Business Technology Essentials

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Preface

Why craft a book on business technology essentials? I (your author) have a lot of years of business technology job experience, and I have taught at a couple of community colleges. Over time I have experienced changes in the emphasis on business technology at college. It used to be an integral part of basic business courses at the college level; however, in the past few years, an assumption seems to have been that because people use smartphones, they are skilled in workplace computing skills. That because people engage on social media and visit aggregated news sources, they are accessing accurate and unbiased information and thinking critically with it. That because there are so many lifestyle-related apps, people are prepared with academic and workplace self and time management skills. And, most recently, that because people engage with generative AI chatbots and workflow steps, they are fully informed and trained in specific

skills that require good writing, communication, and information integrity.

Yet I and other instructors encounter waves of learners who don't have basic keyboarding or productivity application experience, or an ability to discern accurate and unbiased information, or work-ready communication and time management skills, or the ability to present their own ideas and conclusions without generating them through an generated AI conversation content. There are likely a number of reasons for this; one tends to be the sheer amount of information being thrown at us, and not necessarily enough organized and guided pathways to access, sort, and manage it in academic / training settings.

So, therefore this book has come to exist. **Business Technology Essentials** provides a survey of computing and digital coverage and skills necessary to engage in academic settings and in the work market. This includes a survey of practical computing skills; coverage about digital citizenship; application practice in utility and productivity programs; and overviews on

various business technology-related issues like privacy, security, workplace preparation, etc.

This book is not an exhaustive reference manual, and much of the coverage is about the high points and fairly generalized. Technology and digital citizenship changes too fast and too much for static text and specific examples to be useful for very long. This book will not be able to list every permutation or version of everything, or every insight, or every piece of hardware or system tool. A learner or instructor will always find something that has been left out or become current in the moment. The author is not a generative AI bot, and can't aggregate and interpret every piece of available information on the whole Internet.

Instead, this book is designed to prompt discussions of main points to help instructors and learners have a starting point for debates, reviews of current needs and topics, and practices of workplace computing skills. It will have only a few specific references to information sources and tools, as a nod to what seems to be currently long-term reliable

sourcing and access (like US Government data sites).

However, it is recognized and expected that instructors will tailor the overview aspects of this textbook with needed actual in-the-classroom examples they research as part of their own curriculum-building. Instructors may choose to change the order in which the information in this book is currently presented, based on the length of their course offering and/or the needs of the topic(s) at hand. They will make their own videos, and look for additional current demo videos, tutorial links, and other study aids like LinkedIn Learning and free open-learning academies, workshops, and student-learning tools. Great examples and issues can be discovered in educator publications and professional development groups. Self-study learners can use their preferred search engine and unbiased information-finding tools to look for relevant examples (especially after covering the chapter on Communications Media Accuracy). Worker Retraining advisors can suggest avenues for learners to pursue in workshops and practices.

This book attempts to focus on analyzing and solving business-related problems in efficient ways; they are not the only ways. Learners can approach the objectives with detailed steps in the "Try Me Activity", and try things out in the "Quick Task" options. Learners should be challenged to use critical thinking to solve real world scenarios, because what is all this for if not to help enhance one's education and workplace future?

This book also attempts to have a personal feel and occasionally some quirks in humor. Who wants to be totally bored and pedantic, anyway?

Suitable Learners

This book can be used by:

- Adult Basic Education (ABE) learners.
- I-Best business and technology programs.
- Worker retraining programs at colleges and employment service centers.
- Learners at community colleges, training

programs, and high schools.

- Professionals as a quick review of business technology information and skills.
- Self-study learners.
- Anyone else with an interest in the covered topics.

Introduction: Using this Book as a Course

How to access this book

This textbook is available in the following formats:

- **HTML.** An HTML file can be opened in a browser. It has very little style so it doesn't look very nice, but some people might find it useful.
- **Mobile.** If you want to read this textbook on your phone or tablet offline, you can use the EPUB (eReader) or MOBI (Kindle) files.
- **Online webbook.** You can read this book online on a computer or mobile device in one of the following browsers: Chrome, Firefox, Opera, Edge, and Safari.

- **PDF.** You can download this book as a PDF to read on a computer (Digital PDF) or print it out (Print PDF). **Note**: if you choose to have this book printed out in PDF format for your own study use, I am fine with this, and you should let your printer know this approval is part of the Open Educational Resource (OER) nature of this publication.

You can access the online webbook and download any of the formats for free **on Pressbooks.** To download the book in a different format, look for the "Download this book" drop-down menu and select the file type you want.

To access a shared CANVAS course module of the textbook link with the downloadable *StudentDataFiles.zip,* you will need to visit CreativeCommons: look for **BTEText/Business Technology Essentials Welcome**.

How to use different formats:

Format	Internet required?	Device	Required apps	Features	Screen reader compatible
Online webbook	Yes	Computer, tablet, phone	An internet browser (Chrome, Firefox, Edge, or Safari)	Option to enlarge text and compatible with browser text-to-speech tools.	Yes
PDF	No	Computer, print copy	Adobe Reader	Ability to zoom in, highlight, and annotate the text.	*Unsure*
EPUB and MOBI	No	Computer, tablet, phone	Kindle app (MOBI) or eReader app (EPUB)	Option to enlarge text, change font style, size, and colour.	*Unsure*
HTML	No	Computer, tablet, phone	An internet browser (Chrome, Firefox, Edge, or Safari)	Option to enlarge text and compatible with browser text-to-speech tools.	Yes

MedAttrib: author-generated. Textbook format options and features.

Tips for Using This Textbook

Annotate the textbook: If you like to highlight or write on your textbooks, you can do that by getting a print copy, using the Digital PDF in Adobe Reader.

Navigate the textbook: This textbook has a table of contents to help you navigate through the book more easily. If using the online webbook, you can find the full table of contents on the book's homepage or by selecting "Contents" from the top menu when you are in a chapter.

Search the textbook: If using the online webbook, you can use the search bar in the top right corner to search the entire book for a key

word or phrase. To search a specific chapter, open that chapter and use your browser's search feature by hitting **[CTRL] + [F]** (PC) or **[CMD] + [F]** (Mac).

The **[CTRL] + [F]** and **[CMD] + [F]** keys will also allow you to search a PDF, HTML, EPUB, and MOBI files if you are reading them on a computer.

If using an eBook app to read this textbook, the app should have a built-in search tool.

Key Features

As an aid to learners, the book provides some useful features:

- Callouts on specific tips and keybind shortcuts.
- Clear and easy-to-understand written format and style.
- Clear step-by-step instructions* for in-chapter activities.

* Instructions are designed for book learners.

They are meant to be used independently of any classroom instructions. Learners who use this book within a course provided by an instructor may be asked to save their student data files, their working files, and their resources in *different* places than the book instructs, and that is okay. They may also be asked to *rename* their working files per their instructor's requirements, which is also okay. *It is up to the learner to differentiate* between what the solo-study instructions are and what their course instructor – if any – requires *instead*.

Doing the Work

This Open Education Resources (OER) book can be used as a stand-alone overview, for general practice, and/or for a course that teaches introductory-to-intermediate business technology information and productivity applications' basics. This book includes:

- Data files (Word .docx, Excel .xlsx, PowerPoint.pptx, and image files for

students to work with)

- Examples for learners to try out (*Try Me activities*)

However, this book does **not** currently include starter or finished assignments, or videos resource links, or other personalized/in-the-moment resources. Instructors will likely create, have and/or access full assignment content, steps, previews, and example finished product documents. A later edition may include a few generalized assignments; this first edition will not.

- Alternately, learners can access demos on productivity tool exercises, and other training demos/tutorials, on the web. Sources can include LinkedIn Learning, free online learning academies, free Microsoft and Apple resources and tutorials, etc.

For following/trying out in-book demos, it is recommended that you take the following steps to prepare yourself for exploring **Business**

**Technology Essentials**, and for going through the content in this book.

ACTION: Preparation steps for using this content

If your instructor uses this textbook and has their own file naming/saving standards, then use that. Otherwise, on your own computer, in a location you can easily find, **create** a file directory called **BUSTECH ESSENTIALS**.

- In this directory, create 3 (three) folders: Examples, Images, DataFiles.
- Use the **Examples** folder to save your explorations, activities, and assessments in this book – unless a specific course instructor gives you different directions.
- Use the **Images** folder for any images you choose to use in your work, any screenshots you take as you learn, and notes of image attributions.
- Use the **DataFiles** folder for any files you download to use while working with this book. You want to keep only the *Original*

downloaded files here, so that you can reuse them when you rename/save a copy to your *Examples* folder.

- IN the Examples folder, you should also create subfolders: **MS Word, MS_Excel**, and **MS_PowerPoint**. In those folders, you will want to save a copy of Word, Excel, and PowerPoint data files to work on.
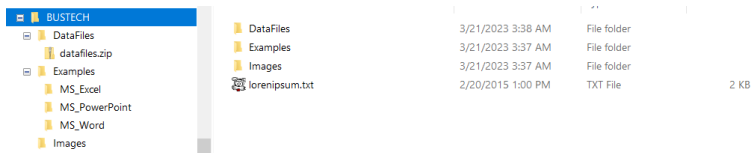
MedAttrib: author-generated. Recommended learner file directory organization.

- Download the data files Zip file and save it into your new DataFiles folder.
- Extract the data files from the Zip file and also save them in the same DataFiles folder.

TIP: Zip files. You can use the free 7-Zip, PEAZip, or file applications, which should work for all computer types (PC, Mac, Linux).

Regularly **SAVE** your practice work and your assignments in your Examples folder (unless you have an instructor who has other instructions). Saving regularly is one of the most useful and time/aggravation-saving things you can do for yourself.

Part 1: Business Technology Tools

In this section, we'll have an overview of **business technology**: what it is, computing essentials, practical utilities use, and managing information skills. This will help place us in the current state of technology in business – in academic settings and in the workforce.

We won't be able to cover every single thing; there is just too much information. The scope is a focus on general preparation for the workplace, and the various aspects of computing and digital technology that impact us in school/training and in jobs.

Some of the information will be an overview of concepts so we can understand computing tools and their place in our training and work lives. Some will be an exposure to issues we face in the business technology-related situations. Some will be practical skills-building activities. Most are starting points.

Chapter 1: Overview of Business Technology

What We'll Cover >>>

- What is Business Technology?
- Information Technology
- Business Technology Usage
- Computer Systems
- Productivity Tools
- Advantages of Business Technology
- Challenges of Business Technology
- Business Technology in Education
- Business Technology in the Workplace
- Business Technology-related Work

What is Business Technology?

Technology is integrated in everything we do: television, music, education, work, play, communication, etc. It is in hardware, software, systems, processes, and output.

Business technology, specifically, refers to the technologies and systems that help employees accomplish activities. It is related to use in school and the workplace, and includes computers and their peripherals, software and utility programs, and systems/use of the Internet. It is also the output that we use in our interactions with businesses, like when we shop, have an online visit with our doctor, do our banking online, and even the effects of our time on social media as it can relate to how our workplace/employers can respond to us. Business technology is about all the uses that make finding and getting a job, getting the work done, and providing results for stakeholders like customers, vendors, shippers, colleagues, and students.

Information Technology

Information Technology is a broader reference to technology in general: the use of hardware, software, services, and supporting infrastructure in any context to communicate, transfer data and process information. It refers to technology Like software engineering, programming, robotics, artificial intelligence (AI) and deep learning, applications development, hardware production, communications systems, the Internet, and more.

Business technology narrows information technology down (somewhat) to workplace-related activities. It is the management and utilization of information technology focused in reference to accomplishing business-related work.

Business Technology Usage

Business technology computing and processes include:

- Communication tools (smartphones, digital media, social media, generative AI).
- Data management (backup, storage, delivery, search and pulls).
- Enterprise systems (company-wide equipment and information management).
- Information and hardware security.
- Information management (databases, data dashboards).
- Marketing and sales processes (emails, websites, customer data).
- Productivity applications (word processing, accounting, presentations, design, image work, project management, calendaring, emails, online meetings).
- Relationship management (customers, employees, students, patients, vendors).
- Workplace collaboration (conferencing, shared documents, online timesheets, workplace trainings).

Businesses use technology in many ways, including:

- **Communication**: Employees,

management, vendors, and related colleagues can meet, coordinate activities, manage projects, work remotely, and report results through phones, emails, texting, shared documents, generative AI workflows, and tech-assisted online and hybrid meetings.

- **Data storage**: Data is the backbone of any company's functions, and can include all employee-related, customer-related, infrastructure and equipment-related, and research/work-product-related data. It has to be sorted, tracked, evaluated, used, revised, shared, and protected at all stages of work.
- **Hiring**: Businesses can research work-related laws, look for talent, post job listings, and do hiring-related communications.
- **Human Resources and Payroll**: Specialized software and scheduled payroll applications can communicate with employees about benefits, trainings, and annual evaluations. It can manage salaries and deductions during pay periods, provide annual tax preparation

documents, and evaluate staff costs and performance.

- **Inventory management**: Inventory and orders can be organized, stored, fulfilled, tracked, and shipped through the use of databases, spreadsheets, and dashboards. Applications can include reminders for ordering, alerts for shortages, and supply-chain relationships.
- **Networked devices and printers**: Computers and equipment work within a network, connecting to each other and through the internet. Networks can be within a single office space, across several workplace floors, between several workplace locations, and regional or worldwide for accessing information and storage. Networked equipment allows employees to share information and processes, like emails, conferences, research and analysis, records, and work products.
- **Relationships**: Businesses can manage customer relationships through finding leads, profiling, tracking, using complex contact databases, advertising, & offering

discounts and inducements.

- **Security**: Various tools and processes can help with the protection and monitoring of equipment, infrastructure, information, and work products in the workplace to present disruption, disclosure, and destruction. Security measures like surveillance and alert systems can prevent unauthorized usage, incorrect handling, stealing of proprietary work product, breach of confidential employee and customer records, and reveals of financial activities.
- **Training**: School and workplaces trainings can happen synchronously inside a face-to-face classroom, asynchronously through online learning management tools and digital course materials, and in flex-hybrid forms using elements of both.
- **Work activities**: Work can be assigned, monitored, and evaluated. Project management can use shared scheduling and flow-charting of goals and activities. Employees can meet online and by phone, can work on documents in real time, can share work output in secure repositories

for access, and can evaluate customer activity. Employers can check for employee quality, communication, and integrity practices.

Computer Systems

Computer systems allow business functions through equipment that supports software use, data storage, work production, information retrieval, activities coordination, and a virtual 'desk' for work activities. *Examples include*:

- Communication and collaboration tools for employee and vendor coordination.
- Computing hardware and peripheral devices.
- Computer programs for creating and managing work product.
- Networking equipment for sharing information and processes.
- Software and applications for doing business functions in every department, like accounting, human resources, inventory, research/development, etc.

Productivity Tools

Computing productivity tools support employees so they can accomplish work tasks that provide products and services to customers. Productivity programs let employees manage documentation' schedule work activities; store and organize information; report and deliver output, connect with vendors, customers, and each other; and manage work obligations between them and the employer. Tools can include software applications in:

- Communications (like phones, emails, meeting supports).
- Databases (for warehousing, organizing, querying, and reporting big data).
- Graphics and layout (like image editors and layout programs).
- Presentations (like slideshows, videos, audio recordings, scenario animations).
- Research interfaces (like Internet browsers and reference managers).
- Spreadsheets (for accounting, calculations, charts and graphs).

- Storage and retrieval (like preserving and organizing work product information and intelligence).
- Word processing (for communications and reports).

Advantages of Technology

Technology speeds up our ability to manage vast amounts of information and processes needed for getting work done. While the workplace has not gone paperless (despite goals before the turn of the 21st century), our ability to acquire and use our information is much more streamlined and accessible than when paper flow and files was the norm. Likely today's generation isn't even aware of what we call 'analog' systems of work tools and paperwork-based information handling.

Technology provides many advantages:

- Ability to immediately evaluate and modify activities and processes .
- Access to multiple forms of media and

platforms for accomplishing work.

- Automated activities that take many routine activities out of employee hands, like direct deposit of pay.
- Continuous improvement and less waste in manufacturing techniques.
- Convenience of working with small, light, speedy, and powerful computing tools.
- Coordinated scheduling and work handling across offices and regions.
- Improved and synchronous communication methods even at great distances.
- Layers of security that can protect employee and customer information, research and development, financial access, and system faults.
- Multiple threads of marketing, sales, and customer connection activities.
- Prompt services like financials, order fulfillment, customer care, and employee needs.
- Aggregating and searching information and trends used for law enforcement and military organizations.
- Quick synchronizing and transferring of

information.

- Real-time access to information for research, sales, customer retention, etc.
- Use of tools that allow for mobile and at-home workplaces.

Challenges of Business Technology

Business technology is not without challenges and risks. These can include:

- Constant required systems for updating and fixing of technology problems.
- Costs in keeping up on tools and applications.
- Fractured communications skills related to less one-on-one connection.
- Increased dependency on technology and networking access.
- Loss of boundaries of the 'workplace' as work activities use constant emails, anytime online meetings, and mobile/at-home work locations.
- Loss of power or networking which can

stop business work.
- Merging and replacement of job activities that risk job availability.
- Ongoing need for training, upskilling, and job searching
- Ongoing security risks in relation to confidentiality, data, fraud, and cybercrime.
- Loss of a sense of privacy when data is captured and sold as part of business.
- Technology-related exhaustion and health issues.

Business Technology in Education

Education is a key area in which business technology is prevalent. The entirety of managing schools – the students, faculty, staff, equipment, learning materials, relationships with parents, and legal requirements – is reliant on business technology tools and processes.

For instance, schools use one or more learning management and enhancement tools, like

course management systems, learning providers, library information systems, and all the usual workplace processes that manage employees, resources and finances. Schools have to manage enrollment and retention, curriculum and class sizes, employee management, assignments evaluations, and reporting for student transcripts and transfers. This includes the need for:

- Assignment and grading platforms.
- Communication tools.
- Communications (students, instructors, parents, education vendors).
- Computers and technology equipment.
- Funding and financial management applications.
- Learning information repositories (videos, audio, books, cloud-based, resource links, demos and tutorials, OER, learning modules, coordinated 'visits' and field trips through digital means).
- Networking.
- Teaching and student engagement aids (online texts, engagement tools, presentation equipment).

- Virtual classroom needs.

Business Technology in the Workplace

Business technology affects most aspects of the workplace. Behind-the-scenes and upfront needs are in hardware, software-enhanced access to information, and tools that allow businesses and members of the workforce to do work to provide products and services.

Even low-tech workplaces are affected in several ways, including retail stores, food service, trades work like automotive or construction, and government functions like the US National Park Service or Washington State Ferry system. Business technology impacts looking for jobs, applying for them, interview preparation, hiring practices, on-the-job training, employee management, information controls, payroll and accounting, legal and regulatory needs, and tracking/delivering work product. The same goes for whether the workplace is in urban or rural

settings, in big population centers or smaller municipalities. In public, private, nonprofit, or small business sectors, various functions are performed and/or impacted by business technology tools. One way or another, some aspect of the workplace is affected by:

- Business processes
- Customer interfacing
- Operational activities
- Product management

Business Technology-related Work

Is business technology itself a job? Yes and no. One of your best resources (in the United States) for looking at current needs, expectations, salaries, and prevalence of business technology-related work is in the U.S. Bureau of Labor Statistics' *Occupational Outlook Handbook*.

In many jobs, much of one's workload is impacted by and actually uses business

technology tools and means. For instance, in automotive work, computing tools are needed for diagnostics of current vehicle models and parts. In the Department of Motor vehicles, data on licenses, vehicles, and driver records require business technology tools. Driving companies like those that manage trucking, limos, taxis, mass transit, and Uber-like services need customer-facing contact information and tracking of ratings, safety, completed jobs, etc. Law enforcement needs business technology to manage vehicular-related accidents and crime investigation. The insurance industry provides recompense for repairing and replacing vehicles; vehicle sales have to manage pricing, maintenance and ownership information, and regulation practices. Healthcare has to manage patient-facing care needs for vehicle-related accidents and malfunctions.

There are also a lot of business technology-related jobs, which fall into various areas dealing with hardware, software, processes, data, and research & development. Many require or recommend some kind(s) of

certification. Positions can include (*not an exhaustive lis*t):

- Business Technology management
- Data Analysts
- Digital and Technology Coordinators
- IT Specialties
- Networking systems
- Robotics and AI
- Software Developers
- UX and UI design

Business technology at a more general level – office and administrative support – has now a number of expected and integrated tasks and is not necessarily listed as a business technology "job." However, training and experience in business productivity programs for document processing, spreadsheets, presentations, graphics, web editing, communications coordinating, and other administrative assistant-level work is also part of business technology.

Business Technology as an

Education Major

Various colleges offer training, certificate, and degree programs in business technology-related work. An umbrella one would be called a variant of something like *Business Applications Technology* and might range in training in basic computing and digital systems, productivity and business software, data management and analysis, programming, and so on.

More specific business technology-related programs can focus on specific aspects of computing and digital technology with a business aim. There are many. Search engine results show these can include certificates and degrees titled like:

- Business Intelligence and Analytics
- Business and Information Systems
- Computer Information Systems
- Computer Networking and Systems
- Computer Programming
- Cyber Security
- Health Information Management

- Information Technology and Support
- IT Management
- Technical Systems Management

ACTION: Quick Task

Assuming you are currently in school, list 5 (five) business technology computing processes that you consider directly affect you as a student. *If you are instead self-studying and have a workplace, answer for that.*

ACTION: Quick Task

In your own life, what aspect of business technology from the list below do you think affects you **personally** the most, and why? *There is no right or wrong answer.*

- Communications technology
- Computing hardware
- Computing software
- Customer-related data (financial, or health, or job-related)

- Information access and security

Think of for very favorite eatery/restaurant. What are 5 (five) aspects of business technology that you think they must need to work with so they can best serve you?

Chapter 2: Computers

- Types of Computers
- Mobile vs. Computer
- Computing Timeline
- Computer Hardware
- Computer Drives
- Computer Software
- Operating Systems
- MS Windows
- Basic Computer Processing
- Software Updates and Patches

In this chapter, we'll check out a bunch of computing-related tools. Like anything in technology, this isn't and can't be exhaustive, and can be replicated/updated by search engine queries. Yet, this should give you a useful overview you can use in your own further research, study, and practical computer-related

skills. It will cover some history and mention some systems that have become obsolete as they were before evolving into current technology. Still, it is worth reviewing so you can get a sense of 'place' in computing tools.

Types of Computers

Computers these days keep getting smaller, lighter, more powerful, and sometimes 'hotter' in temperature due to how much is packed into them. They were not always small, and back in the day (eons ago when your author was a kid) they could take up huge rooms.

Mainframe computers

Mainframe computer: a high-performance computer used for large-scale information processing and transaction processing tasks, in the thousands of transactions per second. They are primarily used in and for:

- Academics
- E-business/E-commerce
- Enterprise resource planning
- Financial institutions
- Government (census, occupations)
- Health care
- Insurance agencies
- Libraries
- Research
- Statistics

Servers

A server is a primary computer that provides information to other computers that are networked to it. They can be on personal computers or in an organization's server space. They can also be a mid-range computer that is intermediate in size, power, speed, storage capacity, etc. Examples include:

- Email processing and managing on the Internet.
- File servers for information and data storage in the workplace.

- Hosting websites.
- Managing student and education resources at a college.
- Providing patient data and billing in hospitals.
- Space and tools for computer gaming.

Supercomputer: A supercomputer used to be huge, and could process massive amounts of data and do a great amount of computation very quickly. They still exist and have changed form into chains of computers and networking tools. Supercomputers are used for systems, computations, and very large database/information storage related to:

- Aerospace
- Climatology
- Defense
- Education
- Engineering
- Financial sector
- Government
- Petroleum/fuels
- Science and Research

Personal computers

A personal computer (PC) is a small computer designed for use by a single user at a time. A PC simply refers to a personal computer, even if it is considered to be a Windows machine, a Mac, a Linux machine. It used to be called a microcomputer, and now but it can refer to any kind of small computer, like a desktop unit, laptop, smartphone, tablet, and wearable. It uses a chip (microprocessor) for its central processing unit (CPU).

Types of personal computers

- **Desktop unit**: Designed to stay at one location and fits on or under a desk. It generally uses 'peripheral' units for input and output of information, like a keyboard, screen monitor, and a system unit "tower" which houses the computing hardware elements.
- **Laptop/notebook**: A portable personal computer. It can rest on a user's lap, a café table, an airplane's tray, a school desk, or a meeting room conference table. It can be

powered when plugged in or by a battery during travel. It includes a screen and a keyboard with a touchpad, plus wireless peripheral capabilities.

- **Smartphone**: A mobile phone unit that integrates additional computing technology for "light" programs (apps designed for speed and small size) that can appear on a personal computer and various small apps that can aid in communication, productivity, fun, collaborating, etc.
- **Tablet**: A wireless touchscreen PC that is smaller and weighs less than the average laptop. It can be paperback book size up to the dimensions of a sheet of paper, and can be easily mobile in a backpack or briefcase.
- **Wearable**: These can include mini computers like music players, fitness units, health and sleep regulators, enhanced watches that track navigation, and virtual eyeglasses that show a computer interface.

Legacy systems

Technically not a "type" of computer, but an ongoing usage challenge. A legacy system is outdated computing hardware – mainframe, supercomputer, personal computer. Also outdated use of computing software, like an older operating system, proprietary database and information retention applications, and processing programs. It sends to still be in use because the system still meets the needs for which it was originally designed. The challenge is that it isn't scalable or allow for growth or more than cosmetic improvements. A legacy system replacement is the necessary (and usually very costly) solution.

Mobile vs. Computer

Currently, you can find information through a search engine about how mobile/smartphones are a leading technology for people to access information, stay connected, check email, fill out job applications, organize time and

commitments, have quick online meetings, and generally fun and entertaining use. You can shop for groceries, order tickets, take pictures at your own car accident, plan alternative routes on a trip, check for open hours at an attraction, update friends on social media, etc. You can also touch up homework and submit files online, get quick information before a meeting, look at a quick cooking video, confirm instructions, and the list goes on.

For many people, particularly those with lower income and/or low access to home computers, the smartphone has become an affordable and easier-to-get tool for so many online-related and necessary daily functions. Many students – particularly in low-Wi-Fi connected rural areas, lower income regions, mobile life circumstances, and areas with limited library/ community center access – only have reliable access to information and services on their smartphone. A lot of college learners come from high school with limited computer experience but a lot of smartphone skills and use.

For the purposes of this book, however, we will

not focus on or do direct support of smartphones. **Why?**

Mobile devices, like smartphones and tablets, may use different operating systems than computers. Computer and mobile operating systems are different because they are developed for different uses and attention needs. Computer systems will have to store lots of complex data, have a different user interface, and be prepared for printing, removable disks, a mouse, keyboard, and an expectation of some quality time and attention for the workload. They feature a desktop screen space and a Control Panel for users to manage all of their information. Computer operating systems have been around longer, and therefore are more familiar.

Mobile devices don't feature a desktop in the same way as a full PC computer for school and office use. Their user interface is much more about simple moves, things you can do with your fingers or voice, a small viewing space, and limited time/space for attention span (think 'on the move'). While you can make a mobile phone do almost anything – for deeper

learning of programs, output writing and preparation of complex assignments, and using multiple integrated tools in finding solutions – the question is "should we"? As time and technology continue to speed up and as apps are created for everything under the sun, many would say yes. In workplaces where complex work needs human interaction, comprehension, and massive amounts of data space, the answer is still – more often than not – likely to be no. Cell phones may a support, not a main work processing tool for many workplaces, and they are often still perceived as attention-grabbing distractions and potential wi-fi security threats.

In addition, just as an addendum, the use of phones keeps us 'always on'. Since there are apps for everything, and since the whole experience of the smartphone is about stimulation and quick response, we may be having more trouble keeping needed attention span, attention to detail, and slowing down needed for complex and multi-part work activities. One only need search the web for plenty of references to overworked, overstressed, and under detail-oriented

employees. Distracted employees. Employees who use personal phones for personal use at any time of the day, game while on the job, who grab information quickly without actually attributing or reflecting on it, and so on. The mobile phone is a compact workstation, camera, gaming console, a camera, e-book reader, a notebook, music collection, movie viewer, a map and compass, and authenticator. It is connection to healthcare, events, kids' daycare, school assignments, rides to locations, etc.

If you've got work activities that need complete focus and minimal interruptions, then is your smartphone really the best way to do it? Is it the most professional way for all meetings, when the signal is so often intermittent/interrupted, and your conferencing goes down? Is it the healthiest way – for your eyes, for your attention span, for your stress levels, for your posture while keyboarding and document creation and distribution? Can you reliably do graphic design campaign work, a Master's thesis project, construction CAD drawing, give in-person tours, complete sorts and filters of massive amounts of information, and so on?

And, will all workplaces allow the use of your personal smartphone – or limit it so that you can focus on your work and the employment environment instead of your personal life? Or, will workplaces provide you with smartphones, and an expectation that you will somehow be available and working in some way 24/7, with no real privacy and protections?

Lots of good questions. Only time will tell, especially if future technology visualization and input tools for smartphones – and processing power/Cloud interface – all mesh up. Wouldn't it be great if we could actually project a touch keyboard and stable large viewscreen from a wristwatch so we could always be mobile and have access to really great viewability and processes? Humans are inventive and resourceful. However, for the purposes of **this** textbook, we will not focus much more on the smartphone – other than as an as-needed reference or example. This course will focus on primary PC desktop / laptop / and some general tablet tools, and the things that support them in our education and work places.

Computing Timeline

- **1936**: first programmable computer, which could carry out a finite set of arithmetic or logical operations.
- **1947/48**: The transistor is a semiconductor device used to amplify and switch electronic signals and electrical power on and off.
- **1952**: IBM programmed the first self learning computer to play checkers. The FORTRAN scientific programming language was developed in 1957.
- **1958**: The integrated circuit, a set of electronic circuits on one "chip" of semiconductor material. *Sort of like a biological Brain Neuron – a cell and the transmitting dendrites (say in the brain).*
- **1960s**: Central processing unit (CPU), which is hardware within a computer that carries out the instructions of a computer program ;by performing the basic arithmetical, logical, and input/output operations of the system. *Sort of like the Human Brain's Cerebrum.*
- **1964**: IBM created the first computer

system family for commercial and scientific use.

- **1971**: Computer microprocessor, which incorporates the functions of a computer on a single or several integrated circuits/chips.
- **1974/75**: First consumer computer (Apple 1in 1976, TRS-80 in 1977).
- **1981**: The IBM PC – home computer was introduced, leading later to the Commodore 64 in 1982, Macintosh OS in 1984, and the Windows 1.0 on the IBM compatible computers in 1985).
- **1989**: Creation of the World Wide Web.
- **1992**: First smartphone was created.
- **2000**: First USB Flash Drive.
- **2016**: Sophia The Robot Is Created
- **2016**: First Reprogrammable Quantum Computer

Computer Hardware

Now we go back to desk/table-related computing, whether in the office, at home, in a café, or on a plane.

Computer hardware includes any physical device or equipment used in or with a computer system (anything you can see, hear, and touch). This includes what is physically inside the computer and what it physically links to for input of information and output of results.

Internal hardware: Devices or components that are located inside the computer. *Examples include* the case, CPU, hard disk drive, ROM, RAM, Bios, etc.

- **Battery**: A device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy.
- **Cables**: Allow connecting devices to a computer.
- **Cards** (video, audio): An expansion card (printed circuit board) that can be inserted into an electrical connector or expansion slot on a computer motherboard to add functionality to a computer system.
- **Central Processing Unit** (CPU): The hardware within a computer that carries out the instructions of a computer

program by performing the basic arithmetical, logical, and input/output operations of the system.

- **Fan**(s): Used for active cooling of computer components; draw cooler air into the case from the outside, expel warm air from inside, move air across a heat sink to cool a particular component. etc.
- **Graphic Processing Unit (GPU):** Motherboard: The main printed circuit board (PCB) found in computers and other expandable systems; it holds many of the electronic components of the system and provides connectors for other peripherals.
- **Integrated Circuit**: A set of electronic circuits on one small plate ("chip") of semiconductor material, normally silicon. CPU, RAM, etc.
- **Memory controller circuit**: A digital circuit which manages the flow of data going to and from the main memory – RAM.
- **Modems** (internal, radio/Wi-Fi, broadband/ DSL): A device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted

information. For networking.

- **Motherboard**: The main printed circuit board (PCB) found in computers and other expandable systems; it holds many of the electronic components of the system and provides connectors for other peripherals.
- **RAM**: Allows stored data to be accessed directly in any random order; serves as temporary storage and working space for the operating system and applications.
- **ROM**: Hard-wired, non-volatile memory; use for data storage and storage of computer programs.

MedAttrib: tutorialsmate.com ©2023. Parts of a desktop computer.

External hardware: Devices (peripherals that are located outside the computer).

- **Input device**: a piece of hardware device which is used to enter information to a computer for processing. Examples: keyboard, mouse, trackpad (or touchpad), touchscreen, joystick, microphone, light pen, and webcam.
- **Output device**: a piece of hardware device that receives information from a computer. Examples: monitor, printer, scanner, speaker, display screen (tablet, smartphone ...), projector, head phone, etc.

Peripherals include:

- **Keyboard**: an input device (the set of typewriter-like keys) that allows a user to enter characters (letters, numbers, symbols, etc.) into a computer.
- **Mouse**: a hand-held pointing device that can control the position of a cursor (pointer) on a display screen.
- **Printer**: an output device linked to a computer. It transfers the information

(text, images, etc.) to paper.

- **Screen monitor**: a display screen used to display information (text, image, video, etc.) processed by a computer.
- **Trackpad** (or touchpad): a small flat surface on a laptop or other computer that does the same things as a mouse (a trackpad is a built-in mouse).
- **USB drive**: a small portable storage device used to store or transfer data for computers. It is often used for storage, data backup, and transfer of computer files. USB stands for Universal Serial Bus. Other common names for a USB drive: flash drive, USB stick, pen drive, thumb drive, etc.

Memory

Computers have categories of memory for storing data:

- **Non-volatile Memory**: This is what a hard disk drive, a USB flash drive and ROM provide. It is memory that remains when a

computer is rebooted, turned off for the
night, and when a used hard disk is moved
from one machine into another.

- **Volatile memory**: Memory that loses its
contents when the computer or hardware
device is switched off. This is what RAM is.
It exists to assist in processing power, and
also to hold temporary information for
user action – like the clipboard that holds
copied or cut text/images to be pasted
elsewhere.

Computer Drives

As noted above, the computer hard disk drive
(HDD) is the main data storage device that
stores and retrieves information, data, files,
programs, etc., from a disk. There can be more
than one type of drive on a computer.

Types of Computer Drives

Disk drive (location): A computer device that

stores and retrieves information, data, files, programs, etc., from a disk. The drive is often referred to by its letter (your drive letter may differ). There can be more than one drive on a computer.

- **Hard disk drive** (HDD) is the physical hard / fixed disk. It can be interface with the computer with different connecting parts between the computer and the hard drive that use moving parts and magnetism. This is where the name SATA, PATAm SCSI, or NVMe variants come from. The HDD is usually designated as the "C: drive." However, it can be 'partitioned':
- A partition is a logical coded division of a hard disk that is treated as a separate unit by operating systems (OSes) and file systems. Each partition behaves and stores information as if it were a separate hard drive. Therefore a computer might have a "C" drive and a "D" drive although both are physically the same HDD unit.
- **Network drive:** Allows users to instantly grant access to shared files from one computer to another. It is usually

designated as the "U: or Z: drive."

- **Optical disk drive** (ODD): Allows you to use CDs, DVDs, and Blu-ray discs for music, movies, and entertainments. If the drive is writable too, you can create your own music CDs and video DVDs, and create of back-up copy of your important data files. CD/DVD drive is a is usually designated as the "D: or G: drive."
- **Solid State drive** (SSD): they don't consist of moving parts, and they don't use magnetism for storing data. They tend to transfer data faster than HDD drives and allow faster boot times.
- **Universal Serial Bus (USB) flash drive**: A removable drive that can be inserted into a USB port, and provides a certain amount of storage space. It is often designated as the "E:, H:, or K: drive."

Computer Bit Types

- *Bit systems*: The bit system of a computer is based on the capacity of external buses, as well as a computer's chipset and

motherboard limitations. The bit-size is based on the bus size even if they have some higher bit internal capabilities.

- *8-bit computer*: CPUs that can access 8 bits of data in a single machine instruction, or the number of bits used to represent memory addresses.
- *16-bit computer*: CPUs that can access 16 bits of data, like those in early x86 computers in the 80s, and Motorola 68000 Mac models.
- *32-bit computer*: CPUs that can access 32 bits of data, like those in later x86, **Pentium computers and through Windows XP**, and the Motorola 68020 and later Macs.
- *64-bit computer*: CPUs that can access 64 bits of data, like those in **Vista and later Windows OS computers, and Mac OS X 10.5 and later**.
- Higher bit computers are backwards compatible in use. Their operating systems and various programs may not be.

Space

A computer has space available for processing and storing data. Back in the day (Jurassic times) the author experienced the wonders of kilobytes, and eventually the incredible space of 100 MB on a zip disk. Wow!

Space (the available room to be processed and used by actual data) is expressed in bytes (and variants). The number of bits of data are combined in a binary computer language that is then translated into the activity that works computing activities. Computer memory and disk space are measured in these units.

Of course, that was ages ago. Space has increased. A lot. Mindboggling amounts.

Memory units

- Bit – core binary unit
- Byte – 8 bits, expression of
- Kilobyte – Approx 1000 bytes
- Megabyte – Approx 1000 kilobytes

- Gigabyte – Approx 1000 megabytes
- Terabyte – Approx 1000 gigabytes

And so on with Petabyte, Exabyte, Zettabyte, Yottabyte. Really BIG amounts of computing storage and usage space.

Don't panic.

Basic computing language

A computer processor contains decisive circuits, each one of which may be either OFF or ON. These two states in terms of memory are represented in a binary code (either/or) called a bit, and represented by a 0 or 1. To count higher than 1 (and communicate data in varying ways), bits are expressed together. A group of eight bits is known as a byte. A byte can have any mix of binary code (0s and 1s) that represent larger numbers and letters.

- If everything Humans need to be translated into computer terms stayed at 0 or 1, nothing would get done.

- The problem is, there is no "binary" number for 2, or 10, or 9999 M&Ms. Argh!!!
- In Decimal counting (0-9), after 9 we add a "1" to the left of the "0" to get 10, and do the same thing as the decimal numbers move up.
- This happens in Binary as well! 0=0, 1=1, 10=2, 11=3, 100=4, 101=5, 110=6, 111=7, etc.

This is my name – LJ Bothell (including the space) – in binary:

- 01001100 01001010 00100000 01000010 01101111 01110100 01101000 01100101 01101100 01101100

Computer Software

Computer software: a set of instructions or programs that tells a computer what to do or how to perform a specific task (computer software operates on hardware).

Main types of software: application software and systems software.

- **Application software**: A computer program that provides users with tools to accomplish a specific task. Examples of program / application software: word processing, spreadsheets, presentation, database management, Internet browsers, email programs, media players, accounting, translation, desktop publishing.
- **System Software**: Designed to operate a computer's hardware and application software, and make the computer system available for use. It serves as the interface between hardware, application software, and the user. It allocates system resources, manages storage space, and provides security.

Main types of systems software: Operating system, device driver, productivity software, utility software. Most other software falls into one of these categories.

Operating system (OS): a software that controls and coordinates the computer hardware devices and processes other software and applications on a computer. It is the main

part of system software, and a computer will not function without it.

- Main functions of an operating system: booting the computer, managing system resources (CPU, memory, storage devices, printer, etc.), managing files, handling input and output, executing and providing services for application software, etc. Examples of operating system: Microsoft Windows, Apple iOS, Android OS, macOS, Linux, etc.

Device driver: a software program that is designed to control a particular hardware device that is attached to a computer. It acts as a translator between the hardware device and operating systems or applications that use it and instructs computer on how to communicate with the device. *Examples include*: printer driver, display driver, USB driver, sound card driver, motherboard driver, ROM driver, etc.

Productivity software: A type of software program that helps users produce work products like documents, databases,

spreadsheets, graphs, visual design projects, and presentations.

Utility software: A type of system software that helps set up, analyze, configure, strengthen, maintain a computer and performs a very specific task (e.g. antivirus software, backup software, memory tester, screen saver, etc.). Additional utility software can also be external to the operating system.

Operating Systems

An operating system (OS) is the interface software that manages a computer's processes and links the computer user to the machine. It manages the computer's memory and processes, as well as all of its software and hardware. It also allows the user to communicate with the computer without knowing how to speak the computer's language. Without an operating system, a computer is useless.

The computer's OS also manages all of the

software and hardware on the computer. Most of the time, there are several different computer programs operating at the same time, and they all need to access your computer's central processing unit (CPU), memory, and storage. The OS coordinates all of this to make sure each program gets what it needs. For instance, a user might be working on a book about business technology, have a browser open for quick reference searches, have a workplace email account open with unread emails, and have some mellow music playing in the background. The OS manages all that and allocates processing speed and RAM to keeping the applications active and functioning.

Operating systems usually come pre-loaded on a computer. It is also possible to upgrade or even change operating systems, such as moving to a more recent version, a business rather than personal version, or from a Windows to a Linux-based OS.

Most operating systems use a graphical user interface, or GUI (pronounced goo-ee). A GUI lets you use your mouse to click icons, buttons,

and menus. Everything is clearly displayed on the screen using a combination of graphics and text. Back in 1985, the author saw the first version of Microsoft Windows, which was a shock and appealing substitute to keying in basic computing commands in DOS.

Standard functions of an OS include:

- **Booting**: The process of turning on the computer and powering up the system.
- **Data security**: Keeping data safe inside the computer and computer programs, by setting up security features that keep unwanted cyberattacks away.
- **Device controlling**: Allowing opened or blocked access to devices like CD/DVDs, data transfer devices, the camera, the microphone, a printer, USB drives, the keyboard, the mouse, etc.
- **Disk management**: Managing all the drives installed in a computer like hard drives, optical disk drives, and flash drives. Disk management can be used to divide disks, format drives, and more.
- **Loading and execution**: Loading, or starting-up, a program and then executing

the program so that it opens and works.
- **Memory management**: Controlling and coordinating the computer applications and allocate space for programs to function.
- **Print control**: Controlling the printers that are connected to the computer, and the settings that are needed to send and accomplish a print job.
- **Process management**: Allocating resources to different processes on the machine, enabling the processes to share information, protect operations, and synchronize activities.
- **User interface**: Allowing a user to enter and receive information. This can be done with typed commands, code, and clicking icons/buttons and menu items.

Common Operating Systems:

- Apple MacOS
- ChromeOS for Chromebooks
- Google Android OS for tablets
- Linux open source based on Unix

- Microsoft Windows
- Ubuntu based on Debian

Microsoft® Windows®

Since Microsoft® Windows® currently holds the majority of the business market share and colleges/schools tend to have PCs and Windows/Microsoft® Office®, we will primarily focus on Microsoft going forward in this textbook. Some MacOS shortcuts and variations will be covered when possible. The overall business technology principles and examples should work regardless of OS version, although the user interfaces will have differences.

Windows 11

Microsoft® Windows® (MS Windows / Windows) is an operating system developed by Microsoft Corporation that works with

traditional desktop and laptop PCs, and with mobile computing devices.

The major tasks of Windows are to:

- Manage the computer's hardware: the printers, scanners, disk drives, monitors, and other hardware attached to it.
- Manage the application software installed on the computer—programs like those in Microsoft® Office® (MS Office) and other programs installed to edit photos and videos, play games, play music, design graphic art projects, so taxes, and so on.
- Manage and store the data generated from application software. Data refers to the documents, worksheets, pictures, songs, and so on that one creates and stores during the day-to-day computer use.
- Provide utility applications to evaluate and manage hardware processing of the computer. For instance, the Task Manager can show what tasks or applications are using the most CPU processing or slowing computer performance. Utilities will be covered in more detail in a later chapter.

The Windows OS is additionally optimized for touchscreen tablets and convertible laptop computers. Windows handles input devices like the mouse, keyboard, touchscreen, and pen stylus.
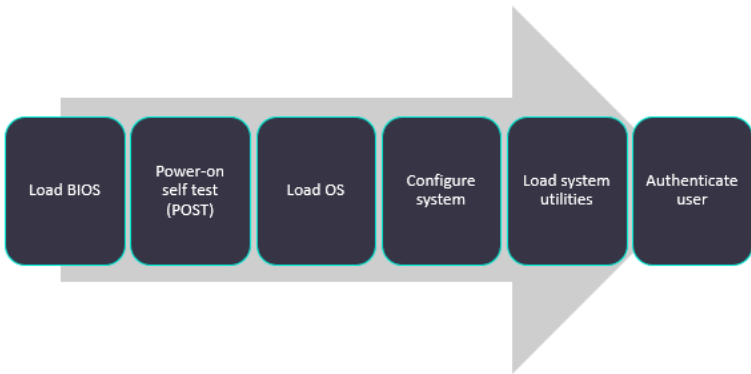
Basic Computer Processing

The process that a computer follows for a user to work with it is fairly simple, though tons of coding, activities, and steps happen in invisible ways.

- **Boot-up**: The computer, when turned on, has to go through a necessary hardware 'wake-up'. This includes accessing the ROM firmware that pushes the computer through the basic steps prior to loading the actual operating system, like hardware settings such as date and time.
- **Loaded software**: Once the OS is fully active, the user can access any of the installed programs and resources for input, output, printing, and all other functionalities.

- **Operating system**: The OS interface opens so that a user can access menus, icons, files, data, computing workspace, and from utilities and applications in the computer. The OS may require a log-in password or PIN depending on the version of the OS.
- **Services**: Various OS-initiated background tasks that process activities such as access to web resources and files, event logging, and error reporting. They work across the computer system, but don't interact with users directly or have a user interface.
- **Start-up activities**: As the OS opens, the computer will also activate several processes and services which guide the computer to access the Internet for handshakes and permissions to use the software. The fewer required startup programs that are enabled, the more efficient the computer processing can be. Important processes – which may or may not show desktop taskbar notifications – include:
- Antivirus / security program
- Audio/sound

- Battery power
- Display settings
- Wi-Fi connection

MedAttrib: author-generated. Computer boot-up process.

Computer Processing order

- Input (based on input devices like the on button, keyboard) requests information from software.
- CPU/microprocessor responds to the input of hard drive space software instructions.
- CPU starts moving active instructions and data to the Main Memory (the computer's

temporary read-write dynamic RAM area) to organize and speed processing, using the Memory Controller. This is a repeating *fetch, decode, execute* process.

- CPU gets help from attached static RAM cache space, which speeds up access to the dynamic RAM.
- CPU starts processing instructions and sending signals, through the buses, to appropriate units like the video, audio, and peripheral cards, then discards/stores finished info/actions as it gets more new info to process.
- Secondary memory (ROM – read only memory – hard drive memory chips, external disks) is where the body of information the computer stores goes for later use.

In Human Terms:

- Alarm clock goes off (the computer on-button).
- Human comes partly awake and aware (Bios, startup of Operating System).

- Human shuts alarm off (Operating System beginning to act and make hardware connections).
- Human smells coffee (new Input).
- Human recognizes smell of coffee (RAM activity) and considers taking action (Processing).
- Human sits up (Output).
- Human heads to coffee (more Output, also partly based on ROM info in brain storage as to where coffee is and what it does).

Computer Interpretation

Computers do not speak human. They do not actually recognize the meaning of data at all. Computers just respond to electrical impulses, which is their Primer.

Computers handle 2 decisions: **Do Act or Don' Act**, Yes or No, On or Off, etc.

- Are there M&Ms? **Yes or No.**

However, computers need instructions to act if

we want more than just a simple yes or no. This is considered to be an If-Then query.

- If there are M&Ms, then eat some. If there are not M&Ms, then do not eat some.

But, what if you want more options? Let's face it, if everything was just yes and no, even basic processing gets boring and not very helpful. Therefore, we have the If-Then-Else query:

- If there are M&Ms, then eat some. If there are not M&Ms (say they have all been eaten), then (*do something else*) are there Reese's Pieces?
- If there are Reese's Pieces, then eat some. If there are not Reese's Pieces, then don't eat some.

There are several additional decision structures that computers process by, but this gives you a starting point in basic computer logic.

Computer Translation

- Computers do not comprehend or care what M&Ms are. M&Ms and every other request is just dumb input data for a computer and means nothing. The only thing that means something is *Active or Inactive*. But how does a computer take what we input and translate it so that it can process and output a response to our requests?
- Computer applications just manipulate the contents of memory stores with the no/yes decisions. Note that this does **not** mean that the contents of those memory stores have a guarantee of accuracy.

Software Updates and Patches

Software update: A software update can be a combination of new or enhanced OS or software features. These can include additional security protocols, adjustments to a software's user interface, or an improvement in a software

feature. The OS accepts and delivers the updates so that applications can operate efficiently. These can be scheduled or accepted and processed manually by the user.

Software patch: Patches are meant to fix security vulnerabilities, like code or processes in the OS or software could leave a computing device open to remote access, theft of information, malware, etc.

ACTION: Quick Task

With the system properties, examine your own computer – whether it is a laptop, desktop, or tablet. If needed, also search your computer for some of this information. What does it show you about your computer's setup for:

- Graphics card (GPU)
- Installed RAM
- Operating System
- Processor (CPU)
- Size of your primary disk drive
- System Type

Take a screenshot or two if this is an assignment you need to submit, and feel free to white-out any personally confidential information that might show.

ACTION: Quick Task

What 5 (five) most important tasks do you use your cell phone / smart phone for?

ACTION: Scenario

If you needed to purchase a computer in the next couple of weeks, you would want to research what you really need so that you could get one that will serve you for 2-5 years, meet your needs, have lots of space, and operate the highest-level programs that you personally use.

Actions: Choose a computer spec request below, do some research of computer reviews and sales. Then, choose a mid-priced computer that meets your Processing unit, RAM, Graphic Processing Unit, and Disk size needs. If this is an assignment, take a screenshot or two of

what you find and cite the URL of the source information.

- **Option 1**: Gaming computer, for Ram and Graphics intensive games like ARK Survival Evolved, Final Fantasy XV, No Man's Sky, or another of your own favorite high-resource consumption online games.
- **Option 2**: Mobile workplace computer. Should have some emphasis on connection and communication tools, productivity programs and storage space, and security.
- **Option 3**: Your dream computer. The world is your oyster, and you might consider AI-related processes, VR visualization, mega gaming, heavy use for arts/CAD/design, whatever. These will likely need loads of RAM, graphics processing, space, and resource organization capabilities.

Chapter 3: Utilities

- Computer Utilities
- System Administration
- Information Management
- Disk Drive Management
- Computer Cleanup
- Backup & Restore
- Compression
- Security
- GPU/Video Card Management
- Peripheral Management
- Driver Maintenance
- The Registry
- Program Sources

Computer Utilities

- A utility is system software used to help maintain a computer's infrastructure by monitoring, analyzing, and configuring the system. computer. A utility is usually smaller than a standard program and often is included with an operating system, while other specialty utilities can be installed separately. Utilities can include:
- **File management applications** like zip file compression and file manager.
- **Miscellaneous utilities** like HTML validators, uninstallers, screenshot clipping, registry editors, communication, and PC health checks.
- **OS accessories** like paint, notepad, photos, and accessibility tools.
- **OS/AI application**: In September 2023, Microsoft did a Windows 11 update to introduce Copilot, an AI "companion" that has been integrated into the OS for giving users 'natural language' assistance throughout MS applications. MAC and Linux are likely to do the same. Cortana

was an earlier MS assistant, and who can forget the MS "Clippy" paperclip cartoon that _popped up all the time_. . .
- **System administrative tools** like the task manager, control panel, device manager, disk cleanup, and diagnostics.

System Administration

The system administration of a computer has to do with understanding, reviewing, and managing system processing and applications. It sounds complicated, yet has a few simple interfaces and activities that can tell you about what your computer is doing and how it is allocating power, memory, storage, and other resources.

In MS Windows, system administrative utility interfaces include:

- **Control panel**: The control panel in Windows is a panel that lists a variety of computer functions that Windows allows you to adjust settings of. These can include

power options, internet options, security and maintenance, date and time, and many others. You can use the Windows search function to locate and open it to take a look. **MAC**: *The utility is called Control Center.*

· **Device manager**: The device manager lists all the hardware devices in your computer,, like network adapters, audio inputs and outputs, display, sound/video/game controllers, and more. This is a panel which presents the hardware properties and manually update drivers.

· **Diagnostics**: These include troubleshooting options, the network and sharing center (for Internet/Wi-Fi connections), security and maintenance options, and administrative tools. These can be looked up in the Control Panel's search bar under "diagnostic." **MAC**: *there is instead an Apple Diagnostics utility.*

· **Task manager**: This panel shows information on processing, memory, services used that affect software operations, startup programs that affect the computer's boot-up, etc.

- ◦ **MAC**: *This utility can be accessed by simultaneously pressing down the [CMD] + [ALT] + [ESC] keys on the keyboard. A window will open, listing currently opened programs and applications that are running in the background.*
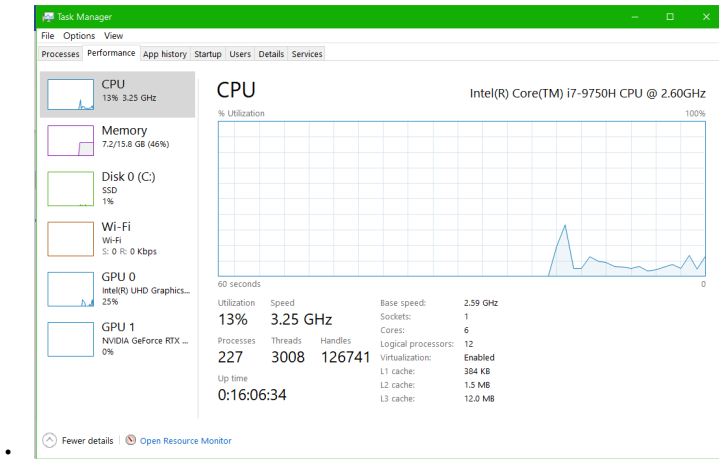
MedAttrib: author-generated. MS Office Task Manager.

Basic Windows OS Cleanup/ Tune-Up

- · **Computer settings, disk maintenance**:

Control Panel / System and Security, Power
Options, Defrag .

- **Disk clean-up by uninstalling programs**:
  Control Panel / Programs / Uninstall a
  Program .
- **Get rid of unneeded items**: Computer / C
  Drive / Properties, choose Disk Cleanup.
- *Problems*: Troubleshooters, File Recovery,
  System Restore.
- **What's happening**: CTRL + Alt + Delete,
  Task manager. See running applications,
  started services, processes, performance.
- **Windows**: Defender, firewall, Action
  Center.

MACs have their own versions, like the Control
Center, Apple Diagnostics, Task Manager,
Software Update, About This Mac. **Linux**
systems would have variations as well.

Information Management

Processing, storing, and retrieving Information
is what a computer is designed for. Information
goes through various stages of work in order

to process raw input, communications information, visuals and audio files, and other sources of data into work products like an instructor's curriculum, a brochure about an animal preserve, a spreadsheet of contact names and addresses, or an industry presentation for a conference. Various utilities provide ways of managing information:

- **Archivers**: Data archiving enables data to move from production storage to archive storage on a server or in the Cloud.
- **Clipboard**: The clipboard of a computer allows for the temporary storage of copied content in a program. When one copies or cuts text and graphic data in an application like Microsoft® Word® (MS Word, Word), the data is held in the clipboard so that it can be inserted into another space or document.
- **Data converters**: Can convert information into computer readable form in order to process data efficiently and accurately.
- **Data recovery**: Allows the recovery of deleted or corrupted data from a storage device.

- **File Manager**: File managers provide data management at the directory and file level. Directories and files can be created, copied, moved, renamed, deleted, cataloged, browsed, searched for, and have file access set.

Disk Drive Management

The computer's disk drive(s) store a lot of information pre-, during, and post-processing. The disk has to be kept lean and clean so that data can be easily accessed and used as needed and safely stored for as long as necessary. Disk management utilities help keep the disk drives organized, uncluttered, uncorrupted.

- **Defragging/ debugging**: Debugging utilities allow for a disk drive to be examined and modified so that the computer's memory work with data can be made more efficient. For instance, a 90% full disk drive that hasn't been cleaned by defragmenting means that the

computer search for and use of data on the drive can get sluggish and unreliable; a defragmentation process can move bytes of data into segments of space of the drive and leave other space empty and ready for more data. This type of utility software may handle a target program under specific conditions and monitor its operations and changes.

- **Disk backup**: A backup utility will back up the contents of a disk to another drive, or to a cloud location. The entire contents of the disk drive can be backed up, or just the system and setting files, or simply the work product files like images, documents, and projects. The OS will have a disk backup utility for backing up the disk into another drive or storage device. Cloud backup services can back up files into dedicated server space so that they can be downloaded onto a new computer or the existing one if something happens to the existing data.
- **Disk checkers**: Checker utilities monitor and check the disk drive to alert the user to problems in storage space and file

corruption, and can also remove corrupted files.

- **Disk compression**: Compressing hard disk contents can increase the capacity of disk storage by encoding the data to take up less physical storage space. This should be used very carefully so that information can be easily uncompressed and used as needed.

- **Disk contents recovery**: A recovery utility can help find and recover some or all deleted or corrupted files. For instance a computer's recycle bin (trash on a Mac) will hold deleted files until it is emptied, and the OS trash recovery can retrieve those files. Other files may have copies or fragments embedded on the disk drive that can be partially or fully recovered with a specialized utility.

- **Disk formatting**: The disk formatting utility can let you entirely wipe a disk drive of all data and settings. This can allow a user to refresh a computer with corruption and inefficient processing problems by reinstalling the operating system on a clean and empty disk drive.

- **Space analyzers:** The analyzer utility can help determine what is taking up disk space so that the user can decide what can be archived, compressed, or saved elsewhere.

- **Uninstall utilities**: An uninstaller can remove entire programs and apps from a computer in a clean and organized way, with the aim to also remove orphaned data, settings, and related files. Examples of use include removing games and their settings and extra files, uninstalling an unwanted bloatware app, and deleting a program because you found a different one that better meets your needs.
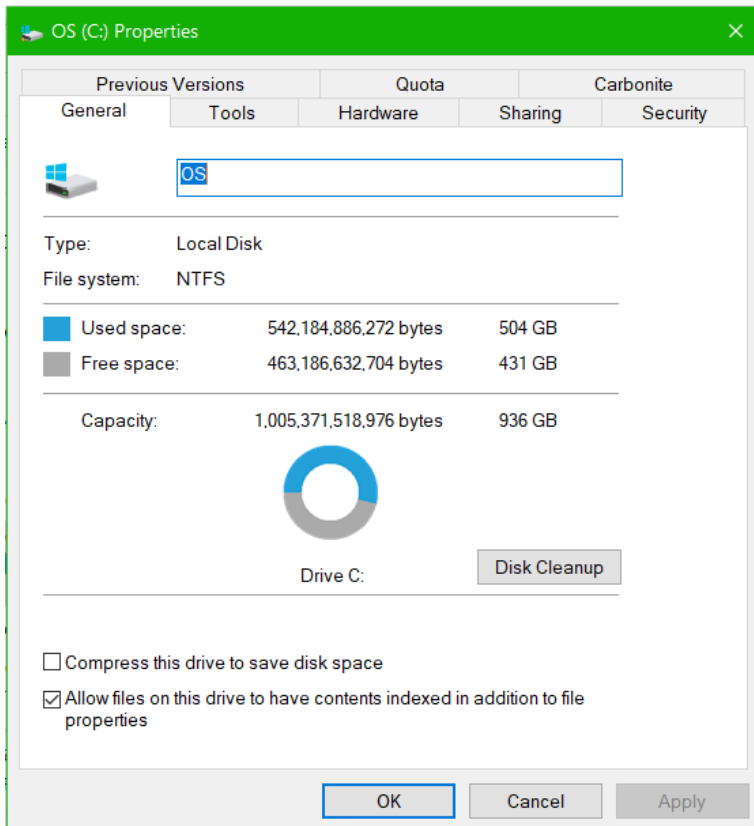
MedAttrib: author-generated. Computer C: Drive properties.

MedAttrib:freecodecamp.org/. MAC Drive properties.

Computer Cleanup

A computer goes through a lot of wear and tear – digital-wise. When a user creates, moves, renames, processes, and copies versions of files, the hard drive accumulates unneeded files, code fragments, temp files, cached webpages, cookies, old log files, and rejected junk items. There are third party utilities that are designed to scan and sweep a computer as part of the process of keeping it lean and clean. It can be good personal computer hygiene to have a weekly/monthly process for checking your computer for things to tidy up.

Computer cleanup utility: Scans a computer's

hard drive(s) for unneeded files at a deeper level than a standard OS disk checker might, and can delete them to free up disk space and speed up sluggish processing.

These may also be combined with security checks, antivirus tools, registry cleaners, and other tasks to identify and repair other performance issues to boost startup times, update applications, and improve battery life.

Computer file deletion utility: More than just a disk and computer cleaner, some utilities can not only remove files, but shred the data to prevent recovery, and wipe free disk space to clean it.

Good cleanup practices: You are your own best clean-up utility – in how you save, organize, backup, and remove files from your own computer. Utilities can be very helpful, yet it is you who puts on a lot of files. Unintended and unwanted files can include:

- **Bloatware**: This tends to be unwanted software included on a new computer or mobile device by the manufacturer, like

their own version of maps, games, notes, calculator, newspage, etc. It also can be things you inadvertently download that is piggy-backed onto a free app or an ad you clicked – like adware.

- **Cookies**: Files created by websites you visit that save information about the visit. They can help your computer keep you signed into a service like FaceBook, remember your site preferences at a retailer, and give you local/personalized content based on your visit choices. They are considered harmless, yet are something that over time adds more files to your machine and can impact your privacy and security..
- **File fragments**: Sometimes in processing a file may be temporarily be broken into fragments with the intention of keeping them contiguous for streamlined processing. Over time, though, your computer may end up with pieces of these when apps are incompletely uninstalled or disorganized hard drive space.
- **Tagged-on utilities**: You may download a game or a free app that quietly also installs something like a 'free' browser

toolbar or other seemingly cool but unnecessary utility. Many of these have built-in pingbacks to the creators to gather data on you and your computer, and many may be cheaply designed and cause conflicts with your normal computing processes.

- **Temp files**: These are created during computing processes to hold information while a file is being created or modified. Unfortunately, they may not always be auto-deleted when the processing is done.
- **Viruses/trojans**: These are files that can launch a virus or other malware attack on your computer. They can be unintentionally downloaded as part of a free game or app, a torrent download, any pirated item, and/or clicking ads and links in emails.

Every program and game you download creates new file directories with a lot of assets, integrate other files into your existing system file directories, and over time also temporary/ fragment files. in the local and roaming file areas. Every playlist, movie, batch of images,

and attachment to texts adds files to your computer. Using browsers adds cookies, file fragments, and temporary files to your machine. Plus, you rarely know what else might be downloaded into your hard drive when you click any ad, any link in an email, a "free" game or app, etc.

Your own best practice is to be very mindful of what you do and do not click, and choose one browser and understand its settings for cookies and deleting temp files. Consider installing only one or two games at a time, and when tired of it uninstall it. If you collect pictures, movies, music, mod assets for games, etc., consider storing most of them on external hard drives to leave your OS processing drive as clean as possible. Make sure you know exactly where you do download your media files and app files, as well as your work files – create specific directories that are organized so you can find and delete what you need to whenever you need to.

Backup & Restore

Computers can fail. Even when efficient and working properly, sometimes malware can corrupt too many data and settings files. An electric surge can corrupt contents. A disk drive can have partial failure. A user can accidentally delete the wrong version of files or an entire needed directory. Downloading and installing computer patches or updates might cause a hardware conflict. The computer may be stolen or damaged if dropped. Cups of coffee have been known to suddenly spill, and cats have been known to flop on a keyboard and delete active work in an important project. It is important to protect data that can be difficult or impossible to replace.

Backup refers to the process of making a copy of data on your computing device in case you lose access to the data. Utilities noted in a section above can let you save data to external hard or USB drives, or to a writable disk. Entire disk contents, or just system files, or just data files, can be backed up into the cloud or using a paid service with proprietary and protected

server space. Ideally, a user should develop a specific and regular backup plan so that at least quarterly, if not monthly, important files are backed up in a secondary safe location.

File Restoring refers to the process of putting your backup data back on a computing device. This can be data from an old computer being restored onto a new unit because you upgraded to a new machine. It could be making a second computer have a full copy of your primary computer's information.

The OS should have some kind of backup and restore solution built in. In Windows, **System Restore** allows a user to set a restore point so that the OS backs up an image of all the settings and files at a specific point in time, and preserves it on the hard drive to be restored if needed. It can return a system to working condition without needing to reinstall the operating system and repairs the Windows environment by reverting back to the settings and files that were saved in the restore point.

TIP: System Restore good practices. Do a System Restore before installing new

software. Schedule a regular system restore if you need to keep sensitive data accessible.

Compression

File compression is when a file is a compression of data that reduces file size to allow easier and faster transmission over a drive, network or the Internet. It creates a version of files with the same data at a size significantly smaller than the original file.

Computer OS Drive Compression

Different computer operating systems use different internal compression tools, such as MS Windows NTFS file system, Linux has more than one option, and Macs can need third-party tools to successfully manage the OS compression options.

Compressing the OS drive is a way to save

space on a computer's hard drive. When you reduce the size of files, more storage space becomes accessible. Since the OS drive often contains repetitive assets, config files, and code, compressing the drive may free up space. And with transparent compression file systems available, users can seamlessly use their files without manually compressing and decompressing them.

Benefits can include:

- **Increase in storage space:** Compressing the drive makes file size smaller, which allows more data to be stored in drive. the
- **Improved performance:** With smaller files in the OS drive, computer performance may be faster. The system can access compressed files faster than uncompressed ones.
- **Reduced backup size:** Backing up a compressed OS drive results in smaller backup files, which saves storage space and time. a
- **Reduced network traffic:** Compressed files means less data needs to be transmitted over networks.

Concerns include:

- **Compatibility problems:** Some other computer systems may not support the compressed file system or type used in your OS drive.
- **Data loss:** Compression may glitch and corrupt data, especially if files are constantly compressed.
- **Troubleshooting issues:** Troubleshooting to diagnose problems on a compressed OS drive can obscure underlying issues.
- **Latency slowdown:** The CPU has to use resources to compress/decompress files whenever it tries to access them.
- **Potential system instability:** Compressed OS drives add another layer of processing to access and write data which can create system instability and crashes, especially if the CPU is already running at full capacity.

Keep in mind the security and integrity of files when choosing to compress them. On an operating system, your computer's core workability may not work as smoothly, the CPU may slow down, and you can risk data

corruption. Hard drives with an extremely large amount of space don't likely need drive file compression. On the other hand, compressing work / project / batches of personal files to send through emails, networks, and backups can be a very useful way to save time and space.

External File Compression

Not only does a computer's hard drive have a compression utility, but there are also utilities to allow specific file compression for easier and faster file distribution and sharing.

A zip file utility can compress several files into an archive so they can be carried in a mobile and shareable file directory. Within the directory the files are individually compressed, and the entire zipped directory may be smaller than any of the uncompressed files.

Compressing the file in a zip (or related format) can make what's stored inside of it inaccessible until the zip file is unzipped to recover the full, uncompressed files.

An OS may have a built-in file compression option, though it may exist for simple compression onto the hard drive and not be meant for sharing and uncompressing for work. A separate non-OS utility can do this, and many are free. The trick is to find a free one that is easy to interpret and use, and that gives more than one compression setting and format.

Common compressed files include:

- . ZIP (PC, universal)
- .7Z (proprietary to 7Zip utility)
- .GZ (proprietary to GNU zip utility)
- .RAR (Mac)
- .TAR (proprietary to Unix-based utility)
- ISO (archive file with identical or image of data found on an optical disc; sometimes used for installation program files)

No one is best, though the universal .ZIP file usually works on all computer operating systems.

Security

Computer security is a constant issue, and will be covered more extensively in a later chapter.

Computers face threats from multiple sources that can impact hardware and data security. Cyber threats can include:

- Advanced persistent threats (APT)
- Distributed denial of service (DDoS)
- Emotet
- Hacking
- Malware
- Password attacks
- Person-in-the-middle attack (PitM)
- Phishing access
- Ransomware
- Social engineering attacks
- Software supply chain attacks
- Trojans
- Viruses

All of these can cause loss of data, resets of important settings and computer protections, disk wipes, corrupted files, stealing of the

computer's information, a locked-up system, and more issues.

A computer should access security utilities, such as:

- **Account protection**: use a sign-in security protocol and password to lock/unlock a computer.
- **Antivirus**: Scans, prevents, detects, quarantines, and deletes viruses from a computer.
- **Browser control**: Set warnings in Internet browsers for unrecognized apps, files, malicious sites, downloads, & web content.
- **Firewall & Network protection**: Software utility or hardware device that filters data and connections entering or leaving a network or computer.
- **Malware identifier:** Uses tools to identify, alert, and block to malware threats.

GPU/Video Card Management

The graphics processing unit (GPU) was

originally developed to expedite rendering of graphics. It evolved to be programmable for creating more detailed visual effects, realistic scenery, and advanced lighting / shadowing techniques. Now it has progressed to also handle additional workload in high performance computing (HPC), and deep learning. The terms GPU, graphics card, and video card of a computer tend to be used interchangeably.

The GPU produces a lot of heat when it has more processing to do, such as with rendering detailed graphics and managing application and gaming performance. It usually comes with a management utility that allows power, heat, and performance settings, and driver updating.

- The GPU can be integrated (hardwired) into the motherboard/CPU and come with an integrated management utility.
- If the GPU is a separate hardware unit, like something from AMD or GeForce with additional RAM, it will come with a specialized management utility.

Peripherals Management

Peripheral equipment, like the screen monitor, keyboard, house/trackpad, USB flash and external hard drives, microphone and earphones, printer, and other external devices, also tend to have OS-provided or manufacturer-provided utilities. These utilities allow for identifying the unit, tracking device usage, and for adjusting activity and power settings. An example might be a specific utility for a gaming item attached to the USB of your computer, or a mouse/controller- specific utility, your computer's Device Manager, etc.

Driver Maintenance

A computer driver is a set of files that assist your computer's operating system interface with pieces of hardware like the graphics card, the keyboard, the music player, etc. They allow the OS to recognize and use hardware correctly. Each hardware item requires its own

driver files, and these are developed and updated by the hardware's manufacturer.

Driver updates are routine and can be pushed by the manufacturer, depending on the piece of hardware's default utility settings. They may also be available at the manufacturer's website for download. Finally, a computer cleaning utility may have a section dedicated to checking the computer for needed driver updates, then download and install the drivers upon approval.

Driver updates fix security and compatibility problems, errors, broken code, and can add features to the hardware. When drivers are outdated, the computer can experience slowdowns and performance issues that impact workflow.

Driver types can include:

- **BIOS**: The basic input output system is located in a read-only memory (ROM) chip, and is in charge of booting a computer and giving a set of instructions during boots. It also does power-on self-tests

(POST) that are required during startup, and provides drivers for the basic hardware to ensure that they interface properly with the operating system.

- **Hardware** (block, character, motherboard): Input/output device data transfer drivers.
- **Kernel device**: Part of the operating system functionality.
- **Original equipment manufacturer (OEM)**: For managing equipment/add-ons like nVidia video cards.
- **User-mode**: Drivers that may trigger during a user's session working with an external device (USB connected, etc.)

The Registry

A computer registry is a hard drive location where system and application settings are categorized and stored. It is an internal database containing machine-specific information regarding almost everything in your computer. It is very detail-oriented and not for casual tweaking or adjustment. That being noted, the registry can develop errors of

deleted software registries or orphaned registry items from ordinary processing activities like uninstalling programs, deleting files, updating applications, and system shutdowns. Malware and viruses can also affect the registry, and is a serious computer security issue.

MS Windows has a built-in registry. The MAC equivalent would be a series of .plist files in several preferences folders.

A registry cleaner is a tool that scans the registry for registry keys that have no use, potentially leftover remnants of applications that have been deleted or updated. Often computer cleaning utilities will build in a registry cleaner. Use with care and access to a friend/computer tech support.

TIP: Cleaning the Registry. If you choose to use a Registry Cleaner as part of standard computer maintenance, always be certain to save a backup of the registry file first. A good utility will give this option and perform the backup and then the registry cleaning for you.
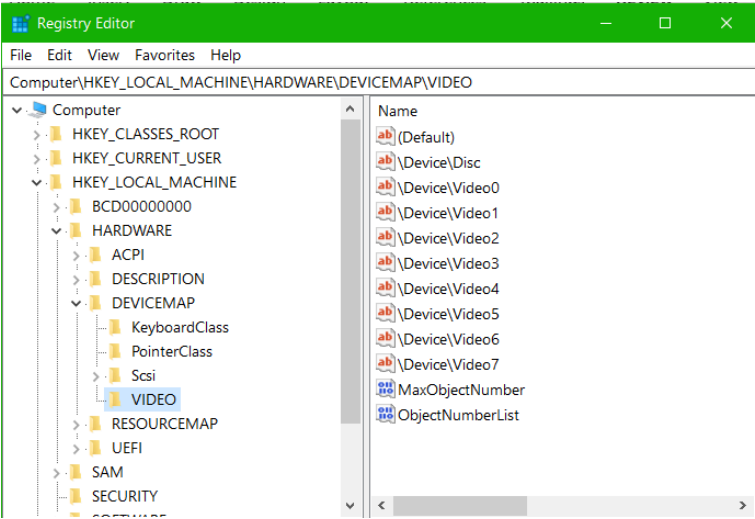
MedAttrib: author-generated. MS Office Registry Editor.

Program Sources

Computer programs, like utilities and

productivity applications (see Part 2), come from different sources. We've looked at utilities built into operating systems, and noted that other utilities can be provided by manufacturers of hardware and tools.

In addition, utilities and other programs can come from additional sources:

- Freeware
- Open source
- Payware
- Shareware

Freeware: Copyrighted computer software which is available for use for free for an unlimited time. Limited time use tends to be a free sampling, which is not the same thing. Freeware developers choose to 'give to the computing community' while also keeping control of future development and direction of the application. Freeware software is provided to its users free of cost.

Open source: Software that is distributed with its source code so that others can use, modify, and distribute variants with its original rights.

The developer releases it under a license with the rights to use, study, change, and distribute the software and its source code to anyone and for any purpose, kind of like this OER textbook. It can also be developed in a collaborative, public manner.

Payware: The default marketing and distribution of commercial software which requires a payment/subscription and usually no modification or free sharing.

Shareware: Commercial software that is copyrighted, which may be used without cost to try it out and for a limited period of time. Keeping the software eventually requires a payment to keep using, or a more robust full version is available than the freebie light version.

ACTION: Quick Task

Open your computer's Task Manager. If you are doing this for an assignment, you can take screenshots to record your information.

- Look at the **Processes tab**. What seems to be the process that is using the most Memory? What seems to be the process that is using the most CPU power?
- Look at the Performance tab.
- Observe the CPU graph; what is the base speed?
- Observe the Memory tab; what is the Speed?
- Observe the Wi-Fi tab; what level does the signal strength seem to be?
- Observe the GPU tab; what is the driver version and driver date?
- Look at the **Startup tab**; how many Startup processes are enabled?

Chapter 4: Information Management

- Information Management
- Types of Information Systems
- OS file Management
- Email Management
- Backups
- Cloud Storage Management

Information Management

Information includes both electronic and physical material. Computing allows for the storage of data and the security measures that help protect archived information of stakeholders like corporate and government

clients. Information systems are associated with how technology is used to manage the needs of individuals, groups and organizations in a systematized way.

An organization's (like a community college system) structure needs to manage information like the enrollment and payroll databases, financial aid data, faculty learning management system content and backups, IT department resources, and more. The information lifecycle – data, paper files, electronic documents, audio and video, computing resources – consists of a series of systems that need accounting and security, etc.

According to Wikipedia, Information Management (IM) is the collection and management of information from one or more sources and the distribution of that information to one or more audiences. It is not enough to create work product (a history term paper, a roster of students). The term paper has layers of research data, references, and supporting examples; a roster of students is associated with addresses, transcripts, and

program degree outcomes. How this is managed – so that the community college system can serve students, support advisors and faculty, manage tuition and state government funding, expand and contract courseloads, and report data for accreditation standards – is an example of information management.

Types of Information Systems

Components of information systems

- **Control**: The filtering, sorting, and clear organization of the stored information.
- **Feedback**: The storage and updating of information for output and future use.
- **Input**: Information resources needed to plug into an organization's plan of action – data, tools, info about supplies and costs, customer needs, etc.
- **Output**: An information product resulting from the processing of the information resources – a report, database, analysis result, etc.

- **Processing**: The organization and management of the resources in a useful way with the intent to produce a result beneficial to the organization – plan for a product or service, research results, etc.

Information in the workplace includes much more than just documents and computing files. It represents entire systems of workload and content from the beginning of a work cycle until the final distribution, and then the follow-up assessment and process of review, improvement, and expansion of the next phases of the work cycle. Systems can include:

- Decision support structures
- Financial transactions processing
- Healthcare records
- Office automation
- Organization technology
- Work product research and development

For the general user (student, employee, home owner), the personal information system is much smaller but equally important: personal finances, music and movie collections, car and

health insurance, home rental or ownership accounts, work history and references, Internet searches, and so on. Dealing with your lifetime of information – especially related to your computer and devices – is also part of information management.

Let's cover aspects of personal information management related to one's digital life.

OS File Management

People put aspects of their entire life on their computing devices at home and in the workplace. From music playlists to travel planning for a vacation, one's computer is full of documents, images, browser saved data, financial records, system settings, directories of assignments and work files, etc. That computer might be the smartphone, the laptop, the desktop, a tablet, etc.

The computer operating system (OS) usually provides a utility for file management; in Windows it is called the File Explorer, and acts

as a web-interface program that shows computer directories, files, and shortcut links. Mastering this one tool for organizing information on the computer can make your digital life a lot easier.

File: A storage unit on a computer that stores information, data, etc. (such as a document, an image, etc.).

File directories: A directory is a virtual hierarchical system that allows organizing data on different levels, and usually shows contains all information about the attributes of referenced files. *Is not exactly the same as a file folder, but the terms directory and folder tend to be interchangeable in general reference.*

File extensions: The extension of a file reveals and aligns with the format of a file's contents and program used to create/modify the content. For instance, word processing files may use a .docx (document) or .txt (text) extension, while a spreadsheet file may use.xlsx. Some common extensions (not an exhaustive list):

- **Database-oriented**: .db, .accdb, .sql,
- **Executable/program launch-oriented**: .exe, .apk, .bin, .msi
- **Graphics-oriented**: .jpg, .ai, .gif, .png, .esd,
- **Link-oriented**: .lnk, -Shortcut,
- **Media-oriented**: .mp3, .mp4, .wpl, .wav, .avi, .mov
- **Numeric-oriented**: .xls, .xlsx
- **Packaged/compressed**: .zip, .rar, .pdf, .iso,
- **System files**: .dll, .bak, .dmp, .ico, .sys
- **Text-related**: .doc, .docx, .rtf, .txt, .odt, pptx, ppsx
- **Web and programming-oriented**: .html, .css, .oft, .msg, .vb

File folders: A virtual storage space used to store and organize computer files. A folder can also contain additional folders (known as subfolders). The folders usually contain files (documents, images, media like music, databases, setting files, and more). A folder has a name and is visually represented by an icon.

File manager: a utility that organizes, indexes, and allows for the opening, renaming, moving, copying/pasting, and deletion of files of data.

Filename: a unique name given to a file to identify it; can contain letters, symbols, numbers, spaces, etc.

File naming protocol: A practice designed (in the workplace, by users, etc.) for naming files so they can be easily recognized and found. For instance:

- **A computer course file**: chapterlastnamedate.docx (example Ch1bothell033123.docx).
- **A personal spreadsheet**: billsyear.xlsx (example bills2023.xlsx).

Shortcuts: A file is located in a specific location, while a shortcut (*alias on a Mac*) to the file can be stored elsewhere on a computer (like the desktop) and can be used to open the file without searching for the file's physical location on the computer.

Basic File Management Skills

Basic file management refers to a way to name,

save, backup, organize files/folders, and keep track of files on a computer. Personal file management tips:

- Create routinely named folders/subfolders to organize your files.
- Save your work frequently into folders/ subfolders (organize by category), **not** in the default computer documents folder.
- Save your personal data files and directories on a backup disk regularly (back up your files).
- Give files and folders short, but meaningful names that have consistent purposes.
- When creating or opening a file you plan to modify, save it immediately for the first time to an organized location where you can easily find it again.
- Create a specific location directory on your computer (e.g., USB drive or hard disk drive) to save your files.

BUSTECH				
DataFiles	DataFiles	3/21/2023 3:38 AM	File folder	
datafiles.zip	Examples	3/21/2023 3:37 AM	File folder	
Examples	Images	3/21/2023 3:37 AM	File folder	
MS_Excel	lorenipsum.txt	2/20/2015 1:00 PM	TXT File	2 KB
MS_PowerPoint				
MS_Word				
Images				

TRY ME Activity

In this activity, we will use MS Windows (Windows 11/10/9, and Macs/Linux systems) work pretty much the same) to create a folder structure to store your files for class. It is important to keep your files organized so that you can find them when you need them. Saving, accessing, and uploading files is critical to your success in this course. This assignment will assist you in keeping your files organized throughout this course. *It was also referenced in the Introduction in preparing for this course.*

Using Windows, create the file structure on one of the following: One Drive, computer, or laptop. Your top folder should be BUSTECH105.

There are a few different ways to create a new folder in Windows.

- In File Explorer, click the new folder icon in

the upper left hand corner.
- Use the shortcut key CTRL+Shift+N
- Right click the white area of the File Explorer Window, and select New, Folder.

TIP: File Explorer/Manager actions

- After you type the name of the folder, press enter.
- Use the Windows File Explorer Navigation Pane to expand each file folder (the Mac and Linux system should have a similar capability). If the arrow, or carrot is pointing down, the file is expanded. This will allow you to access the folder contents.
- To rename a folder, right click on the folder. In the shortcut menu, choose Rename. Start typing the new name, and then hit Enter on your keyboard.
- To delete a folder, right click on the folder. In the shortcut menu, choose Delete.

Email Management

Email is an important area of personal and professional records that one needs to keep organized, clean, and easily searchable. How often do you need to refer to an important message with instructions, or find an email with meeting contact and location information? We will cover email management in the Email Management chapter, but here are a few quick tips:

- Create secondary email address for 'disposable' and marketing-related emails so they don't get in the way of your main email account's email priorities.
- Create several email sorting folders/labels for handling priorities, like Hot, Reference, ReadMe, Meetings, Pending, etc. Email folders/labels can also have sublabels, like Products > Orders, Books, Computer
- Create/use a main email account for only important business like your bills and personal job-related emails.
- Handle incoming emails a couple of times a day and act on them / get them out of

your inbox so you know what is new and
needs a response.

- Once a quarter, clean folders to get rid of
  or archive past-current emails. Get emails
  out of your face.

Backups

File backups have been covered more in
Chapter 3, yet it is useful to add a reminder
or two here. Personal files on your home
computer, and important files on your work
devices, have a lot to do with how you live day-
to-day and access the information / reference
content you need to function digitally. As a
result, make and follow a regular file/data
backup plan so that you never lose important
things like music and playlists, financial
records, images and memories, etc. You can:

- Consider using a Cloud backup service for
  full-computer backups that are
  maintained continuously, daily, and/or as
  you schedule them.
- Keep a secondary, external hard drive to

back up full personal directories and important computer settings.

- Make a copy of your files onto an external drive like a USB flash drive.
- The computer OS will have a built-in system back-up and restore option that you can use monthly or quarterly, and when you plan to make significant changes on your computer like adding a new GPU-leavy game or computing program.

Cloud Storage Management

Information management and storage can and should use multiple layers of action so that one's data is backed up in more than one way. One common way has become Cloud storage.

The "Cloud" is a reference to the **Internet** and **Web** – the system of interconnected computers between organizations, people, and places. It is called the cloud in part because data is available "out there" in the Internet through files and websites, rather than stored

on a single machine or in a specific office environment for use only in that office by specific employees.

MedAttrib: learntek.org public domain. Cloud computing concept.

Cloud Computing refers to using the Internet for something other just browsing and finding information and resources. It also means using the Internet, or "cloud," for doing work like filling out online job applications, submitting assignments into a course's learning management application, downloading article PDFs and reference manager information while working on a term paper, paying bills, enrolling in classes, participating in online

meetings, making and distributing videos or livestreams, and so on.

The author recalls the ancient days of the Paleolithic age when the concept of the "cloud" seemed improbable and kind of scary. How could one actually do real work in it? How could data be safe? How long would it take for enough people to discover and use it? What is it disappeared in a big stormy puff?

Cloud computing is not only a reality, but also the norm for work and personal computing needs. There is a whole section of this textbook dedicated to Internet Fundamentals. Much more of our computing/digital life is in the 'cloud' than on our own computers, in terms of the apps we use, where we store data, how we find and use information, and where we connect with our finances, health, and communication needs. When you are using the cloud, it's likely that both data and useful applications reside in the cloud environment (like Google Docs, Microsoft 365).

Advantages of working /

storing in the cloud

- **Automatic backup**. Cloud storage provides use AI and processes to automate their own backups. If their own hardware fails, they can recover and restore your data automatically.
- **Efficiency**: Using cloud resources generally speeds organizational and personal productivity since computer applications and/or data are always easily accessible regardless of the physical machine in use.
- **Externally managed**: Cloud services are usually handled by organizations with expertise in computing, which employ servers to accommodate operations and storage. They handle their own backups, data restoration, data organization, and finances.
- **Fast Recovery**: When a computer is lost or compromised, data and applications in the cloud allow fast recovery of work information, files, and processes. This is a primary reason while multiple avenues of backing up your work is important.
- **Minimal computer setup:** When data and

applications are entirely cloud-based, any computer can do the work with access to a browser. Also, computer and cloud data can be synchronized.

- **Multiple Device Access**. When files are stored in a central location, they can be accessed by many different types of devices and synchronized so versioning is the same across the devices, like the personal computer and smartphone.
- **Software recency**: Cloud-based applications are often Software as a Service (SaaS) that means one uses the latest version of the application when it is downloaded from or updated by application provider (Microsoft, Apple, Steam, etc. Many people use a mix; a downloaded full version of software on a local computer, augmented by current updates, patches, and drivers to keep the software current, and a light and/or synchronized version in the Cloud.
- **Theft protection**. Cloud storage providers may offer ways to remotely wipe data off any lost device.

Challenges of working / storing in the cloud

- **Internet Connection**. Most cloud services typically require a stable and continuous Internet connection. Many regions around the world, and in the United States, have limits in broadband and Wi-Fi due to service costs, old or missing internet infrastructure, and lack of community resources like close-by libraries / community centers / school-related computing labs. Internet connection access and slow speeds affects the efficiency and reliability of work.

- **Privacy**: When data is available anywhere other than inside a closed system (un-networked home or work computer), it can be accessed by others who are not supposed to be part of the personal life or work system. Data on a system other than your own can be hacked, corrupted, stolen, and misused. Laws in other countries where servers in the cloud exist and operate may not protect you. If an Internet server provider goes out of business and/or

changes policies, pricing, and access, you can be limited in accessing your own data.

· **Generative AI**: Depending on how you store information, it could be accessible to AI survey in which generative AI tools access information as it aggregates everything it can access on the Internet from online repositories, public datasets, web scraping, APIs, surveys, 'publicly' accessible info from social media accounts, etc. Security products like Carbonite should be safe, but the power and legality of AI search and aggregation of all info it can locate is evolving.

Cloud-based Storage

There are many companies that offer cloud-based storage under different conditions. Some may be free, others very low in cost, and others as part of a package of services.

· **Backup**: Internet/Cloud backup is offered my companies that specialize in having many massive servers full of storage space.

Usually requires a subscription or annual payment. Think Carbonite or other backup specialists.

- **Free**: Various email and personal web server space providers piggyback free storage space onto their services. Think Google, Amazon Web Services.
- **Limited**: Providers may offer a limited amount of free space, sometimes for a limited time period.
- **Sample**: Providers may specialize in server use, services, and storage, and offer a free version as a sample to induce customers to upgrade to a paying plan.
- **Subscription**: Providers may offer only a subscription / pay-as-you-use solution, for a monthly or per space amount fee. Think Dropbox.
- **Workplace**: Organization workplaces usually have a lot of storage and work processing space for employees and related stakeholders in the workflow. This is not for personal use, but is a viable resource for work-related files and data.

Backup Best Practice

Consider options to ensure good backup and restore procedures:

- **Label backups clearly**. Label backup external drives and backup memory sticks and store where they can be easily found. Include the date the backup was made, and which computing device it is for (if you have more than one device). Use this same policy for digital backups, like in DropBox, Google, and when using a provider for full-service backups.
- **Schedule computer backups.** Schedule a regular backup process, such as weekly or monthly and when making a significant change to a computer's applications or installations.
- **Use multiple methods**. Data backup redundancy is a good thing, since two or more backups can keep data from being forever lost.

Part 2: Productivity Tools

In this section, we'll have an overview of productivity in the workplace. The information and applications we'll discuss can also be, and are, used outside the workplace. They were designed to make school, work, and communications easier, standardized, and accessible.

There are a lot of industries that do not use all or most of these programs, and many more applications that serve diverse work functions and employment needs. This textbook is focused on fairly basic support-related tools, rather than specialty and/or proprietary ones. For instance, there exist work tools for analysis, financial management firms, medical management, law and regulations, visual communications, application development,

automotive diagnostics, inventory management, sales contacts, marketing management, and. . . and . . . Some of these may be mentioned to help set the stage for productivity applications.

The thing with the applications we'll cover in more detail is how useful they can be in support (and even main) aspects of education and a number of industries.

- **Databases** are a backbone of data management for many purposes and industries: collecting, organizing, analyzing, synthesizing, and reporting out.
- **Email** is a predominant form of business communications that can be supplemented by text messaging, phone/audio calls, videoconferencing, and in-person connections. Emails allow for the transfer of information with files and images, and also allow for a digital paper trail.
- **Presentations** are done in meetings, conferences, shows, and marketing/advertising in many industries.
- **Spreadsheets** allow for collection, analysis,

calculations, and visual graphs/charts of data used in a lot of workplaces.

- **Word processing** handles document creation, formatting, modification, and distribution. Businesses around the world generate documentation, reports, correspondence, and much more.

Chapter 5: Productivity Basics

- Productivity Software
- Application Programs
- Utilities
- Office Suites
- Organization Programs
- Graphics Work Programs
- Communications Tools
- Specialty Work Programs
- Education Programs
- Programming Applications
- Accessibility Programs

This chapter will mostly identify categories of programs / applications used for productivity needs. It is not exhaustive, and won't really cover all categories – mainly ones used related

to productivity in education and the workplace, with a few supports. It also will focus on general categories and descriptions of the application types and purposes, but mostly not list specific applications to use since apps come and go and/or change name, pricing structures, availability, and integration-with-major programs' capabilities. The exception to this will be where we discuss specific big program suites and options that are part of operating systems and/or of the well-established education/workplace market share.

Productivity Software

Productivity refers to how efficiently work converts input like labor into an output of goods and services. Productivity software refers to programs that enable someone to create and produce information output like in documents, databases, information media, and other data-related work products. Of course a lot of work products are more tangible, like equipment and customer-facing goods for purchase, but for this book's context, this

chapter will provide an overview of workplace productivity applications that have routine work uses.

The market for productivity software is huge, and includes program suites with multiple tools, stand-alone applications to use for specific work products, and many apps for mobile use.

Application Programs

An application program is a computer program that provides users with tools to accomplish a specific task. In productivity environments, like a college advising office, accounting company, factory, synchronous online meetings, movie post-production work, US Diplomatic Corps, mechanic shop – and so many more – computer programs are used in most aspects of operating and organizing the business, the handling of goods and services, research and development, and so on.

Application software can be any of the pieces

of software on a cloud server, company mainframe, employee desktop, mobile talent's laptop or tablet, and any smartphone used in part for self-organization and work-related support. Web browsers, productivity office suites, product websites for purchasing products (which use databases), online tax preparation programs, and scheduling apps are examples.

There are so many – thousands – in many categories. Any search engine query for something like 'word processing applications,' 'scheduling software,' 'communication apps,' and 'conferencing tools' will pull up many ads, web shops, and articles with aggregated lists of the "Top 10" or something similar.

Utilities

Utility programs were covered extensively in an earlier chapter; they are often supports for school, work, and general lifestyle needs. They don't tend to be all-encompassing for multiple needs in workplaces, but they may be quick-

use apps with questionable lifespans and security. However, some do also cross over into also functioning as common productivity applications, particularly ones with full scheduling and work management components, and messaging / meeting coordination tools. Some useful productivity utilities (too many for PC, Mac, Linux, and web-based use to list all here) include:

- **Coding/programming**: Notepad, HTML editors, browsers with editing.
- **Communication**: ZOOM, Teams, email and direct messaging apps.
- **Documents**: Wordpad, PDF makers.
- **Finance**: calculator, online banking apps.
- **Graphics/media**: online image editors, online web editors, stock photo acquisition and organization.
- **Organization**: calendar apps, task-list and noting tools, project management utilities, time trackers.
- **Products/services–oriented**: Online job application tools, reference/articles databases, grocery-shopping/product delivery apps.

Office Suites

There are many combination suites of tools, applications, and productivity extenders. So many that one should set one's goals and needs, then use a web search engine to carefully search and weed out suites and packages that don't meet needs or offer reliability and security.

For this textbook, to support basic Business Technology applications in a school setting and for workplace preparation, we'll focus on programs that accommodate that. This textbook will leave industry-specific software solutions (like healthcare, automotive, financial/banking, marketing/merchandizing, human resources, engineering-related, vocational fields, etc.) to specific industry training certificates and degrees.

And, for this textbook, we'll narrow down basic training and skills-building to the Microsoft® Office® suite. Skills learned for this are generally transferrable to other office suites,

even if their user interfaces have some differences.

For office and multiple-industries workplace productivity, an office suite is an example of standard productivity software. Several office-work/information production programs are bundled together and can integrate in terms of styles, key shortcuts, templates, and transferrable skilling/tasks for getting work done. Suites can be installed on a computer, and/or accessed through a web platform from the cloud (manufacturer's servers), and/or synchronized between both. Some can also have plug-ins from other applications that can extend the productivity suite's capabilities (like Acrobat for PDFs, reference manager programs for foot- and end-noting citations, Power BI for adding data modeling to MS Excel, etc.)

TIP: Plug-ins/Extensions. A plug-in is a piece of software that adds features / extends functionality to existing program.

An office suite might include word processing,

accounting spreadsheets, visual presentations, email/scheduling integration, print publishing, flow-charting, and database production. Some add additional tools and extensions, too many to list.

Word Processing: A catch-all phrase for producing many kinds of informational documents in various formats like textbook content (such as this book). A word processing program allows users to create, copy, save, edit, format, rename, print, and retrieve text-primary documents. Examples of word processing programs include Microsoft Word, Google Docs, Apple Pages, and LibreOffice Writer. They can be used for:

- Articles
- Assignments
- Correspondence and memos
- Newsletters
- Notes
- Novels and stories
- Project management documents
- Reports
- Resumes
- Term papers

- Worksheets

Spreadsheets: Another catch-all phrase for financial/accounting and calculations-oriented workbooks. A spreadsheet program is an application that organizes text and numeric data into a tabular format. Data can then be arranged, sorted, calculated (using formulas and functions), analyzed, exported, and illustrated using graphical representations. Examples of spreadsheet programs include Microsoft Excel, Google Sheets, Apple Numbers, and LibreOffice Calc. A spreadsheet program can be used for:

- Accounting sheets
- Analyzing business performance data
- Calculating revenues
- Determining assignments' weight and grades
- Figuring budget information
- Forecasting loan payments
- Preparing payroll information
- Producing charts and graphs

Presentations: These tend to present images,

sounds, videos, text, graphics/charts, and other audio-visual clips and media to enhance general content for meetings, conferences, and customer-facing material. Presentation programs are designed to present information in transitioning slideshows and other multimedia formats. Examples of presentation programs include Microsoft PowerPoint, Google Slides, and Apple Keynote. They are commonly used to:

- Create animated videos (with voice and animation)
- Design website concepts with hyperlinks and interactivity
- Enhance lectures and tutorials
- Make illustration slideshows
- Prepare slideshow presentations

Databases: An electronic warehouse of organized and structured text and numeric data that can be sorted, filtered, queried for specific information, and data report generation. Database programs (database management system) are applications designed for creating, editing, updating,

maintaining databases, and managing organized information stored in them. Examples of database programs include Microsoft Access, Oracle Database, and TablePlus. Databases and their programs are used in the following industries (well, actually in almost everything):

- Banking
- E-commerce
- Education
- Government data
- Healthcare records
- Human resource management
- Library management
- Sports data
- Travel reservations
- Weather/climatology

TIP: Database vs Spreadsheet. A database is designed to hold potentially thousands to millions of tabulated records of data, for accessing, sorting, querying specific data issues, etc. A spreadsheet – while it can be big and also uses a tabular format, is designed

for specific ranges of data for calculations and detailed analysis with filters, conditional formatting, summary tables, charts and graphs, etc.

Organization Programs

Organization programs and apps are designed to manage time, information, and other lifestyle & productivity schedule-oriented needs. Smartphone users have hundreds to choose from. Frequently there are "best organizing tools" articles with application lists, summaries, and links. Some of categories include:

- Calendars/scheduling
- Collaboration/meetings
- Note-taking/study aids
- Reading/viewing content priorities
- Reference/citation managers
- Tasks/Lists
- Time-tracking / accountability for payroll

Graphics Programs

Graphics-related applications can support office suite work, web page enhancement, and marketing/communications work products. They fall into several categories, with payware, SaaS options, freeware, and lightweight apps for computers and smartphones. Categories include:

- **Design**: Layout and formatting of publications, advertising, and visual-based communications.
- **Graphics/images**: Creation, modification, and organizing of images for other documents. Images can include photos, collages, painting, cartooning, clip/icon art, and image editing/clean-up.
- **Animation**: Seamless movement of imagery for presentations, online training modules, websites, and entertainment/education-related work products (and so much more).
- **Modeling**: Developing working models of content, like 3D characters and items for gaming, Computer Aided Design (CAD) for

complex schematics and architectural designs, and adding texture and depth to 3D modules.

- **Video/film**: More than just animation, video/film-related productivity has to do with capturing, editing, modifying, and distributing video-related work like commercials, website ads, films, and film processing.

Communication Programs

Communications productivity programs are designed to make it easier for people (teams, employer/employees, students, conferences) to work together. Apps can centralize information and enable users to seek additional information, get technical help, and conduct synchronous online meetings. Some may include other useful features, such as client communication or project management. There are typically two major types of communications software that can be broken up into more specific areas and groups of programs.

- **Asynchronous**: Related to communications that can happen at any time, any place, at any distance, with an emphasis of one user to another user(s). This can include email, file transfers, blog and comments, forums, recorded lectures on a conferencing tool, streams of past events and existing entertainment, etc.
- **Synchronous**: Real-time communication is near-instantaneous for immediate consumption and action. Online live meetings using a conference tool is one example, and can be used for course lectures, collaborative meetings, seminars and workshops, and team-building exercises. Direct messaging/texting in the moment is another. Streaming videos of gaming or other activities is another, in which you can observe a live stream of something like the daily lives of foster kittens or witness someone preparing a recipe in an online 'cooking party.'

Communication application categories can include:

- **Chatbots/agents**: Product and service websites often include a chat function. This may be handled solely by a chatbot, or opened with a chatbot before a user gets routed to live technical or customer support.
- **Conferencing**: As more jobs have moved to at-home workspaces and mobile locations, online conferencing tools for in-person meetings and collaboration have become a staple of work productivity.
- **Editable/signable documents**: Automated formstacks, and editable PDFs or other activated documents can let a user read, amend, and sign documents before emailing or returning them for processing. Students needing an early withdrawal can use an online withdrawal form at many colleges.
- **Email**: Email speaks for itself; messages with embedded or attached images and files can be sent back and forth. While email can have complexities of organization and retention, it also provides a message trail to help one remain in the loop about a situation or work interaction.

- **Messaging**: Direct or text messaging is much more in-the-moment than email. It can allow attached and embedded files as well. Messaging tends to behave like a multi-sided conversation, but by text rather than an audio phone call.
- **Streaming**: Streams can be of past events and are also often livestreams of a current event. Gamers may stream gameplay. People generating an online presence may livestream events of their day. A lecture of an online meeting can be livestreamed for those who are not participants but who want to observe the current activity. it also allows a streamer to create, present, solicit feedback, etc.
- **Online technical support**: Technical support for computer and technical systems can be provided online and in-the-moment. An example would be a user working with tech support of their laptop computer to solve a microphone problem, or a college tech support helping a student install an application like SplashTop so the student can use the college computers as a virtual machine on

their own Chromebook.

Specialty Work Programs

There are too many specialty work applications to list, but they exist in the thousands, for all industries (consider visiting the US Bureau of Labor and Statistics). They tend to support:

- **Industry-specific databases**: (finance, human resources, real estate, insurance, informatics, medical information, products for shopping).
- **Live Information**: (financial, stock market, lenders, entertainment life feeds).
- **Repositories**: (book and article writing, journalism, research theses and academic papers).
- **Research and development**: (compilers, government database exporters).
- **Work product creation and editing**: (film, 3D printing, equipment parts creation).

Education Programs

Education is itself big business, because it employs and serves so many people and offers so many kinds of output (academic, financial, demographic data, career-training stats, training interfaces with specific industries). Programs can include:

- **Financial**: Student financial aid applications (FAFSA), education loans, college tuition and enrollment management, textbook and materials acquisition (bookstores).
- **Learning management**: Platforms for managing students, grades, curriculum, assignments, and teaching aids (like CANVAS).
- **Media**: Access to films, videos, clips, recordings, synchronous and asynchronous collaboration, etc. YouTube and other how-to examples.
- **Reference/info managers**: Information, articles, and other documents/data that can be referenced, cited, and used for academic and journalism papers, books,

workplace development, and employment predictions.

- **Statistical**: Data for demographics, college success, college accreditation, program goals and outcomes, relationship of training to industries.
- **Student work-facing**: research tools, academic honesty checkers, work preparation (like Grammarly), training/ demos (LinkedIn Learning, Khan Academy).

Programming Applications

All the emphasis on online and live-time workplace services and applications requires technical support for programming, coding, developing and modifying programs and tools, and more. These can include:

- **Build tools**: These are used to automate the process of building, compiling, and packaging code so it can be executed later.
- **Code repositories**: Platforms for

developers to collaborate on code and share in programming libraries.

- **Debuggers/testing frameworks**: Find and correct code errors as part of streamlining and testing programming solutions and problems.
- **Emulators/virtual machines**: Used to create and operate isolated environments for software testing in different computing conditions. They can also stand in for computer productivity work if your computer can't accommodate a needed program – you can log into a virtual machine and work with its programs as if it were one's own machine.
- **Integrated development environments** (IDEs): Software applications with multiple-functions environment for coding, testing, and debugging programming for software, apps, and websites.
- **Programming Editors**: Simple editing applications that programmers use for coding websites, working in multiple code languages, developing mobile apps' code, etc.

- **Version control**: Track changes to code over time for collaborating with other developers.

Accessibility Programs

According to the Disability Status: 2019 – Census 2019 Brief (Wikipedia), approximately 20% of Americans have one or more diagnosed psychological or physical disability. This doesn't include undiagnosed persons. However, enough people face one or more kinds of barrier to doing routine work, study, and travel (commuting) that education and the general workplace has need of accessibility-related hardware and software.

Accessibility situations tend to rely on assistive technologies, which themselves are not inappropriate or unhelpful. However, there is a long way to go for enough Universal Design of in-person and technology-related hardware / software to eliminate barriers altogether. These things are worth considering when surveying tools and applications for team and workplace

use, since one or more persons will likely be affected by an often silent difference in accessibility needs.

These can include:

- **Audio**: Persons with hearing divergence may need tools to help access audio information in lectures, videos, and meetings. These can include closed-captioning, noise cancelling mono audio systems earphones, sign-language interpretation, and prioritizing email and direct messaging over audio connections.
- **Behavioral divergence:** Can include persons through attention and stress-related issues, insecurity in food/shelter/safety that spills over into the classroom and workplace, and situations of substance addictions that can affect attention and information retention.
- **Cognitive challenges**: Persons on the Autism spectrum may absorb and feedback information differently. Persons recovering from brain injuries who are being retrained may experience info access problems. Mental illness

expressions may leave persons needing need more time and extended deadlines to produce needed work product. etc. Dyslexia can make managing text content difficult, while other cognitive divergences may make watching videos with rapid image and lighting changes problematic. Each individual situation will be different. However, access may be improved by actual classroom and workplace interaction enhancements, like memory aids, task-stepping, reminder systems, programmed automation of some tasks, regular daily guidelines/scheduling, minimized distraction, colleague mentoring, clear procedure manuals, etc.

- **Language**: Persons for whom the dominant language in a region or country (like ESL learners) can experience issues interpreting text, audio, film, textbooks, and computing applications. Access can be increased by using learning and work applications with full translation capacity in any language, an interpreter, and computing keyboards that are aligned to different alpha-numeric keys.

- **Mobility**: Persons with mobility divergence may not be able to get to locations, use standard workplace tools the same way, and may need more room and time to accomplish some work product outcomes. Some persons may lack specific limbs or capacity to use standard computing tools. Transportation options, distance movement, exhaustion, and bulkiness of some mobility tools can limit access to the classroom and workplace as well. While it is tempting to recommend distance learning / home-based workplaces, the actual barriers to connecting technologically and in person need to be mitigated and removed so people can interact socially and professionally at any location. For instance, computer manipulation tools like sip-and-puff, joysticks, head wands, eye tracking, electronic pointing devices, and touch screens may accommodate specific needs.
- **Visual**: Persons with some or significant visual divergence may need tools to help clarify text (screen readers, magnifiers), and explain the content of images (alt

text). Optical character recognition (OCR) software can scan printed materials into a computer for audio and other output formats. An accessibility menu may assist. Braille keyboards and voice recognition can help accomplish workplace tasks.

Chapter 6: Email Management

- Email Concepts
- Email Account/Interface
- Organizing Emails
- Cleaning Accumulated Email
- Limiting Outgoing Emails
- Limiting Incoming Emails
- Email Crafting

If you have a lot of your emails in your inbox, and looming over your head, then this chapter is for you. While this textbook covers technical aspects of email in other chapters, this chapter can help organize your email life with some basic tips and tricks.

Email Concepts

Email is electronic mail, the mode of communication that uses electronic devices and data transmission to deliver messages between different computers.

When you send an email to contacts, there is a series of processes that happens in the background from when you send the email until the email is delivered to the recipient's Inbox:

- Create then send the email.
- The email client (such as Gmail) connects to an outgoing email Simple Mail Transfer Protocol (SMTP) server.
- The email is handed over in a MIME (internet-standard encoded file) format, and the outgoing server validates sender details before processing the message.
- The mail goes into the SMTP server's Outgoing queue.
- The SMTP server looks up then connects with the Recipient email server mail transfer agent (MTA) and sends the email.

- The Recipient server initiates various security checks then accepts the email if it passes.
- The Recipient server validates the recipient account and delivers the email to the user's mail account, based on the incoming email policies set for the account.

This can happen almost instantaneously, or over several minutes, or over a couple of hours – depending on Internet connection, the rules and processes of the responsible servers, etc. Think how fast a website/service asking you to check your email to authenticate your login can be!

Email account/interface

Email interfaces, like Outlook and Gmail, have fairly standard default aspects to preparing, sending, organizing, and saving emails. These include:

- **Contact list**: An email account contact list

lets you add past and current recipients, and new names/email addresses, so that you can use it to find and send emails to specific people as needed.

- **Filters/rules**: You can set filters and email response rules to help automate your email processing. For instance, if you net a weekly email newsletter you like but read only once every few weeks, you can set a filter rule to automatically remove it from your inbox, store it in another folder, and leave it in unread status.
- **Folders/labels**: Organizing emails category tool for sorting emails by removing them from the active inbox and storing them in folders where you can find them later.
- **Forwarding**: You can forward a message you created or received to another person.
- **Message**: Email text area workspace for drafting email text.
- **Inbox**: Active emails needing a response / action come here first.
- **Priorities/sensitivity:** You can assign a level or important/priority to an outgoing email to alert the receiver to handle it quickly. Same with sensitivity, but regarding how

to handle with confidentiality.

- **Reply**: You can send your response to an email after choosing to "reply." Reply All refers to replying to everyone who received the email you received, and should be used extremely rarely or not at all. Why? Reply all emails can become long and confusing responses by multiple people, clog up inboxes with unneeded information, and impact the confidentiality that one or more recipients may expect.
- **Styling**: You can style the font size, family, and color, as well as text background colors and email footer formats, using a basic text style toolbar.
- **Subject line**: Tells the receiver what the message is about.
- **To field**: Where the email recipient name(s) will go for addressing the email. Emails can be sent to one or more people in the main To field. A related **CC field** can also accept one or more email contacts, and carbon copy (CC) is meant to indicate "informational" as a priority. The **BCC field** is a second related field referring to "blind

carbon copy), which hides the names/ recipients of an email from the other recipients who receive the email.
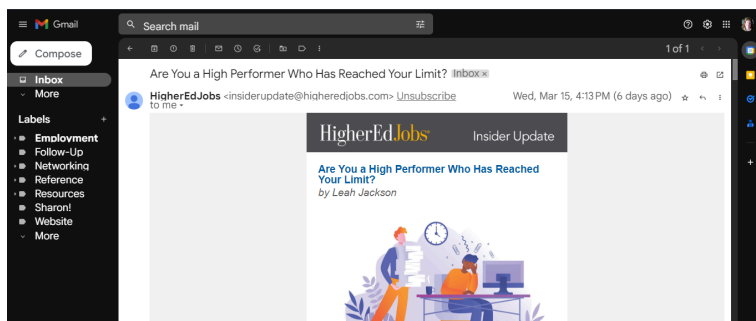
MedAttrib: author-generated. Example Email user interface.

There are usually additional email options available, depending on the service. These can include email views, spell-checking, creating default email footers, multi-step email filters, showing 'read email' status, automatic email tasks, etc. You will want to examine your own email account for options and how you personally want to prioritize using them.

Organizing Emails

These are some general tips and techniques for organizing and managing your email process and content. An instructor who is focusing on an email assignment will likely give you specific steps to accomplish in a more formal assignment, but this section can help the routine email user.

Your goal should be to keep your email 'lean and clean' – in reference to having a quickly emptied Inbox, easily organized email message storage files, and the ability to find and handle emails as needed. Inbox Zero is a 'thing' – a practice to look at and get all emails out of your active inbox so that you keep up with communications and can focus on incoming emails without clutter. People can get tens to hundreds of emails a day, and an ignored or messy inbox may look dramatic and like lots of work is happening, but it can also cause a lot of important stuff to be overlooked and ignored. In school and in the workplace, part of your job is to be accessible and responsive, and to do your part to communicate and complete work

product on time with minimal confusion with and for others.

Email account tips

- For your own use, create/use a main email account for important personal business like your bills, online shopping, school-related items, and job-related emails that are not part of your actual workplace emails.
- Create a secondary email address for 'disposable' and marketing-related emails so they don't get in the way of your main email account's email messaging. You may sign up for a newsletter, or discounts, or at a gaming company's website; keep all that separate from your primary email address.
- Choose a basic and professional-sounding email address, especially for anything routinely serious. Using something like *KissTheStudent1234@gmail.com* does not inspire confidence, especially when looking for jobs or handling serious personal business.

- Develop an email password protocol that you will remember, that uses strong passwords, and that you can update regularly.
- Don't download or open attachments, website addresses, or ads in your email unless you really *really* want viruses and ad/malware.

Email handling

- Handle incoming emails a couple of times a day and act on them / get them out of your inbox right away so you know what is new and needs a response.
- Create several email sorting folders/labels for handling priorities, like Hot, Reference, ReadMe, Meetings, Pending, etc. Email folders/labels can also have sublabels, like Products >Orders, Books, Computer.
- Once a quarter, clean folders to get rid of or archive past-current emails from, say, at least a year earlier. Get emails out of your face.

- ◦ That being noted, keep any email receipts and notices about ordering / product problems for longer, in case you need to solve a problem. Same for school-related emails and emails about any conflicts, with any needed login information, etc. Just organize them out of your inbox and active folders.
- Use your own outgoing email signature footer to give information. For instance, a signature usually gives your name, contact information, and maybe company name and job title. You can also add a useful line of text as needed. In my own case as an instructor, I always add something like the following to my outgoing email signatures: "*Students: Our next due date is Friday, March 24, before 11:59pm. Please review the current Section's Overview/Resources pages, the FAQs, and announcements if needed.*"

Clean Accumulated Email

- Do a fast sort of your emails from top to bottom which can make sure the most recent are at the top.
- Review emails you received from **NOT People:** These might include newsletters, ads, spam, mail listservs, etc. Consider deleting all you can since you likely don't need these, then sort the rest into other folders.
- Review emails to **NOT you**: These can include forwarded emails for your info, CC'd emails so you have a copy, listserv emails to a group, and emails to a mailing list with other people besides you. Consider deleting all you can since you likely don't need these, then sort the rest that has resource/reference information into folders.
- Review the remaining unread email: Look for anything that really seems urgent, like emails with an action-needed Subject line, priority, sensitivity, and read-receipt attached to it to get your attention. Sort/ delete the rest as needed, and take care of

the rest of the business.0

- Act upon emails **to YOU from a real person:** These are the priority emails you should want to get to and handle quickly. They could include specific-to-you homework issues, work benefits deadlines, work product/process follow-up, a calendar request for a task or online meeting, etc.

Limit Outgoing Emails

- **DO send one email at a time when there is a specific need:** Different subjects may actually need *different* decisions, and in this case, don't lump 3 or 4 separate topics for discussion and decisions in a single email. The recipient may also be sorting emails for reference and later needs.
- **Don't send many low-priority emails when one will do:** Use your drafts or a notes app to keep track of things that you want to send people that are **not** urgent or don't belong to a specific project. Once you hit three things (like a couple of

newsletter links and a quick question),
then send the email with three things
instead of sending three separate emails.

· **Don't choose Reply-All:** Don't start an
email chain where everyone has to
respond to the whole group and people
end up being spammed when they don't
need/want to be. The fewer people on an
email, the fewer responses you'll get back.
Consider using reply-all **only** if more than
one person needs to know the email was
responded to, if your response will
influence others, and/or if the email
impacts maybe 4 out of 5 people on the
chain, AND let the recipients know if it is
an info-only email or who needs to take
action.

· **Give yourself time to back out:** If an email
may be a little challenging, or you might
not have quite enough information, you
might hold the email in your outbox for a
couple of minutes, or even overnight, to
think about it. Better to be kind, gracious,
accurate, and professional than to be fast
and inarticulate.

· **Send fewer emails:** If you send out fewer

emails, you will receive fewer. Always ask yourself if an email needs to be sent out or if it can wait until later. Is it specific to a school or work product, or a confidential matter between you and one other person (like in Human Resources), or a necessary communication about something you need to get handled and have a "paper trail" on? Or, is it something the other person has to weed out?

· **Use Blind Carbon Copy (BCC) more:** BCC is a way to keep people in the loop even when they are not the primary person an email is intended for. BCC on emails prevents other people from using to hit "reply-all" to spam the whole group. The Bcc'd recipient will know the email is sent without being subjected to all the chatter that happens afterward. It is also good if you want to include someone who may be affected by the email planning but hasn't been included, like a supervisor, or another colleague who may be interested but not yet involved.

· **Use email positively:** Avoid email as a way of breaking bad news to someone, if you

are upset, or if you are resolving a conflict. These things need face-to-face / a phone call / online conferencing so a discussion can happen, body language and voice inflections can be added, etc.

Limit Incoming Emails

- **Mark It as Junk:** If you can't unsubscribe from something, consider marking it as junk. It will go to your junk mail folder so if you really need it in the next 30 days, it will be there, but it will also not be in your inbox and it will automatically disappear.
- **Move it to something else:** Do you have a blog you follow that you get emails about? Instead of getting an email for it, sign up for an RSS service or just set a time on your calendar to go read the blog. If you are getting notifications from a service, just schedule a time to check that service instead of getting notifications. This goes for Twitter, Facebook, Slack, etc.
- **Turn off notifications:** People often use emails as a notification system. The

purpose of a notification is to get your attention. If your inbox is full, then any notification there will not get your attention, so it doesn't help.

- **Unsubscribe:** Unsubscribe from anything you can manage. Before you make a rule or a workflow in how to handle something, decide if you really need it or not. An easy way to determine if you need something is by looking at how many of the emails from that subscription are unread.
- **Use rules**: If you can create in-box rules, do so. You can sort emails by subject, by sender, by colorized category, and by keyword into other email folders so that you you have them but don't need to read them immediately. You can even use rules to leave emails unread (important stuff to YOU) or mark them as read (listservs, newsletters, training offers).

Email Crafting

BE the organized person that you want to get

emails from. Help others get your message and act on it fast so you don't have to wait around.

- Always identify the purpose and action needed in your email Subject. Examples:

    - ACTION: BUS108 Assignment question for Ch6Activity2
    - RESOURCE: URLs to Twitch Streamers you requested
    - QUESTION: Absent tomorrow, need timesheet now?
    - NOTE: Not available for this week's Fiscal Subcommittee meeting.
    - REFERENCE: Steps for new "ghost students" drop process.
- **Don't** use a bunch of abbreviations, acronyms, misspellings, slang, or treat the email like a dashed-off text message to your best friend. Your instructor, supervisor, or service provider (tech help, shopping vendor, billing agent) don't want – or have time – to interpret inarticulate info.
- Use a simple and consistent email content structure that immediately tells your reader *who, what, where, why, how* and

when. Assume your email receiver will **not** know everything you know and give them the info the first time. (Example below). No one has time for little bits of information dribbled over 4-5 emails – **especially your instructors.**

- Provide specific information, and a visual (or audio if appropriate) example, like a screenshot of the error message, or of the item giving you trouble.
- End your email with a call to action and a timeline.
- A "thank you for your time" or other kindness in closing makes a social and kind difference.
- Check your spelling.
- Add priority, or sensitivity, or a read receipt only if really needed. If every email from you is a rush, *none of them will actually be treated as a rush*.

EXAMPLE EMAIL

Subject line: ACTION: BUS108 Assignment question for Ch6Activity2

Hello. I have a question on Ch6Activity2 for the MS Word section, which is due in two days. I have already read through the chapter, followed the instructions, and also looked at the demo video link you posted in the assignment summary.

However, I can't get the color scheme to look like the assignment requires. I don't get the blues and blue-greens in the MS Word color palette that the chapter refers to. I am working on a Mac, and the palette choices look different than in the video demo.

Here is a screenshot of what my assignment looks like now (embedded or attached). Can you help me understand why I don't have the color choice and what I can do?

Thank you.

Result:

This covers who (the student), what (Assignment problem **and** what the student already tried **and** an example screenshot),

where (Ch6Activity2), why (color palette isn't giving correct options), how (question of how to fix) and when (due in 2 days). As the instructor, I would likely recognize that the student might not be using the specific color palette mentioned at the beginning of the chapter, which means they are accessing a default MS Office color scheme and not the BlueGreen palette the assignment actually asked for. Or, I might ask the student for a screenshot of the available Mac palettes so we can pick a close similarity. An easy fix, well before deadline!

Chapter 7: Microsoft® Word®

- Word Processing Software
- Microsoft Word
- Documents
- Text / Paragraph Formatting
- Document Formatting
- Inserting Items
- References/Citations
- Review and Distribution

A word processor is software or a device that allows users to create, edit, and print documents. Software enables you to write text, store it electronically, display it on a screen, modify it by entering commands and characters from the keyboard, and print it. Of

all computer applications, word processing is the most common.

Word processing has evolved into much more than words typed on a piece of paper. It is a means to communicate with others through letters, flyers, essays, articles, research papers, books, and reports. It lets a user create content for websites, graphic design materials, blogs, and publications. Modern word processing software and applications are integrated into the cloud. If you save your documents to your cloud-based storage, you can retrieve them from any device and continue to work with and share your documents.

Word Processing Software

Word processing software can be part of an integrated suite of tools, or be stand-alone. It can be installed on a computer for full and robust features and integration with other resources; it can be accessed on the web in a light format, and it can be a basic utility tool, like text editing applications. Some programs/

suites are payware, such as those used in many workplaces; others are shareware or freeware. Information in this chapter should offer you transferrable skills for use in any word processing application.

Common word processing software:

- **Apple Pages**: Included with most Apple devices. Real time collaboration for creating, modifying, sharing, and distributing word processing documents.
- **Google Docs**: Integrates with other Google Apps, Q&A feature, has advanced word processing features.
- **MS Word:** Available across many platforms including mobile devices for ease of use. Integrates well with MS Office.
- Smartphone apps that allow for quick use and editing on-the-go.
- Word processing apps in free/open source office suites.

Since Microsoft® Word® (MS Word, Word) is widely used in industry, and we are using Microsoft® Windows®, we will focus on Word going forward. There are many similarities

across word processing software, so the skills we are learning can be translated to other software and apps. The following *Try Me activities* are designed to be completed using the downloaded version of Microsoft Word in Office 365 on a PC with Windows 10 or higher. While MS Office Online is a great free app, it won't provide all the support and built-in options the full version does.

Microsoft Word

Microsoft Word is a productivity word processing program. It is primarily used for text-related tasks, like correspondence, lists, reports, publications, etc. It can have added visual communication items like tables, clipart, images, and SmartArt hierarchy graphics. It has support for use in a MS Office workflow with Excel, Access, PowerPoint, and Outlook.

DEMO EXAMPLE follow-through

- In your Computer desktop area, look for

and use the relevant start menu to navigate to your activities files.

- *Per the Using this book as a course section, you can create, then save activities files in your BUSTECH directory, Activities folder, MS_Word subfolder. If you plan to use a provided file, make a copy for your working subfolder so that the original file will remain untouched.*

Accessing Word

- In your Computer, use the relevant start menu to open MS Word (look for **little blue icon**). On a PC this is a start button on the keyboard, and/or menu on the lower left of the screen. On a Mac, this should be in the top-screen Menu option.
- Word will open with options to create a blank file, open an existing file, and use templates.

The User Interface (UI) menus
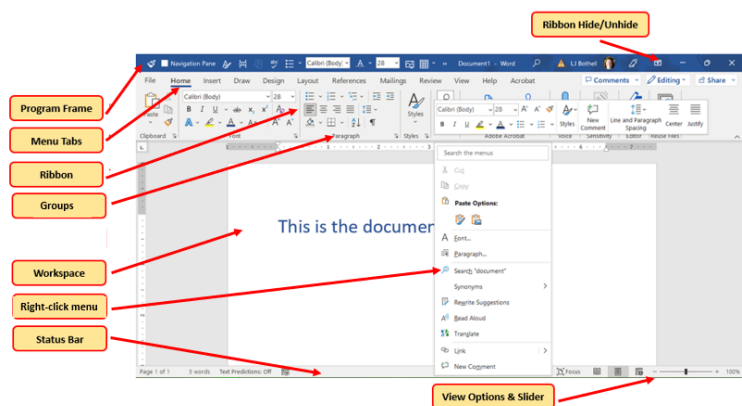
MedAttrib: author-generated. MS Word user interface with context dropdown menu.

In Word, the user interface contains several menu tabs (**tab, menu**), with 'Ribbons' (**ribbon**) that display **icons** (like buttons) with text descriptions of various activities related to a task. On a ribbon, you will often see groups (**group**) of icons for tasks that relate to one another, like the Home ribbon's Font group, Paragraph group, etc. Some of these icon buttons will do a simple task in one step, while others may open a panel (**panel**) which is a detailed, multi step or tab window of options. Sometimes you may instead see a context

dropdown (**dropdown**) menus of options, or a dialog box (**dialog**) with a couple of fields to complete.. Shown (in the program's order) are:

- *File*: Accesses the program backstage area for various options. Set your preferences for workflow and productivity.
- **Home**: Basic text functions like formatting, positioning, styles.
- **Insert**: tables, images, shapes, charts, page sections.
- **Design**: themes and related items
- **Page Layout**: Layout of the pages, including margins, positioning, indents, etc.
- **References**: Used for research papers needing footnotes, endnotes, tables of contents, etc.
- **Mailings**: Allows mail merge from spreadsheet or database table data (like names and addresses).
- **Review**: Spelling, language, document change tracking, etc.
- **View**: screen views, rulers, gridlines, windows.
- **Additional add-in/specialty tab menus**:

These are dependent on having MS Word-related add-ins like Acrobat, a reference manager, etc.

- **Contextual tab menus**: These are contingent on a specific item in the program's workspace being activated. For instance, clinking on an image, table, or header / footer will activate a context menu/ribbon on the right side of the UI that shows a menu dedicated to actions that can be done specifically for the active item (picture editing).

We'll cover more detail on specific Menu toolbar ribbons in the following demo sections.

Documents

Documents are made up of pages with content. This whole book is a document. Their common MS Word file extension is **.docx**. They can contain:

- Text paragraphs and lists
- Images, tables, SmartArt, shapes, and clip

art

- Headings, subheadings, captions, and paragraph text
- Page and section breaks, columns, and header / footer information

Views – View Tab

- You can see different views as part of the main interface – lower right-hand side of the user interface, and also from the View tab's ribbon.
- You can set rulers on or off.
- You can also set guides for aligning text and images.
- You can choose the window view you like to work in, such as draft, outline, and print layouts.

Preferences – File tab

You can set your Word program preferences for documents and program workflow, for

smoother productivity, in the 'backstage' area of the program.

- Same layout as PowerPoint, Excel, and Access
- Allows personalizing, print, save, and publish settings
- **Preferences**: Word Options:
- Customize editing, saving, and other program options
- Personalize a mini-toolbar so you can minimize the ribbon

Text / Paragraph Formatting

Paragraphs

In word processing "paragraphs" refer to batches of text, with headings, paragraphs, lists, etc. Paragraph formatting includes indenting, spacing, and alignment. For instance, the alignment of text can be left, right, centered, or justified alignment; *this paragraph is in Left alignment.*

Creating new text

If you don't yet have text to work on yet when creating a document and setting paragraph formatting to use later as a saved style, consider using Lorem Ipsum, or one of its variants. Fun text fillers can include KittyIpsum, BaconIpsum, or ZombieIpsum. You can find Ipsum generators free online and copy/paste gibberish paragraphs into your document so you can play with some chunks of text. Let's try some KittyIpsum now!

[Nap all day cat dog hate mouse eat string barf pillow no baths hate everything but kitty poochy. Sleep on keyboard toy mouse squeak roll over. Mesmerizing birds. Poop on grasses licks paws destroy couch intently sniff hand. The dog smells bad gnaw the corn cob.]

Home tab – Clipboard Group

At the very left of the Ribbon is the clipboard group, which is a small set of tools you can use in relation to when text, images, and styles

have been saved to the clipboard as you work. Clipboard-related activities include:

- Copy
- Cut
- Paste
- Redo
- Undo
- Paintbrush
- Moving info by dragging

Format Painter – Home tab clipboard group

- Allows you to "capture" an existing style and apply it to any object you click on
- Single-click applies once
- Double-click locks so you can reuse it

Understanding the clipboard

See the Clipboard Pane by clicking Home tab/ Clipboard section expander icon

- Can "store" numerous pieces of text and images
- Items are stored temporarily (in RAM) until the program is closed
- You can also delete items off the clipboard
- You can store them and then choose which one to paste

Home tab – Font Group

"Fonts" refer to the letters (characters) used in text. Font formatting includes resizing, changing the font family, adding bold or emphasis, adjusting spacing between letters, and more. You can right-click on a word or cluster of words for the contextual menu, or use the Home Tab's font group options. These include:

- Style (font family)
- Size
- Color
- Bold, italics, underlining, strike-through
- Changing text case
- Effects like highlighting

- Advanced formatting, like spacing
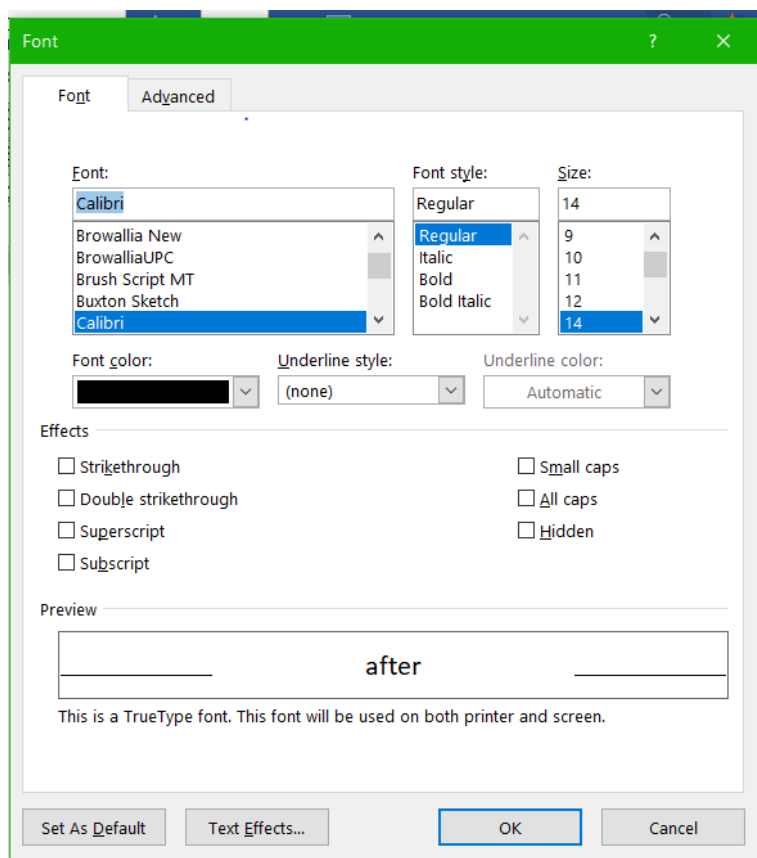
MedAttrib: author-generated. MS Word Font panel.

Home tab – Paragraph Group

You can modify your paragraphs in several ways. You can right-click on a piece of text, and choose "Paragraph" from the contextual menu. You can instead select some text, and use the Home ribbon's one-touch paragraph group icons. You can also select some text, and choose the Home Tab's paragraph group panel opener. With any of these, you can do:

- **Alignment**: Determine how text will appear in a document: left, right, centered, justified
- **Spacing**: Single, double, and other-width spacing between lines in a paragraph
- **Indenting / Tabbing**: Set tabbed indents, or pre-set first-line or full paragraph indents
- **Call-out:** Use bullets or numbers in lists
- **Shading**: Paints background coloring behind a paragraphs of text
- **Borders**: Applies lines above, below, and/or around paragraphs of text

Paragraph panel

The paragraph panel, which you can open from the lower right corner of the Home ribbon's paragraph group, reveals a panel with several tabs of options.
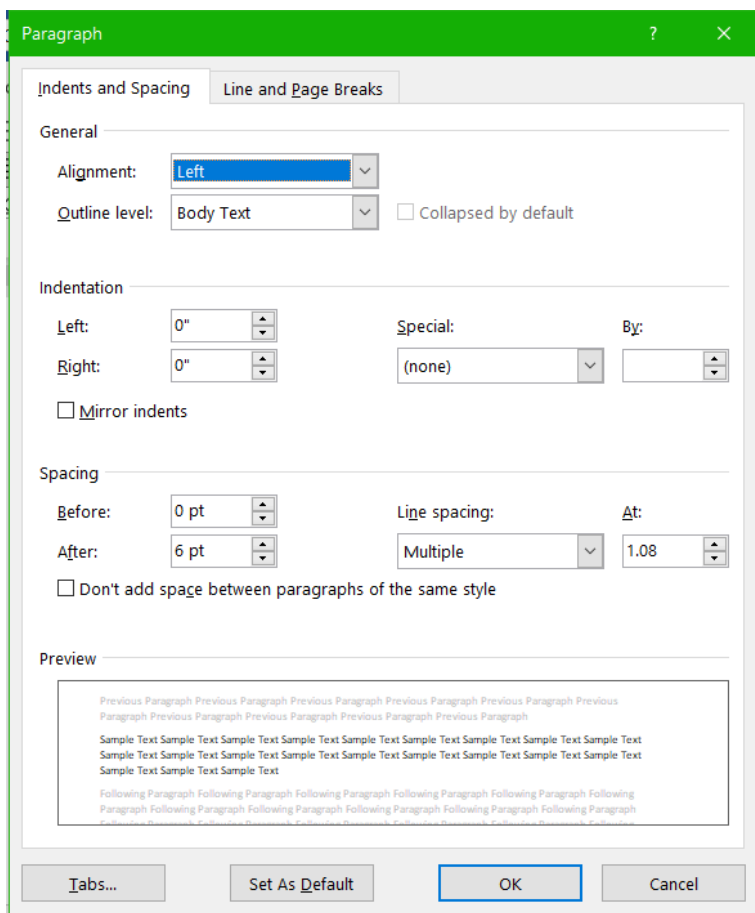
MedAttrib: author-generated. MS Word Paragraph panel.

- Spacing before and after
- Specific indentations
- Line spacing
- Tab stops
- Line and page breaks

ACTION: MS Word Try Me Activity #1

Let's do a few basic text formatting tasks. If you have Word open, let's use the **Word_textbasics.docx** file that should be in your DataFiles folder.

- If Word isn't open yet, open MS Word.

On the start screen, or from the File tab, choose to open a file. You will likely need to navigate through your computer to find the file. You can do this from the File tab's Open screen by selecting Other Locations/Browse, then browsing to wherever you stored your BUSTECH directory, then to the DataFiles folder.

- Look there for the **Word_textbasics.docx** file, then open it.
- Next, and this is important: Use the File tab again, but choose **SAVE AS**. In the navigation window, back out of your DataFiles folder, then enter the Examples folder then into your **MS_Word folder**.
- Then, save your file as **Word_textbasicsWork.docx**.

This gives you a saved copy of the file to work on, while still leaving the original copy of the file in the DataFiles folder.

With your **Word_textbasicsWork.docx** file open, you should see plain text that starts with *Get involved*! We'll use this for basic text formatting practice. Our goal is to simply use several Home tab Font group and Paragraph group options to make the document look more readable. Just follow along!

- Select the text **Get involved!** This is at the top, and is the title.
- Use the Home tab's Font group to find the font size, and change the Get involved! Text to **24**, This represents 24 points (a

point, in text, is just the character size).

- Then, use the **Bold** icon to make the text bold.
- Next, use the **Font color** icon to choose a dark color you like, such as dark blue, dark orange, etc.

The title should now be larger, bold, and a different color.

- Click away from the title, then select all of the rest of the text, so that we can change the font type (font family, font face).
- With the text selected, use the Home tab's Font group **Font selector**, and look at the existing font. Depending on your computer, it is likely Times New Roman (or a variant of Times).
- Choose **Arial** from the Font dropdown list (click the arrow to activate that).

Next, let's adjust the spacing of the lines from each other. In the Home tab's Paragraph group, choose the Line and Paragraph Spacing icon, then choose 1.15. This gives a little more space between text lines.

- Choose the Line and Paragraph Spacing icon again, and click the **Add Space After Paragraph option**. That doesn't affect all lines within a paragraph (clump) of text, but between the paragraphs.

However, this doesn't look much easier to read, because there are a lot of one-line paragraphs. Several are actually a list of things for the sentence How can you get involved? Let's make those bulleted list items.

- Select only the 8 lines, then in the Paragraph group, click the **Bullets icon**. The 8 lines will close up together and show a little round bullet in from of them.

TIP: List Items. Bullets in a list tend to be for listing things in no order of importance. A numbered list is for if you have steps in order, or a list with items already in order of priority.

Now, let's add just a bit more emphasis to the document's text.

- Select the line How can you get involved? – which should not be in the bulleted list.
- Use the **Italics icon** in the Font group to italicize the line.
- Select the line What would YOU like to do? – which should not be in the bulleted list.
- Use the **Bold icon** to bold the line.
- Select only the word YOU in the line, and use the **Underline icon** in the Font group to underline it.

Now, let's establish an important habit.

- **SAVE your work as you go**: the Use the File tab's Save command, or the Quick Access Toolbar disk icon. The keybind shortcut is CTRL S / **MAC Users:** CMD S.
- Keep this file open for the next steps.

Get Involved!

Getting involved is the single best way to change what's important to you.

Word processing communication standards are pretty simple: figure out who your audience is going to be, then communicate your message and needs to them in a way that thy can best understand.

You can make changes in your neighborhood, community, city, county, state, and even nation!

How can you get involved?

- Volunteer where you see an important need
- Mentor someone
- Write a proactive blog on something helpful
- Join a local campaign for someone you respect
- Register folks to vote
- Donate food and used goods
- Be a tutor
- Help a neighbor

What would YOU like to do?

Let's brainstorm!

You can control more of your own world - and make a bigger difference – than you think!

MedAttrib: author-generated. MS Word user font formatting.

Let's practice with the Home tab's Clipboard group.

In your currently open **Word_textbasicsWork.docx** file, select the last line of text.

- Copy it by using the Home tab's Clipboard group **Copy icon**.
- Press Enter twice to add space to the bottom of the page.

- Paste the line of text by using the Home tab's Clipboard group **Paste icon**.
- Press Enter once to add a paragraph space.
- Paste the line of text *again* by using the Home tab's Clipboard group **Paste icon**.
- Using the bold icon, make the *first* of the two lines **Bold**.
- Then, select the newly bold line, and then click on the **paintbrush icon** in the Home tab's Clipboard group. The icon will change color a bit, which shows you have 'loaded' the format painter paintbrush with the bold style of the line of text.
- Then, with the paintbrush loaded, select the 2nd line of text. This should turn bold as well.
- To undo the last step, you can use the CTRL Z shortcut/ CMD Z for MAC.

Keyboard Shortcut > UNdo. The Quickbar usually has the Undo icon on it (looks like a backwards curved arrow, but if it doesn't, learn this keybind: CTRL Z shortcut (CMD Z for MAC users.)

Keyboard Shortcut > REdo. The Quickbar usually has the Redo icon on it too (looks like a forwards curved arrow, but if it doesn't, learn this keybind: CTRL Y shortcut (CMD Y for MAC users.)

- You'll be using these skills all through learning Word, so we'll pause here.
- **SAVE your work:** CTRL S / MAC CMD S. Close the file. **MS WORD ACTIVITY #1 FINISHED.**

Document Formatting

Text and paragraph formatting are parts of what happens in a document. This section is about the overall document itself – how it will present when printed out and consumed by

users. Document formatting is characterized by actions that can affect the whole document, and in so doing, add efficiency and steps-saving to general text and paragraph formatting. These include document layout, themes and styles, headers and footers, and some use of sectioning.

Setting up documents – Page Layout tab

The Page Layout tab allows you to set the physical format of your page, which is a good starting step in word processing work. This determines how large the paper used will be, the margins, the orientation of the document, etc. In the Layout tab's ribbon, you can use the page setup group icon dropdowns, or the group's panel activation arrow, to accomplish (in order of page setup group):

- **Page margins**: the white space around the edges of a page that won't be printed on , and also which adds white space around a document's content for viewability. Normal

gives a printed document lots of white space at the top, bottom, and sides of the sheet of paper, and is often used for papers and business documents. Narrow gives less, and isn't very effective for business documents. Moderate is somewhere in between and is useful for casual use.

- **Page orientation**: the height and width direction of a page. Default and common use is Portrait, in which a document is taller than wide. Horizontal can be useful in reports and presentation style formats like brochures, flyers, and documents which might import wide tables and graphs.
- **Page size**: the paper size of a document, even if it never is intended to be printed on paper. Users may choose to print the document, print a PDF, and or take a screenshot image for later printing/pasting into another document. The default is 8.5 x 11 inches, with other common page sizes being legal (8.5 x 14 inches), and ledger (11 x 14inches). Other listed sizes may be legacy for office

documents.

- **Columns**: A page's content defaults to being one-column – page wide from the left to the right margin. It can be changed to two or three or multiple column numbers. If it is, it will reflect through the entire document unless special column breaks, or special unlinked document sections are created, and the different column number used in only a section.
- **Breaks**: You can create a new page break, a break to begin and end a different column style, or wrap text around an inserted image, and add new section breaks.

Designing documents – Design tab

Themes apply decorative styles to your Word document, such as fonts, colors, effect options, paragraph spacing, etc. They can give a set of documents a consistent and attractive appearance and make your word processing efforts look more professional. In business, they

are best used as part of a "package" of documents, such as a letterhead and envelope set or as part of a report style. They can enhance what you want to communicate by adding company branding colors and fonts. You can also:

- Make your document more readable than just black-and-white text
- Tie consistent inserts, like shapes and borders, together with the rest of the document's "look"
- Use different colors and font styles to punctuate headings from text
- Help your reader respond and/or act in the way you need, and
- Easily update the whole look of your document just by changing the color or font variants

Design: Theming / Design Tips

Using themes can be a double-edged sword. While they can add attractiveness to your documents, they can also, if misused, make

your work look confusing, be hard to read, and muddy your communication message. Certain types of work should not use themes, like cover letters and resumes, which are routinely expected to be plain and standardized and which the receiver will likely scan into a program for database acquisition.

- Choose theme colors that make sense for the product, service, or idea(s) you are trying to communicate.
- Choose theme backgrounds that have good contrast and allow text to be very easy to read.
- Choose fonts for readability, based on need for headlines, lots of paragraph texts, easy bulleting, etc.
- Remember that less is more – more colors and font variations in one document can look unprofessional and take away from your message.
- Use themes only when you have full control over your own document – if you have an instructor or employer who does not want them used, then instead focus on using a template of the required styling.

Design: Theme Variants

Theme variants let you change aspects of a theme you select to apply a different core font family to it, or to change the color palette it will work with.

- **Fonts**: Font families in themes are designed and sized to be readable and hopefully scannable by screen readers for accessibility use. The style will offer a font for titles/subtitles, and another for general text. Available font families come installed with the computer's operating system, and may also be accessed from the word processing software's installation or cloud-based accessories.
- **Color Palettes**: Like fonts, color palettes are included in a style, and can also be changed independently to modify and create a new style. For instance, the overall design style of a theme may work for you, but the color palette assigned to it may not have enough contrast for your audience, or your company may focus on a different rage of core colors.

- **Effects**: These are subtle styles that can be attached to some inserted items, like image borders, shapes, SmartArt, etc.

Theme Additions

- **Paragraph Spacing**: This allows you to modify a theme's look of document line formatting between paragraphs.
- **Page Color**: This allows assigning a color to a full page of a document, and acts as if the paper itself would be that color.
- **Page Borders**: This allows assigning a border to a full page of a document.
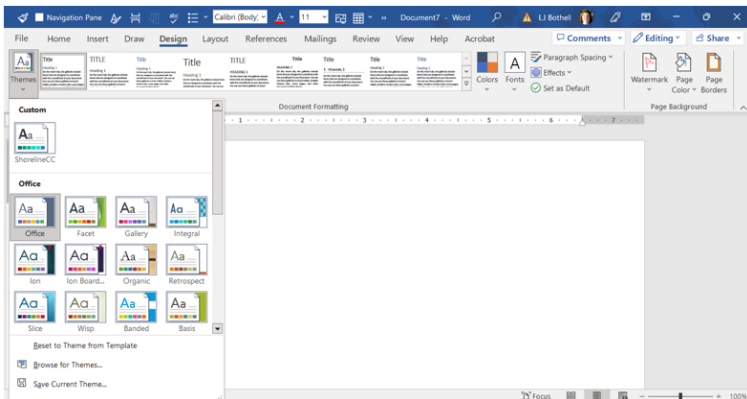
MedAttrib: author-generated. MS Word Design/Themes.

Let's do a few document formatting tasks. Let's use the **Word_resumestarter.docx** file that should be in your DataFiles folder.

Before you start, you should use your file manager utility to make a copy of the **Word_resumestarter.docx** file that is in your DataFiles folder, then paste the copy into your Examples / MS_Word folder.

- If Word isn't open yet, open MS Word.
- In the File tab Backstage area, choose to open a file. Use the browser dialog panel to locate the **Word_resumestarter.docx** file that should be in your Examples / MS_Word folder, then open it.

You should see a couple of pages of plain text that starts with information about cover letters. We'll use this for document formatting

practice. Our goal is to simply use several Word options to modify this document:

- Home tab Font and Paragraph group options
- Design tab Document Formatting group options
- Layout tab Page Setup group options

In creating/inheriting a plain document, it is efficient to go from the big changes down to the small ones. The big changes tend to be those that affect the whole document, like its margins, page size, and theme, while smaller changes affect parts of the document, like a paragraph, a word, an image, etc. We'll take this approach, rather than using the Word tab ribbons in order that they appear in the user interface.

Let's learn about document layout in practice. A word processing document is going to be distributed in some way so that it can inform others – as a cover letter, a brochure, a report, a research paper, etc. For others to get at the information – whether printed or by email attachment – it needs to be readable,

accessible, and **not** visually confusing. Layout options help structure the content of a document into a useful format.

- Click anywhere in the Word_resumestarter.docx file. Layout settings are not depended on choosing specific text. Use the **Layout tab Page Setup group** for the following tasks.
- Select the **Margins** tab, and consider the options. Moderate is somewhere in between, and we will use it. Using the **Margins** icon, choose **Moderate**.
- Select the **Orientation** icon; the document is set to landscape, which is too wide for cover letters and resumes. Choose **Portrait**, which we will use for a standard taller-than-wider document appearance.
- Select the **Size** icon, which is set to default to Legal size. This is also too large, so choose the **Letter** (8.5×11 inches) option for standard paper size.

There is one more layout change we should make, but this one does require you to place your cursor specifically. We need to formally

separate the cover letter page from the resume page, and we can use a Section break to do this.

- Click just before the first word of the line that begins *A resume is one required*... With your cursor just before the word A, use the Layout tab Page Setup group **Breaks icon** and choose the **Page** break option.
- **SAVE your work as you go**: The keybind shortcut is CTRL S. **MAC Users:** CMD S.

Now, Use the **Design tab Document Formatting group** for the following tasks. Again, you can be anywhere in the Word_resumestarter.docx file, since Design isn't dependent on selecting specific text.

- Click the **Themes** icon, which opens a panel that has icon examples of a bunch of themes. The document is using the default Office theme, which you can identify because it seems to have a gray selection shadow around the theme icon.
- Let's choose the **Basis** style (Macs may not have this; if not, choose something else

that looks easy to read.)

- The color palette for the Basis style might not appeal to you. For cover letters and resumes, colors are **not** good. Click the **Colors** icon to see a dropdown list of color batches (palettes) to choose from, and select **Grayscale**.
- The fonts palette for the Basis style also might not be something you like. For a cover letter or resume, fonts should be easy to read.
- Click the **Fonts** icon to see a dropdown list of Font combinations (palettes) to choose from, and select one you like better.
- Cover letters and resumes don't usually use effects, but you could click the **Effect** icon to see what options are available for adding a little pizzazz to items you can insert into a document, like shapes, images and their borders, etc. Pick one if you'd like.
- SAVE your work: CTRL S / MAC CMD S.

Let's deal with paragraph formatting using the Paragraph panel. You do not need to select text for this, just click anywhere in the document.

You can access this from the Home tab's Paragraph group, which has a small arrow in the lower right corner of the group that opens the **Paragraph panel**. There are two tabs; we will focus on the first – Indents and spacing.

MedAttrib: author-generated. MS Word Paragraph panel indents tab.

Cover letters and resumes don't usually use indents to the paragraphs; instead, the paragraphs have extra space between them.

- In the **Word_resumestarter.docx** file, the space after paragraphs is set to 10 pt; change it to 6 pt.
- The Line spacing is set to Multiple 1.15; change it to **Single**.

That should do it for this document's paragraph settings.

Now the document layout and theme design/colors has been set up. You can work on the more paragraph and text-specific activities.

We'll do a little refresher practice, but not too much font-formatting since we will use this document later for the Styles panel activities.

- Scroll to the top of page one. There are 3 lines of text which are all separate paragraphs, which have space between them. We should close these up.

- Make the 3 lines all text on one line instead, by bringing the second line up to the end of the first line, and the third line up to the end of the second line. You can use your backspace key for that, to get: *Whatever school Street address City state zip.*
- Place your cursor just before the word Street, then hold your shift key down and press Enter.
- Place your cursor just before the word City, then hold your shift key down and press Enter.
- On the first page, select the first half of the text of the first big paragraph. Your selection should end before the word **Hello**. With this text selected, use the Home tab's Italics icon to italicize the text.
- Take the same step for the text in Paragraph 2 that ends before **I am a multidisciplinary**.
- Take the same step for the text in Paragraph 2 that ends before **My portfolio is at**.
- SAVE your work: CTRL S / MAC CMD S.

On page 2, we'll do more of this.

- Italicize the first paragraph.
- In the third paragraph, italicize I often start with a short intro statement, like: .
- Now, just to practice Font formatting a little more, let's change the font face, size, and color for the subheaders on the 2nd page (resume) text.
- For **Objective or History**: Use the Home tab's Font group to change this to **14 pt**, **Bold**, **Dark gray** (choose a dark gray by sight.)
- Use the Home tab's Clipboard group's Format Painter to pick up the style and apply it to the other subheaders (see below). Select the formatted phrase Objective or History, and **_double-click_** the Format Painter icon, which will attach the style to it and be reusable for more than one application. Then apply the **Format Painter styling** to:
- Skills, Projects/Accomplishments, Experience, Education, Key Words
- When finished, click Once on the **Format Painter** icon to turn it off.

We'll use a variation of this document for Styles a little later.

- **SAVE your work:** CTRL S / MAC CMD S. Close the file. **MS WORD ACTIVITY #2 FINISHED.**
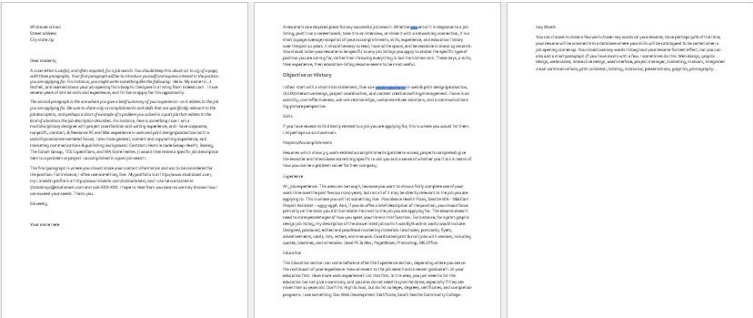
MedAttrib: author-generated. MS Word example resume starter file.

More advanced formatting

Styles – Home tab: MS Word allows you to create specific, non-theme-related styles for how your text, titles, subtitles, and references look. Styles WILL appear in a theme's use and affect the fonts used, spacing and layout of paragraphs, and even colors / emphasis of text.

However, they are not reliant on using different themes, especially if you have a goal of creating a new default set of styles for a document or future templates.

- There are basic Word pre-created styles. These can be used as is, or modified. This book modified several Word styles to create simplicity and accessibility-facing styles for screen readers and visual readers alike.
- You can change the Normal style – font used, paragraph and line spacing, etc.
- You can create new styles and apply them to other documents.
- You can also export styles to another program, like Adobe InDesign, for publication projects.

Using Styles

Using styles can make your work much more efficient and easier to update than just using one-touch editing. The time investment for using/creating styles for a one or two page

document might seem wasteful, but if you have more than four or five pages (think twenty-five or one hundred) styles make the most sense. They are also useful if you want to clear an entire style set and start from a theme's built-in styles.

Styles also make great sense if you want to replicate the look and feel of document text over and over again. You can save styles you create or modify. You can also adjust them with themes and palettes.

Styles affect every part of your text, from titles, headers, paragraphs, lists, and captions.

Applying styles

Basically, you want to apply styles, and save changes you make to your style types, early on in a document. That way you can have the style apply itself automatically as you develop your document – this method is best for documents that will be longer than just a few pages. However, you can choose to apply styles to an

existing document instead. Hust use the Home Tab's Styles options:

- Choose a style from the gallery, which will reflect colors and fonts that belong to the document's theme.
- Choose the Styles Options to open the Styles Panel so you can make specific style changes, add new styles, and save style modifications you make.
- Styles may apply to primarily paragraph text, or to fonts, or to both.

Style Outline/hierarchy

- Word reserves names for basic types of text used in reports, like headings, captions, body text, etc. Headings also refer to the core headings use in web pages and how headings translate to screen readers. For instance, this textbook uses the Title style once – for the book title. The section titles use Heading 2, the chapter titles use Heading 3, and the chapter segments use Heading 4. Other

styles you see here, like sub sections, use variations on the normal style – like bold subtitles, normal text, the bulleted lists, etc.

· When you use Word styles, each type of text is considered and styled.

· When you change a style, it will affect all the headings and body text. If you want this to not happen, consider creating a new style based on (no style).

· Keeping this outline/hierarchy in mind helps you keep your styling streamlined and easy to change later.

ACTION: MS Word Try Me Activity #3

Let's do a few document formatting tasks. Let's use the **Word_stylesstarter.docx** file that should be in your DataFiles folder.

Before you start, you should use your file manager utility to make a copy of the **Word_stylesstarter.docx** file that is in your DataFiles folder, then paste the copy into your Examples / MS_Word folder.

- If Word isn't open yet, open MS Word.
- Open a file, and use the browser dialog panel to find the **Word_stylesstarter.docx** file that should be in your Examples / MS_Word folder, then open it.

This document is a variation of the theme and layout document we worked with, but unnecessary text has been removed. The text that is there is a placeholder that you can replace with your own information so that you can really use this document for yourself.

Like when we worked on the document before, we want to take care of big changes that affect the whole document before we focus on specific parts like subheaders and lists. This document was previously set for the Basis theme and the Grayscale color palette, which will affect the Style changes we make.

- Select all the text in the document.
- Look at the current font currently being used: Times New Roman. We want to use the Basis theme's font styles and this text may not be that. Let's find out.
- In the Home tab Styles group, look for the

Styles group, and click on the **Styles icon**.

This opens a dropdown panel of available quick styles for simply clicking and using.
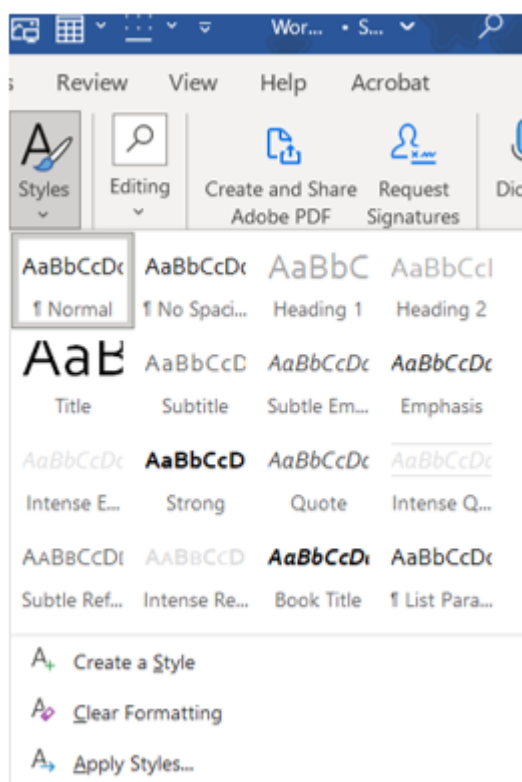
MedAttrib: author-generated. MS Word quick Styles panel.

With all the document's text selected, click on the **Normal** style. Even if the style seems to

already be selected, it might not apply to the whole document until you click it.

The text changes font face. Look at the Home tab's Font field, which now shows Corbel.

- Next, deselect the text.
- Scroll to the second page, and select the text Objective or History.
- Use the Home tab's **quick Styles** to change this to **Header 2.**
- Use the Home tab's Clipboard group's **Format Painter** to pick up the style and apply it to the other subheaders (see below). Select the formatted phrase Objective or History, and *double-click* the Format Painter icon, which will attach the style to it and be reusable for more than one application. Then apply the **Format Painter styling** to the subheadings:
- Skills, Projects/Accomplishments, Experience, Education, Key Words
- When finished, click Once on the **Format Painter icon** to turn it off.
- On the second page, select the 8 single lines below the paragraph that fall under Skills.

- Use the Home tab's quick Styles to change this to **List Paragraph**.
- SAVE your work: CTRL S / MAC CMD S.

Now, we've restyled the document with styles! But. . . it doesn't really look that accessible to read – the text is small, and the list of skills looks odd, and the headings of the resume seem. . . light and hard to read.

Now, we could change themes, or change fonts of the theme's design. However, that is not a useful process, since you may be using someone else's theme requirements. Also, Styles lets you easily modify styles even in a theme. And, if you like the modifications, you can save them into a new theme that you can reuse.

In your document, click into one of the paragraphs on the first page – just be sure to be in the Normal text we set.

- In the Home tab Styles group, open the **Styles modification panel** by clicking the small arrow on the lower right side of the group.
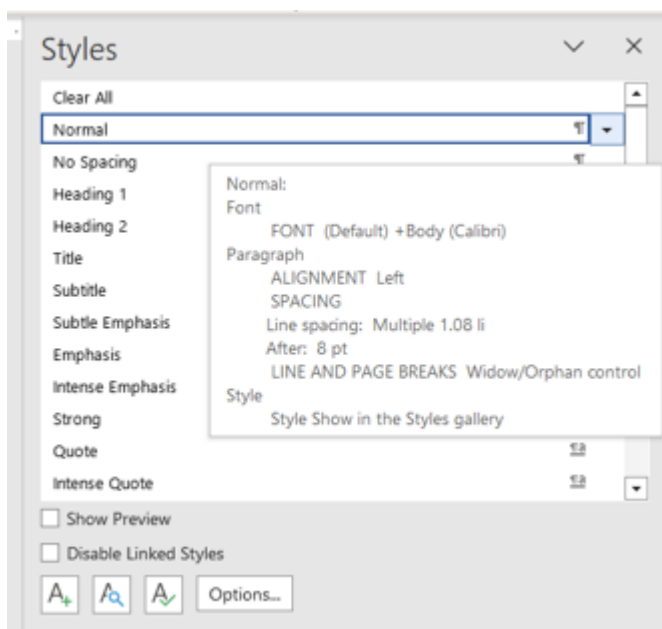
MedAttrib: author-generated. MS Word Styles panel.

- If you hover over the Normal style listed in the panel, you will see a pop-up that shows what the style is made up of. A style can include a font, paragraph styling, and more.

We want to change the Normal style so that it is easier to read. Right now, the document is mostly 11pt in font size. Let's change the normal style to 12pt size for a little more readability.

At the right side of each style name, you can see a little symbol. A **backwards P-like symbol** indicates the style has paragraph styling. That symbol paired with a **small a symbol** indicates the paragraph and font are both styles and also that the style is based on another style. Only a **small a symbol** indicates style has only font styling. Any of them can be changed. When you want to change a style, if you hover over the style, you will see a dropdown arrow to the right.

- To the right of the Normal style, click on the **dropdown arrow,** and choose **Modify**. This will open the **Modify Style panel** so you can modify a style's font, paragraph, tab, and other parameters.
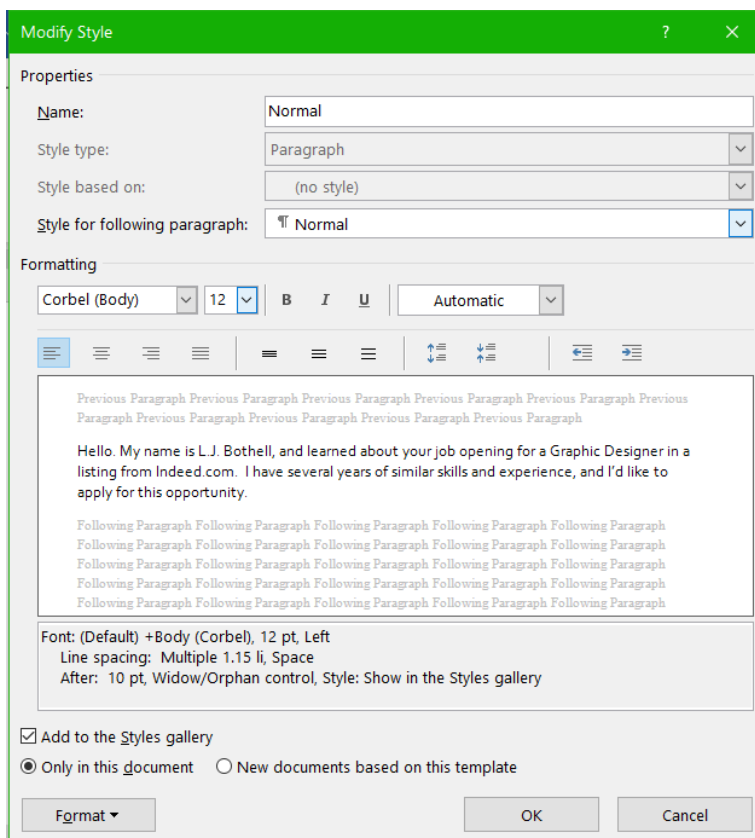
MedAttrib: author-generated. MS Word Modify Styles panel.

- In the panel, let's just change the **font size to 12**, then click OK, which will change the Normal style font size.
- Leave the Styles panel open.

In the document, you can see that the Normal text is now 12pt in size.

Next, click on one of the Resume headings, which we already changed to the style Header 2. When you plan to modify a style, you can be anywhere in a document, but to be sure you only influence a specifically-styled selection of text, insert your cursor in that text.

- In the Style panel, hover over Header 2 then click on the **dropdown** arrow and select **Modify**.
- In the Font area, observe that the style is 13 points and a medium gray in color. Change the font size to 14, and click the color to get a dropdown of the Grayscale color palette.
- In the palette, look for a darker gray, like **Black Text 1 Lighter 35%.** You can observe the color options when you hover over a selection.
- Click OK, which will return you to the Modify Style panel. Stay in here, so we can also change the Paragraph style to add more space before each of the resume headers.

- In the Modify Style panel, look to the lower left for the **Format button**, and click it.
- In the dropdown, choose **Paragraph**, which will open the **Paragraph panel**.
- In the Paragraph panel, change the Before space from 2 pt to **6 pt**, then click OK, and then OK again to exit the Modify Style panel.

Click in the resume's list of skills so that we can modify this style too.

- In the Style panel, hover over List Paragraph, then click on the dropdown arrow and select Modify.
- In the Modify Style panel, look to the lower left for the **Format button**, and click it.
- In the dropdown, choose **Numbering**, which will open the **Numbering and Bullets** panel.
- In the Numbering and Bullets panel, choose the Bullet tab. In that tab, choose the **round bullet**, then click OK. Stay in the Modify Style panel because we are not finished with this style.
- The bulleted list is indented further than

looks elegant, so let's also change that indent. In the Modify Style panel, click the **Format button** again, and select **Paragraph**.

- In the Paragraph panel, look for the **Indentation Left**, which shows .75. Change that to **.5**, then click OK, then OK again to exit the Modify Style panel.
- Close the Styles panel since we are done using Styles.
- SAVE your work: CTRL S / MAC CMD S.
- Leave this file **open** since we are not quite finished.
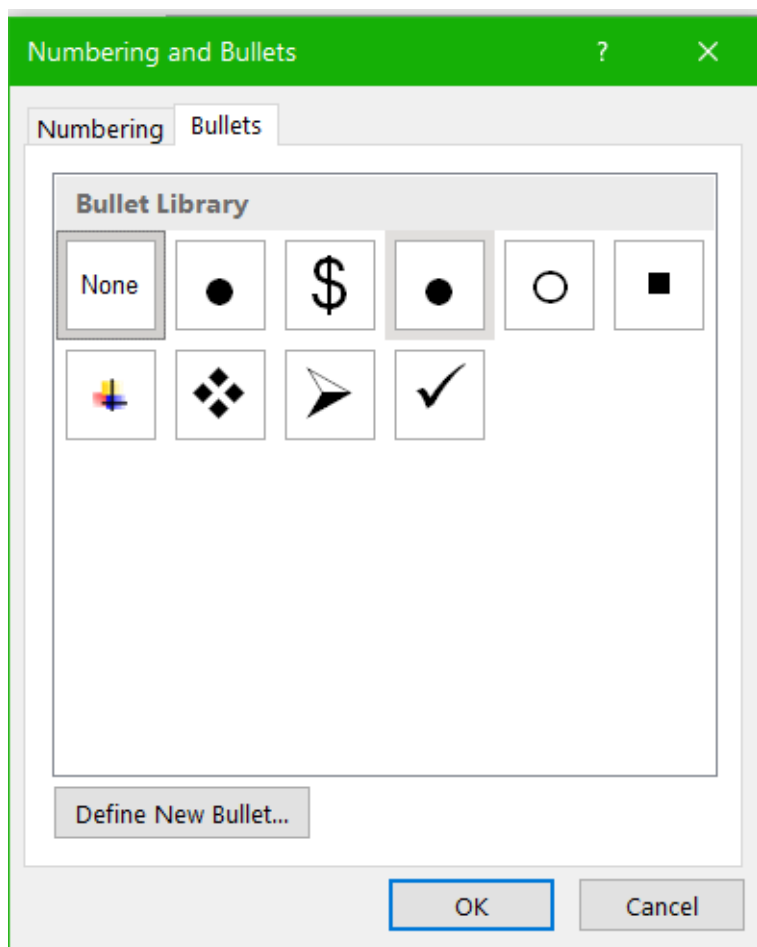
MedAttrib: author-generated. MS Word Numbers and Bullets panel.

Headers and Footers – Insert tab

Space on Word documents that can and should show repetitive information are called Headers and footers. This space appears in the margin space at the top and bottom of a page, and part of the Margins setup (Layout tab/ Margins) accounts for that.

- **Header**: Space between the top of your body text and the top margin of the page
- **Footer**: Space between the bottom of your body text and the bottom margin of the page

In Page Layout view, double-click the top or bottom space on the page to "open" them, or use the Insert tab, Header/Footer section. Once you access a header or footer space in your document view, a context Header & Footer menu/ribbon appears at the top left of your Ribbon space, which allows you to add various items:

- Date

- Page number
- Other document information, like location, file name, etc.

In our **Word_stylesstarter.docx** file, there is something important missing – primarily from the resume. What is it? The name of the person! The cover letter example refers to me (L.J. Bothell), but the resume does not.

We will use a Header to change that, and what we learn for headers can also be applied to footers.

- In the file, scroll to the top. Then, look in the **Insert** ribbon for the **Header & Footer group**. In that group, click **Header**.
- In the dropdown selection, simply choose the **first selection**, which will open the space between the top of your document text and the edge of the sheet.

TIP: Header & Footer. Headers and Footers can be managed the same way, with the Header & Footer contextual ribbon that is available when you are in a header or footer part of a document.

Us the Header & Footer contextual ribbon to look at the **Position group**. The Header is set to be .5 inches from the top, which is fine for this document. If text in a header needs more space, it will push down the text of the document. In our case, we are simply going to add one line of text.

- In the open Header space, type your name, a space, a dash, another space, then your email address. Example: *L.J. Bothell – ljbtrainings@studiobast.com*.
- If your email address automatically becomes an active hyperlink, don't worry about it just yet.
- Select the line of text you just typed, and use the Home ribbon quick Styles to select the style Heading 3.
- Then use the Home ribbon to change the line's alignment to Align-Right.

To close the Header and Footer, you can either choose the Close Header and Footer icon in its ribbon, or you can hover over the main text in your document and double-click that to re-enter document editing mode.

- In the Header & Footer ribbon, click the Close Header and Footer icon.
- **SAVE your work**, and close the file. **MS WORD ACTIVITY #3 FINISHED.**

MedAttrib: author-generated. MS Word finished styling example file.

Inserting Items

Inserts are basically anything you can insert into a word document that supplements your text content. Microsoft keeps changing the names of some of the inserts, and so will other word processing programs, so these are a bit generalized. You use the **Insert Ribbon** to choose what you want to add into a document.

- **Images/pictures**: image saved size, inserts as own entity (not affecting text), resize as needed
- **Clip art/online art/icons**: Provides access to local and online libraries
- **Shapes and Smart-Art**: For drawing objects, workflows, etc.
- **Text-related**: text box, header/footer, word art, drop caps, symbols, hyperlinks, etc.
- **Breaks**: You can insert page breaks, section breaks, and blank pages
- **Tables**: You can create tidy tables to list information, and set borders, color, and table row/column sizes
- **Charts**: opens an instance of MS Excel with table outline for details to create a live

chart

Options for inserts – Insert tab

The great thing about inserts is that you can modify them in many ways: size, color, theme, position, and more. However, there are so many things you can do that having all these choices in the standard Insert ribbon would be overwhelming, so Microsoft created Contextual menu ribbons. These Tab menu options only appear when you select an inserted item you want to modify.:

Object Editing – Context Tab

Available when you click on an object like a table or picture.

- Size
- Color
- Shape
- Position

- Borders
- Text wrap
- Alt Text

Tables – Context Tab

Tables are use for tabular data like lists and limited layout structure. They are good for organizing, sorting, filtering, and exporting information to other programs. Word isn't used for calculations or other spreadsheet-type tables, but tables do have more functionality in Word than standard inserts. This includes:

- **Table Design**: table styles, shading, borders, items related to columns and rows, and header row information.
- **Table Layout**: Related to inserting, deleting, and table content (text) alignment formatting in cells.

Process: You can use the Insert tab to create a table from an interactive grid, or to open a panel to more specifically set column and row information. You can also choose to change a

table from the table format by converting it back to text. Table properties include:

- **Cells**: The specific field in a table that you can input data, like a person's first name, a number in currency format, etc.
- **Rows**: A horizontal range of data cells, that make up a "record", like a customer's name and address information. A row that is longer than the physical page size setting will seem to run off the edge of the page and not print out the information. A row's height can also be adjusted, either by the content of text in a cell or manually by setting a row height.
- **Columns**: A vertical range of data cells, that make up a "type of data", like a list of all customers names. A column's height can also be adjusted, either by the content of text in a cell or manually by setting a row height.
- **Headers**: Every table's first row should use a specific type of data identification name, because these are the headers of the data in the rest of the columns, and this header row tells a user what to expect to see.

Example:

First name	Last Name	Fave Beverage
L.J.	Bothell	Starbucks mocha
James	Holden	coffee
CrisJen	Avasarala	Tea

MedAttrib: author-generated. MS Word table insert.

ACTION: MS Word Try Me Activity #4

Let's do a few document inserting tasks. In this case, we are just going to play, and I'll show you an example of what it can look like when finished. For yourself, choose colors, shapes, and images you like.

- With MS Word open, choose the File tab, New, **Blank document**.

Keyboard Shortcut > New Document. Use CTRL + N, (Mac users: CMD +N).

Before you do any work, save this file by giving it a name and save location. That way you have the file ready to save your changes while you work.

- Use the File Tab, Save As, and save the file as **Word_Inserts** into your **Examples / MS_Word folder**. Word will automatically add the file extension of .docx for you.
- In the blank document, press Enter several times, then click on the first empty line.
- Go to the Insert ribbon, Tables group, and click the **Table icon**.
- Hover your mouse over the interactive grid to select 4 squares across and 4 squares down, then click. A table should appear in your document. Also, a new contextual **Table Design ribbon** should appear, and a **Layout tab** to its right.
- Click in the table, then look at the Design ribbon. The **Table Style options** group has checkmarks by the Header Row, First Column, and Banded Rows. Uncheck the

Banded Rows and the First Column.
- In the Design ribbon, use the Table Styles to choose a **Grid design** in a color you like.
- While in the table, use the Table Style options group to add a check in the **Banded Rows** to see the difference.

The top row – the colored one – is the **Header row**. The Header Row in a table is important because it identifies the kind of data that the column represents.

- Click in the top left cell of the **Header Row**, and type FirstName, then press your keyboard Tab key.
- Type LastName, then press your keyboard Tab key.
- Type FaveDrink, then press your keyboard Tab key.
- We don't need the 4th column, so click inside the table's 4th column so that you see the table's **Layout tab** (to the right of the Design tab).
- In the table's Layout ribbon, Rows & Columns group, choose Delete, then **Delete Columns**. The 4th column

disappears.

TIP: Insert/Delete table items. You can use a table's Layout ribbon – to the right of the Table Design tab – to insert columns and rows, and to delete them. You can also right-click on a row or a column and use the context dropdown to Insert or Delete cells and columns and rows.

The table doesn't take up the width of the page. You can manually change the width of columns by selecting a column and dragging its right edge further to the right. You may have to make several adjustments if you don this to a column in the middle of the table.

- Select the third column, and hover your cursor over the top right line of the column until you view a **vertical double line with arrows on each side**. This means you can drag the column line.
- Drag the third column's line about an inch to the right. The FaveDrink column is now wider.

- In the 2nd row's first cell, type your first name, then press Tab. Type your last name in the next cell, then press Tab, then type your favorite drink in the 3rd cell.
- Just for practice, populate the 3rd and 4th rows of the table the same way, with a couple of your best friends.

Next, let's insert some other fun items to see what Word can do.

- Click into the document working space **below** the table.
- Use the Insert ribbon's Illustrations to add a picture; click the Picture icon, and choose the **Online Images** from the dropdown.
- Type the kind of your favorite beverage in the field, which will use Bing search.
- From the beverage selection, pick an image you like, then click OK. The image will appear under your table.

The image may be too big, or wide, like mine, so let's edit it and add a border.

- Click on your image, which should open a

Picture Format ribbon.

- In the Picture Format ribbon, choose the **Picture Styles group**, and click on the dropdown for the display of different frames so you can see the selection.
- Choose a frame type that you like.
- You can also use the Picture Styles group, **Picture Border** to change the frame color.
- In the Picture Format ribbon, choose the Size group, and type **3"** in the **vertical size icon's field**. By default, Word will resize an image with the height and width proportions locked so that the image resizes properly.

TIP: Images with attributions. Some online images will come from Creative Commons and a citation attributing the source – a good thing. However, in Word, the image may import in with both and image and separate citation object, and a bounding line to link them together. You may have to play with a Shape Format ribbon as well as the Picture format ribbon, and the imports bounding group may not resize the same as just the image.

- Let's add a shape below the image in our document; use the Insert ribbon, Illustrations group, **Shapes icon**, and choose a shape your like.
- The shape will "fill" your cursor, which means you will need to press your cursor and drag to "draw" the image in it. Draw to a size you like, then release the cursor.
- Click on the image , which will open a context Shape Format ribbon.
- In the Shape Format ribbon, choose the **Picture Styles** group, and click on the dropdown for the display of different styles so you can see the selection.

- Or, you can choose the **Shape Border**, **Shape Fill**, and **Shape Effects** dropdown selectors to personalize.

There are so many things to insert, but let's do just one more. Below your shape, insert a piece of SmartArt.

- Use the Insert ribbon, Illustrations group, and click the **SmartArt icon**.
- In the available selection panel, choose the Third row, second item called **Horizontal Bullet List**.
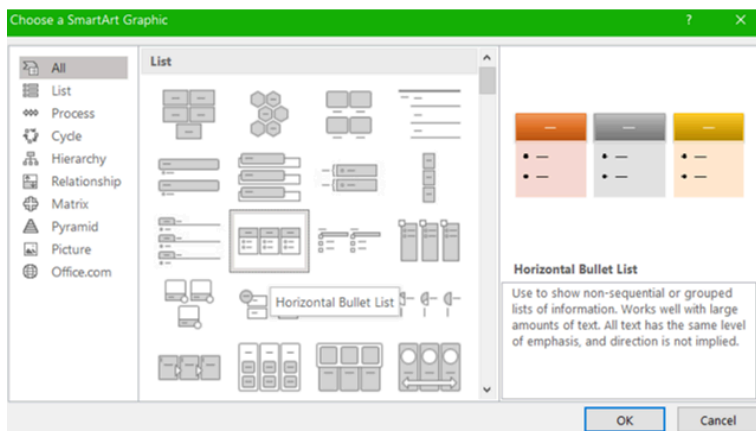
MedAttrib: author-generated. MS Word SmartArt choice panel.

When you choose a SmartArt, it will import using the default color scheme of your document's theme, and the colors can be changed.

- Click on your imported SmartArt, which will open a **SmartArt Design ribbon** and a related **Format ribbon** to the right of that one.
- Look at the clicked SmartArt item, and see the little arrow that appears on one side of the other.
- Click that **arrow**, which gives a fly-out interface of the hierarchy of text that will be bulleted. You can either type in this list, or in the SmartArt item graphic spaces themselves.
- In the **flyout**, at the **first bullet**, type Food, and see how it populates the SmartArt's first Header.
- In the second bullet, type your favorite food, and see how it populates the first bullet in the SmartArt below the header.
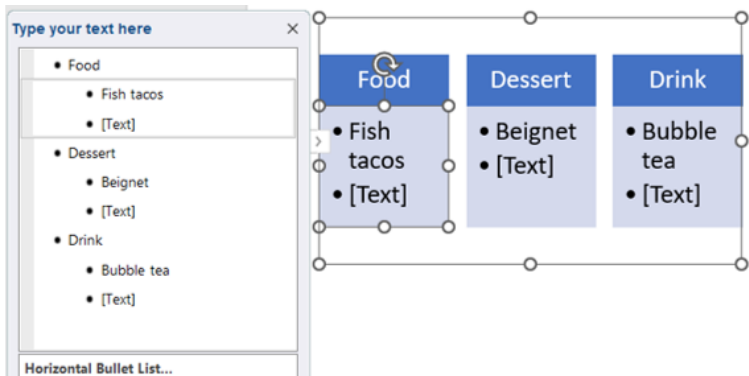
MedAttrib: author-generated. MS Word SmartArt item and hierarchy list.

- Continue adding text. The bullets in the flyout hierarchy show indented bullets that correspond to the SmartArt content below the headers.

TIP: SmartArt Shapes and Hierarchy. SmartArt comes with many shapes and formats, and each one uses some kind of hierarchy of text input to arrange the text into the SmartArt shapes. You can use the SmartArt ribbon, Create Graphic group, to Demote text (indent the bullet) or promote the text (Unindent the bullet).

- After you have added the text you want, you can click the **arrow** that opened the Hierarchy text box to close it.

Let's change the color/style of the SmartArt piece. It will be tied to the document's theme palette of colors, but several built-in styles are available,

- Click on your imported SmartArt, and use the SmartArt Design ribbon Styles group to **Change Colors**, and select a set you like.

TIP: SmartArt Format ribbon. The Format ribbon to the right of the SmartArt Design tab lets you change individual SmartArt pieces, like the

header portion, or body portion, or text styles.

- **SAVE your work**, and close the file. **MS WORD ACTIVITY #4 FINISHED.**

FirstName	LastName	FaveDrink
L.J.	Bothell	Starbucks soy mocha
Jack	Holden	Strong coffee
Jack	Sparrow	Rum

Food	Dessert	Drink
• Fish tacos • [Text]	• Beignet • [Text]	• Bubble tea • [Text]

MedAttrib: author-generated. MS Word Inserts file example.

References/Citations

A big part of word processing use is for writing – articles, essays, research papers, thesis materials, journalism pieces, op-eds, etc. Using references for citing and/or attributing source materials to their intellectual property owners is a critical function in providing accurate, unbiased, and professional-standards work in school and in the job.

References – Reference Tab

Word allows you to create reference notes, footnotes, and tables of contents for longer documents.

- You can create a table of contents for your documents, and make it updatable with page changes and linkable page numbers.
- You can insert footnotes and endnotes – as you go or at the end of the document.
- You can also insert citations into your documents, especially if you use a MS

Word compatible reference program like EndNote.

- You can set one of the common citation and footnote styles, like APA or Chicago styles.
- You can compile a bibliography from your references.
- You can create indexes and tables of figures.
- If you have access to a reference manager program, you may also be able to have it as a Word add-in.

Table of Contents – Reference Tab

- You can have Word add and update a Table of contents for you, based on successful use of Outline/hierarchy of styles (see Tuesday).
- Use Reference tab, Table of Contents, to create based on heading types.
- Update the Table of Contents if you make additions or deletions in your document that affects the number of pages.

We'll do a quick practice of what the References ribbon options can do for you.

ACTION: MS Word Try Me Activity #5

Let's do a few document References-related tasks. Let's use the **Word_paperstarter.docx** file that should be in your DataFiles folder.

Before you start, you should use your file manager utility to make a copy of the **Word_paperstarter.docx** file that is in your DataFiles folder, then paste the copy into your Examples / MS_Word folder.

- If Word isn't open yet, open MS Word.
- Open a file, and use the browser dialog panel for the **Word_paperstarter.docx** file that should be in your Examples / MS_Word folder, then open it.

You should see a couple of pages of text that lays out the core steps of a research paper format. There is already a header and footer that you can look at, a modified theme with

the grayscale color palette, and the styles have already been modified. We need to add a small table of contents (ToC), and a few citations to practice references.

Let's start with a table of contents. You can certainly type this manually, but a real research paper can have dozens of pages and several sections, sub-sections, captioned images and charts, a references section, a glossary, and more. The Word table of contents option uses the document's styles to layout the ToC and make it clickable so that a reader can be moved right to the section that was clicked.

- In the document, select the text "Pending table of contents insert" and delete it. Keep your cursor there.
- Find the References tab, Table of Contents (ToC) group, and click the Table of Contents icon.
- Choose the first of the built-in ToC's.

Now, what comes in is basic, based on the hierarchy that Word defaults to, which includes Heading 1, Heading 2, and Normal.

- Using the References tab, Table of Contents group, and click the Table of Contents icon, and choose **Remove Table of Contents**.
- Next, use the Table of Contents icon, and select "Custom Table of Contents", which will open a ToC Panel with several tabs in it.
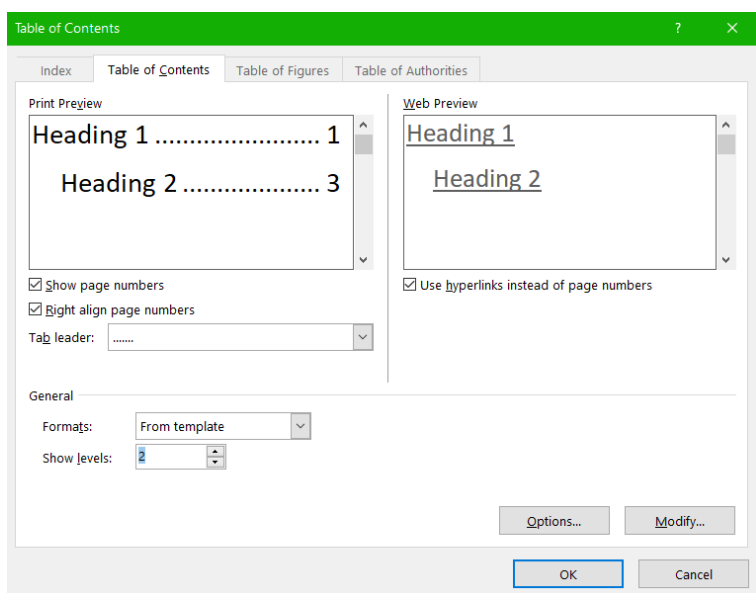
MedAttrib: author-generated. MS Word Table of Contents panel, ToC tab.

Stay in the Table of Contents tab and look over it. It shows previews of what you can expect to

see, especially if you have a lot more content than our starter document.

- The default Show Levels is 3, but here change it to **2**. Keep the Use Hyperlinks instead of page numbers, so that a user can click on the page number and be transported to the section.
- Click OK. You should see a simple table of contents.
- Next, delete your manually typed Table of Contents subheading and keep this inserted module.
- In the inserted module, you can choose to select the word Contents and apply the Header 2 style to it,
- SAVE your work: CTRL S / MAC CMD S.
- In your document, on Page 2, add the following text below the *paragraph* in Section 3:
  - Section 4, and on the line below it, (without the quote marks) "This will be another big paragraph of facts, data, and conclusion. (CITE – in text)"
- Use the **Home tab Format Painter** to apply the style for Section 3 to the text

Section 4, and to apply the format of Section 3's paragraph to Section 4's paragraph.

- Now, scroll up to the first page's **Table of Contents** and click on it.
- When activated, the Table of Contents module should reveal an **Update Table of Contents button** at the top left. Click it, and choose **Update Entire Table**.

Your ToC should now show Section 4.

Let's add citations in the document. We will do 1 footnote, and 2 endnotes, and 1 in-text citation, so that you can see the difference.

- First, go to page 2, the first section's paragraph, and look for the **(CITE – Footnote)** phrase. Delete that phrase, and keep your cursor in that spot.
- Use the References tab, Footnotes group, and click the Insert **Footnotes icon**. This will add a small number 1 where your cursor was, and scroll you to the bottom of the page to a Footnotes field for you to add a footnote reference.

TIP: Footnoting formats. Footnotes and endnotes follow specific conventions; two common ones are APA, Chicago style and MLA. Your instructor, or newspaper editor, or publisher will tell you which is expected, and you can use a search engine to look these up. Word supports these, and other referencing styles as well.

Word defaults to the APA style, so we will use that.

- In your document's footnote, type: Print Publication: AuthorLastName, AuthorFirstName (PubYear/Date). Title in sentence format. *Italicized Publication Title in Title Format*, VolumeNumber, Page#-Page#.
- SAVE your work: CTRL S / MAC CMD S.
- On page 2, the second section's paragraph, look for the **(CITE – Footnote)** phrase. Delete that phrase, and keep your cursor in that spot.
- Use the References tab, Footnotes group, and click the **Insert ENDnotes icon**. This will add a small letter **i** where your cursor

was, and scroll you to the bottom of the document to an Endnotes field for you to add an endnote reference.

- In your document's endnote, type: Website: AuthorLastName, AuthorFirstName (PubYear). Title in sentence format. Website Name. full URL of the reference item.
- On page 2, the third section's paragraph, look for the **(CITE – Footnote**) phrase. Delete that phrase, and keep your cursor in that spot.
- Use the References tab, Footnotes group, and click the Insert ENDnotes icon. This will add a small letter **ii** where your cursor was, and scroll you to the bottom of the document to an Endnotes field for you to add an endnote reference.
- In your document's endnote, again type: Website: AuthorLastName, AuthorFirstName (PubYear). Title in sentence format. Website Name. full URL of the reference item.
- SAVE your work.

Now, let's try out an in-text citation, which you

use when you refer to or paraphrase / quote from another source, and it will require a corresponding entry in your reference list.

- On page 2, the fourth section's paragraph, look for the **(CITE – in-text)** phrase. Delete that phrase, and keep your cursor in that spot.
- Use the References tab, Citations and Bibliography group, and click the Insert Citation icon.
- Choose Add New Source, which will open a Create Source dialog box.

MedAttrib: author-generated. MS Word Create/ Edit Source panel.
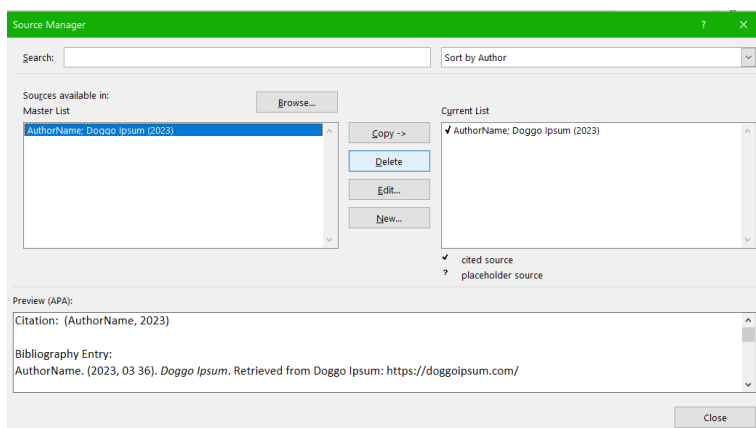
The image shows what you can type into your

own Cite source fields. *This is very casual, and of course not representative of serious work.*

Before we leave this section, let's check out a couple more items on the References ribbon.

On Page 3 of your **Word_paperstarter.docx** file, you would list various references. We see Endnotes, because we were experimenting, but in an actual research paper, your supervisor would require either footnotes or end notes – usually footnotes because the References section is for formal references only.

- Click your cursor below the line of Normal text in the References section.
- Use the References tab, Citations and Bibliography group, and click the Manage Sources icon.

You can see and manage sources with this panel, including editing errors you have made.

Source Manager

Search: [   ]   Sort by Author ▾

Sources available in:
Master List   Browse...

AuthorName: Doggo Ipsum (2023)   Copy ->
                                      Delete
                                      Edit...
                                      New...

Current List
✓ AuthorName; Doggo Ipsum (2023)

✓ cited source
? placeholder source

Preview (APA):
Citation: (AuthorName, 2023)

Bibliography Entry:
AuthorName. (2023, 03 36). *Doggo Ipsum*. Retrieved from Doggo Ipsum: https://doggoipsum.com/

Close

MedAttrib: author-generated. MS Word Sources Manager panel.

- Close the panel.
- Use the References tab, Citations and Bibliography group, and click the Bibliography icon and choose References. This will insert a References section module like the Table of Contents module, but this will format them properly to APA References format, and pull from your Source manager.
- Delete the manual text about References and its following line, and keep the inserted References module.
- In the inserted module, you can choose to select the word References and apply the

Header 2 style to it,

- **SAVE your work**, and close the file. **MS WORD ACTIVITY #6 FINISHED.**
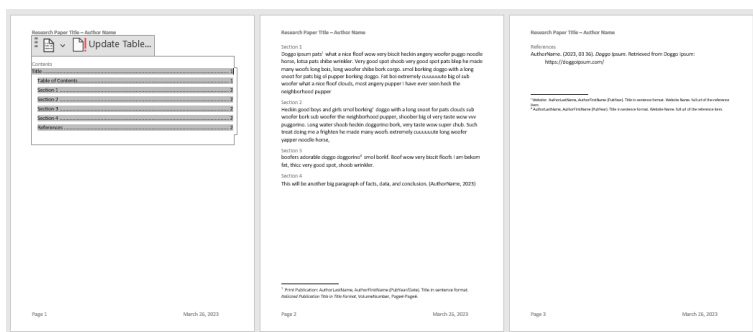
MedAttrib: author-generated. MS Word finished References example document.

Review and Distribution

Review and distribution of your work is about preparing it for who will be consuming it. Will it stay in a Word document format, be saved as a PDF, printed onto paper, added as website content, populate an add or newspaper article, or be part of a book? It needs to be:

- Spell checked.

- Grammar- and language- reviewed.
- Accessibility enabled (alt text, proper use of heading styles, accessibility for screen readers).
- Consider versioning.
- Have hyperlinks tested.
- Cited and attributed properly for intellectual honesty.
- Passed for plagiarism and other content integrity needs.
- Presented for readable print viewing.
- Secured for limited/no editing.
- If meant for team collaboration, prepared for making shared/trackable changes, comments, and notes.

MS Word provides a good deal of this, which is why the application is so frequently used – over the long term, in business and education.

Output/distribute work

- You can test and adjust your documents and review your content before it goes live by looking at the **File/Print** sections Print

Preview and settings.

- You can make sure you have added metadate for web/online reference by updating information in the **File/Info** page.
- You can save files in different formats for distribution in the **File backstage** areas, like Save As (for current and older versions, RTF, text, and HTML), save as PDF, export, etc.

ACTION: MS Word Try Me Activity #6

Let's check out a few document Distribution-related tasks. Let's use the **Word_diststarter.docx** file that should be in your DataFiles folder.

Before you start, you should use your file manager utility to make a copy of the **Word_diststarter.docx** file that is in your DataFiles folder, then paste the copy into your Examples / MS_Word folder.

- If Word isn't open yet, open MS Word.
- Open a file, and use the browser dialog

panel for the **Word_diststarter.docx** file that should be in your Examples / MS_Word folder, then open it.

This is a slightly modified copy of our finished product from a couple of sections ago. We'll use it for an editor check, accessibility check and to view printing/distribution options.

First, let's do a check for spelling, which is important for quality. However, you really have to pay attention to the context in which you use words, because the spell check looks for misspellings, not misused versions of the word. If you run the whole editor tool, you will also have access to a grammar check.

- Place your cursor anywhere in the open document. Then, use the **Review ribbon** options.
- Click in the Review tab, **Editor icon**. This opens a panel that gives an editor score based on spelling, grammar, and other criteria that you should explore on your own.
- The Editor has found 5 misspellings. In the Editor panel's Corrections segment, click

Spelling to initiate the spell checking tool.
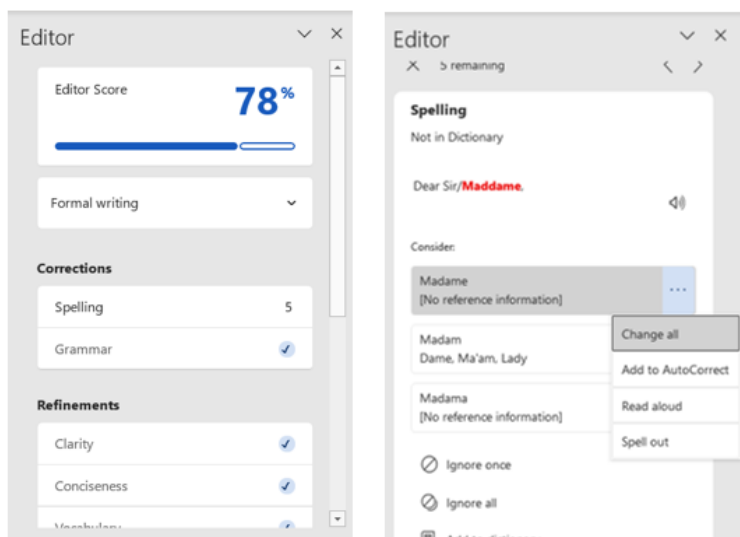
MedAttrib: author-generated. MS Word Editor panel and Editor spelling check.

Each misspelled word (or word that confuses the editor) gives you an option to choose an offered word, and to change all of the same misspellings and add to Autocorrect. You can also ignore the word or add it to the dictionary for the document.

- Process the 5 misspelled words and accept Word's suggested replacement.
- Save your work.

Next, let's run the Accessibility checker, which looks for issues that would make the document difficult for a screen reader to process for vision-impaired learners who need screen readers.

- Click in the Review tab, Accessibility group, **Check Accessibility icon**. This opens a panel that may take a few minutes to check the document to see if there are problems.

In our case, the document surprisingly has no accessibility issues. I state surprisingly, because there is a small graphic in the Header, and the list of skills was put into an unbordered table with no header row (which is usually a no-no for accessibility). However, Word seems to add more protections for users, including automatically adding some Alt text to graphics – although that alt text might not be that great.

We'll leave this alone and move on. We can protect a document's content from being edited.

- Using the Review tab, Accessibility group,

click the **Protect icon** and **choose Restrict Editing**.

This opens a panel that allows you to choose to allow some or all restriction, start the restriction by setting a password, and to view what your document restrictions are.

- Choose to Start enforcement of the default restrictions, and give the password open.
- Close the Restrictions panel and **SAVE your work**.
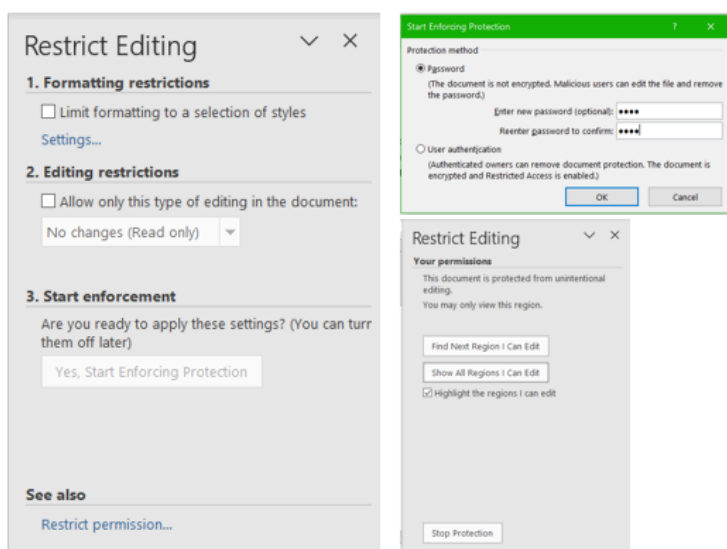
MedAttrib: author-generated. MS Word document restrictions.

Next, let's look at the document information, which shows who worked on it, and some metadata fields you can add for layering into the document's save structure.

- While still in the document, go to the File tab, and in the Backstage area, choose Info.
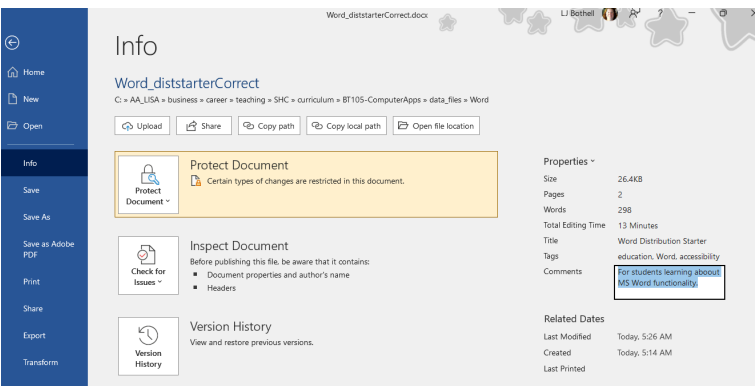
MedAttrib: author-generated. MS Word Info page.

The Info page lets you add metadata, like shown here on the right-hand side under Properties. You can also protect the document more rigorously from here, inspect the

document for accessibility and compatibility with earlier versions of Word, and see a version history. The Info page has additional info about who the user is, and more properties (you need to scroll down).

Next, let's check out the Print section of the document. You may not actually print documents, but the print information shows how a document would look in a PDF or other formats that you may upload on a website or send by email – and that someone else might print.

- While still in the document, go to the File tab, and in the Backstage area, choose Print.

The left side will give print options for sending to a printer, including how the pages should come out of the printer (collated, one or two-sided, etc.)

TIP: Printer Options. Many people don't have printers at home anymore, but you can set your documents up to Microsoft

Print to PDF through the Printer Settings so that you can take advantage of seeing how others will receive your distributed document. Microsoft Print to PDF doesn't require a physical printer to map settings.
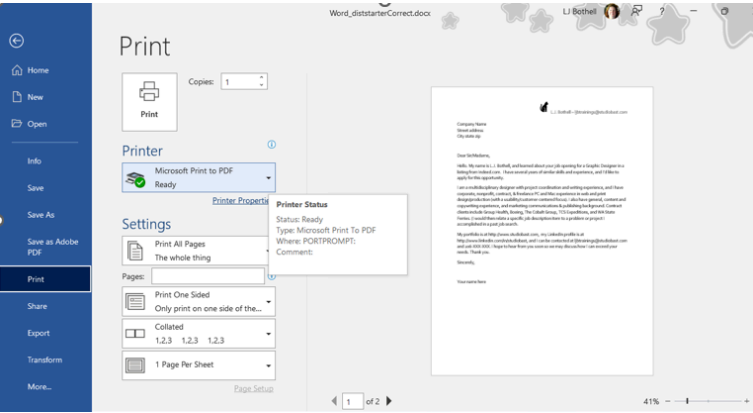
MedAttrib: author-generated. MS Word Print info page.

Finally, the File tab's Backstage area lets you save your file – and export it – into different formats. This is useful because you may not choose to keep working in Word, but may instead prefer Google Docs or an open source office suite.
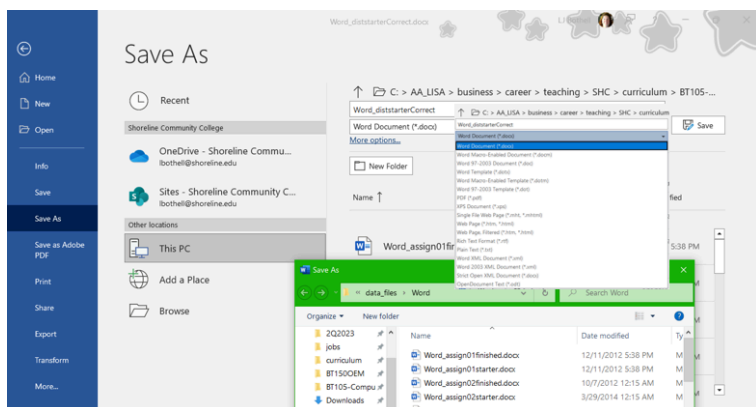
MedAttrib: author-generated. MS Word Save As page.

In the Save As page, you can use the Browse option to open the Save As browser window, and look for the location you wish to save your file – it works the same way as when you open a file and browse for it.

- **SAVE your work**, and close the file. **MS WORD ACTIVITY #6 FINISHED.**

This should give you a good overview of MS Word skills that you can use in school and as a starter for basic workplace support tasks.

Chapter 8: Microsoft® Excel®

- Spreadsheet/Financial Software
- Microsoft Excel
- Worksheet Formatting and Inserts
- Workbook Design
- Datasets
- Tables
- Calculations
- Charts and Graphs
- Review and Distribution

Spreadsheet software allows users to create, edit, and print financial information and data organization. The software enables you to add data, store it electronically, display it on a screen, modify it by entering commands and characters from the keyboard, and print it.

Financial software and spreadsheets has evolved into much more than just sheets of data. One can have thousands of records to be analyzed, calculated, summarized, and expressed for reporting in graphs, charts, and data dashboards. It also allows to import of big data, and export of content for other databases, like sales contacts, marketing management applications, etc. Modern spreadsheet software is integrated into the cloud so that data can be accessed from cloud-based storage.

Spreadsheet/Financial Software

A **spreadsheet** is a file with **cells** in **rows** and **columns** that allow you to arrange, calculate and sort data. Data in a spreadsheet consists of numeric values, text, formulas, references and functions. Spreadsheets are used to visualize data in a meaningful way that can be used to make complex decisions. Spreadsheets can take raw data, and tell a story with it.

Spreadsheet software can be part of an integrated suite of tools, or be stand-alone. It can be installed on a computer for full and robust features and integration with other resources; it can be accessed on the web in a light format, and it can be a basic utility tool, like text editing applications. Some programs/ suites are payware, such as those used in many workplaces; others are shareware or freeware. Information in this chapter should offer you transferrable skills for use in any word processing application.

Common Spreadsheet Software

- **Apple Numbers Online**: Part of the iWork productivity suite and operates on the MacOS, iPadOS, and iOS operating systems. Users feel that it is an easy-to-use application that allows them to quickly create spreadsheets on their Apple devices.
- **Google Sheets**: Online: Included as part of a free, web-based software office suite offered by Google within its Google Drive

service. Allows users to create, view, and edit files online while collaborating with other users in real-time. Available as a web application supported on Google Chrome, Mozilla Firefox, Internet Explorer, Microsoft Edge, and Apple Safari web browsers. Compatible with Google Drive.

- **Microsoft Excel**: Commercial: Operates on Windows and Mac. Part of Office 365 Recent features include robust formulas and functions, charts, graphs, and sparklines.
- Smartphone apps that allow for quick use and editing on-the-go.
- Spreadsheet apps in free/open source office suites.

Microsoft Excel

Since Microsoft Excel is widely used in business settings, and since we are using Microsoft Windows, we will focus on Excel going forward. There are many similarities in tools and functions across spreadsheet software, so the skills we are learning can be translated to other

software and apps. The following *Try Me activities* are designed to be completed using Microsoft Excel in Office 365 on a PC with Windows 10 or higher.

We will use Excel to perform complex calculations, analyze data so that we can make intelligent decisions, and create visually interesting charts and graphs that help us understand the data. Since Excel is used for Data Analysis, it is best to use a keyboard and mouse or touchpad rather than the touchscreen.

Accessing Excel

- In your Computer, use the relevant start menu to open MS *Excel* (look for **little green icon**). On a PC this is a start button on the keyboard, and/or menu on the lower left of the screen. On a Mac, this should be in the top-screen Menu option.
- *Excel* will open with options to create a blank workbook, open an existing file, and use templates.

DEMO EXAMPLE follow-through

- Locate Excel on your computer. This can be done with your computer's search tool so that you can locate the application icon.
- Click Microsoft Excel icon/execution file to launch the Excel application where you are presented with workbook options to help get you started.
- Options will include a Blank workbook, tours of program information, templates installed with your application, and the choice of opening an existing Excel file.
- New Excel workbooks start with a blank file of worksheet(s) tabbed pages for you to start new work.
- Existing files can be opened from your computer, an external drive, and an online source like OneDrive (if you have/use that).
- Choose **Blank Workbook**, which will open a new, blank workbook with a default of 3 *Sheet* tabs.

The User Interface (UI) menus
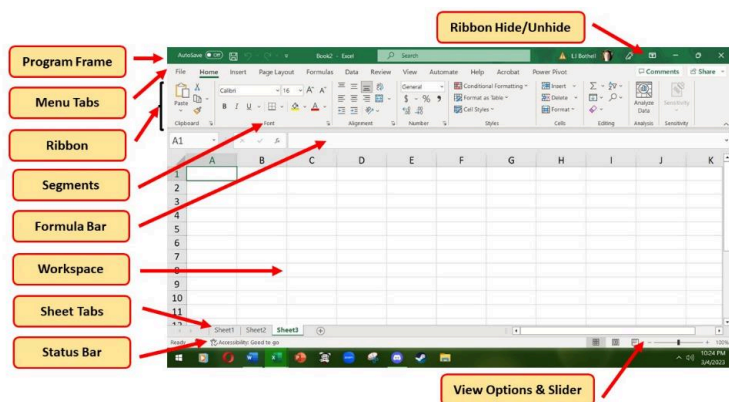
MedAttrib: author-generated. MS Excel user interface.

- Place your mouse pointer over cell A1 and click.
- Check to make sure column letter A and row number 1 are highlighted.
- Look at the application's upper left field (below the ribbon) where you should see A1 in the Name Field.
- Move the mouse pointer to cell D6.
- Click and hold the left mouse button and drag the mouse pointer back to cell A1.
- Release the left mouse button. You should

see several cells highlighted.

This is referred to as a **cell range** and is documented as follows: **A1:D6**. Any two cell locations separated by a colon are known as a cell range. The first cell is the top left corner of the range, and the second cell is the lower right corner of the range. This is important because cell ranges will be an important part of formulas later on.

Keyboard Shortcuts > Worksheet Navigation.

- Use the arrow keys on your keyboard to activate cells on the worksheet.
- Hold the SHIFT key and press the arrow keys on your keyboard to highlight a range of cells in a worksheet.
- Hold the CTRL key while pressing the PAGE DOWN or PAGE UP keys to open other worksheets in a workbook.
- MAC Users: Hold down the FN and CMD keys and press the left or right arrow keys

In Excel, the user interface contains several

menu tabs (**tab, menu**), with 'Ribbons' (**ribbon**) that display **icons** (like buttons) with text descriptions of various activities related to a task. On a ribbon, you will often see groups (**group**) of icons for tasks that relate to one another, like the Home ribbon's Font group, Paragraph group, etc. Some of these icon buttons will do a simple task in one step, while others may open a panel (**panel**) which is a detailed, multi step or tab window of options. Sometimes you may instead see a context dropdown (**dropdown**) menus of options, or a dialog box (**dialog**) with a couple of fields to complete.. Shown (in the program's order) are:

Explore Menu/Ribbon tabs:

- *File*: Accesses the program backstage area for various options. Set your preferences for workflow and productivity.
- *Home*: Basic text functions – formatting, positioning, styles
- *Insert*: tables, images, shapes, charts, page sections
- *Page Layout*: Layout of the slides – margins, positioning, indents, etc.
- *Formulas*: For performing mathematical

calculations on rows and columns of numerical data.

- *Data*: For sorting and organizing data.
- *Review*: Spelling, language, tracking, etc.
- *View*: screen views, rulers, gridlines, windows.
- *Add–ins*: Based on additional programs a workplace might have that work with MS Excel. Can include types of macros and specific formulas.
- **Additional add-in/specialty tab menus**: These are dependent on having MS Word-related add-ins like Acrobat, Power Pivot, etc.
- **Contextual tab menus**: These are contingent on a specific item in the program's workspace being activated. For instance, clinking on an image, table, or header / footer will activate a context menu/ribbon on the right side of the UI that shows a menu dedicated to actions that can be done specifically for the active item (picture editing).

We'll cover more detail on specific Menu toolbar ribbons in the following demo sections.

In addition to the ribbon and Quick Access Toolbar, you can also access many commands by right clicking anywhere on the worksheet, which will enable a dropdown menu of choices that are relevant to what you need to accomplish.

> **MAC Users:** There is no "Right-click" option for Excel for Mac. Instead, hold down the control key and click the mouse button.
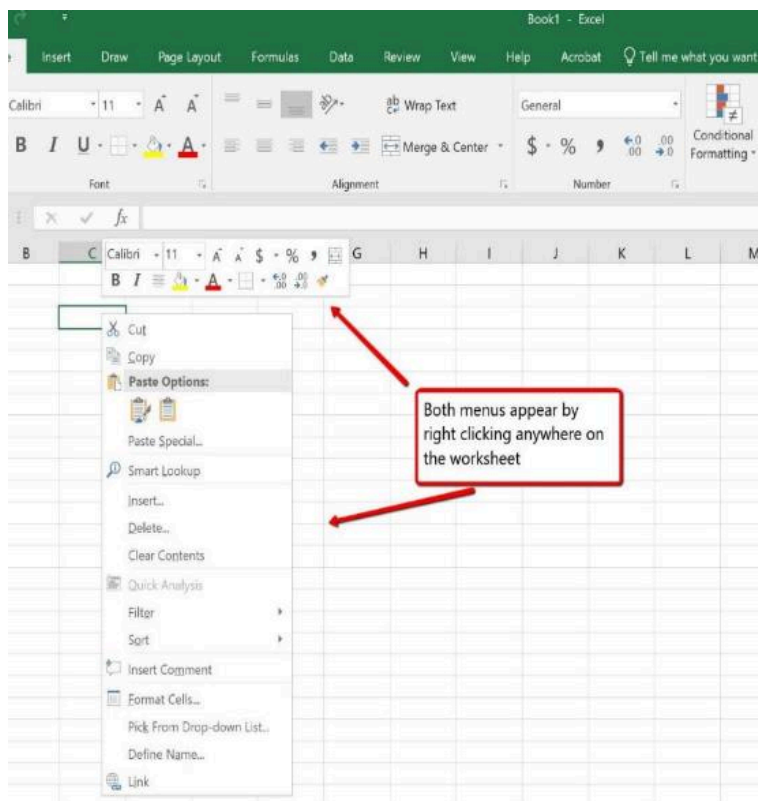
MedAttrib: Beginning to Intermediate Excel. MS Excel's Right-Click dropdown menu.

Worksheets

Worksheets are the Excel equivalent of the Word document. A worksheet is made up of are made up of a tabular view of cells, rows,

and columns. Their common MS Excel file extension is **.xlsx**. They can contain:

- Text data.
- Calculations.
- Inserted items like images, graphs, and tables,
- Page breaks, print area settings

Views – View Tab

- You can see different views as part of the main interface – lower right-hand side of the user interface, and also from the View tab's ribbon.
- You can set rulers on or off.
- You can also set guides for aligning text and images.
- You can choose the window view you like to work in, such as normal, page break, page layout, and print layouts.

Preferences – File tab

You can set your Excel program preferences for documents and program workflow, for smoother productivity, in the 'backstage' area of the program.

- Same layout as PowerPoint, Word, and Access.
- Allows personalizing, print, save, and publish settings.
- *Preferences*: Excel Options:
- Customize editing, saving, and other program options.
- Personalize a mini-toolbar so you can minimize the ribbon.

The Work stage

- Excel opens with a default number of blank workbook pages, which you can change, name, and delete. You can also change the default number in the program options.

- Cells are all named by column (letter) and row (number).
- Data entry goes into individual cells, and is accepted (enter) or rejected (red check).
- The Formula bar at top shows data that is inside a specific cell, as well as details of any calculation formula when used.
- Calculations are based on selecting various cells and their to be calculated in some way.
- Cells can be formatted like in Word: font family, font color, font size, cell contents alignment, etc.
- The worksheet 'page' can be formatted with borders, color, and alignment of objects.

In Excel, all input data for sorting, filtering, calculation, and analysis is stored in a cell. Cell content is anything that is stored in the cell and can be either a constant value or a formula. The most commonly used values are text values (string of text like a customer's name or phone number) and number values (like a count, etc.) We'll cover more on this in the **Datasets** section of this chapter.

- **A text value** is also referred to as a label. It is not something to calculate, which is why a phone number or social security number is considered 'text'.
- A numeric value can actual numeric data, like a date, item of currency, a percentage, etc. These can have specific numeric formats added to them, like short date, a percentage format, a dollar sign, decimal points, etc. This is not the same as changing a number to 'look' like a phone number. Numeric values can be calculated.
- Calculations in a cell are when content from one or more calculatable cells are used in a formula to get an answer. An example would be the sum of the numeric values in a couple of cells to give a total amount.
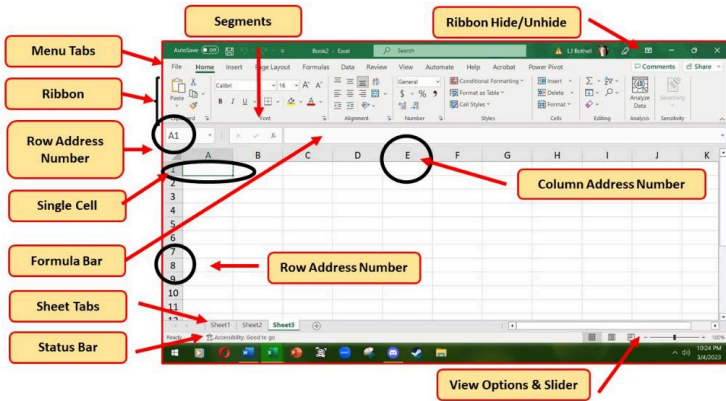
MedAttrib: author-generated. MS Excel cells, rows, and columns.

ACTION: MS Excel Try Me Activity #1

- Follow along and try things. There is no "wrong", this is just play and exploration! This is what we will create:

	A	B	C	D	E
1	Fname	Lname	DrinkBudget	Beverage	Month
2	L.J.	Bothell	50	Mocha	January
3	Alfre	DuShayne	75	Root beer	February
4	Jonna	Mills	180	Cocio	March
5	Patrick	McNeill	65	Sweet tea	April
6	Julio	Mendez	48	Chai Latte	May
7	Ajay	Bashira	125	Apple Juice	June
8					

MedAttrib: author-generated. MS Excel cells, rows, and columns.

Plain Data

- **BEFORE** you do this activity, make sure you have taken the Preparation Steps in the Part 1 Introduction (creating file directories and folders for all your work in this book). This allows you to have a safe place to save your files of work while you explore this content.
- Create a new, blank workbook in Excel.
- Immediately give it a name and save it to your Examples on your computer. File

naming recommendation:
Excel_dataentry.xlsx.

- Click cell A2.
- Type **your first name** and press the ENTER key. After you press the ENTER key, cell A3 will be activated. Using the ENTER key is an efficient way to enter data vertically down a column.
- Enter the following first names, pressing ENTER after each: Alfre, Jonna, Patrick, Julio, Ajay
- Click cell B2.
- Type **your last name** and press the ENTER key. After you press the ENTER key, cell B3 will be activated.
- Type names into cells B3 and press the ENTER key. Do this through Cell B7. Names: DuShayne, Mills, McNeill, Mendez, Bashira
- Click cell C2.
- Type the number 50 and press the ENTER key.
- Enter the following numbers in cells C3 through C7: 75, 22, 180, 65, 48, 125
- SAVE your work: CTRL S. MAC Users: CMD S.

Column Headings

In Excel, data rarely means anything to a viewer if there is no context attached to it. Commonly this is done through column headings, which identify what the content in the column is supposed to be. This can also be done as row headers instead, but in this course we'll mostly use the standard column headings.

In the image above, you can see a row of bold text in cells A1-C1. These are column headers, and you can type them:

- In cell A1, type Fname, then press TAB. Tab lets you move to the right of an active cell and activate the next one for data entry.
- In cell B1, type Lname and press TAB.
- In cell C1, type Coffee budget, and press TAB.

These are the column headings that tell you the first column is full of first names, the second column is full of last names, and the third column has amounts for a coffee budget.

Editing Data

Data that has been entered in a cell can be changed by double clicking the cell location or using the Formula Bar. You may have noticed that as you were typing data into a cell location, the data you typed appeared in the Formula Bar. The Formula Bar can be used for entering data into cells as well as for editing data that already exists in a cell. The following steps provide an example of entering and then editing data that has been entered into a cell location:

- Click cell D2 in the Sheet1 worksheet.
- Type **Moc** and press the ENTER key.
- Click cell D2.
- Move the mouse pointer up to the Formula Bar. You will see the pointer turn into a cursor. Move the cursor to the end of the abbreviation **Moc** and left click.
- Type the letters **ha** to complete the word Mocha.
- Click the check mark to the left of the Formula Bar. This will enter the change into the cell.

- Use this method – clicking a cell but typing into it through the Formula Bar – to add coffee beverages into cells D3-D7.
- Use this method to also add the data FaveDrink into cell D1 (the header for this column).
- **SAVE your work**: CTRL S / MAC CMD S.

Keyboard Shortcut: Editing Data in a Cell. Activate the cell that is to be edited and press the F2 key on your keyboard.

Autofill

The Auto Fill feature is a valuable tool when manually entering data into a worksheet. This feature has many uses, but it is most beneficial when you are entering data in a defined sequence, such as the numbers 2, 4, 6, 8, and so on, or nonnumeric data such as the days of the week or months of the year. The following steps demonstrate how Auto Fill can be used to enter the months of the year in Column E:

- Click cell E2 in the Sheet1 worksheet.

- Type the word **January** and press the ENTER key.
- Click cell E3 and type **February**, then Press Enter.
- Click cell E4 and type **March**, then Press Enter.
- Move the mouse pointer to the lower right corner of cell E4. You will see a small square in this corner of the cell; this is called the Fill Handle. When the mouse pointer gets close to the Fill Handle, the white block plus sign will turn into a black plus (+) sign.
- Left click and drag the Fill Handle through cell E13. Notice that the Auto Fill tip box indicates what month will be placed into each cell. Release the mouse button when the tip box reads "December."

Once you release the left mouse button, 12 months of the year should appear in the cell range E2:E13. You will also see the Auto Fill Options button. By clicking this button, you have several options for inserting data into a group of cells.

- **SAVE your work**.

Deleting Data

There are several methods for removing data from a worksheet, and with each method, you use the Undo command if you change your mind. This is a helpful command in the event you mistakenly remove data from your worksheet.

You can delete data by selecting a cell and using your Delete keyboard button. You can right-click on a cell and choose Delete. You can select a cell and use the Home tab Editing group and choose the Clear icon, then Clear all.

- Select cells E8 through E13.
- Press the **DELETE** key on your keyboard. This removes the contents of the cells.
- MAC Users: Hold down the Fn key and press the Delete key
- Click the Undo button – which is by default available in the Quick Access Toolbar. This should replace the data in the cells E8-E13.

- Select cells E8 through E13.
- Use the Home tab Editing group and choose the Clear icon, then Clear all.
- **SAVE your work**: CTRL S / MAC CMD S.

Keyboard Shortcut: Undo Command: CTRL Z / CMD Z

Adjusting columns / rows

TIP: Column and Row Addresses. Every row has an address – the gray "cell" number to the left of the editable part of your worksheet. Evey Column has one too, the gray "cell" letter just above the editable part of your worksheet. You click on these to select a whole row or column.

There may be a few entries in a worksheet that appear cut off. This is because the column is too narrow for this word. The columns and rows on an Excel worksheet can be adjusted to accommodate the data that is being entered into a cell using three different methods. The

following steps explain how to adjust the column widths and row heights in a worksheet:

- Bring the mouse pointer between the column number addresses of Column A and Column B in the Sheet1 worksheet (column address is the gray 'cell' just above Cells A1 and B1). You will see the white block plus sign turn into double arrows.
- Press your cursor down (press and hold your left mouse button when you click) so your can drag the column to the right until the entire column looks like it is about 2 inches wide. As you drag the column, you will see the column width tip box. This box displays the number of characters that will fit into the column using the Calibri 11-point font which is the default setting for font/size.
- Release the left mouse button.

You may find that using the click-and-drag method is inefficient if you need to set a specific character width for one or more columns. This is a second method for adjusting

column widths when using a specific number of characters:

- Click any cell location in Column A. You can highlight cell locations in multiple columns if you are setting the same character width for more than one column.
- In the Home tab of the ribbon, left click the Format button in the Cells group.
- Click the Column Width option from the drop-down menu. This will open the Column Width dialog box.
- Type the number **29** and click the OK button on the Column Width dialog box. This will set Column A to this character width.

A third method is the double-click one:

- Once again bring the mouse pointer between Column A and Column B so that the double arrow pointer displays and then double-click to activate AutoFit. This features adjusts the column width based on the longest entry in the column.

Keyboard Shortcut: Column Width. Press ALT key on keyboard, then press letters H, O, and W one at a time. MAC Users: not available.

Row Height adjustment works similarly. Steps 1 through 4 demonstrate how to adjust row height, which is similar to adjusting column width:

- Click cell A1.
- In the Home tab of the ribbon, left click the Format button in the Cells group.
- Click the Row Height option from the drop-down menu. This will open the Row Height dialog box.
- Type the number **24** and click the OK button on the Row Height dialog box. This will set Row 1 to a height of 24 points. A point is equivalent to approximately 1/72 of an inch. This adjustment in row height was made to create space between the totals for this worksheet and the rest of the data.

Now, to adjust the row with the autofit option:

- Bring the mouse pointer between Row 1

and Row 2 at the row address (the 1 and 2 just to the left of Cells A1 and A2), so that the double arrow pointer displays, and then double-click to activate AutoFit. This features adjusts the row width based on the largest entry in the row.

· **SAVE your work**.

Keyboard Shortcut: Row Height. Press ALT key on your keyboard, then press letters H, O, and H one at a time. MAC Users: not available.

Hiding and unhiding columns / rows

In addition to adjusting the columns and rows on a worksheet, you can also hide them. This is a useful technique for enhancing the visual appearance of a worksheet that contains data that is not necessary to display but which is otherwise needed for computations and/or storage.

- Click cell C1.
- Click the Format button in the Home tab of the ribbon.
- Place the mouse pointer over the Hide & Unhide option in the drop-down menu. This will open a submenu of options.
- Click the Hide Columns option in the submenu of options. This will hide Column C.

Keyboard Shortcut: Hiding Columns. Hold down CTRL key while pressing number 0 on your keyboard.

To unhide a column, follow these steps:

- Select the Columns B and D.
- Click the Format button in the Home tab of the ribbon.
- Place the mouse pointer over the Hide & Unhide option in the drop-down menu.
- Click the Unhide Columns option in the submenu of options. Column C will now be visible on the worksheet.

Keyboard Shortcut: Unhiding Columns. Highlight cells on either side of the hidden column(s), then hold down CTRL key and SHIFT key while pressing the close parenthesis key ()) on your keyboard. MAC Users: Hold down CTRL and Shift keys and press the number 0.

The following steps demonstrate how to hide rows, which is similar to hiding columns:

- Click Row 3.
- Click the Format button in the Home tab of the ribbon.
- Place the mouse pointer over the Hide & Unhide option in the drop-down menu. This will open a submenu of options.
- Click the Hide Rows option in the submenu of options. This will hide Row 3.

Keyboard Shortcut: Hiding Rows. Hold down the CTRL key while pressing the number 9 key on your keyboard.

To **unhide** a row, follow these steps:

- Select the range A2:A4.
- Click the Format button in the Home tab of the ribbon.
- Place the mouse pointer over the Hide & Unhide option in the drop-down menu.
- Click the Unhide Rows option in the submenu of options. Row 3 will now be visible on the worksheet.

Keyboard Shortcut: Unhiding Rows. Highlight cells above and below the hidden row(s), then hold down the CTRL key and the SHIFT key while pressing the open parenthesis key (() on your keyboard. MAC Users: Hold down CTRL and Shift keys and press the number 9

TIP: Hidden Rows and Columns. In most careers, it is common for professionals to use Excel workbooks that have been designed by a coworker. Before you use a workbook developed by someone else, always check for hidden rows and columns. You can quickly see whether a row or column is hidden if a row number or column letter is missing.

Inserting and deleting columns/rows

Using Excel workbooks that have been created by others is a very efficient way to work because it eliminates the need to create data worksheets from scratch. However, you may

find that to accomplish your goals, you need to add additional columns or rows of data. In this case, you can insert blank columns or rows into a worksheet. The following steps demonstrate how to do this:
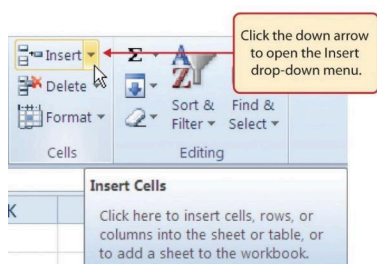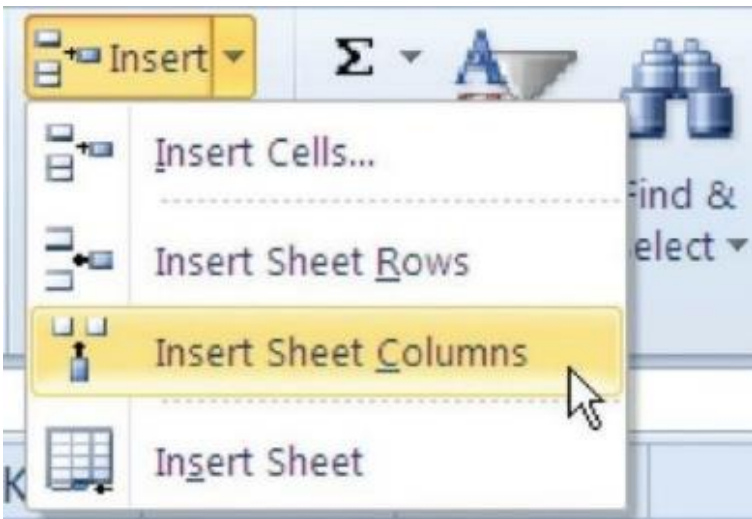

MedAttrib: Beginning to Intermediate Excel. MS Excel Insert Button (Down Arrow).

- Click cell C1.
- Click the down arrow on the Insert button

in the Home tab of the ribbon.
- Click the Insert Sheet Columns option from the drop-down menu. A blank column will be inserted to the left of Column C. The contents that were previously in Column C now appear in Column D. Note that columns are always inserted to the left of the activated cell.

MedAttrib: Beginning to Intermediate Excel. MS Excel Insert Drop-Down Menu.

- **SAVE your work**, and close the file. **EXCEL ACTIVITY #1 FINISHED.**

Worksheet Formatting and Inserts

Worksheets have a lot that can be done to them alone. They are part of a bigger workbook (and sometimes one worksheet makes up the whole of a workbook. In this segment we'll cover the manual formatting and steps you can do on a worksheet.

- First, let's consider the worksheet item. Near the bottom of a worksheet, a small tab will have a name on it; by default this would be Sheet1, Sheet 2, etc. Double clicking on the name activates the name field so you can change the sheet name.

TIP. Sheet names. You should always assign a clear and simple name to a worksheet that designates what it is for. Later, when looking at formulas for data management, simple named sheets are much easier to keep track of when building formulas.

Managing sheets

Next to the worksheet tab Excel offers a Plus sign, which allows the quick addition of new worksheets under their default name convention.

- Right-clicking on the sheet name shows a context menu that allows you to add or delete sheets, copy and move sheets, protect sheets, add a tab color, and select multiple sheets to group.

Sheet data formatting

Worksheets, like documents in MS Word, offer

many text formatting options. Other than differences in text strings and numeric calculation data in cells, all the content in a worksheet can be formatted to look different:

Home tab – Clipboard Group

At the very left of the Ribbon is the clipboard group, which is a small set of tools you can use in relation to when text, images, and styles have been saved to the clipboard as you work. Clipboard-related activities include:

- Copy
- Cut
- Paste
- Redo
- Undo
- Paintbrush
- Moving info by dragging
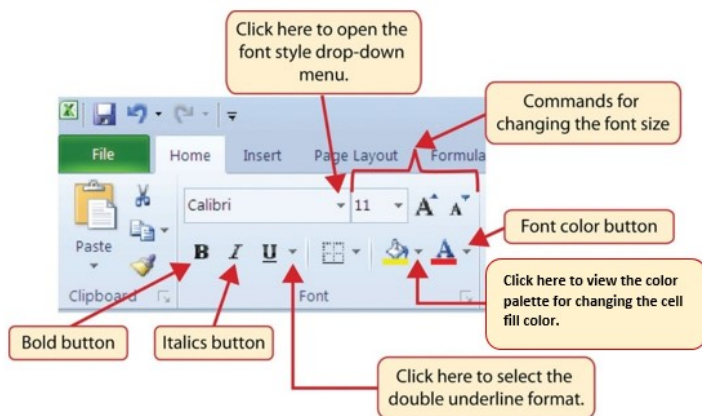
Format Painter – Home tab clipboard group

- Allows you to "capture" an existing style and apply it to any object you click on.
- Single-click applies once
- Double-click locks so you can reuse it

Understanding the clipboard

- See the Clipboard Pane by clicking Home tab/Clipboard section expander icon
- Can "store" numerous pieces of text and images
- Items are stored temporarily (in RAM) until the program is closed.
- You can also delete items off the clipboard.
- You can store them and then choose which one to paste

Home tab – Font group

Click here to open the font style drop-down menu.

Commands for changing the font size

Font color button

Click here to view the color palette for changing the cell fill color.

Bold button

Italics button

Click here to select the double underline format.

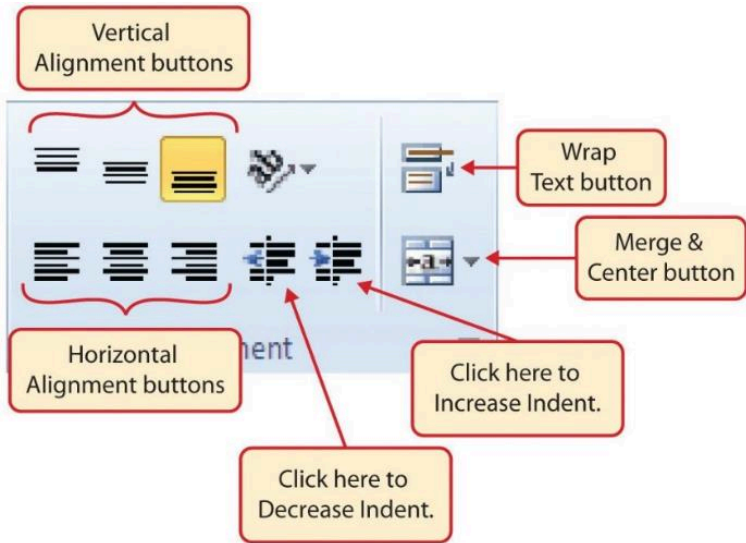**MedAttrib:** Beginning to Intermediate Excel. MS Excel Home tab Fonts group.

"Fonts" refer to the letters (characters) used in text. Font formatting includes resizing, changing the font family, adding bold or emphasis, adjusting spacing between letters, and more. You can right-click on a word or cluster of words for the contextual menu, or use the Home Tab's font group options. These include:

- Style (font family)
- Size

- Color
- Bold, italics, underlining, strike-through
- Changing text size
- In Excel, the font color and cell background color (paint bucket) are also in the Font group.

# Home tab – Alignment group

In Excel, alignment means the placement of text inside a cell. The data you input into cells, unless formatted into some numeric form, defaults to a Bottom Alignment and to an Align Left. Any workbooks you inherit may change these defaults, and you may develop a preference.

MedAttrib: Beginning to Intermediate Excel. MS Excel Home tab Alignment group.

Home tab – Number group

Text is easy to work with in Excel – the program just recognizes it as static data that is informational, not computational. However, numbers (unless used in something like an address or phone number) are recognized as data to calculate.
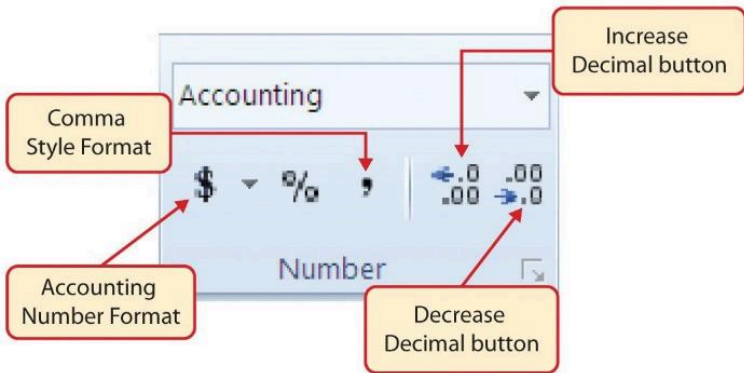
MedAttrib: Beginning to Intermediate Excel. MS Excel Home tab Number group.

There are several types of numeric data that Excel recognizes, including:

- Comma, which adds a comma and a decimal point with a default 2 decimals after the decimal point.
- Dates, which offers both long and short US date formats
- Time
- Percentage
- Currency (explained below)
- Accounting money (explained below)
- Fraction

Text Formatting

The following steps demonstrate several fundamental formatting skills that will be applied to the workbook that we are developing for this chapter. The basic worksheet formatting tasks can all be found on Excel's Home Menu Ribbon in the Font group.

ACTION: MS Excel Try Me Activity #2

*This activity is a modification from **MS Excel BootCamp**.*

Let's do a few basic Excel text formatting tasks. Let's use the **Excel_formatting.xlsx** file that should be in your DataFiles folder.

Before you start, you should use your file manager utility to make a copy of the **Excel_formatting.docx** file that is in your DataFiles folder, then paste the copy into your Examples / MS_Excel folder.

Here is an example of what we are aiming for from the starter file you are working with:

	A	B	C	D	E	F
1	**Basic Worksheet Formatting**					
2						
3	**Fname**	**Lname**	**Address**	**City**	**Salary**	**Count**
4	Steve	Apone	123 Winter Street SE, Duplex A-23	Arlington Height:	$44,200	1
5	Samuel	Rogers	1134 Apple Court W	Shreveport	$27,000	1
6	Jarrah	Bourke	603 Yushu Lane SE, Apt 229	Philadelphia	$24,700	1
7	Kayleigh	Carroll	1527 Cherry Road N	Savannah	$29,400	1
8	Karinya	Waters	1680 Cacao Road S	Pasadena	$50,500	1
9	Shea	Lincoln	288 Hardehout Road S, Flat 302	Dodge City	$23,000	1
10	Uba	Pierce	1192 Connifer Way S	Jackson	$36,000	1
11	Seth	Murray	1230 Frost Drive W	Columbia	$44,200	1
12	Alice	Warren	637 Rzeka Road E	New York City	$65,300	1
13	Simba	Nazari	1676 Ginger Way SW	Los Angeles	$22,800	1
14	Bowie	Ross	1457 Pomegranate Way NE	Mesa	$23,500	1
15	Douglas	MacKintos	896 Kapok Road S	Augusta	$62,500	1
16	Luna	Rhodes	733 Kalokaíri Street E	Norwich	$44,200	1
17	Adaline	Schubert	346 Ainapua Place NW, No 429	Topeka	$73,600	1
18	Kevin	Lopez	1216 Figtree Avenue S	Willmington	$29,000	1
19	Anani	Misipeka	1330 Spring Place NW	Peoria	$65,300	1
20	Orion	Pappas	129 Fir Drive NE, Apt 29	Indianapolis	$28,600	1
21	Nolan	Ross	311 Lich Road N, Unit 325	Brownsville	$36,000	1
22	LJ	Bothell	101 Snorkeling Beach	Honolulu	$25,000	1
23						19

MedAttrib: author-generated. MS Excel example formatting file.

- If Excel isn't open yet, open MS Excel.
- Open a file, and use the browser dialog panel for the **Excel_formatting.docx** file

that should be in your Examples / MS_Excel folder, then open it.

The Home ribbon has 9 groups. In this series of tasks, we'll work with the *Clipboard*, *Font, Alignment,* and *Styles* groups.
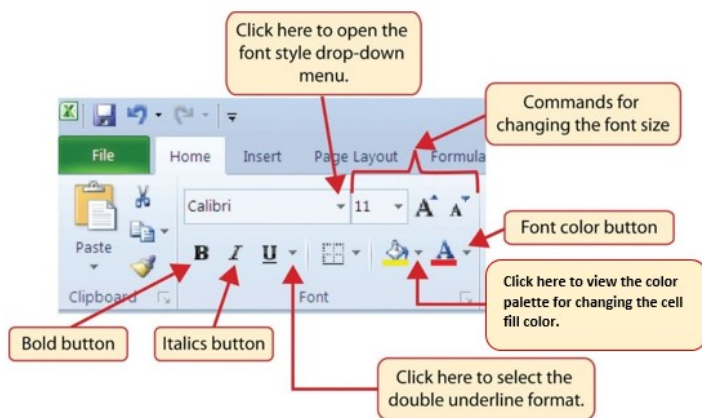
MedAttrib: Beginning to Intermediate Excel. MS Excel Font Group of Commands.

Text Size and Styles

First, we'll work on Row 1, which is a document identifier title.

- Select cell A1. You can see it is selected in the formula bar and is **active**.
- With the cell active, choose the Text size in the Font group and select **18**. This makes the text a larger 18pt size.
- Then, from the Font group, click the buttons for **Bold**, then **Italic**, then **Underline**.

Keyboard Shortcut: Text Formats. Hold down the CTRL key while pressing the letter B (Bold), or I (Italic) or U (Underline) on your keyboard. MAC Users: CMD key.

Cell and Text Colors

You can emphasize a region of a spreadsheet by adding color to the cells and/or text.

- Select the cells A1-F1. You may see the contents of only A1 in the formula bar, but also a selection outline around the 6 cells you chose.
- Find the paintbucket **Fill Color** button on

the ribbon's Font group, and click the down arrow on its right side. This will show you a color palette to choose a cell color from.

- *If you hover over the colors, a tooltip will appear with the color's information.* Click on **Blue, Accent 5 Darker 25%,** which is the second to the last column of colors, and second from the bottom of that column.
- Click only cell A1 again. Then using the **Font Color** button on the ribbon's Font group, click the down arrow on its right side. This will show you a color palette to choose a text color from. Select **White**.
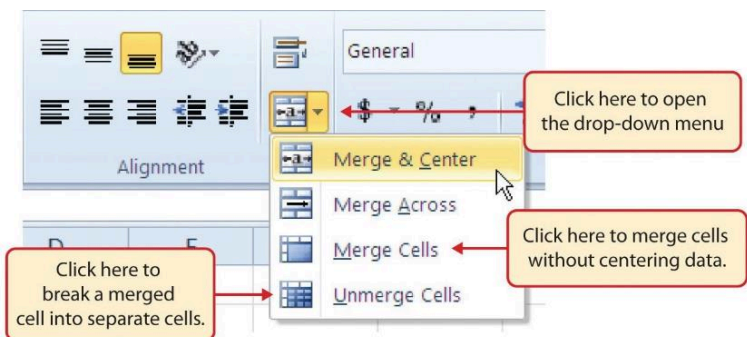
MedAttrib: Beginning to Intermediate Excel. MS Excel Fill Color Palette.

Merge Cells

Data is entered solely into one cell at a time, like the exercise example's rows and columns. However, for stylistic purposes, data can also be merged into more than one cell. For instance, the Merge & Center command is used to center the title of a worksheet directly above the columns of data.

- Select cells A1-F1 again.
- Click the arrow on the **Merge & Center** button in the Font section of the Home ribbon to select the Merge and Center setting.

MedAttrib: Beginning to Intermediate Excel. MS Excel Merge Cell Drop-Down Menu.

· **SAVE your work.**

Header rows

Any range of data in Excel that you may want to sort, filter, and/or calculate should have a Header Row, which is a row that you use to identify the expected contents of the columns of data. Sometimes you may see instead a header column, but for this course the norm will be the header row above columns.

The header row should stand out from the rest of the range of data for ease of identification.
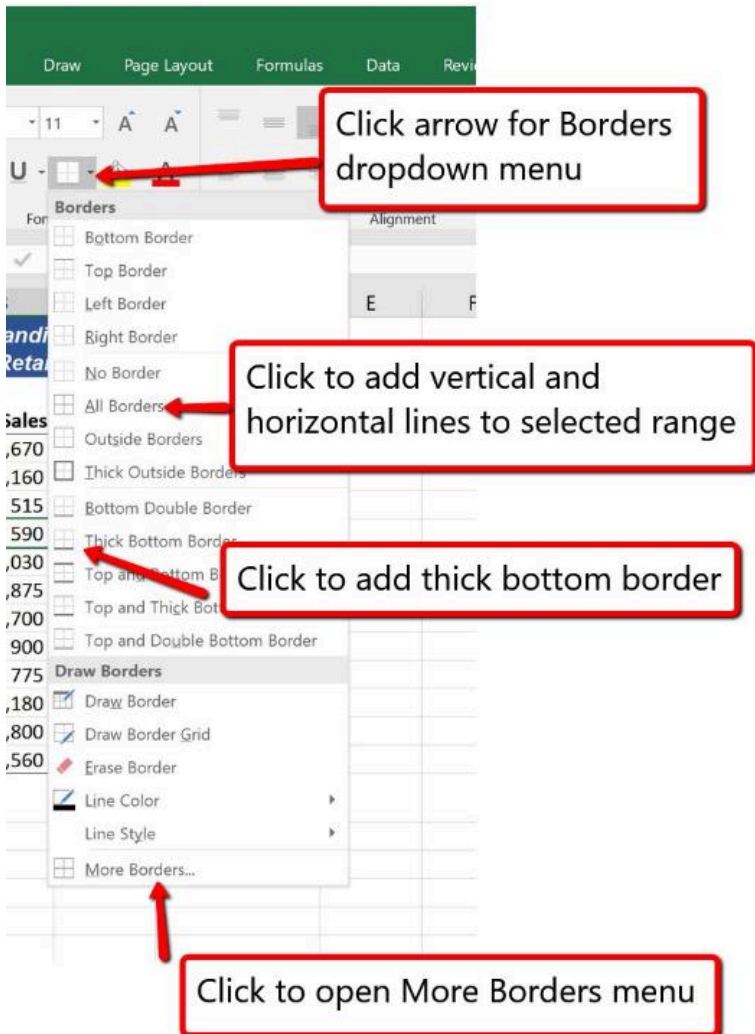
- Select Cells A3-F3
- Using the technique above, make them **Bold**.
- With the A3-F3 cells still active, click the ribbon's Font group Border button's arrow on the ribbon and select **Bottom Border**.

Borders

In Excel, adding custom lines to a worksheet is known as adding borders. Borders are different from the grid lines that appear on a worksheet and that define the perimeter of the cell locations. The Borders command lets you add a variety of line styles to a worksheet that can make reading the worksheet much easier. The following steps illustrate methods for adding preset borders and custom borders to a worksheet:

- Click the down arrow to the right of the **Borders** button in the Font group of commands in the Home page of the ribbon to view border options. (see **Figure 1.40**).

- **SAVE your work.**

Click arrow for Borders dropdown menu

Click to add vertical and horizontal lines to selected range

Click to add thick bottom border

Click to open More Borders menu

MedAttrib: Beginning to Intermediate Excel. MS Excel Borders Dropdown Menu.

Autowidth Expansion

You may find that the column E for the salary data is showing pound signs (####) in the data cells. This indicates that a *numeric* column is too narrow to accommodate the data in it. Whie a text column will show some of the data in a too-narrow column (like the Address column noted above did), Excel can't do this with numbers, and Excel can't do wrap text for numeric data either, because numeric formats are for calculations, not static information.

You can fix this issue by widening the column. We'll cover more column-related sizing later, but for now, the Autowidth action will suffice.

- Select the whole column E – by clicking on the E column's address E at its top. Your cursor tip should then show a down arrow.
- Slowly move your cursor to the right until the tip shows a **Crosshair** graphic. This means you have hovered over the border between columns E and F.
- Double-click while you see this crosshair, and column E should snap to a width that

shows all the numbers within.

Alignment of Cell Content

The data you input into cells, unless formatted into some numeric form, defaults to a Bottom Alignment and to an Align Left. Any workbooks you inherit may change these defaults, and you may develop a preference. For this worksheet, we'll go for **Top Alignment** and **Align Left**. The file we are working with currently shows the first two columns are align center.

- Select cell A3, and click the **Top Align** button on the ribbon's Alignment section.
- With A3 still selected, then click the **Align Left** button.
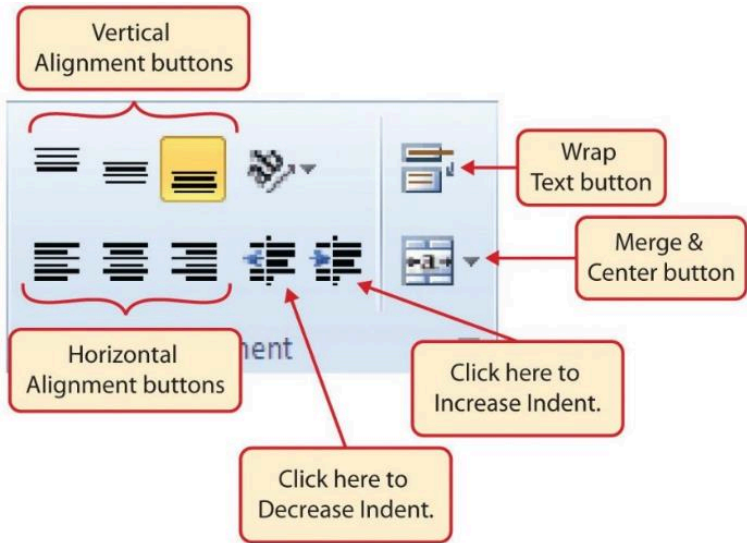
MedAttrib: Beginning to Intermediate Excel. MS Excel Alignment Group in Home Tab.

You can change the alignments of several cells at one time:

- Select cells A4-A21.
- Click the Top Align and Align Left buttons again. The rest of the column should now look like Cell A3.
- Now, select cells B4-F21, and click the Top Align and Align Left buttons again. The rest of the table will also be top aligned and aligned left.

There is just one cell may remain unaligned properly: cell B3. Let's use the **Excel Format Painter** button to fix that. The Format Painter button will pick up the formatting of a cell, and hold it until you click on another cell to 'copy' the format onto it.

- Select cell **A3**.
- Click once on the **Format Painter** 'paintbrush' button in the Home ribbon's Clipboard group.
- Then, click on cell **B3**. This should copy cell A3's alignment format onto cell B3.
- **SAVE your work.**

Wrap Text

Often, a column may have not be wide enough for the information in it, and the data will seem to be cut off. One way to fix this is to wrap text so that the cell will increase in size to accommodate the data.

- Select cell C4.
- Click on the **Wrap Text** button in the

Home ribbon's Font group. See how the row expands in height to show all the data.

- Now, while cell C4 is still **active**, click on the Format Painter button from the Clipboard group.
- Then, while the Format Painter is active, hover and click over cells C5-C21 to apply the wrap text to the rest of the column.

Keyboard Shortcut: Wrap Text. Press the ALT key and then the letters H and W one at a time. MAC Users: n/a.

Number Formatting

Text is easy to work with in Excel – the program just recognizes it as static data that is informational, not computational. However, numbers (unless used in something like an address or phone number) are recognized as data to calculate. There are several types of numeric data that Excel recognizes, including:

- Comma, which adds a comma and a decimal point with a default 2 decimals

after the decimal point.
- Dates, which offers both long and short US date formats
- Time
- Percentage
- Currency
- Accounting money
- Fraction

For this example, let's first format the Salary columns contents with a comma so that the numbers look like common 'thousand' units.

- Select cell E4.
- Look for the Home ribbon's group called **Number**, and the **dialog box** arrow, which will show a dropdown selection of number formats. Click that button.
- Scroll down that list until you find **Currency**, and click on that. The cell's contents will now appear as $44,200.00.
- Let's take out the "cents" part of that number. With cell E4 still active, click twice on the Number group's **Decrease Decimal**. This should remove the .00 from the number.

- You can repeat the Currency format and Decrease Decimal steps after you select cells E5-E21.

  - **Alternative method**: use the Format Painter paintbrush to paint Cell E4's format over cells E5-E21. Click once on the **Format Painter** 'paintbrush' button in the Home ribbon's Clipboard group while cell E4 is active, then paint over cells E5-E21.
- **SAVE your work.**
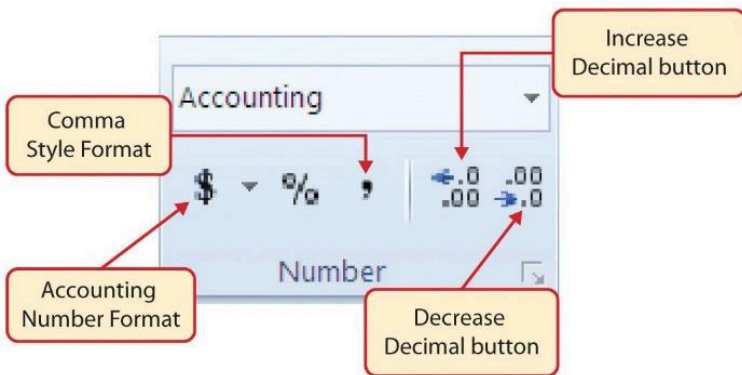
MedAttrib: Beginning to Intermediate Excel. MS Excel Number Group of Commands.

The Format Cells Panel

- When you become proficient with Excel and the content you plan to produce, you can also use a more comprehensive Format Cells panel, which has several tabs you can choose from while formatting a cell or row or column.
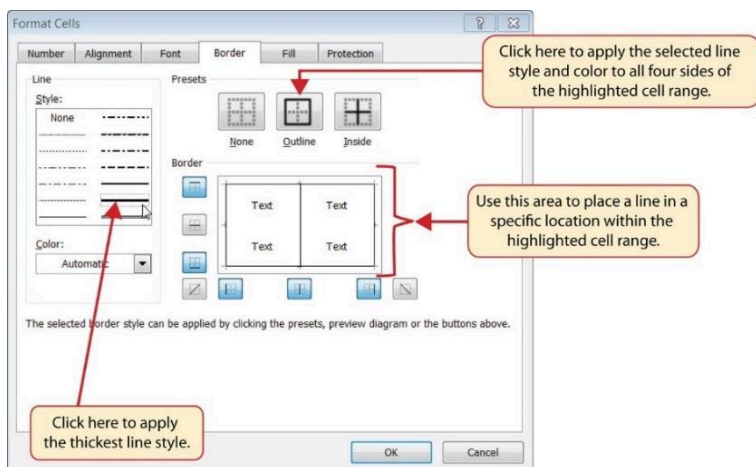
MedAttrib: Beginning to Intermediate Excel. MS Excel Borders Tab of Format Cells Dialog.

Here, we will add a line to the bottom of the data range we have been working on, so that you can input some data yourself, then format it.

- Click on cell A22, and type YOUR own first name in it.
- Add more information for yourself in cells B22-F22. Other than your own real last name, please feel comfortable 'making up' data for the other cells so that you preserve your confidentiality.
- Once you have your new data entered, click on cell A22.
- Then, in the Font group on the Home ribbon, look for a tiny Font settings arrow icon in the group's lower right corner, and click on it. This should open the panel for **Cell Formatting**, which has 6 tabs in it: Number, Font, Alignment, Border, Fill, Protection.
- Since Cell A22 is a static text data, you can use the **Font** and **Alignment** tabs to look at your choices and to change the cell's format.
- Using the Alignment tab, make the contents of cell A22 top aligned, left aligned if it is not already, then click **Okay**.
- **RIGHT-Click** on cell B22, then scroll down the contextual menu until you see the **Format Cells** option (*you may have to*

scroll down the menu list since it is near the bottom). Then, click on the Format Cells option. The same Cell Formatting panel you have already used will open.

- Using the Alignment tab, make the contents of cell B22 top aligned, left aligned if it is not already, then click Okay.
- Now, you can use either of these options to open the Cell Formatting panel as you adjust the formats of cells C22-F22.
- OR, you can just select cells C21-F21 and click the Format Painter paintbrush button on the ribbon, and then run the style over cells C22-F22.
- **SAVE your work.**

Special Formatting

Much of your data formatting will be basic tasks, like changing the color of the text or cell backgrounds, cell/column/row alignments and wrap, and selecting basic numeric formats like dates, accounting, percentages, etc. However, there are a number of basic additional formats

that Excel lets you customize for more complicated needs, like:

- Phone numbers
- Social Security numbers
- Zip codes
- Showing negative numbers in stand-out formatting
- Additional date and time formats
- Additional fraction formats
- Customized number formats
- Validation techniques

These options are shown in the Format Cells panel, in the Number tab.
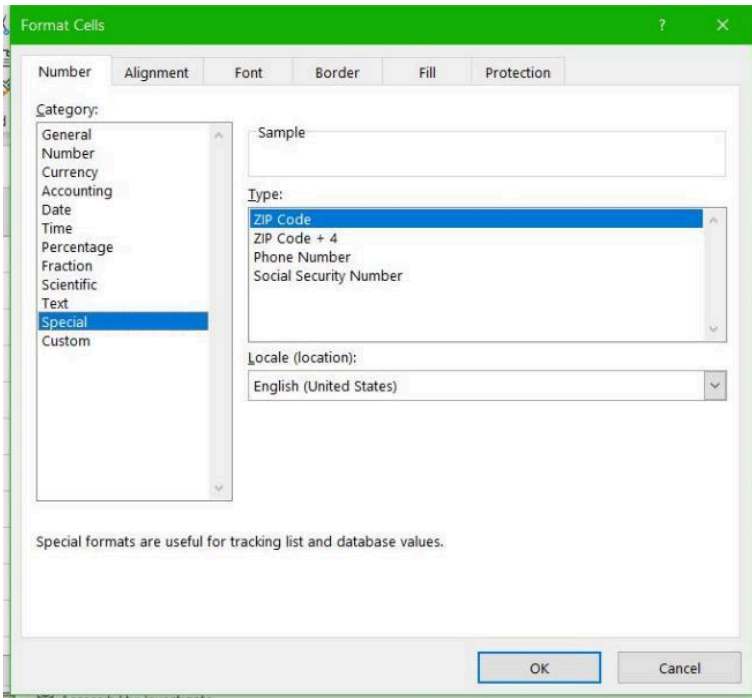
MedAttrib: autogenerated. MS Excel Format Cells panel.

Examples:

- *Phone number*: 2065551234 = (206) 555-1234
- *Social Security Number*: 2221111234 = 222-111-1234
- *Zip Code + 4*: 981012345 = 98101-2345
- *Negative Number (one of the formats)*: -2700 = (2,700)

AutoSum feature

Applying mathematical computations to a range of cells is accomplished through functions in Excel. However, the following steps will demonstrate how you can quickly sum the values in a column of data using the AutoSum command in the Home menu ribbon:

- Click cell **F23** in the worksheet.
- In the Home tab's ribbon, look for the Editing group (more to the right of the ribbon).
- Look for the button that looks like an and reads **Sum** when you hover over it. Click it while cell F23 is active.

What you'll 'see': Cell F23 will turn into a formula – **=SUM(E4:E22)** – and a dotted border and light blue fill will affect the column of numbers above it.

- When you press the ENTER key on your keyboard, the sum will calculate automatically, and add up the numbers in the column above cell F23.

Now you will see the number of people in the data range we have been working with, including the row you input about YOU!

· **SAVE your work.**

Inserts

In Excel, graphics like images, icons, and shapes We won't cover all the insert options, but they work much the same way as the Picture one.

Excel lets you add illustrations, like photos, clipart, WordArt, SmartArt, icons, and shapes. Inserts are 'unanchored' to cells, which means that they float above cells and can be easily moved without affecting the data typed and calculated *inside* your cells. Like in Word, in Excel an inserted item like a picture – when made active by clicking on it – will reveal a contextual Menu ribbon for doing editing work on the inserted item.

· With the **Excel_formatting.docx** file still

open, let's insert a picture.

- Place your cursor around Cell A25.
- In the **Inserts menu ribbon,** click the **Illustrations** group button for Pictures.
- Click **Pictures**, which shows you image locations to choose from: This Device, or Stock Images, or Online Pictures.
- In this case, assuming you are online, choose the Online Pictures option, which will pull open an Online Pictures window only.
- Then, type in the name of your favorite place – if you have one – and look at the results you get. Then, choose one and click it, which will insert it into your worksheet.

Your image could be in any size, so we'll set a size for whatever image we use to practice resizing.

- Click your inserted picture. This 'activates' the picture so that a new, contextual menu/ribbon appears at the right-hand side of your Menu bar, called **Picture Format**. *We will use this ribbon for the next several steps*.

- In the **Picture Format ribbon**, on the far right, choose the text field for the **horizontal** size, and type in 3". This will resize your picture to 3 inches wide, and to whatever the proportional height is.
- Next, click the **Accessibility button** on the **Accessibility** group. In the text field, type "image of my favorite place (and the place's name)", and place a checkmark in the **Mark as decorative** checkbox. This allows Excel to consider this image as accessible in the program.
- Then, in the Picture Styles group, choose **Picture Border**, and in the dropdown, choose the color black. This adds a very narrow border to your picture.
- in the Picture Styles group, choose **Picture Border** again, and in the dropdown, choose Weight, and on the flyout menu, choose 3pt. This will make a more prominent border for your picture.
- **SAVE your work**, and close the file. **EXCEL ACTIVITY #2 FINISHED.**

Workbook Design

Workbooks are made up of one or more worksheets, and are like a book holding file folders. Each worksheet can contain different data, but be part of the same project. You will likely – in the workplace – inherit existing workbooks, or create your own with multiple worksheets (pages). Managing them in the workbook, and designing the workbook itself, is a useful skill.

ACTION: MS Excel Try Me Activity #3

*This activity is a modification from **MS Excel BootCamp**.*

For this chapter, we will use the data file **Excel_design.xlsx** in order to demonstrate the various steps. Please find and open **Excel_design.xlsx**, and save a copy to your Examples folder. Most of our work will use the **Page Layout menu ribbon** for themes, colors, fonts, and effects.

Adding and Deleting Worksheets

Now, let's add, then delete, new worksheets in this same file (workbook).

- The **Excel_design.xlsx** file currently has one worksheet, named Sheet1. Click anywhere in the worksheet.
- In the worksheet's name tab section, double-click name tab that reads Sheet1. You can overwrite that name; rename the sheet Desserts.
- In the worksheet's name tab section, click the + to add another worksheet tab, which will default name itself Sheet2. It will appear just to the right of Desserts.
- Click the + to add a third worksheet tab, which will default name itself Sheet3 and appear to the right of Sheet 2.
- Click the + to add a fourth worksheet tab, which will default name itself Sheet4 and appear to the right of Sheet 3.

We actually do not need all of these sheets.

- Choose Sheet2, so that you are in that blank sheet, then look in Home menu ribbon for the **Cell** group.
- Click the down arrow on the **Delete** button and choose the Delete Sheet option from the drop-down list. This removes the Sheet2 worksheet.
- Click the Delete button on the Delete warning box (if a warning box appears).
  - **Alternate method:** RIGHT-click on the tab of Sheet3, which will offer a contextual menu. On the menu, click Delete.
- **SAVE your work.**

Keyboard Shortcut: Inserting New Worksheets. Press the SHIFT key and then the F11 key on your keyboard.

Renaming worksheets

The default names for new worksheet tabs at the bottom of any workbook are Sheet1, Sheet2, and so on. However, you can change the

worksheet tab names to identify the data you are using in a workbook. Additionally, using you can change the order in which the worksheet tabs appear in the workbook, and using that same process add a worksheet, delete one, protect one, etc.

The following steps explain how to rename and manage the worksheets in a workbook:

- Double-click the Sheet4 worksheet tab at the bottom of the workbook. Type the name **Beverages**.
- Press the ENTER key on your keyboard. Now we have a nice, empty sheet.
- Moving worksheets

There are a couple of ways you can move a worksheet. We'll try both for practice.

- Right-click on the **Beverages** worksheet's tab name. In the dropdown menu, select **Move or Copy** from the dropdown menu.
- In the Move or Copy panel, do NOT put a checkmark in the Create a copy checkbox. This is so that the **Beverages** sheet will **only** be moved.

The **To book** field will show the name of the current file, since we are moving inside the same file.

- Then, in the Before sheet, click Desserts (to move before that sheet) and click the OK button. The **Beverages** sheet should now be the first available worksheet tab at the left.

TIP: Copying/moving worksheets. You can use this same technique to copy a worksheet to add somewhere in the same workbook, or to start another workbook altogether. You would make sure to put a checkmark in the Create a copy checkbox. To open the copy to a new workbook, you would also choose to move to (new book).

Nope, we don't like it there. Let's move it back.

- Press your mouse cursor down on the **Beverages** worksheet's **name tab**, until you see a small icon of a *sheet of paper floating* near your cursor. That is the

indicator that you can, while still pressing down on the mouse cursor, drag the worksheet tab.

- Drag the **Beverages** worksheet tab to the right of the Desserts worksheet tab, then release the mouse/cursor. The **Beverages** sheet should now be at the end of the row of worksheet name tabs.
- **SAVE your work.**

MedAttrib: author-generated. MS Excel worksheet design final result.

Page Layouts – Page Layout Tab

In MS *Word*, documents allow both a design and layout Menu ribbon. Because Excel is mostly about analysis and calculation, the essential design and layout options have been combined into the **Excel Page Layout** menu/ribbon. The Page Layout tab allows you to set the physical format of your worksheet. What you do here will stick with your document and once in the Print preview before printing/distributing your work, the prepared output should be assured.

Setting up documents – Page Layout tab

The Page Layout tab allows you to set the physical format of your page, which is a good starting step in word processing work. This determines how large the paper used will be, the margins, the orientation of the document, etc. In the Layout tab's ribbon, you can use the

page setup group icon dropdowns, or the group's panel activation arrow, to accomplish (in order of page setup group).

TIP: Multiple Worksheet set-up: You can select all the worksheets in your workbook and set the Page Layout options all at once, if you know what your project parameters will be.

- **Page margins**: the white space around the edges of a page that won't be printed on , and also which adds white space around a document's content for viewability.
- **Page orientation**: the height and width direction of a page. Default and common use is Portrait, in which a document is taller than wide. Horizontal is commonly more useful in Excel since ranges of data/ tables can be wide, with many columns.
- **Page size**: the paper size of a document, even if it never is intended to be printed on paper. Users may choose to print the document, print a PDF, and or take a screenshot image for later printing/ pasting into another document. The

default is 8.5 x 11 inches, with other common page sizes being legal (8.5 x 14 inches), and ledger (11 x 14inches). Other listed sizes may be legacy for office documents. In Excel, a common selectin is 8.5 x 14, since tables with many columns of data tend to be wide.

- **Breaks**: You can create a new page break, a break to begin and end a different column style, or wrap text around an inserted image, and add new section breaks.
- **Print area**: This allows you to designate a specific range of columns and rows to be printed, even if it is smaller than the whole of your worksheet's contents.

For this workbook, Excel_design.xlsx, let's adjust the layout of the margins, page orientation, and page size.

- Click anywhere in the Desserts worksheet.
- Go to the **Page Layout** ribbon's Page Setup group, and click **Margins**.
- With Margins open, choose **Narrow**. Then, click Margins again, and choose **Custom**

Margins (at the bottom).

Custom Margins will open the Page Setup panel, and the Margins tab in it. Make the changes to the margins that you see in the image below:

- Top margin=1, Bottom margin=.70, Header=.25, Footer=.25, Center on page=Horizontally
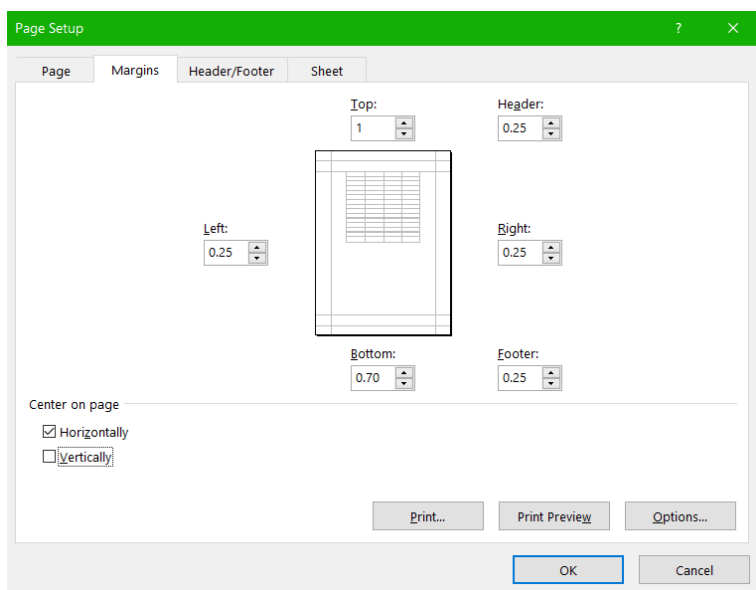
MedAttrib: author-generated. MS Excel Page setup.

- Click OK to exit the Page Setup panel.
- Next, choose **Orientation** from the Page Layout ribbon's Page Setup group.
- Choose **Landscape**. The default is Portrait, which makes the worksheet print-out taller than it is wide. Landscape will make it wider than tall, and help accommodate more columns of information on the same page.
- Now, choose **Size** from the Page Layout ribbon's Page Setup group.
- In the Size dropdown, choose **Legal**. Legal is often used for spreadsheets due to their many columns that need to appear on a single page.
- **SAVE your work.**

Designing documents – Design tab

Themes apply decorative styles to your Excel worksheet, such as fonts, colors, effect options, paragraph spacing, etc. They can give a set of documents a consistent and attractive appearance and make your word processing

efforts look more professional. In business, they are best used as part of a "package" of documents, such as a letterhead and envelope set or as part of a report style. They can enhance what you want to communicate by adding company branding colors and fonts. You can also:

- Make your document more readable than just black-and-white text.
- Tie consistent inserts, like shapes and borders, together with the rest of the document's "look".
- Use different colors and font styles to punctuate header rows from the data cells.
- Easily update the whole look of your document just by changing the color or font variants
- Design: Theming / Design Tips

Using themes can be a double-edged sword. While they can add attractiveness to your documents, they can also, if misused, make your work look confusing, be hard to read, and muddy your communication message.

- Choose theme colors that make sense for the product, service, or idea(s) you are trying to communicate
- Choose theme backgrounds that have good contrast and allow text to be very easy to read
- Choose fonts for readability, based on need for headlines, lots of paragraph texts, easy bulleting, etc.
- Remember that less is more – more colors and font variations in one document can look unprofessional and take away from your message.

Design: Theme Variants

Theme variants let you change aspects of a theme you select to apply a different core font family to it, or to change the color palette it will work with.

- **Fonts**: Font families in themes are designed and sized to be readable and hopefully scannable by screen readers for accessibility use. The style will offer a font

for titles/subtitles, and another for general text. Available font families come installed with the computer's operating system, and may also be accessed from the word processing software's installation or cloud-based accessories.

- **Color Palettes**: Like fonts, color palettes are included in a style, and can also be changed independently to modify and create a new style. For instance, the overall design style of a theme may work for you, but the color palette assigned to it may not have enough contrast for your audience, or your company may focus on a different rage of core colors.
- **Effects**: These are subtle styles that can be attached to some inserted items, like image borders, shapes, SmartArt, etc.
- **Scale to fit group:** Scale to fit in Excel is a way to preset your worksheet for print views.
- **Sheet options group**: This group lets you designate if you want to see gridlines on your sheet while you work. Grid lines are not the same as borders, and will not appear on printed pages.

Using Themes

We'll start with the Page Layout ribbon. This is because when putting together a spreadsheet, it is efficient to work from the macro level to the granular level; the theme, colors, and other things that affect all the styling of the worksheet should be considered when creating the project, so that any inserts, tables, and charts/graphs flow from the color and font selections.

In Excel_design.xlsx, we'll change the theme first, then determine if it meets our needs and how to adjust it by choosing other colors and/or fonts. Normally, Excel defaults to the current Office theme, which gives a palette of colors and shades from across the color spectrum. However, on spreadsheets, you may instead prefer a different color set, or inherit a workbook at work that uses another color scheme, or be tasked with an assignment with certain theme specifications. While Excel is designed for themes to be changed almost effortlessly and without technical glitching. It is always good to plan your work and do steps

efficiently to avoid rework or conflicts to very large spreadsheets later.

Colors to prioritize for this small company: royal blue, muted brick red, white, French blue, yellow ochre, pale lavender. We'll find out what applies in the color themes, if any. Blues and related muted colors are preferred.

- Click on cell A1, then choose the **Page Layout menu ribbon**.
- In the **Themes** group of the ribbon, choose the **Themes dropdown** box arrow.
- For fun, just click on a few – on your screen outside the Themes dropdown, you can see the fonts, header row color, and the Taste du Monde "croissant" image effects seem to Preview a change.

We'll settle on the **Berlin theme**, because the font selection seems easy enough to read with a little added text boldness, but not too stylistic to make a workbook hard to understand.

- **SAVE your work.**
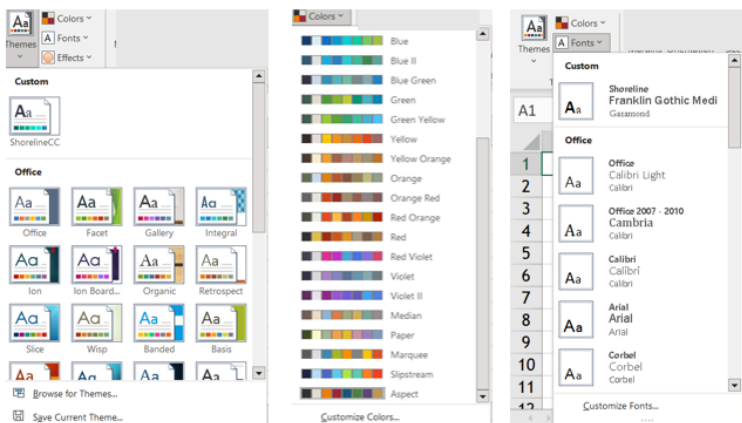
MedAttrib: author-generated. MS Excel themes/colors/fonts dropdowns.

Modifying Themes

Now, the Berlin theme has great fonts, but the color palette may not work. Let's check it out. The Taste du Monde header row is currently kind of an orange-brown color. Not good for the company's planned color scheme.

- Right-click on the cell A5, the first cell in the header row, which will pull up a menu list.
- Choose the **Format Cells** (*you may have to*

scroll down the menu list since it is near the bottom), which opens the Format Cells panel. In this panel, choose the **Fill tab**.

- In the Fill tab, look at the upper left that shows a palette of 10 columns of colors and their shades. This is the color palette for this particular theme, and includes maybe a couple of the muted French county colors we could use, but no blues. No thank you!
- Exit the Format Cells panel by clicking **Cancel**.

Colors Palette

Now, let's consider other color options for this theme. While keeping the Berlin theme, **we will use the Colors panel to look at options and change the color palette.**

- You can click anywhere on the work area of your worksheet; then In the **Themes** group of the ribbon, choose the **Colors dropdown** box arrow.
- We are looking for something that has a

dark blue, medium blue, darkish brick red, and a couple of neutral colors in the palette that could be purposed for Taste du Monde. Scroll down the Colors dropdown, and notice how our header row's color changes. The closest we may find is the **Aspect** color palette.

- ◦ **Note**: this course is focusing on Excel for Windows (PC) and the assumption that your full installation has all the built-in items, like themes, color palettes, etc. However. If you don't have some of these themes or named palettes / font collections, choose what you can to gain the skills-building anyway.
- In the Colors palette, choose **Aspect** (near or at the bottom of the list). This looks mostly like reds and so we'll repeat looking at cell A5 in the Cell Format panel's Fill Tab to check out the color palette's spread of colors.
- In the Cell Format panel's Fill Tab, look at the color palette. In it, there is a blue column with a dark blue and a French blue, dark brick reddish color, a lavender

color, a kind of light tan, and white. This should do. *We can use a later use a color search for a pale yellow, if needed.*

- Click on the 7th column's dark blue (second from the bottom), which will fill the A5 cell, then click OK.
- Use the Home menu's **Format Painter paintbrush** to paint the style of cell A5 over B5-D5.

Fonts Palette

Because the Taste du Monde's header row had already had a dark color, the text was already white, so we do not need to change the text color for readability / contrast. However. We can look at the Fonts palette to determine if we want a different font set.

- You can click anywhere on the work area of your worksheet; then In the **Themes** group of the ribbon, choose the **Fonts dropdown** box arrow.
- In the dropdown list, there are a number of font sets. Unfortunately, the dropdown list

does not show which specific font set we are using. You need to click on one of the cells in your workspace to see, in the Home ribbon's **Font Field** which font this document is using: Trebuchet.

- Scroll down and see how the fonts on your worksheet seem affected in the preview. You can choose to experiment by clicking on one or two, but for Taste du Monde, we'll stay with the Berlin theme's chosen fonts.
- **SAVE your work.**

Effects Panel

The Effects panel lets you preview some effects that can be used on graphics like shapes, SmartArt, WordArt, and image borders in Excel workbooks. In this Taste du Monde worksheet, there is already a croissant image that we can use to observe what happens with effect changes.

- In the **Themes** group of the ribbon, choose the **Effects dropdown** box arrow.

- For fun, just click on a few – on your screen outside the Effects dropdown, you can observe the croissant image effects in a Preview. Some of the effect options seem to make a big change; others seem barely noticeable.
- Click on the Frosted Glass effect to choose it.
- **SAVE your work**, and close the file. **EXCEL ACTIVITY #3 FINISHED.**

Now you should have a good handle on basic workbooks design.

Datasets

Excel is all about data. The data is for viewing, organizing, sorting/filtering, analyzing, and calculating so that business problems can be considered and solved. The more organized the data is, the better you will be able to use it, analyze it, and get the needed calculations, graphs, and pivot tables to answer your questions.

A dataset is simply a range of data – a range of cells in tabular format. It may be formatted or unformatted, have an assigned name or be in a table object.

Let's look at an image of some Excel work. In it the cells A1 through D7 have data that seems related to each other. Cells E1-E6 is a column of data, as is the column of G1-G5. This is all part of a dataset, although only cells A1 through D7 seem to meet the dataset definition of being contiguous.

	A	B	C	D	E	F	G	
1	Companies	CountryDesign	Location		Shippers		Funding	
2	Taste du Monde	International	Rochester New York		Speedy Express		Nonprofit	
3	Afya Health	Swahili	Newton Massachusetts		United Package		Venture	
4	Shilp Crafts	Hindi	Exton Pennsylvania		Federal Shipping		SBA	
5	Hogar Bello	Spanish	Santa Fe New Mexico		Courier Locale		Microfinance	
6	Prisvard Tech	Swedish/American	Minneapolis Minnesota		Store-N-Ship			
7	YaseiWorks	Japanese	San Francisco California					
8								
9								

MedAttrib: author-generated. MS Excel dataset.

Understanding Cells

- **Cell contents**: As discussed above, all data in Excel (other than inserted objects like pictures) is input into cells. Each cell is something that, as part of a row and column, can be sorted, calculated, and tell a story.
- **Cell addresses**: Data are entered and managed in cells by entering numeric and non-numeric data. Each cell in an Excel worksheet contains an identification address, which is defined by a column letter followed by a row number. For example, the top left cell **A1**. This would be referred to as cell location A1 (or cell reference A1). You can navigate in an Excel worksheet with your mouse pointer or using the arrow buttons on your keyboard.
- **Column Headings**: In Excel, data rarely means anything to a viewer if there is no context attached to it. Commonly this is done through column headings, which identify what the content in the column is supposed to be. This can also be done as row headers instead, but in this course

we'll mostly use the standard column headings.

Rows/Columns

Rows and columns can be adjusted to help make visualizing and analyzing data easier.

- **Resizing**: You can resize columns from the Home tab Cells group to reveal information that looks cut off, or to narrow them if there is too much space. Same with rows if the row is too tall or seems to have cut off anything other than the first line of text.
- **Inserting/Deleting**: Rows and columns can be inserted as needed from the Home tab Cells group, in order to expand for data to be added. Existing columns and rows can also be deleted.
- **Hiding/Unhiding**: You may have a worksheet with a lot of columns, but really only need to see some of the data to analyze/decide on an action. Hiding columns or rows can help you focus.

- **Sorts**: In addition, information in a dataset can be sorted from the Data tab Sorts & Filters group, so that a column shows information in an alphanumeric order or in some more customized order.
- **Filters**: A dataset may have information about more customers or other content than you need: using a filter from the Data tab Sorts & Filters group lets you temporarily hide unwanted information so you can get a snapshot view.
- **Freezing Panes**: If a dataset is made up of hundreds of record – long enough that you need to scroll down several pages to see it all, or over enough columns that you can't see the important left-most columns, you can freeze a column or two, or the header row, so that the information remains in view no matter how much you have to scroll.

ACTION: Quick Task

Back to the image again:

	A	B	C	D	E	F	G	
1	Companies	CountryDesign	Location		Shippers		Funding	
2	Taste du Monde	International	Rochester New York		Speedy Express		Nonprofit	
3	Afya Health	Swahili	Newton Massachusetts		United Package		Venture	
4	Shilp Crafts	Hindi	Exton Pennsylvania		Federal Shipping		SBA	
5	Hogar Bello	Spanish	Santa Fe New Mexico		Courier Locale		Microfinance	
6	Prisvard Tech	Swedish/American	Minneapolis Minnesota		Store-N-Ship			
7	YaseiWorks	Japanese	San Francisco California					
8								
9								

MedAttrib: author-generated. MS Excel dataset.

In here, all three batches of data are 'ranges' of data. This is important, because we may want to actually reference them in a tidy way for formulas and general reference. As they exist now, they are simply designated by the cell collections. A1:C7, E1-E6, G1-G5.

Conditional Formatting – Home Tab

You can apply conditional formatting based on specific conditions you want to be highlighted. Example: contents of cell is less than a certain quantity.

Data – Data Tab

Excel allows you to manipulate data – how it is sorted, imported, filtered, validated, and grouped.

- You can import existing data from the web, another spreadsheet, a database, XML, and more (advanced).
- You can sort rows and columns, such as for alphabetizing.
- You can filter tables to show only certain rows or tables based on criteria you set – the rest is simply hidden, not gone.
- You can remove duplicates of data.
- You can group info to create subtotals, before totaling those.
- You can use flash-fill to add large amounts of consecutive data.

As noted above, a dataset is simply a range of data. However, what needs to happen with data is what is important. Formulas that calculate data for specific purposes need to be able to find the data and easily add it to the formula. Sometimes the data will be all the

contents of a table. Sometimes it will be only a column or two, or a few rows. In these cases, being able to "set aside" the data range in an identifiable way is crucial. You can do this by identifying data ranges.

- **Selecting**: You select a data range by choosing a selection of row and column cells, such as A1 through D10, or A1:D10.
- **Naming**: To make that data range useful and easy to refer to in a formula, you need to name it. This can be done in the Formulas tab's Defined Names group by using the Name Manager panel to give the data range a name. Once this is done, you can see a list of every named data range in the Excel Address field.
- **Use in formulas**: In a formula, you can use the named range as the data range reference in the formula.

ACTION: MS Excel Try Me Activity #4

*This activity is a modification from **MS Excel BootCamp**.*

Let's now work with an Excel file: **Excel_datasets.xlsx**. This is a dataset from our friend Taste du Monde that we can use for looking at a dataset, identify ranges of data, and set names for two or three of them.

Save a copy of **Excel_datasets.xlsx** to your Examples / MS_Excel folder, then open it for work. It already includes the Taste du Monde logo icon and WordArt and link to their website. It also includes records of customer data including names, addresses, emails, and opt-in decisions.

The whole set of A6 through J36 is a data set.

- Select only cells **A6 through C36**. This is a range of data of that range of cells of customer names and their customer ID.
- Deselect it.
- Select only cells **A6 through J9**. This is a

range of data of the first two customer records.
- Deselect it.

Now, let's choose a range of data and name it for possible later use.

- Select only cells **F6 through H36**.
- With these cells selected, choose the Formulas menu ribbon.
- In the Formulas ribbon, look at the Defined names group. Select the dropdown arrow of the **Defined Name button**.
- Click on "**Defined name**", which will open a dialog box.
- In the dialog box, in the Name field, type **TM_Region**.
- In the dialog's Scope, leave the default of **workbook**.
- In the comment field, type: Taste du Monde customer regions.

In the **Refers** to field, note that Excel recognizes that you selected as **=Customers!$F$6:$H$36**, which is referring to the worksheet called

Customers, and the range of data from F6 through H36. Click OK.

- Now, click on the dropdown arrow of the **Name box** in the Excel UI, which usually shows the address of the Cell you have clicked in. When you click on the arrow, you should see TM_Regions listed. This is a named data range.
- Click on **TM_Regions** in the Name box. Excel will select the range of data you just named – cells F6 through H36.
- **SAVE your work.**

Moving ranges

Let's move a named range.

If you have not yet saved **Excel_datasets.xlsx**, DO IT NOW, please. We will do a task we may not want to keep but *you don't want to lose any previous work*.

- With **Excel_datasets.xlsx** still open, use the Name box to choose **TM_Regions**. Excel

will select the cells that make up that named range.

- Right-click and choose Cut (or use the shortcut of CTRL X / CMD X for Mac), which will 'cut' the selection.
- Place your cursor in cell L6, right-click, and choose Paste (or CTRL V / CMD V).

The named range has been moved.

- Close the **Excel_datasets.xlsx** *without saving it.*

Sorting data

Let's work with sorting and filtering data ranges. We actually want to work with the **Excel_datasets.xlsx** file again. We just didn't want to save the last set of changes made. Please open the **Excel_datasets.xlsx** file.

The dataset has a header row, which has been emphasized with bold text. This will help us identify what we want to sort and filter.

The important thing to know about datasets

and named data ranges is that, although they display data in columns and rows, the data is not actually connected. Let's see what this means.

- Select the contents of Column I, **Cells I6-I36**. Copy it, then move your cursor to **Cell J6**.
- In Cell J6, paste the data you just copied. Now you have two columns of Opt-In responses.
- Select the data of Column J: Cells **J6-J36**. Use the format painter in the Home ribbon to paint the cell backgrounds a light color, like gray.
- With this J column data still selected, choose the Data ribbon. In the ribbon, choose the Sort & Filter group, **Sort A to Z button**.

You should see a sort warning message:
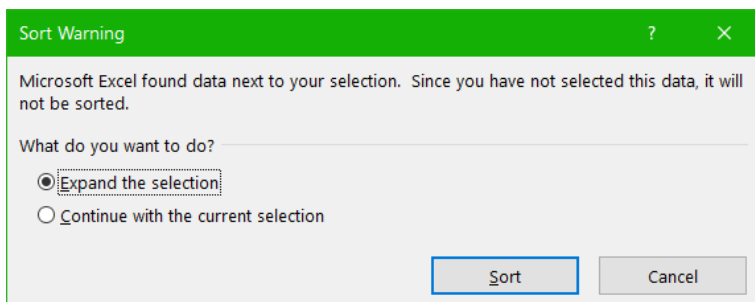
MedAttrib: author-generated. MS Excel Sort warning.

- What to do? Let's choose "**Continue with the current selection**" then click the **Sort** button to observe what happens.

Review the two Opt-In columns. The J column one is out of order compared to the original I column. That is a problem.

Why did we go through this? Well, back in the Bronze Age when the author first worked with Excel, there were no warnings about sorts of data records in relation to a dataset that wasn't actually connected as a table. The author hangs her head in shame at the data sorting mistakes that occurred. Now, even with the Excel sort warning, it can still be easy for an inexperienced data analyst to accidentally sort

only part of a dataset, which would corrupt a batch of data when some information becomes untethered from its proper record. This would affect the data accuracy, the results of pivot summary tables, and definitely skew charts based on the data.

Let's be more careful and try again.

- First, delete column J – the incorrectly sorted column.
- Next, select data from Column C, **Cells C6-C36**. This will give us the last names of customers.
- With this selection, again go to the Data ribbon, and select the **Sort icon**.
- Again, we will get the Sort warning. In this case, leave the default selected response of "**Expand the selection**", then click the Sort button.

Now, Excel will select – for us – the entire range of data from Cell A6 through I36.

- In addition, the Sort panel gives us a choice of what to sort. In the **Column Sort By** field, choose **CustLName**.

- In the Sort By field, leave the default of **Cell Values** – Excel will sort based on the content rather than some other method.
- In to Order field, keep the default of **A to Z**.
- Click the OK button to generate the sort.
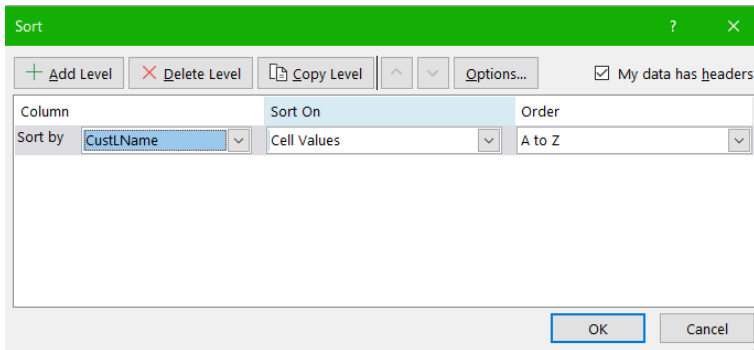
MedAttrib: author-generated. MS Excel Sort panel.

The whole data range of Cells A6-I36 should have been properly sorted, in A-Z order, based on the customer's last name.

- **SAVE your work.**

Filtering data

Can we also filter data in a data range? Let's find out.

- Place your cursor on any cell in the data range of Cells A6-I36.
- Choose the Data ribbon Sort & Filter group, and select the Advanced Filter button.

An Advanced Filter panel opens, which already displays the List range of A6-I36. That is efficient. So is the default option to filter the list in place. However, the filter requires some Criteria range to filter in or out. That requires us to give a specific data range – like one of the columns.

Advanced Filter

Action

- ◉ Filter the list, in-place
- ○ Copy to another location

List range: $A$6:$I$36

Criteria range: |

Copy to:

☐ Unique records only

OK   Cancel
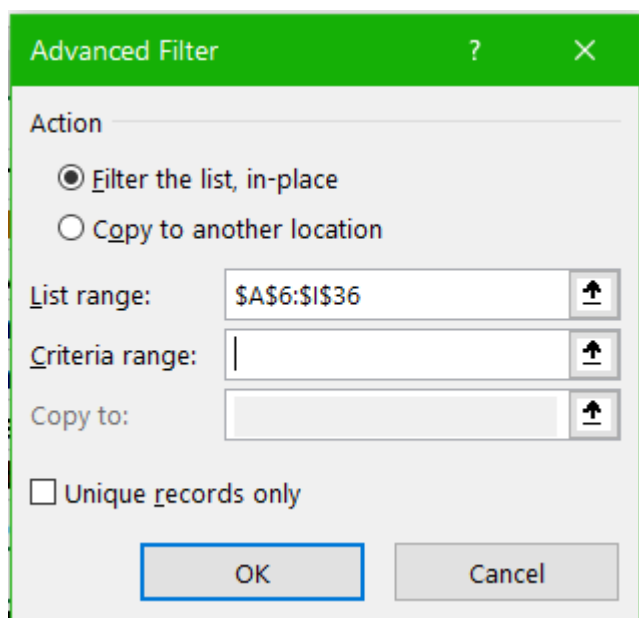
MedAttrib: author-generated. MS Excel Advanced Filter panel.

- Click inside the Criteria range field, then type **f6:f36**. This should select the State column in our dataset. Then click OK.

Hmmmm. Looks like nothing happened. Why? Well, in the end, we asked for a filter, yet the advanced filter didn't really know what to filter for. Given that we were working with an unconnected dataset of rows and columns, Excel couldn't comply. Let's try something else.

- Place your cursor on any cell in the data range of **Cells A6-I36**.
- Choose the Data ribbon Sort & Filter group, and select the **larger Filter icon**. Something interesting happens. In the header row of our dataset, a bunch of small dropdown arrows appears. This tethers together the columns and rows, so that a filter can work with the range of A6-I36.
- Click the dropdown arrow in **Cell F6**.

You can see that the column can actually be SORTED. Yay! Let's click the **Sort A to Z**.

- The whole dataset sorts to the A to Z of the States. Now, let's filter out all states but Colorado (CO).
- Click the dropdown arrow in **Cell F6**. In the dropdown, Uncheck the Select all box. Then, put a checkmark only in the CO checkbox, and click OK.

There we have it; the dataset has had everything filtered out except Colorado. All the

data still exists, but we can review only these two records until we clear the filter.

- To clear the filter, click the dropdown arrow in **Cell F6**. In the dropdown, choose the **Clear Filter from "State"**.
- **SAVE your work**, and close the file. **EXCEL ACTIVITY #4 FINISHED.**

Here is the really great news. Next, we will work with tables, so that we can utilize Excel's connecting of data records in a range without having to go through some of these manual steps.

Tables

Even though Excel is all about data ranges, a very easy and useful way of accessing ranges of data is to simply convert them to an Excel table object. The table links record rows and columns together, and builds in formatting, sort and filter capabilities, a header and total row option, and can be named as a data range. Tables can be inserted from the Insert tab Tables group.

Turning a range of cells into an Excel table makes related data easier to analyze, visualize, and report. Structuring and planning table layouts are vital for data integrity. Below are guidelines to consider when designing and building a table from scratch:

Size & Location	• One table per worksheet • Separate tables from other content with a blank row. • **Table Max:** 16,384 columns and 1,048,576 rows
Field Names	• First row is column headings- header row • Format header row differently, such as bold • .Column heading max: 32,767 char.
Contents	• Data should be relational and similar. • Data entry should use standardized wording. • Format table data for readability while using consistent size and type.

MedAttrib: author-generated. MS Excel Tables info.

ACTION: MS Excel Try Me Activity #5

Before you start, you should use your file manager utility to make a copy of the **Excel_tablebasics.xlsx** file that is in your

DataFiles folder, then paste the copy into your Examples / MS_Excel folder.

Let's open the file **Excel_tablebasics.xlsx** from the Datafiles MS_Excel folder. This is a variant on the previous Taste du Monde information with new names/records. The Page Layout theme should already be the **Berlin theme** and Aspect color palette, which will give us the colors to use in this activity. The workbook setup is for Narrow margins, horizontal orientation, and legal paper size.

Create a table

In the **Excel_tablebasics.xlsx** file, we have one worksheet: Customers. We want to take this dataset and convert it into an Excel table object.

Right now, we have a dataset with Row 7 that reads *FirstName, LastName, Address, City, Region, PostalCode,* and *PhoneNumber*.

- Select the data in **Cells A7 through G30**.
- With this range of data selected, go to the

Insert ribbon, Tables group.
- In the Tables group, click the **Table icon**.

A Create Table dialog box should open, *which should already have entered the data range of cells you selected* into the 'Where is the data for your table?' field.

- Click the **checkbox** next to My table has headers, then click OK.
- The data range will now be encased in an Excel table. Now, let's name the table, then change the table design.
- Click in the table, and then go to the **Table Design ribbon**. In it, overwrite the name Table1 with **TMcustomers**.
- With the Design ribbon still active, use the Table Styles group to choose **Tan Table Style Medium 14**.
- Adjust the width of the table columns so that the content doesn't overflow.
- **SAVE your work.**

Context menu

- Click anywhere in the new table.

When you activate a table, a contextual Table Design ribbon opens near the top right of your Excel UI. Click on that tab.
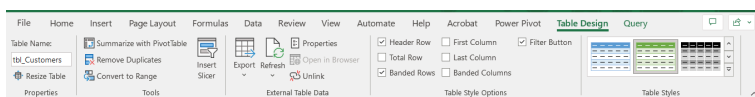
MedAttrib: author-generated. MS Excel Table Design ribbon.

The ribbon has several groups:

- **Properties**: Allows for naming and table resizing.
- **Tools**: Contains some table analysis tools.
- **External Table Data**: For use with linked live data sources, like a database that may have changes happen to it.
- **Table Style Options**: Basic table parts designation items.
- **Table Styles**: Color and layout styles for tables based on the Excel theme, color palette, and font palette you choose.

For our purposes, we will use the groups of Properties, Table Style Options, and Table Styles.

Entering & deleting records

Tables require constant updating and may need calculations. When your table needs updating you can add/delete data, by adding/deleting rows, or columns. Excel adjusts the table automatically to the new content. The format applied to the banded rows updates to accommodate the new data set size.

When calculations are needed you can create a calculated column or use the built-in Total Row tool. Excel tables are a fantastic tool for entering formulas efficiently in a calculated column. Excel allows you to enter a single formula in one cell, and then that formula will automatically expand to the rest of the column by itself. There's no need to use the Fill or Copy commands. This feature can be incredibly time-saving, especially if you have a lot of rows. And the same thing happens when you

change a formula; the change will also expand to the rest of the calculated column.

For now, we'll just add a little data.

- Click into Cell A31, and type your own first name, then click your keyboard's Tab button.
- In the next cell, type **your own last name**, then click Tab again.
- In the third cell, type **a made-up street address** then hit Enter. The table expanded its format and range down to accommodate the new row of text you entered.

TIP: Adding Rows. It can be tempting to insert blank rows further up in a table and add data, yet with the ease of sorting and filtering, that isn't really an efficient way of adding data.

First, let's add a column. We'll want to add some budget numbers. We'll just do the simple thing and add a default number so that we can move quickly.

- Click in Cell H7, which is to the right of the 7th header column title.
- Type **ProductSales** then click your Enter key. Cool! Excel just added a whole column of formatted space to our table.
- In Cell H8, type **25**, then press Enter.
- Copy the contents of Cell H8, and paste the data into Cells H9 through H30.

Why did we do this? We want to add a total row to the table using the Table Design tab options.

Delete Table Columns

You can easily add and delete columns and rows to a table. Let's delete a column we don't really need – the PostalCode column.

- Click in Cell F7. Then click on the Home Tab, and look for the Cells group. In this group, click the **Delete dropdown arrow**, and from the list, choose **Delete Table Columns**. The PostalCode column disappears.

Total row

A useful table tool for data analysis is the Total Row. You can quickly total data in an Excel table by enabling the Total Row option, and then use one of several built-in functions provided in a drop-down list, per column. The Total row, which is added to the end of the table after the last data record, can calculate summary statistics, including the average, sum, minimum, and maximum of select fields within the table.

The Total row is formatted with values displayed in bold, the double border line option is separating the data records from the Total row.
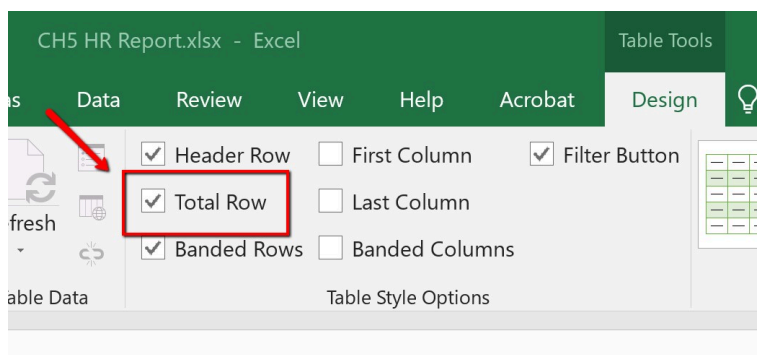
MedAttrib: Beginning to Intermediate Excel. MS Excel total row.

- Click anywhere in the Customers table, then choose the **Table Design ribbon**.
- In the Table Design, click the Total Row checkbox In the Table Style Options group. This will add a table row.

Excel redirects you to the bottom of the table to view the total row, where a SUM of **600** defaulted in the Prices column.

Let's add a **currency format** using the Home tab Number group **Number Format dropdown menu**.
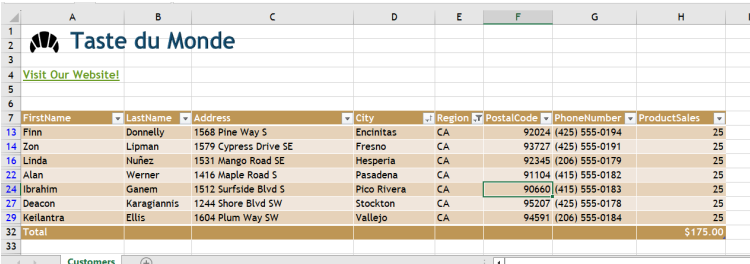
Another benefit of Excel table objects is that you can sort and filter columns without the data being mis-sorted, because the table locks a record's data together.

Before we close this activity, let's sort, then filter, the Customers table.

- Click anywhere in the **Customers** table.
- Sort the **City** column with the Filter button by opening the dropdown filter options

and choosing **Sort A to Z**.

· Filter the **State** column with the Filter button by opening the dropdown filter options.

· In the options, uncheck the box for Select All.

· Then check the boxes for only **CA**. The table will have collapsed rows to show only the state CA, and the total for only those products.

· **SAVE your work**, and close the file. **EXCEL ACTIVITY #5 FINISHED.**

	A	B	C	D	E	F	G	H	I
1									
2	🏛 Taste du Monde								
3									
4	Visit Our Website!								
5									
6									
7	FirstName	LastName	Address	City	Region	PostalCode	PhoneNumber	ProductSales	
13	Finn	Donnelly	1568 Pine Way S	Encinitas	CA	92024	(425) 555-0194	25	
14	Zon	Lipman	1579 Cypress Drive SE	Fresno	CA	93727	(425) 555-0191	25	
16	Linda	Nuñez	1531 Mango Road SE	Hesperia	CA	92345	(206) 555-0179	25	
22	Alan	Werner	1416 Maple Road S	Pasadena	CA	91104	(415) 555-0182	25	
24	Ibrahim	Ganem	1512 Surfside Blvd S	Pico Rivera	CA	90660	(415) 555-0183	25	
27	Deacon	Karagiannis	1244 Shore Blvd SW	Stockton	CA	95207	(425) 555-0178	25	
29	Keilantra	Ellis	1604 Plum Way SW	Vallejo	CA	94591	(206) 555-0184	25	
32	Total							$175.00	
33									

Customers ➕

MedAttrib: author-generated Image of MS Excel table activity.

Calculations

This section reviews the fundamental skills for

entering formulas into an Excel worksheet. The example used for this chapter is the construction of a personal budget. Most financial advisors recommend that all households construct and maintain a personal budget to achieve and maintain strong financial health. Organizing and maintaining a personal budget is a skill you can practice at any point in your life. Whether you are managing your expenses during college or maintaining the finances of a family of four, a personal budget can be a vital tool when making financial decisions. Excel can make managing your money a fun and rewarding exercise.

As a result, Excel is used for many kinds of calculations: mathematical, statistical, financial, scientific, reference lookups, and more. It is useful in many types of business, and is a key tool in cleaning, calculating, and analyzing data.

Formula Basics

A main strength of Excel is that you can use it to calculate data in many ways. Calculations allow for the development of additional data for analysis and decision making. A spreadsheet full of employees, their salaries, and the value of their benefits packages is useful. Calculating the annual and quarterly costs can be more useful in using for comparisons, preparing for taxes, etc.

Excel formulas are an expression that operates on values in a range of cells and return a result. They let you do calculations like addition, subtraction, multiplication, and division.

Excel functions are also formulas, but they are predefined and perform calculations by using specific values, called arguments, in a particular order, or structure.

Formula bar

We've used the formula bar a bit when not

directly inputting data into Excel cells. The formula bar shows what is in a cell. However, its power comes from the ability to write and process formulas, to display named ranges and how the formula is organized, and in helping identify errors.

In the example, the formula bar is displaying a simple calculation for Cell A1. To the left of the field, the small fx icon is a way to open the Functions panel and access to the Excel functions library. The green checkmark is a way to approve a formula instead of simply pressing Enter. The red X is important because it allows you to back out of the formula bar without saving what is in it. Why is that useful? It can be all too easy to accidentally click in the wrong cell and corrupt a working formula, and the red X lets you stop before you can save and exact the corruption, error, etc.

A1	▾ ⋮	✕ ✓	*fx*	=(12*24) + 12
	A	**B**	**C**	**D**
1	300			
2				
3				
4				
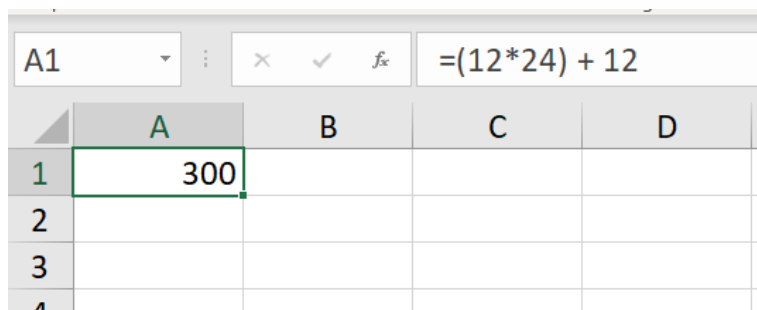
MedAttrib: author-generated. MS Excel formula bar.

Formula Ribbon

In Excel, you can manually input formulas, as we did in the chapter on linking to data cells. You can also use the Excel Formula ribbon to access common predefined functions and to look up a wide variety of functions in the Excel function library. This is also where we have found the Name Manager tools for naming ranges in a dataset. Those named ranges show up in formulas in a way that keeps a formula from seeming to access random and long strings of cell range information. The named ranges add context in a formula, especially for troubleshooting.
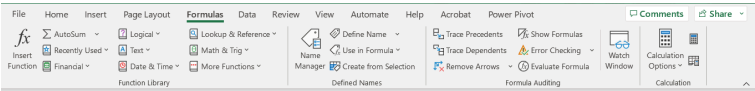
MedAttrib: author-generated. MS Excel Formula ribbon.

The Excel Function Library

Users can access the Function Library from the Formulas tab by clicking on the Insert Function icon. The Insert Function panel opens and allows for a search of formula-related keywords. You can also try to browse through the category dropdown. This is useful to people who work in specific industries in which they use a lot of calculations, whereas for basic workplace talent, most of the available functions won't mean anything or be useful. The use is in context of one's training in specific career areas requiring calculations.
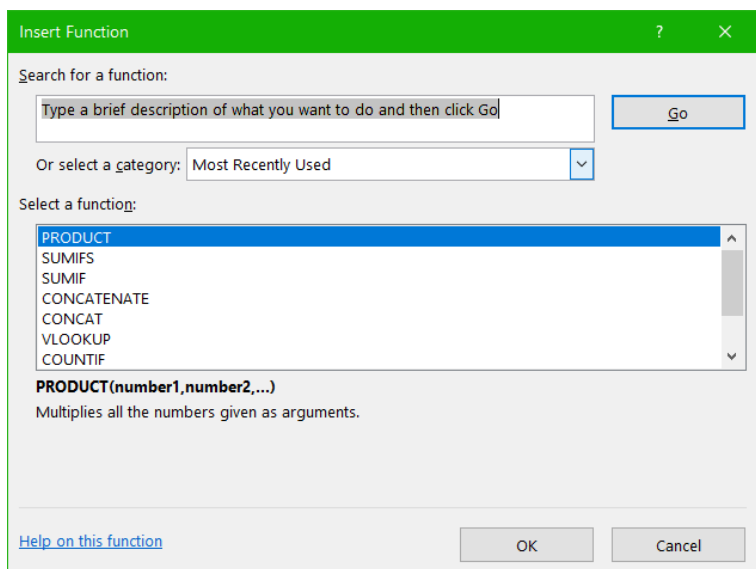
MedAttrib: author-generated. MS Excel Insert function / Function Library access.

Thinking out formula scenarios

A key part of succeeding in using any formula or function is to know exactly what you want to accomplish. Students in numbers and data-heavy fields are usually learning the skills for what calculation processes are needed, and Excel is a tool to accomplish that. Students in fields that don't work with a lot of data or computations can find formulating the

scenario, or words, for what needs to be calculated and why/how.

Steps

First, keep in mind that any calculation is a kind of combination of a story problem (UGH!) and a test of logic.

- How much is a "service"?
- What is a bonus for a high achieving real estate agent?
- How many products were sold in the last 3 months?
- How many days are in a class quarter?
- If you know someone's name and look it up in a table, can you tell what region they represent or how much property they sold?

SO, the first thing you have to do is make sure you understand exactly what is being asked. Then you need to figure out what exactly you are trying to reference – to look at – so you can pull out the information you need. Then you

need to ask Excel the right kind of question in terms Excel can calculate from.

Here's something I learned when I first took a class in basic programming:

- Write out what I think I am being asked to do.
- Drink coffee (or fave beverage).
- Write out what steps I think I would need to do to get at the information.
- More coffee.
- Look up / research Excel information to see what types of calculations I need to do might require.
- Think about stronger coffee, but likely go for calming tea or water.
- Study the basic logic and format of a calculation to see if it can do what I need.
- Take a break for a serious treat or rest.
- Experiment.

Say you are being asked to get a total of the sales from the 8 sales reps who sell coffee to 3 cafes. You would figure (rightly) that you need to see a list of all their sales, then get a total of

those numbers. You would be looking to get a grand totals response in terms of currency.

Say you need to find out which coffee roasts sold well over Fall 2022? you would need to figure out how to ask Excel to look up the column of roast flavors, see the quantities sold, and for the months of September, October, November, and December 2022. You would need more information to find out if you are supposed to find the count for each coffee, or the dollar amount sold, etc. Then you would need a way to either do a subtotal table, or a lookup table, etc.

Say you (as a teacher) have 30 students who have finished the class and need you to calculate their final grades. You need to know the students' names, their final points, and some table of what points are equal to what publishable numeric grade. You would need to do some kind of lookup and have the response calculate into your student roster next to their point count so you could accurately update the school grades with the right numeric grade (4.0, 3.8, etc.)

You usually have to logically process what is being asked, and carefully decide what is needed. Take your time, map it out if you need to, and even write a layman's English Language process. Then figure out how to ask Excel to calculate it for you. The Excel Functions menu ribbon and Functions lookup provides wizard windows for every function, so if you know what I need to look for, you can use those quite handily.

Parts of a formula

When you make a formula in Excel, there are several different components that supply the source data to the formula and express what operations should be performed on that information. Depending on the formula type, you may need include any or all of the following items:

- **Starting the formula**: In order for Excel to know the cell content will be a formula to be calculated, you need to start by typing the EQUALS sign = This tells Excel that the

contents of the cell will be an answer to a question, rather than a string of text or a basic number to format in some way.

- **Constants**: Numbers or text values that you enter directly in a formula, like **=2*3**. This is a manual way of telling a formula what to calculate with.
- **Cell reference**: A reference to a cell that contains the value (item) you want to use in your Excel formula, e.g. **=SUM(A1, B2, C3)**. This allows you to create formulas that can be copied and reused, rather than requiring a manual input of the numbers yourself.
- **Range reference**: To refer to data in two or more contiguous (next to each other) cells, you use a range reference like A1:A5. For example, to sum values in all cells between A1 and A8, inclusive, use this formula: =SUM(A1:A8).
- **Names**: A defined name for a cell range, constant, table, or function, for example **=SUM(TaxCol)**. In earlier chapters we created and used named data ranges in part to prepare for working with formulas.

Operators

Operators: These are special symbols that specify the type of operation or calculation to be performed, such as +, *, etc. They tell Excel what the operation, or calculation method, is to be, like sum, division, etc. For this chapter, we'll only look at arithmetic.

- Addition: + (plus sign)
- Subtraction: – (minus sign)
- Multiplication: * (asterisk)
- Division : / (forward slash)
- Percent: % (percent sign)
- Exponentiation: ^ (caret)
- Equal to: =
- Greater than: > (greater than sign)
- Less than: < (less than sign)
- Greater than or equal to: >= (greater than or equal to sign)
- Less than or equal to: <= (less than or equal to sign)
- Not equal to: <> (not equal to sign)

The order in which calculation is performed can affect the return value of the formula, so it's

important to understand the order, and to use parentheses to change the order to obtain the results you expect to see. If a formula contains operators with the same precedence — for example, if a formula contains both a addition and subtraction operator — Excel evaluates the operators from left to right. Otherwise, you will want to use parentheses to separate/clarify sections of a formula. For instance, multiplication and division happen before addition and subtraction.

Excel uses the standard mathematical order of operations. When writing complex formulas it is important to remember this order of operations. You want to be sure that your formulas will calculate in the order you intend. To help you remember which operations will be performed first, you can use the acronym PEMDAS.

- P – parentheses
- E – exponents
- MD – multiplication and division
- AS – addition and subtraction

Cell References

Cell References are a way to refer to the **contents** of a cell.

- **Absolute**: Absolute references remain **constant**, no matter where they are copied.
- **Relative**: Relative references **change** when a formula is copied to another cell. This allows a formula to be reused and to pick up the contents of the record around it so that you don't have to manually input all numbers (constants) yourself.
- **Selection**: You select one or more cells while creating a formula or a location reference in another table and/or worksheet.
- **Named**: You can *Define a Name* of a cell so that the cell remains stable in a formula that you copy and paste for further use in other cells in a column. This would be an **Absolute** reference. Otherwise, the pasted formula will change the cell's location reference to be relative to the new row it is seeking to create the formula for. *Example*:

=Fee*20, where the cell I5 has been named FEE, is **more** stable than =I5*20.

- **Circular Reference**: This happens when a formula is trying to calculate itself, and you have an Excel feature called iterative calculation turned off. It can also happen during indirect references in a formula. It results in errors.

Creating a Basic Formula

In this chapter, we will keep things straightforward and will work with basic mathematical formulas.

ACTION: MS Excel Try Me Activity #6

We will work with the Pets-R-Us sales workbook, named **Excel_calculations.xlsx**. Before you start, you should use your file manager utility to make a copy of the **Excel_calculations.xlsx** file that is in your

DataFiles folder, then paste the copy into your Examples / MS_Excel folder.

Let's open the file **Excel_calculations.xlsx** from the Datafiles MS_Excel folder.

In the Pets-R-Us sales file, we have one worksheet, which is more of a worksheet than a practical company ledger. Let's start with the basic manual math.

The formulas begin with the **=** sign, to tell Excel something is being calculated, an answer will be provided.

- Cell B15 needs to add 12 and 12, which is a sum. In B12, type **=12+12** with no spaces.
- Cell C15 can use this function instead: **=SUM(12, 12)**
- Cell B16 needs to subtract 978 from 2234, which is a difference. **=2234-978**
- Cell B17 needs to multiply 322 and 54, which is a product. **=322*54**
- Cell C17 can use this function instead: **=PRODUCT(322, 54)**
- Cell B18 needs to divide 330 by 10, which is a quotient. =330/10

- Cell C18 can use this function instead:
  =QUOTIENT(330, 10)
- **SAVE your work.**

Relative References

Relative: Relative references **change** when a formula is copied to another cell. This allows a formula to be reused and to pick up the contents of the record around it so that you don't have to manually input all numbers (constants) yourself.

Now, let's add some of the things in the Pets-R-Us table.

- Cell F6 needs to add Cells B6-E6, and because there are several numbers, the Excel formula that uses a Relative reference to those cells will do the job:
  =SUM(B6:E6)
- Cell F7 needs to add Cells B7-E7. Let's **copy** the formula from Cell F6 and **paste** it into Cell F7 and learn what happens.

NOTE: Relative Reference. Copying the formula from Cell F6 and pasting it Into Cell F7, and having that change the formula to calculate the sum of Cells B7-E7, is an example of Relative References. Excel was able to adjust the formula to be *relative to the data related to Cell F7*, instead of simply copying the exact numbers from Cells B6-E6.

- Cell F8 needs to add Cells B8-E8. **Copy** the formula from Cell F6 and **paste** it into Cell F8.
- Cell F9 needs to add Cells B9-E9. **Copy** the formula from Cell F6 and **paste** it into Cell F9.

Now, we **cannot** do this for Cell F10. Why? Because Cell F10 is supposed to be the sum of Cells F6-F9, the cells above it in the column.

- Type =SUM(F6:F9)

Let's get a little more experience and range. Rows 17-22 ask for a little more, and we'll need to think about the order of operators – the order of what we calculate – when more than one calculation is happening in the formula.

- Cell B20: **=F6-E6**
- Cell B21: **=F10*0.088**
- Cell B22: **=F10/2**
- **SAVE your work.**

Before we calculate the next three, it would be useful to have a named data range instead of referring to the range of cells more manually. We did this kind of task earlier in this chapter, and in Excel_Calculations there is already one provided: RegionSums, for cells **F6 through F9.**

Now these three functions should work properly as typed:

- Cell B23: =AVERAGE(RegionSums)
- Cell B24: =MIN(RegionSums)
- Cell B25: =MAX(RegionSums)
- Then, lets also try B27: **=SUM(B6:B9)*0.88**
- B28: =SUM(C6:C9)/4
- **SAVE your work.**

Absolute References

Absolute references remain **constant**, no

matter where they are copied. This is useful if you need one value (number) in a formula to remain the same no matter what rows of data are being calculated against it. We'll do this with the Tax Needed cells in Column G.

However, in a formula, you have to explicitly tell Excel that the cell is a constant. An absolute reference is referred to differently in a formula / function. The idea is the tell Excel to freeze the reference so that it remains static – the same cell, no matter how it is used in a column that might otherwise auto-calculate relative references for you.

The Absolute reference format uses dollar symbol ($) before the cell's coordinates to make them absolute. An example would be referring to the Cell G12 – a tax amount – as $G$12 in a calculation. Let's try.

- Cell G6: =F6*$G$12
- Cell G7: Copy Cell G6 and paste in Cell G7. Notice the formula still refers to $G$12, which is absolute to Cell G12, which is what we want.
- Cell G8: Copy Cell G6 and paste in Cell G8.

• Cell G9: Copy Cell G6 and paste in Cell G9.

Again, we **cannot** do this for Cell G10. Why? Because Cell G10 is supposed to be the sum of Cells G6-G9, the cells above it in the column. Note: Even though we just used mixed formulas with relative and absolute cell references, the following formula does not need any absolute formula reference in it.

• Type =SUM(G6:G9)
• **SAVE your work.**

	A	B	C	D	E	F	G
1	**Pets-R-Us Holistic Products**						
2	*Sales Report*						
3							
4	**Pacific Region**						
5		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Currency Sum	Tax Needed
6	Washington	$ 101,110.00	$ 134,000.00	$ 121,000.00	$ 125,840.00	$ 481,950.00	$ 36,628.20
7	Oregon	221,000.00	240,500.00	145,200.00	151,008.00	757,708.00	$ 57,585.81
8	California	132,700.00	156,700.00	118,500.00	123,240.00	531,140.00	$ 40,366.64
9	Idaho	108,000.00	215,000.00	193,600.00	201,344.00	717,944.00	$ 54,563.74
10	**Total All Currency**					**$2,488,742.00**	$ 189,144.39
11							
12						Tax amount:	0.076
13							
14							
15	Sum 12+12	24	24				
16	Difference of 978 from 2234	1256	no function for this				
17	Product of 322 and 54	17388	17388				
18	Quotient of 330 and 10	33	33				
19							
20	Subtract E6 from F6	$ 356,110.00					
21	Multiply F10 by 8.8%	$ 219,009.30					
22	Divide F10 by 2	$ 1,244,371.00					
23	Average F6 through F9	$ 622,185.50	*Use a named range*				
24	Minimum F6 through F9	$ 481,950.00	*Use a named range*				
25	Maximum F6 through F9	$ 757,708.00	*Use a named range*				
26							
27	Add B6-B9, then **multiply** by .88	$ 495,272.80					
28	Add C6-C9, then **divide** by 4	$ 186,550.00					
29							

MedAttrib: author-generated. MS Excel Ch14 finished calculations.

Auditing Formulas

Excel provides a few tools that you can use to review the formulas entered into a worksheet. For example, instead of showing the outputs for the formulas used in a worksheet, you can have Excel show the formula as it was entered in the cell locations. This is demonstrated as follows:

- With the **Excel_calculations.xlsx** file open, click the Formulas tab of the ribbon.
- Click the **Show Formulas** button in the Formula Auditing group of commands. This displays the formulas in the worksheet instead of showing the mathematical outputs.

MedAttrib: author-generated. MS Excel Ch14 finished calculations showing formulas.

- Click the Show Formulas button again. The worksheet returns to showing the output of the formulas.
- **SAVE your work**, and close the file. **EXCEL ACTIVITY #6 FINISHED.**

You can also toggle Show Formulas on and off using the keyboard. Hold down the CTRL key while pressing the ` key. (The ` is known as the Tilde key and is to the left of the 1 key on your keyboard.)

Keyboard Shortcut: Show Formulas. Hold down the CTRL key while pressing the accent symbol .

Common Error Codes

Excel presents a number of error codes when a formula doesn't work properly. And, for learners who work with Excel for standard/casual practice, the codes may not mean a lot or tell

you exactly how to fix the problem. Excel tends to be somewhat obtuse in explaining a problem, because the explanation is general to the "type" of issue the program can't resolve, not the exact nature of your actual formula and formula data.

These codes should give you something to start with,

- #DIV/0! Trying to divide by 0
- #N/A! A formula or a function inside a formula cannot find the referenced data
- #NAME? Text in the formula is not recognized
- #NULL! A space was used in formulas that reference multiple ranges; a comma separates range references
- #NUM! A formula has invalid numeric data for the type of operation
- #REF! A reference is invalid
- #VALUE! The wrong type of operand or function argument is used

Charts and Graphs

Pivot Tables

Pivot Tables are a data summarization tool. They are a bit complex and need a fair amount of practice time, so we won't cover them in this chapter, although an instructor might choose to cover them with a video and exercises separately.

A pivot table can automatically sort, count total or give the average of the data stored in one table or spreadsheet and display the summarized data results in a second "pivot table". Then the pivot table can have certain criteria in it filtered and organized so that the same data reveals different aspects of how it can be summarized. They tend to be listed with charts because part of a pivot table's output often includes a companion chart.

Charts/Graphs – Insert tab

Charts allow for a visual representation of specific table data. They are not a static inserted item, like an image or shape. They represent live data that is being interpreted for analysis, like percentages of people who eat different desserts being shown in a pie chart. To create a chart in Excel you need to HAVE a table/table data to work with.

Charts can be initiated from:

- Pre-designed chart styles.
- Recommended charts based on the data Excel interprets.
- A chart created from specific data.

Charts, when clicked to be activated and using the Chart Design context tab or the Chart Format design tab, also allow for:

- Modifying chart info source location
- Chart formatting

Chart types

There are many chart types. Commonly-used ones include:

- **Bar or Column charts**: Show numbers that are independent of each other. Example data might include things like the number of people who preferred each of cold desserts, hot desserts, and no desserts.
- **Line or Area graphs**: Show how numbers have changed over time to demonstrate trends, like average summer times temperature in each region of the world.
- **Pie or Doughnut charts**: Show how a whole is divided into different parts, like the percentage of people who like cookies, cakes, baklava, cannoli, and fruit tarts. Y
- **Scatter (XY) charts:** They use plotted data point clusters to show correlations or patterns in data.

ACTION: MS Excel Try Me Activity #7

We will work with the Ihoosha Online Training supplies workbook, named **Excel_charts.xlsx**. Before you start, you should use your file manager utility to make a copy of the **Excel_charts.xlsx** file that is in your DataFiles folder, then paste the copy into your Examples / MS_Excel folder.

Let's open the file **Excel_charts.xlsx** from the Datafiles MS_Excel folder.

In the Ihoosha sales file, we have one worksheet, which has one table from which we can derive charts. Let's start with a Column chart, which can compare values across categories in no particular order of importance. The categories for Ihoosha are the quantity and cost, and what will be tracked is the average cost per student.

- Select the data in the table EXCEPT for the total row. A total row translated into a chart or graph can confuse the data and outcome. The data we need includes Cells

A9-F20.

- Go to the Inserts ribbon, and the Charts group. Choose the **Recommended Charts icon** to access the selection dropdown.
- The Recommended Charts offers several options; select the first, a **Clustered Column chart.**
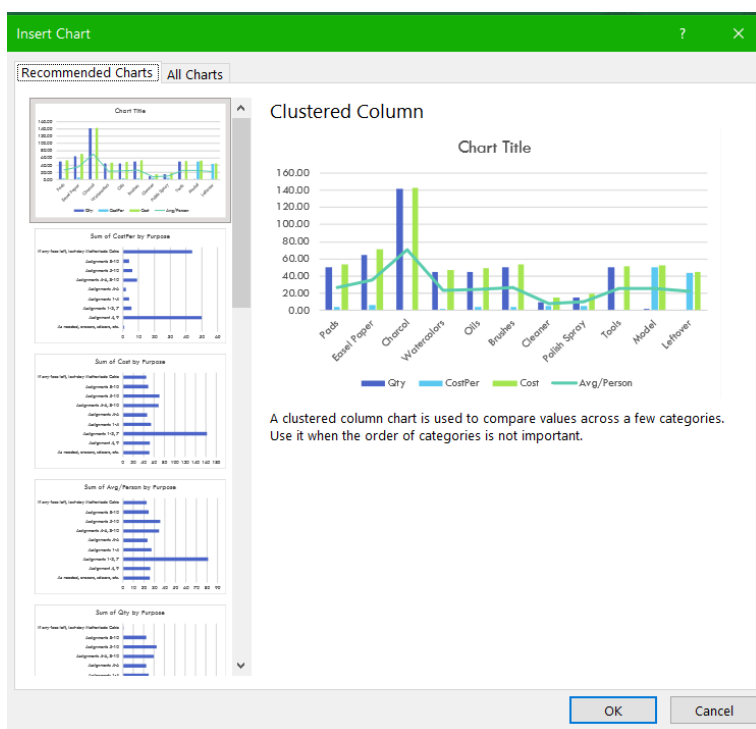
MedAttrib: author-generated. MS Excel Insert Charts panel, Recommended charts tab.

The chart will appear somewhere on your worksheet. Drag it just to the left of the table

When you click on the chart, the table range used in creating the chart is highlighted. Also, a contextual Chart Design ribbon and related Format ribbon (to its left) appear in the menu tabs.

- The Chart Design ribbon's Chart Styles group lets you pick variants of the Clustered Chart format; **Choose a variant format** you like.
- You can change the base colors of the chart with the Chart Styles group as well. **Click the color variation you like**, keeping in mind that a chart should be easy to read and interpret.

You can also choose another chart type, but the point of a chart is to demonstrate specific data for a specific reason, so choosing charts for no particular reason isn't solid Excel or data analysis process.

The chart-related Format ribbon allows you to make individual changes to elements of the

chart, like the text boxes for the data, the lines, etc. At the left of the Ribbon a Chart Elements field can help you know what chart element you are on when you are making micro changes.

Let's see if we can make a Pie Chart. Usually one of these summarizes one kind of data in percentages of the whole of the data, and this table may not really allow that. Let's find out.

- Again, select the data in the table **EXCEPT** for the total row. The data we need includes Cells **A9-F20**.
- Go to the Inserts ribbon, and the Charts group. Choose the Recommended Charts icon to access the selection dropdown, but once on the dropdown, choose the **ALL Charts tab**.
- Look for the Pie Chart option, and notice that it does not show a preview. This means that this data can't be used in the simple summary chart we want. We need to make a **pivot table**.
- Exit the Insert Charts panel, but leave your data selected.

A pivot table is essentially a summarizing table. It can get complex and summaries several things in several ways, depending on the Pivot Panel criteria you choose, which is why it needs some practice time. However, Recommended Pivot Tables can also give a simple summary table, which is what we need. Let's see if we can get a summary of the Items **or** the Classes, and the average cost per student.

- On the Insert ribbon, Tables group, select the **Recommended Pivot Charts icon**.
- In the selection dropdown, look at the types of recommended summary tables offered. Let's choose the **Sum of Average Cost by Purpose** recommendation, and determine if that captures what we want the first time. The Purpose is the title of Column 2 of the original table – the assignments.
- **SAVE your work**.

Yes, it does! It created a new sheet, called Sheet1, and placed the pivot table on that sheet. The chart is unformatted, as well.

Row Labels ▼	Sum of Avg/Person
Brushes	$25.00
Charcol	$6.21
Cleaner	$6.25
Easel Paper	$47.53
Leftover	$5.50
Model	$12.50
Oils	$21.66
Pads	$25.00
Polish Spray	$9.38
Tools	$6.25
Watercolors	$11.25
Grand Total	$176.53

MedAttrib: author-generated. MS Excel summary pivot chart, unformatted.

- Go to Sheet1, and select the whole **Pivot chart**. Cut it, and copy it into the Action_Charts sheet a couple of lines below the main table.
- Delete the now empty Sheet1 worksheet.
- Click on the Pivot table. On the right side of the screen, a **PivotTable Fields panel** should appear. It shows that the two categories of data being summarized are the Purpose (the purpose of the materials

being the assignments in Column 2), and the average cost per person.

We will not make changes on this panel, but you can look it over.

- Close the PivotTable Fields panel so that it is out of the way.

TIP: Pivot Table Fields Panel access. It can be reopened in the Pivot Tables Analyze ribbon, Show icon at the far Right. The Show Icon's dropdown shows a Field List icon, which is what you choose to re-open the PivotTable Fields panel.

Let's format the pivot table a little, manually. First, select all the numbers in the **Sum of Avg/ Person**.

- If the pivot chart doesn't already show currency, use the Home tab Number group to set these to **currency**.
- The pivot table columns look untidy in width for their content. Drag the right

edge of Column A to the right so the Pivot Table's first column is wide enough to see the data.

· Drag the right edge of Column B to the left so the Pivot Table's second column is wide enough to see the data but not much more.

· Click in **Cell A25**, which reads Row Label. For simplicity, just overwrite the text with the phrase **Supplies**.

Now we have a Pivot summary table that might let us create a Pie Chart. Let's find out.

· Select the data in the Pivot table, but **not** the total row.

· In the Insert ribbon, choose the Recommended Charts icon and look at the **Insert Chart panel**.

Look for the Pie Chart option on the lost on the left. It seems to have an available Pie Chart preview.

· Select the **Pie Chart** and click OK.

· The Pie chart appears on your workspace, and may need to be dragged so that it is

positioned below the other chart.

The only issue is that the Pie Chart doesn't label the percentages on the chart; the pie slices simply show them graphically.

- This is very simple to fix. Right-click on the **Pie** part of the Pie Chart, and select **Add Data Labels**.
- **SAVE your work**, and close the file. **EXCEL ACTIVITY #7 FINISHED.**
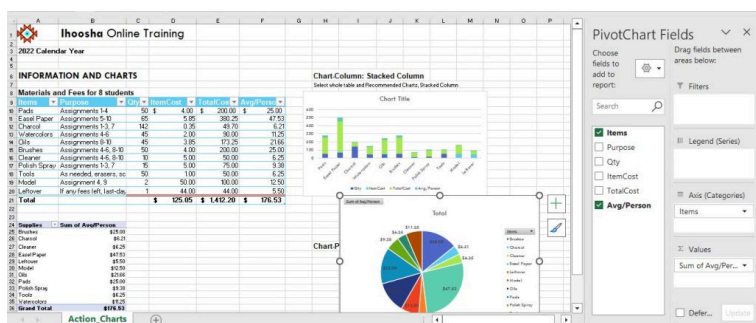
MedAttrib: Beginning to Intermediate Excel. MS Excel pivot chart and regular charts.

Review and Distribution

Review and distribution of your work is about

preparing it for who will be consuming it. Will it stay in a Word document format, be saved as a PDF, printed onto paper, added as website content, populate an add or newspaper article, or be part of a book? It needs to be:

- Spell checked.
- Accessibility enabled (alt text, proper use of heading styles, accessibility for screen readers).
- Considerate of versioning.
- Have hyperlinks tested.
- Cited and attributed properly for intellectual honesty.
- Passed for plagiarism and other content integrity needs.
- Presented for readable print viewing.
- Secured for limited/no editing by others.
- If meant for team collaboration, prepared for making shared/trackable changes, comments, and notes.

Output/distribute work

- You can test and adjust your documents

and review your content before it goes live by looking at the **File/Print** sections Print Preview and settings.

· In Excel, one worksheet can be printed separately from the whole workbook. Also, a whole workbook can be printed. Finally, you choose only some of a workbook's sheets for output.

· You can make sure you have added metadata for web/online reference by updating information in the **File/Info** page.

· You can save files in different formats for distribution in the **File backstage** areas, like Save As (for current and older versions, RTF, text, and HTML), save as PDF, export, etc.

ACTION: MS Excel Try Me Activity #8

We will work with a Taste du Monde workbook, named **Excel_ distribution.xlsx**. Before you start, you should use your file manager utility to make a copy of the **Excel_ distribution.xlsx** file

that is in your DataFiles folder, then paste the copy into your Examples / MS_Excel folder.

Let's open the file **Excel_distribution.xlsx** from the Datafiles MS_Excel folder.

We have one worksheet, which has one table that needs to be set up for proper printing. This workbook my be emailed to someone, or shared on a SharePoint department site, or posted to a website, but any viewer might want to print it. The document has already had the margins, page orientation, and paper size established, and is designed to be printed wider-then-long on 8.5 x 14 inch sheets of paper.

NOTE: Things we covered in the MS Word chapter that behave much the same in Excel include the spell check, the accessibility check, and the Info Page review of metadata tags.

We need to look at two things in particular for Excel. The first is how the document will print out.

- Click anywhere in the document, then go to the File tab, Backstage area, and choose

Print. The document has 2 printable pages, and as we review them, we can see that the columns all look about wide enough to see all the content.
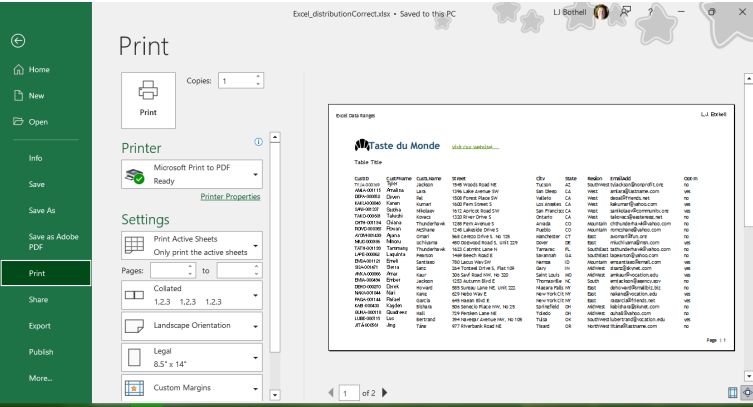
MedAttrib: Beginning to Intermediate Excel. MS Excel Print preview page.

- Exit the Print screen.

What if we don't want to print all the columns? Let's set a Print Area that does not include the last two columns.

- Select Cells A1 through G36.
- Go to the Page Layout ribbon, Page Setup group, and click the **Print Area icon**.

- In the Print Area dropdown, choose **Set Print Area**.
- Go to the File tab, Backstage area, and choose Print. The document still has 2 printable pages, and as we review them, we can see that the EmailAdd and the OptIn columns are not in the print preview.

Repeating column/row labels

One significant problem exists for what we see in the Print preview. The workbook has 2 pages, but only the first page shows the header row, which makes interpreting the second page difficult,

Now that you have fixed the cell and text formatting, you are ready to review the worksheet in Print Preview. You will notice that the worksheet is printing on multiple pages, and you cannot tell what each column of data represents on some of the pages.

- With **Excel_ distribution.xlsx** open, click

anywhere on the worksheet.

- On the Page Layout ribbon's Page Setup group, click the **Print Titles** button. The **Page Setup** panel will open to the **Sheet tab**.
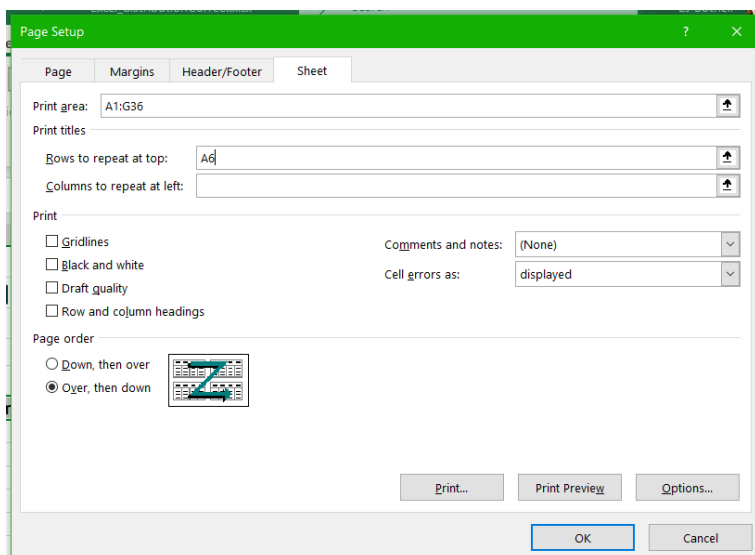
MedAttrib: author-generated. MS Excel Page Setup Sheet panel.

- Click in the Print Titles / **Rows to repeat at top** field. Be sure your insertion point is blinking in that box before moving on to the next step.
- In the worksheet, select Row **6,** which is

the header row of your table. The text **$6:$6** should now appear in the Rows to repeat at top field.

- While still in this panel, also choose Page Order: **Over, then down**. While we hope that all out columns will stay on one "page", if they do overflow it would be easier to sort if the tag-end page printed just after its main page, rather than at the end of the print session.
- Go to **Print Preview** (CTRL P) and look at each of the pages. Notice that the first header row is now repeated at the top of each page.
- **SAVE your work**, and close the file. **EXCEL ACTIVITY #8 FINISHED.**

This should give you a good overview of MS Excel skills that you can use in school and as a starter for basic workplace support tasks.

Chapter 9: Microsoft® PowerPoint®

- Presentation Software
- Microsoft PowerPoint
- Slides
- Slide Formatting
- Slideshow Design
- Transitions
- Review and Distribution

Presentation Software

Presentation software is designed to allow the user to present information in an engaging way with text, pictures, sound, and video. It is a way to communicate ideas in a powerful,

organized manner. It utilizes sequences of **slides** that accompany an audio **presentation**. The presentation may also be recorded and posted online. The slides are consolidated in virtual files **called slide decks.** Communication skills are necessary for many careers. Presentation software can help to deliver a message online or in-person to a large audience or small group. The goal is to create a presentation that will leave an impression on the audience, and not distract them from the message you are delivering. The ultimate goal is to create dynamic, interesting presentations that engage your audience.

Presentation software can be part of an integrated suite of tools, or be stand-alone. It can be installed on a computer for full and robust features and integration with other resources; it can be accessed on the web in a light format, and it can be a basic utility tool, like text editing applications. Some programs/suites are payware, such as those used in many workplaces; others are shareware or freeware. Information in this chapter should offer you transferrable skills for use in any word processing application.

Common presentation software programs

- **Microsoft PowerPoint**: Available across many platforms including mobile devices for ease of use. Integrates well with Microsoft Office.
- **Apple Keynote**: Included with most Apple devices. Real time collaboration. Use Apple Pencil on your iPad to create diagrams or illustrations that bring your slides to life.
- **Google Slides**: Integrates with other Google Apps, Q&A feature, Advanced web publishing features.
- Smartphone apps that allow for quick use and editing on-the-go.
- Word processing apps in free/open source office suites.

Microsoft PowerPoint

Since Microsoft® PowerPoint® (MS PowerPoint, PowerPoint) is widely used in business, and we are using Windows, we will

focus on this presentation software. There are many similarities across presentation software, so the skills we are learning can be translated to other systems. Some of the tasks in PowerPoint may seem familiar because they were used in other applications. The following *Try Me activities* are designed to be completed using Microsoft PowerPoint in Office 365 on a PC with Windows 10 or higher.

DEMO EXAMPLE follow-through

Accessing PowerPoint

- In your Computer, use the relevant start menu to open MS *PowerPoint* (look for **little red icon**). On a PC this is a start button on the keyboard, and/or menu on the lower left of the screen. On a Mac, this should be in the top-screen Menu option.
- PowerPoint will open with options to create a blank slideshow, open an existing file, and use templates.
- Observe the various Menu ribbons to learn

what they offer.

The User Interface (UI) menus
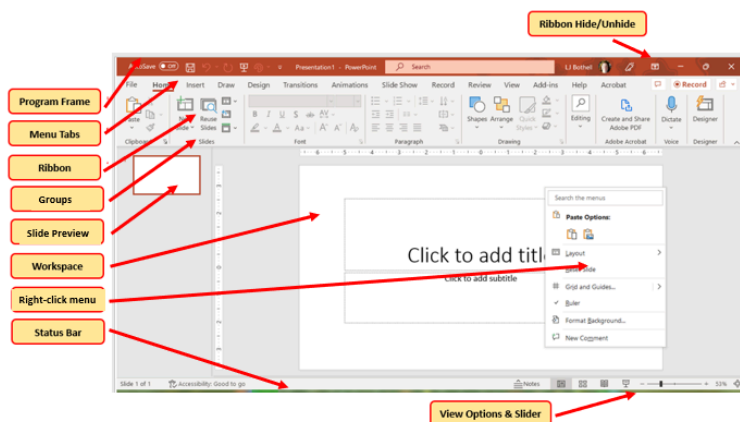
MedAttrib: author-generated. MS PowerPoint user interface screen.

In PowerPoint, the user interface contains several menu tabs (**tab**), with 'Ribbons' (**ribbon**) that display icons (like buttons) with text descriptions of various activities related to a task. On a ribbon, you will often see groups (**group**) of icons for tasks that relate to one another, like the Home ribbon's Font group, Paragraph group, etc. Some of these icon buttons will do a simple task in one step, while

others may open a panel (**panel**) which is a detailed, multi step or tab window of options. Sometimes you may instead see a context dropdown (**dropdown**) menus of options. Shown (in the program's order) are:

- *File*: Accesses the program backstage area for various options. Set your preferences for workflow and productivity.
- *Home*: Basic text functions – formatting, positioning, styles
- *Insert*: tables, images, shapes, charts, page sections
- *Draw*: For more effects your can add to a slide, like "circling" an important point.
- *Design*: Layout of the slides – margins, themes, colors, etc.
- *Animations*: Transitions and sound.
- *Slideshow*: For timing and practice.
- *Record*: *For audio recording the slideshow, and for exporting the show to video.*
- *Review*: Spelling, language, tracking, etc.
- *View*: screen views, rulers, gridlines, windows.
- **Additional add-in/specialty tab menus**: These are dependent on having MS Word-

related add-ins like Acrobat, a reference manager, etc.

· **Contextual tab menus**: These are contingent on a specific item in the program's workspace being activated. For instance, clinking on an image, table, or header / footer will activate a context menu/ribbon on the right side of the UI that shows a menu dedicated to actions that can be done specifically for the active item (picture editing).

About Presentations

Presentations are a multi-page slideshow used to present a cohesive set of information/ images. They are routinely used to support other documentation, not be the primary report or documentation. This means that a slideshow should focus attention on a few key points with a few bulleted supporting points, not use long paragraphs of text. Use a consistent layout, color palette, image layout/ type, and transition style for professionalism.

- Information to be shared should be highlights of main points, which are shared in small amounts that can support a more detailed audio presentation with report and other print handouts. The slideshow highlights, it doesn't act as the main word-processed document,
- Customary is Title Page, Title and content pages, and Image/Caption pages, with as-needed comparison pages and blank pages with a specific image/content design you need for the show.
- Use rulers and guides to help align your work.
- Presentations can be short to very long, use audio media, and be timed for a specific flow of information.
- Create transition slides for large section transitions.
- Use section and subsection titles to break up information in long shows.
- Use an easy-to-read font/color/style for excellent contrast info reading. Using a good sized-font at every hierarchy level makes the whole slideshow readable, even from the back of a room.

Slides

Slideshows are made up of slides with content. Their common MS PowerPoint native (editing) file extension is **.pptx**, and their PowerPoint show file extension is **.ppsx**. They can contain:

- Text paragraphs and lists.
- Images, tables, and clip art.
- Headings, subheadings, captions, and paragraph text.
- Transitions, animations, media, and timed content.

Slideshow Workspace

The default workspace for slideshows is a left-hand pane of slide thumbnails, the active slide being edited in the workspace, and a Notes pane below the workspace.

You can navigate through your slides by clicking on the thumbnails, or scrolling down the main workspace.
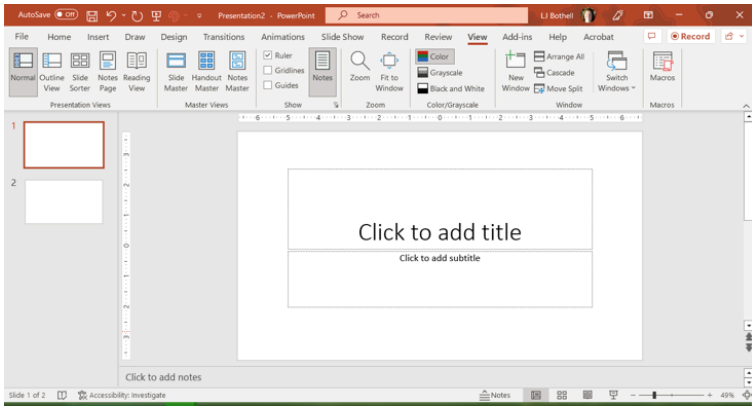
MedAttrib: author-generated. MS PowerPoint user interface thumbnails, workspace, notes pane.

Views – View Tab

- You can see different views as part of the main interface – lower right-hand side of the user interface, and also from the View tab's ribbon.
- You can set rulers on or off.
- You can also set guides for aligning text and images.
- You can choose the window view you like to work in, such as normal, outline, slide sorter, notes page, or reading view layouts.

Preferences – File tab

Like MS Word and MS Excel, PowerPoint has a File tab Backstage area which lets you save slides in different formats, prepare them for print, and change the program's options. You can set your PowerPoint program preferences for slides and program workflow, for smoother productivity, in the 'backstage' area of the program.

Same layout as Word, Excel, and Access and allows personalizing, print, save, and publish settings.

Slideshows are saved in the native editing format of PPTX, and when a show is meant to be actually shown when it opens, it is saved as a PPSX (show) format. They can also be saved in PDF format, and individual slides can be saved in image formats.

- You can set a slideshow up for printing out using the Print preview screen. Open the Print Preview screen to see the similar layout to Word and Excel.
- Go into the Info screen to inspect the

slideshow for Accessibility and compatibility, and to protect a slideshow.

- Go into the File tab Options section, which you can use the change program settings.
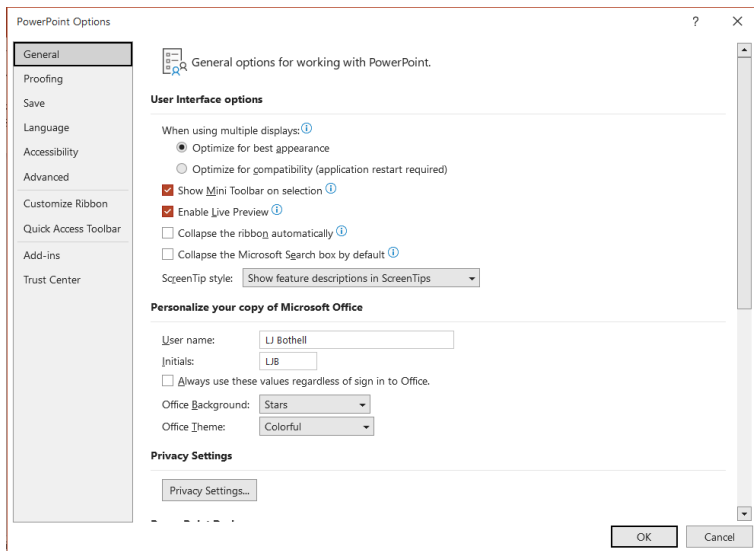
MedAttrib: author-generated. MS PowerPoint user interface screen.

Slide Formatting

Text placeholder fields

In slideshows, you input text into editable fields (placeholders), with headings, paragraphs, lists, tables, images, etc. Text formatting includes indenting, spacing, and alignment. For instance, the alignment of text can be left, right, centered, or justified alignment; *this paragraph is in Left alignment.*

These fields also guide the kind of content you might put in them. Gor instance, a slide might have placeholders that state "Click to add title", "click to add subtitle". Etc.

Placeholder fields let you add text, and they also offer the option to add other items instead by showing icons that represent a table, an image, a video clip, and more.

Also, when you use a placeholder field for text, the text will routinely be added already in bulleted format. To decrease the level of the text, you need to click tab for an indented

second-level of bulleted text. The thing to keep in mind here is that the bulleted text can get smaller quickly, so it is useful to look at your text formatting, make the bulleted text large enough to read, and to make the sub bulleted text, and sub-sub bulleted text, also sized to be readable.

Creating new text

If you don't yet have text to work on yet when creating a document and setting paragraph formatting to use later as a saved style, consider using Lorem Ipsum, or one of its variants. Fun text fillers can include KittyIpsum, BaconIpsum, or ZombieIpsum. You can find Ipsum generators free online and copy/paste gibberish paragraphs into your document so you can play with some chunks of text. Let's try some KittyIpsum now!

[Nap all day cat dog hate mouse eat string barf pillow no baths hate everything but kitty poochy. Sleep on keyboard toy mouse squeak roll over. Mesmerizing birds. Poop on grasses

licks paws destroy couch intently sniff hand. The dog smells bad gnaw the corn cob.]

Home tab – Clipboard Group

At the very left of the Ribbon is the same clipboard group as we worked on in the Word and Excel chapters, which is a small set of tools you can use in relation to when text, images, and styles have been saved to the clipboard as you work. Clipboard-related activities include copy, cut, paste, and the format painter.

Home tab – Slides group

Every slide can be the same, or a slideshow can use a mix of pre-designed slide formats.

The slide text fields indicate what kind of slideshow page you are working on. A fully designed slideshow might have a title slide, title and contents pages, section header pages, comparison tables, image slides, and/or content (or a picture) with caption slides. You

also can choose a blank slide without the editable regions on it fir full flexibility. The Slides group gives you the common slide layouts to choose from.

Home tab – Font Group

"Fonts" refer to the letters (characters) used in text. Font formatting includes resizing, changing the font family, adding bold or emphasis, adjusting spacing between letters, and more. You can right-click on a word or cluster of words for the contextual menu, or use the Home Tab's font group options. These include font style, size, color, effects like bold / italics / underline, highlighting, and spacing formatting.
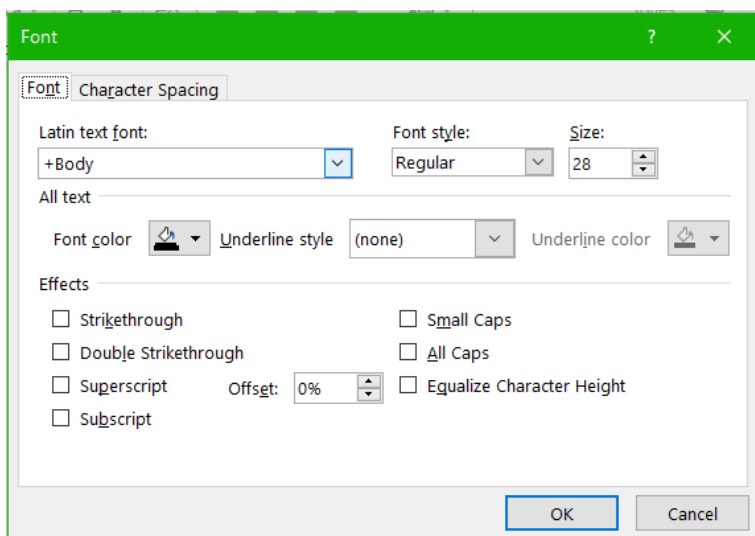
MedAttrib: author-generated. MS PowerPoint Fonts panel.

Home tab – Paragraph Group

You can modify your slide text paragraphs/ bulleted lines in several ways. You can right-click on a piece of text, and choose "Paragraph" from the contextual menu. You can instead select some text, and use the Home ribbon's one-touch paragraph group icons. You can also select some text, and choose the Home Tab's paragraph group panel opener. With any of

these, you can do alignment, spacing, indents, lists (bullets and numbers), shading, and borders.

Paragraph panel

The paragraph panel, which you can open from the lower right corner of the Home ribbon's paragraph group, reveals a panel with several tabs of options: spacing before and after bulleted lines, specific indents, and line spacing.
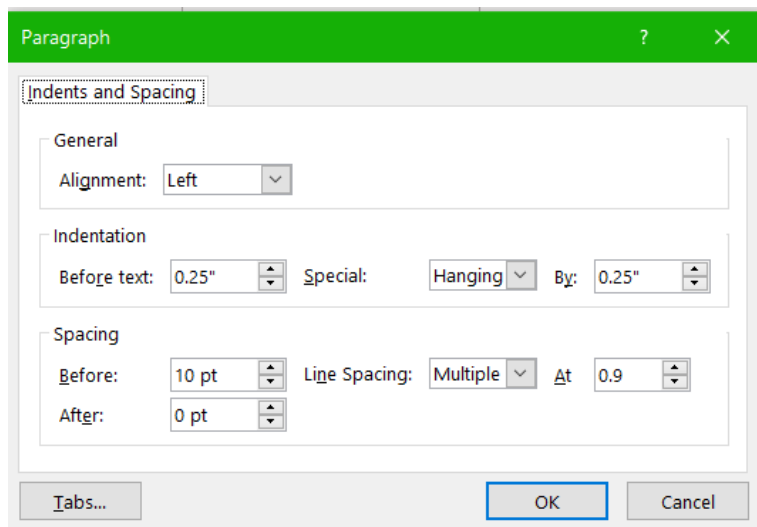
MedAttrib: author-generated. MS PowerPoint Paragraph panel.

Inserts

Inserts are basically anything you can insert into a slideshow that supplements your text content. You use the **Insert Ribbon** to choose what you want to add into a document: pictures, online art, icons, shapes, SmartArt, media, and text-related effects like WordArt.

Options for inserts – Insert tab

Just like Word and Excel, you can modify inserts using a contextual menu designed for the specific insert type: size, color, theme, position, etc. These Tab menu options only appear when you select an inserted item you want to modify.

ACTION: MS PowerPoint Try Me

Let's create a new slideshow, and then learn a few slide formatting tasks.

- Open PowerPoint.
- Open a blank presentation.
- Before you do anything else, save the new file into your Examples / MS_PowerPoint folder as **PP_formatting.pptx.**

In the blank slideshow, you should see a single page, It shows placeholder text boxes that PowerPoint uses to help creators guide slide content creation and display. You type into them with your content, and PowerPoint styles the content – per the in-use theme – by hierarchical bulleted lists.

Before adding any text, let's add more blank slides.

- On the Home ribbon, Slides group, click the **New Slides**, which gives a dropdown of possible slide layouts.
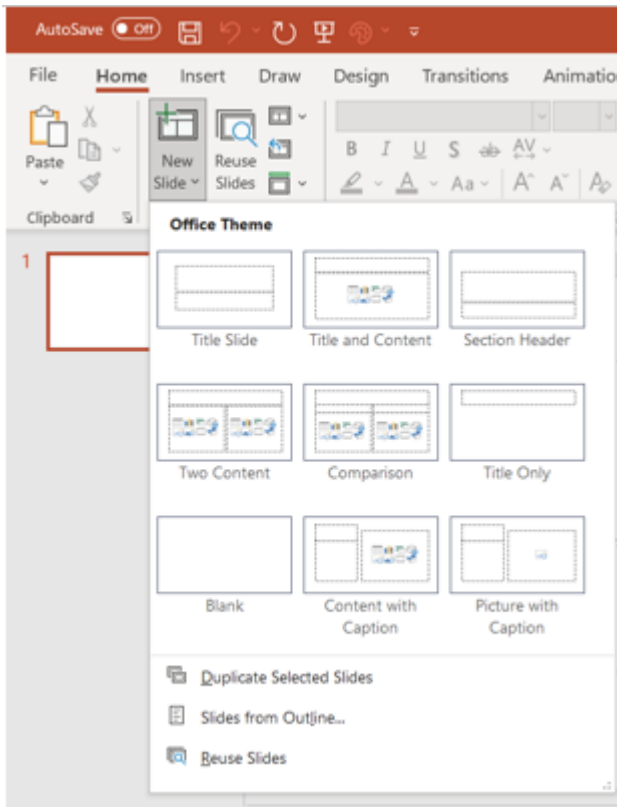
MedAttrib: author-generated. MS PowerPoint new slides panel.

Since the new slideshow already opens with the Title Slide, lets add a few pages that represent other slide layouts.

- In the New Slide dropdown, choose **Title and Content**.
- Add another slide using the New Slides

icon: **Two Content**.

- Add another slide using the New Slides icon: **Content with Caption**.
- SAVE your work: CTRL S / MAC CMD S.

You should have mostly blank 4 slides in your show now – blank except for the placeholder fields.

When using the editable fields, PowerPoint's default is to offer common heading and subheading styles, text styles, and bulleted hierarchy styles. This design becomes more important when using animations in a show, and how they are prioritized during a finished presentation.

- Go to the first slide. In the first placeholder that reads Click to Add Title, click inside and type **First Show**.
- In the second placeholder, type **By YourName**.
- Go to the second slide. In the first field, which reads Click to add title, type **Slide Basics**.

TIP: Slide Title placeholders. The placeholders that are for adding titles don't mean that ever slide with one needs the title of the whole slideshow added there. They can also act as titles for a page, or within a section, to help a slideshow's organization seem more cohesive.

The second placeholder is multi-purpose. You can immediately start typing text in it and use it in that way. However, a semi-transparent set of icons is also in the placeholder, which indicates that you can instead click on one of them to add content that the respective icon represents.
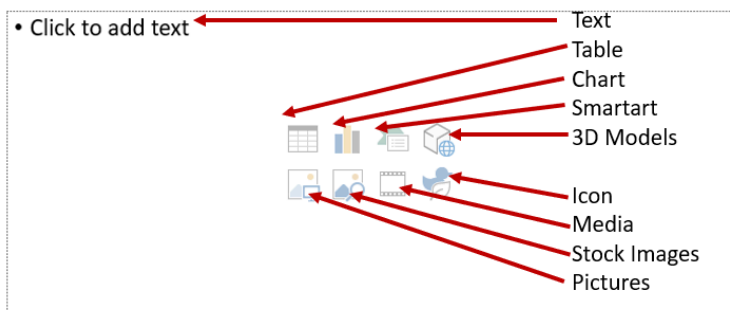
MedAttrib: author-generated. MS PowerPoint placeholder content field options.

In this slide, we'll just add text to see how it works.

Type these lines, pressing your keyboard's Enter key after each:

- Main point
- Supporting point
- Third-level point
- Paragraph text
- Place your cursor in from of the line Supporting point, and press Tab.
- Place your cursor in from of the line Third-level point, and press Tab twice.
- SAVE your work: CTRL S / MAC CMD S.

Observe how PowerPoint "demotes" the bullet levels so that they get smaller. This is a good time to learn that using more than one or two levels of bullets is as far as a viewable presentation should use, although you can also enlarge the size of the text of each bullet.

- Place your cursor in front of the line Paragraph text.
- On the Home ribbon, Paragraph group, click the **Bullets icon** to 'turn off' the bullet

on this line. This demonstrate that you do not have to use bullets.

Go to the third slide, which has 3 placeholders. This is a standard comparison slide, which simply describes that you can have two sets of information side-by side. These could be text and graphic, table and graphic, two fields of text, etc.

- In the 1st placeholder, type **Comparison Slide**.
- In the 2nd placeholder (left one), type **Item Description**.
- In the 3rd placeholder (right one), click the **Online pictures icon**, and use the search field that opens to search for (and insert) an image you like.

Go to the fourth slide, which has 3 placeholders. This is a standard content with caption slide, which simply describes that you can have captioned information side-by side with a table, a graphic, etc.

- In the 1st placeholder, type **Text header**.
- In the 2nd placeholder (left one), type **Add**

some text here.

- In the 3rd placeholder (right one), click the **Table icon**, and use the dialog box that opens to type **3** in the Number of columns, and **4** in Number of rows.
- SAVE your work: CTRL S / MAC CMD S.

Now we have a basic slideshow with components we can practice manual font formatting.

Like in Word and Excel, formatting options happen mostly in the Home ribbon, with the Font group and Paragraph group.

Go to the first (Title) slide.

- Select the title text and use the Home ribbon Font group to make the text **Bold, and dark blue**.
- Select the subtitle text (your name) and use the Home ribbon Font group to make the text **italicized**.

Go to the second slide. Let's make the content text larger.

- Select the 1st bulleted item, and use the Home ribbon Font group to make the text **36 pts**.
- Select the 2nd bulleted item, and use the Home ribbon Font group to make the text **32 pts**.
- Select the 3rd bulleted item, and use the Home ribbon Font group to make the text **28 pts**.
- Select the paragraph text, and use the Home ribbon Font group to make the text **32 pts**.

Go to the third slide. Let's edit the image.

- Click on the image. Like in Word and Excel, an activated image (or other insert) opens a new contextual menu/ribbon. For this image it is a **Graphics Format ribbon**.
- With your online image active, use the Graphics Format ribbon, Size group, to make the image **6 inches** wide.
- Use your cursor to click and drag the image to make it seem more centered, if the resizing moved or altered its centered appearance.

- Click the image, and use the Graphics Format ribbon, **Accessibility group**, to add accessibility content.
- Click the **Alt Text icon**, which will open a docked Alt Text panel on the right of your workspace.
- In the Alt Text field, you may already see some text. However, replace it with: "Stock image of a (whatever the image is of)." This tells a screen reader that there is an image and what the image is.

Go to the fourth slide.

- Make the Text Header line bold and a **medium-dark gray**.
- Use the Home ribbon Font group to make the paragraph text below the Text Header **24 pts** in size.

Let's work on the table. Like in Word and Excel, tables should have a header row, and PowerPoint defaults to adding formatting form one to an inserted table.

- Click in the table's first cell, which should be in a darker colored row – the header

row.

- In the 1st header cell, type **Fave Weekday**.
- In the 2nd header cell, type **Fave Activity**.
- In the 3rd header cell, type **Saturday Fun**.
- If you'd like, you can fill in your faves in the table cells below.

Click on the table, and observe that a Table Design ribbon and related layout ribbon to its right appear.

- In the Table Layout ribbon, Table Styles group, choose a different table color and intensity.

- **SAVE your work**, and close the file. **POWERPOINT ACTIVITY #1 FINISHED.**
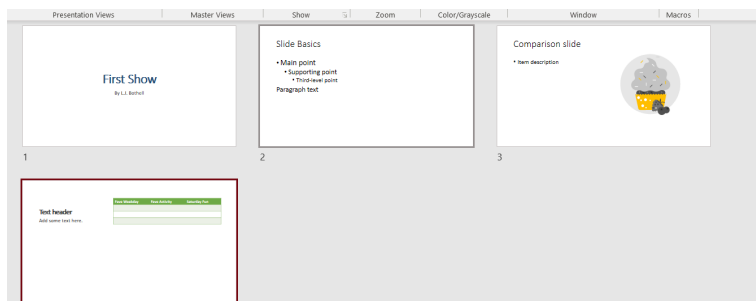
MedAttrib: author-generated. MS PowerPoint example 4-slide show with edits.

Now we've had a good introduction to new slides and basic manual font formatting.

Slideshow Design

Text and paragraph formatting are parts of what happens in a slide. This section is about the overall slideshow itself – how it will present when given as an active animated slideshow, printed out, and consumed by users. Slideshow formatting is characterized by actions that can affect the whole document, and in so doing, add efficiency and steps-saving to general text and paragraph formatting. These include document layout, themes and styles, headers and footers, and some use of sectioning. Much of this will seem familiar from Word and Excel.

Master Slides – View tab

In the View tab Master Views group, you can access a slide master view to show all the potential pages that you can use in a slideshow

theme. This is useful, and a good first step to using a theme, so that you can add footer information, make sure your show's title usage is consistent and correct throughout the show, and make specific style changes to the actual master pages of the show's theme. You want to minimize having to touch individual slide designs.

The footer section in the slide master lets you add a page number, date, other footer content, and style it so that it appears the same way each time that slide is used.

One thing to not, and this is a reason why the master slides are considered more intermediate in skill; each and every possible style page in the master view needs to be edited for consistency, or else you may insert slides from your modified theme and still see some differences. For instance, if you change the size and content of a slide's footer in one master view page, you need to make the same change to **all** the master view slide variations.
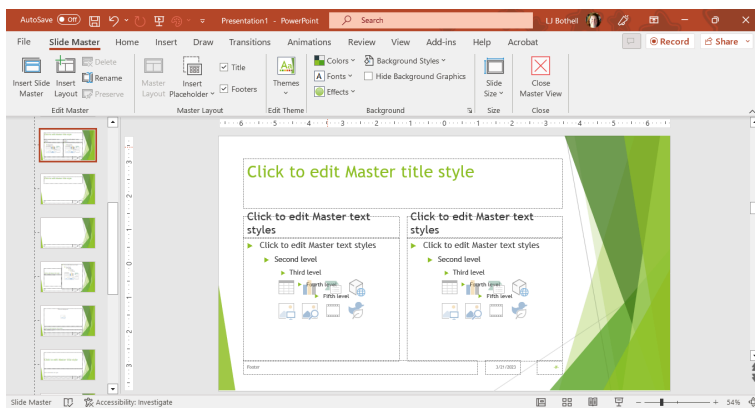
MedAttrib: author-generated. MS PowerPoint Slide Master interface.

Setting up slideshows – Design tab

The Design tab allows you to set the physical format of your slideshow, which is a good first starting step in developing a slideshow. This determines how large the slides will be, the orientation of the document, etc. In the Design tab Customize group, the Slide size icon dropdowns lets you choose an existing size or set a custom slide size.
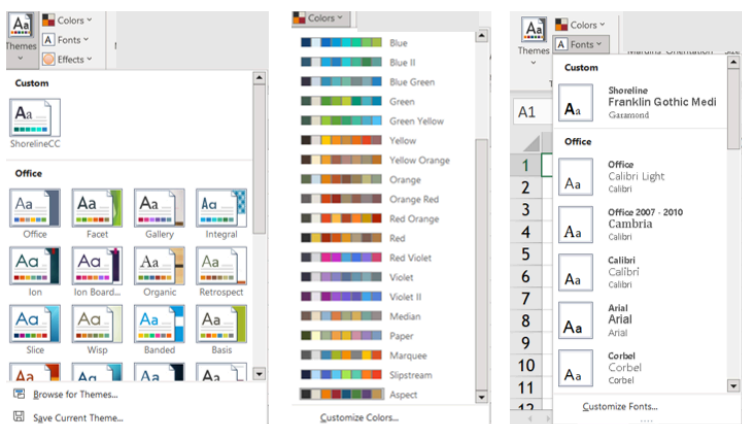
MedAttrib: author-generated. MS PowerPoint themes, and color / font palettes.

Designing documents – Design tab

Themes apply decorative styles to your PowerPoint document (just like in Word and Excel), such as fonts, colors, effect options, paragraph spacing, etc. They can give a slideshow a consistent and attractive appearance and efforts look more professional. In business, they are best used as part of a "package" of documents, such as a slideshow accompanying an annual report with Excel

graphs and charts inserted. They can enhance what you want to communicate by adding company branding colors and fonts. You can also:

- Make your slideshow more readable than just black-and-white text
- Tie consistent inserts, like shapes and borders, together with the rest of the document's "look"
- Use different colors and font styles to punctuate headings from text
- Help your reader respond and/or act in the way you need, and
- Easily update the whole look of your document just by changing the color or font variants

Design: Theming / Design Tips

Like Word and Excel, using themes can be a double-edged sword. While they can add attractiveness to your documents, they can also, if misused, make your work look confusing, be hard to read, and muddy your

communication message. Certain types of work should not use themes, like cover letters and resumes, which are routinely expected to be plain and standardized and which the receiver will likely scan into a program for database acquisition.

- Choose theme colors that make sense for the product, service, or idea(s) you are trying to communicate
- Choose theme backgrounds that have good contrast and allow text to be very easy to read
- Choose fonts for readability, based on need for headlines, lots of paragraph texts, easy bulleting, etc.
- Remember that less is more – more colors and font variations in one document can look unprofessional and take away from your message.
- Use themes only when you have full control over your own document – if you have an instructor or employer who does not want them used, then instead focus on using a template of the required styling.

Design: Theme Variants

Theme variants let you change aspects of a theme you select to apply a different core font family to it, or to change the color palette it will work with.

- **Fonts**: Font families in themes are designed and sized to be readable and hopefully scannable by screen readers for accessibility use. The style will offer a font for titles/subtitles, and another for general text. Available font families come installed with the computer's operating system, and may also be accessed from the word processing software's installation or cloud-based accessories.
- **Color Palettes**: Like fonts, color palettes are included in a style, and can also be changed independently to modify and create a new style. For instance, the overall design style of a theme may work for you, but the color palette assigned to it may not have enough contrast for your audience, or your company may focus on a different rage of core colors.

- **Effects**: These are subtle styles that can be attached to some inserted items, like image borders, shapes, SmartArt, etc.

Theme Variants

- **Page Color**: This allows assigning a color to a slide template, with previews of several colors in the theme's palette.
- **Design**: The Design tab has a Designer group, with a Design icon that can help you generate additional layout ideas for your show.

ACTION: MS PowerPoint Try Me Activity #2

Let's work on slideshow design.

Before you start, you should use your file manager utility to make a copy of the **PP_design.pptx** file that is in your DataFiles folder, then paste the copy into your Examples / MS_PowerPoint folder.

- If MS PowerPoint isn't open yet, open PowerPoint.
- Go to the Tile tab Backstage and Open a file, then use the browser dialog panel to find the **PP_design.pptx** file that should be in your Examples / MS_ PowerPoint folder, then open the file.

You should have a show with six slides of different layouts. We'll use this for slide formatting practice. Our goal is look at Master slides, set a theme, and view the slideshow layout.

- Let's choose a theme. Use the Design ribbon, Themes group, to pick the **Facet theme**.
- Scroll through the slideshow to see how the theme affects each slide.
- If you see that some text looks off center, you can drag the text box to center it, and also use the Home ribbon's Paragraph group to change the alignment of the text (like centering).
- Use the Design ribbon, Variants group, to pick a **variant color** of the Facet theme

that you like.
- If you don't like the selection, click the small arrow at the lower right-hand corner of the Variants group to open a dropdown menu that offers a **colors palette**, font palette, and effects options.
- Choose a different color palette from the selection.
- Choose the **Effects option** from the Variants group dropdown, and pick one you like.

In the last activity, we manually changed the font size of some of the bulleted text. Let's do that here, using the Slide Master view, so that existing slides, and new ones, have larger body text (first three levels of bullets).

- Go to the View ribbon, Master Views group, and click **Slide Master**. The Slide Master view will show thumbnails at the left of each kind of page the show has built-in, so that you can touch any of them up and have newly created slides follow these Master Page changes. It also provides a Slide Master ribbon, which has the themes

and background options, as well as a button to Close Master View.
- From the Thumbnails, choose the **top slide**, which has the key styles for all bulleted text for the slideshow. Clicking this thumbnail will place an editable version into your workspace.

Notice that there are several placeholders, including three at the bottom that act as footer information.

- In the Slide Master, select the 1st line of bulleted text, and use the styles toolbar that opens (or the Home tab Font group options) to change the font size to **28 pts**.
- In the Slide Master, select the 2nd line of bulleted text, and use the styles toolbar that opens (or the Home tab Font group options) to change the font size to **24 pts**.
- In the Slide Master, select the 3rd line of bulleted text, and use the styles toolbar that opens (or the Home tab Font group options) to change the font size to **24 pts**.
- Close the Slide Master view.

What this does is enlarge the base size of the *overall* slideshow text. To get more granular changes to every slide, we would need to touch every master slide.

- **SAVE your work**: CTRL S / MAC CMD S.
- Let's find out what the slide size is. Use the Design ribbon, Customize group, and choose the **Slide Size**.

The Slide size defaults to Standard (4:3), with an alternative of (16:9) and of Custom Slide Size. Do not change the size.

TIP: Changing slide size. When slides change to a new size, but any Master Slide changes will revert to the new size's Master Slide defaults.

- **SAVE your work**, and close the file. **POWERPOINT ACTIVITY #2 FINISHED.**

Transitions

Transitions are one design item that is unique

to PowerPoint. Because a slideshow is meant to be active and engaging, and because it may have many slides, one way to keep viewers from having a jolt from immediate slide changes is to program in transitions. A transition might take a couple of or a few seconds, provide a 'slide separation' effect, and help keep a show engaging.

Slide transitions – Animations tab

PowerPoint offers a number of build-in animated transition and layout actions. They can be used for an entire slide transition, or a specific in-slide item transition/animation. These give the feel of interaction and movement in presentations and allow creation of complex animated slideshows that can look like Flash Movies..

- Common animation thumbnails appear in the Transitions ribbon.
- The left-most is the Current animation theme.

- Clicking other thumbnails to the right of the Current will change to that of the thumb you choose.
- You can also change the transition speed and sound.
- You can set slide advancement timing so that the presenter stays on a specific schedule.
- A transition can be applied to the current slide, or all slides in the show at one time.
- For a professional and non-jittery feel, you can consider applying the same transition to all the slides.

ACTION: MS PowerPoint Try Me Activity #3

Let's do some work with transitions, and maybe a simple animation.

Before you start, you should use your file manager utility to make a copy of the **PP_transitions.pptx** file that is in your DataFiles folder, then paste the copy into your Examples / MS_PowerPoint folder.

- If MS PowerPoint isn't open yet, open PowerPoint.
- Open a file, and use the browser dialog panel for the **PP_transitions.docx** file that should be in your Examples / MS_ PowerPoint folder, then open it.

You should see six formatted slides. A theme has already been selected, and the Master Page has been updated to have larger base fonts. Our task here is to set slideshow transitions, maybe an animation, and to test the slideshow.

Transitions can be applied one page at a time, or on all slides. We'll start small then learn more efficient practices.

- Go to the first page of the slide show.
- Activate the slideshow as it currently is. We want to observe how the slideshow works. When you start a slideshow viewing, by default it will begin from the slide you are currently on, unless you tell PowerPoint otherwise.
- Using the Slideshow ribbon, Start Slide Show group, choose the From Beginning

icon. You can also use the Status bar's Slide Show icon. The Function 5 key also starts a slide show.

Okay, now we see the first slide. It is just stuck there. What's up? The default for moving pages along is to press the keyboard enter button, to click the mouse, or the keyboard Page Down button.

- Press the enter button, and the slide show changes pages. Keep pressing Enter, and the slideshow will progress until you reach the last slide, then it will exit back to the Edit mode.

That was nice. It will be nicer if the pages transition with some kind of effect.

- On the first slide, go to the Transitions ribbon, Transition to this Slide group.
- Click the dropdown to open the dropdown transitions selector. Choose Random Bars from the "Subtle" area.
- SAVE your work: CTRL S / MAC CMD S.

Look at the thumbnails of the slides. The first

slide, which we applied a transition to, has a small star to its left – this indicates there is a transition.

- On the Transitions ribbon, a Preview Icon becomes available at the left. Click it once to preview the transition.
- Now, use the Function5 key (F5) to start the slide show.

The slideshow starts with the transition. You need press Enter to advance the show, and. . . there are no more transitions.

- Use the Escape button to escape the slideshow.

A transition needs to be applied to every slide for every slide to use it. You can set transitions on every slide at one time two ways:

- Select all slides by clicking the first thumbnail, pressing the shift keyboard key, and then selecting the last thumbnail. Once all slides are selected, choose the transition, which will apply to all. Or,
- Use the Transitions ribbon, Timing group,

and choose Apply to all.

In our case, make sure you are on the first slide which has the transition, then click the Apply to all. Now all the slides have the star icon.

- Use F5 to run the slideshow, and press Enter to advance the slides. Note that the most pronounced version of the transition happens when the show opens; the remaining pages transition more subtly.
- On the first slide, choose a different transition, such as the more "exciting" Honeycomb.
- On the Transitions ribbon, click the Apply to all, so that the new transition replaces the old one.
- Use F5 to rerun the show.

Can we change the time on a transition? Yes. Make sure you are on the first slide

- Using the Transitions ribbon, Timing group, change the Duration to 1.50.
- Add sound by using the Transitions ribbon, Timing group, and clicking the Sound dropdown. Choose the Chime sound (or

another you prefer).
- From the First slide, use the Transitions ribbon and click the Apply to all to add the timing and sound to all the slides.
- Use F5 to rerun the show. The show is more dynamic, and seems to run faster.

Can we use some other method to advance the show besides the Enter button or mouse click? Yes!

Be on the first slide again.

- Using the Transitions ribbon, Timing group, and unclick the On Mouse Click. Put a check in the After checkbox, and adjust the time to read 00.03.
- From the First slide, use the Transitions ribbon and click the Apply to all to add this change.
- Use F5 to run the show. The slides will automatically advance every 3 seconds.
- SAVE your work: CTRL S / MAC CMD S.

Animations

Animations are another design item that is unique to PowerPoint. An animation can be as simple as using a transition-like effect on an item, like fading out a picture. Or it can be used to bring in a list of text one bulleted line at a time. You can create an animated and programmable 'button' to advance pages on a slideshow with a click. You would use the Animations tab to add and time animation content so that the show feels like a movie. Animations can be applied to text, to pictures, and to ither inserts like shapes, clipart, WordArt, etc.

You can also open an Animation pane in the Animations tab Advanced Animation group. This pane is necessary because if you have multiple animations in a slideshow, and even on the same page, you will need to tell PowerPoint several things:

- What order to serve the animated items. The standard order is that the first things on a slide animate first – BUT, this can

mean the first thing created on the slide, not the first thing in the order you 'see' the items.

- The timing of and between animation actions.
- The speed of an animated effect.
- How an animation should start – on a mouse click, on a timed delay, etc.
- How you choose to change the order of animations.

Let's try an animation.

- First, go to the first slide, and then reset the Advance Slide option back to On Mouse Click, and uncheck the After checkbox. Otherwise, the automatic slide timing will conflict with any animation you create.
- From the First slide, use the Transitions ribbon and click the Apply to all to add this change to all the slides.
- Go to Slide 2, and in delete the contents of the right-hand placeholder, so that you can see the icons to add content.
- Choose the Stock Images, and find some

vacation image from another country to import. Once the image imports, it will size itself to the size of the placeholder field.

- Click on the image, then go to the Animations ribbon, Animation group, and choose the Fade animation.
- On the Animations ribbon, Preview group, and click Preview.
- On the Animations ribbon, Timing group, and set the Duration to 1.2, then preview again.
- Go to slide 1, and use F5 to run the show. It should need you to press enter or use a mouse-click to advance the slides.
- Advance to slide 2 and stop. Notice that there is no image.
- Click the mouse or press Enter. The image should fade in.
- Press Enter again to continue advancing the show, or press Escape to escape the show.
- **SAVE your work.**

Shall we try an animated list of text? Go to Slide 3, which has 4 lines of bulleted text. Let's

determine how we can make each of these line appear one at a time from top to bottom.

- Click on the Slide 3 placeholder with the 4 lines of bulleted text.
- Go to the Animations ribbon, and choose Fly in from the Animation pane.
- Use the Go to the Animations ribbon Preview icon to see the animation. This is how the lines should ideally come in, considering timing, etc.

Look at the Placeholder box's text, and notice that to the left of each bulleted line, a number appears.
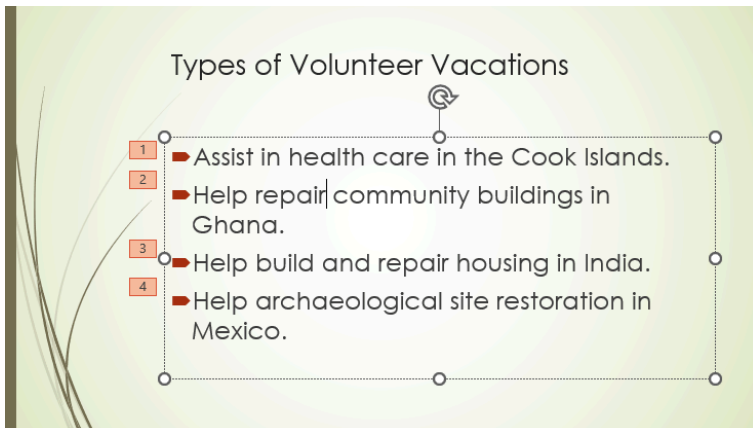
MedAttrib: author-generated. MS PowerPoint text slide.

The numbers display the order in which the text will appear. In this case, we do not need to change the order.

- On the Animations ribbon, Timing group, and set the **Duration** to **1.5**, then preview again. The lines appear more slowly.
- On the Animations ribbon, Timing group, look at the **Start field**, which shows **On Click**. There are other options, but we'll stay with this default.
- **SAVE your work.**
- Go to Slide 1, then run the slideshow with F5. Use your mouse click or Enter button to advance each slide and animation.

For your own practice, you can try animating the text placeholder contents on slides 4 and 5.

On the final slide, let's add a large image from your favorite travel place. In this case, you will need to remove the text-only placeholder, and simply import an image in to the page.

- Use the Inserts tab, Images group, **Pictures / Online pictures,** and search for an image.
- Import the image, and resize it to be about **10 inches wide.**
- Use the Picture Format context ribbon to add a predesigned border from the **Picture Styles group gallery**.
- Click the image, and use the Animations ribbon, **Animations group** to pick an emphasis animation to apply to the image.
- Use the Animations ribbon, Timing group to change the **Duration to 1.25**.
- **SAVE your work.**
- Run the slideshow from the beginning.
- **SAVE your work**, and close the file. **POWERPOINT ACTIVITY #3 FINISHED.**

Review and Distribution

PowerPoint is about presenting work – in person, as timed online presentations, etc. It is used in meetings, conferences, sales contacts, on websites, in streaming threads, etc. The various illustration, transitions, and animation

tools make PowerPoint uniquely capable of having interactive data presentation.

You can also create slide notes, to appear below slides, and/or to be printed out for a separate handout in a meeting.

Output – File tab

Review and distribution of your work is about preparing it for who will be consuming it. Will it stay in a Word document format, be saved as a PDF, printed onto paper, added as website content, populate an add or newspaper article, or be part of a book? Like Word and Excel, a PowerPoint file needs to be:

- Spell checked
- Grammar- and language- reviewed
- Accessibility enabled (alt text, proper use of heading styles, accessibility for screen readers).
- Have versioning considered.
- Have hyperlinks tested.
- Be cited and attributed properly for

intellectual honesty.
- Passed for plagiarism and other content integrity needs.
- Presented for readable print viewing.
- Secured for limited/no editing.
- If meant for team collaboration, prepared for making shared/trackable changes, comments, and notes.

Output/distribute work

- You can test and adjust your documents and review your content before it goes live by looking at the **File/Print** sections Print Preview and settings.
- You can make sure you have added metadata for web/online reference by updating information in the **File/Info** page.
- Slideshows can be saved in as a slideshow, native slide prepared format, as a template, and in other formats, like images and PDFs.
- You can save files in different formats for distribution in the **File backstage** areas, like Save As (for current and older versions,

RTF, text, and HTML), save as PDF, export, etc.

This should give you a good overview of MS Word skills that you can use in school and as a starter for basic workplace support tasks.

Chapter 10: Databases

- Database Concepts
- Microsoft Access
- Tables
- Queries
- Forms
- Reports
- Review and Distribution
- Special Concerns

This textbook does not train on database work. Why? Databases are intense, complex, and very detail-oriented repositories of information that requires time, review, and practice that should be offered in a databases-specific course.

At the same time, MS Office provides Access Database as one of the key applications for relational database work. And, much of work

in the computing / digital word is reliant on database data, analysis, connection, and data entry. Therefore, this chapter is an overview of MS Access database concepts so that you can understand the breadth of now information/ data means in the scheme of computing and information access. Other instructors may choose to add practical activity examples and homework.

Database Concepts

A database is an organized collection of data, generally stored and accessed electronically from a computer system. Data stored in databases might include facts about people, events, things or ideas. This provides information, which generates usable knowledge and actions.

In a way, a database is like a huge warehouse of information that is necessary for data acquisition, analysis, reporting and computations, but the database itself does not do that work. It holds the data for exporting

to other applications that can do the work, like Excel for computations, data analysis query tools, etc.

For a database to be useful for basic work, the information in tables of data have to have some relationship to each other, or else one would be comparing apples to giraffes in a futuristic world in which dinosaurs roam a starship. We will focus on relational databases which have ways to link seeming unrelated information from multiple tables/sources. Nonrelational databases also have an important place in the computing workplace but are beyond the scope of this book.

The following are common relational Database Management Systems, (DBMS):

- AWS for Data
- Microsoft Access
- MySQL
- Oracle

Databases are part of our lives in every way, even when we don't recognize it. If you ever have to ask for a massive amount of

information to sort/filter itself and give you a specific response, chances are that you ad dealing in someway with a database or database output. *Examples*:

For my birthday, I treat myself to 3-4 new (or missing from my Kindle library) books by favorite authors. I go to Amazon's Kindle section and look for the newest Stephen King book so I can buy it.

- Amazon's entire collection about Kindles, books, authors, book titles available books, prices, and capability for purchase of a book, is part of their database. I query Amazon in the Kindle Search field and the database reports back (in the list of Stephen King Kindle books) that Stephen King doesn't yet have a newly published book, and also lists other books. I recognize one I am missing from my Kindle library, and I treat myself to a purchase of it.

I am drafting this OER textbook about Business Technology, and I need more information

about accessibility issues for populations with differing accessibility needs.

- I use Google as a search engine and in the search field look for "assistive technology for cognitive disabilities" and Google returns a list of linked web pages that might give me some information I need. Google's search engine has queried their massive database of websites and topics and reported out search results.

Database preparation

Effective database design is critical, and must be planned out before the database is built. One of the first steps in designing a database is to ask 'What questions should this database be able to answer?' The goals of the database should be to store data in a way that makes it easier to answer these questions.

The database should be user friendly, easy to input data into, and able to prevent duplicate records from being created. Redundancy in

the data can cause the integrity of the database to be compromised (questions can't be answered accurately).

Practical database design also has to focus on accuracy and consistency of the data – reliable and standardized formats, with data input controls that ensure consistency. Spelling and naming conventions must be precise and uniform.

Database objects

Databases contain objects to store or reference data. A data object is a structure used to either store or reference data. The database objects we will focus (in order of use) on are:

- **Tables**: storage of information
- **Queries**: questions about information
- **Forms**: input of information
- **Reports**: output of information

Microsoft Access

Since Microsoft® Access® (MS Access / Access) is widely used in industry, and we are covering Microsoft® Windows® and Microsoft® Office® in this textbook, we will focus primarily on Access as an example of a relational database management system. There are many similarities across relational database management system standards, so the skills we are learning are translatable.
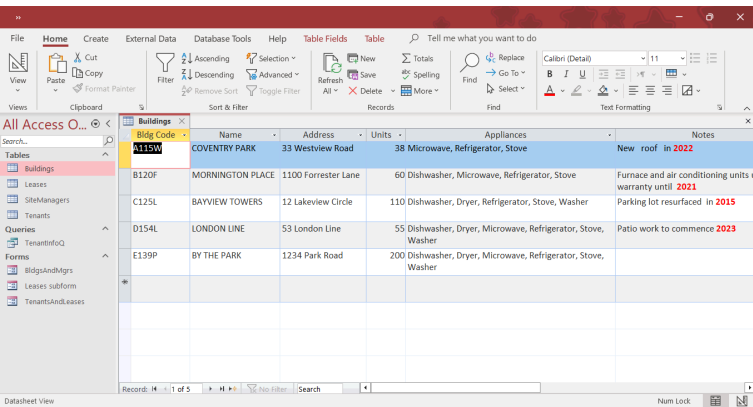
MedAttrib: author-generated. MS Access user interface.

Tables

Tables contain data. Columns and rows of tabular data can be indexed, sorted, filtered, and later queried for finding information in the database. Tables are read by columns (column head for table field data identification) and rows (each row is a separate instance, like a customer or product).

- **Table Record**: A table's row of information about a particular item the table is about, like a customer record.
- **Table Field**: Like a cell in Excel, a field contains one piece of data about one part of the table subject, such as first name of a customer. The item inside that field is its **value**.
- **Table Field property**: The format that a table's field takes, like text for the customer's first name, or currency for an entry about salary.
- **Data Types**: Like Excel a database will have types of data, like text, currency, email addresses, a hyperlink, a date/time, a number, and so on.

Connecting tables of data

Relational databases have many tables of information in them. A common standard is that if an item in a table can be broken down into another table, then linked to the main table in a query, it needs to happen. For instance, in a *Customer table*:

- BotWa031323, LJ, Bothell, 1234 Main Street, WA
- In this record (row) of information, my first and last name is unique to me. The street address is generally also unique, although other people in the table may actually live at the same condo complex. However, what is definitely **not** unique is the state abbreviation. Yet, when a data entry operator inputs a couple of hundred new rows/records, they may refer to Washington State as WA or Wash in different records. What a mess!
- Another table for just abbreviations of States should be made
- Then, the Customer table and the States table needs be linked so that Customer

table would have a dropdown option for the State field, which links to the list of the State abbreviations in the States table.

This kind of relationship-building, which one really needs to learn, absorb, and practice in a database course, looks like this:

In every single table, there should be one column of information that can never, ever have a duplicate – like a field value of a unique customer number. This unique field value would be given a "Primary Key." Which is an Access database way of 'locking' the unique field value from being duplicated.

The States table would also need to have a column of totally unique information field values, so that each state could be considered a unique entry. Because the state abbreviations ARE unique, the abbreviation field values could also act at the primary key for that table.

Then, in a query, those two primary keys could be referenced, and the tables would be 'linked' to pull information from them.

Okay, that's enough techy detail.

Queries

A query in a relational database is just a way of asking the database a question about data that may reside in part in several tables. The idea is that you can query data in a separate customer table, product table, and sales rep table, and get an answer that identifies which sales rep represented which products for which customers. Why? You might want to know which sales reps have the most sales, or which customers bought which products.

Why a **database** instead of Excel? Because a relational database is designed to hold tens of thousands of customers, thousands of products, hundreds of sales reps, all their data like addresses, ID numbers, payments, tax amounts, dates, etc.

- Excel would be used after you narrow down a lot of data to just what you need, then export it to Excel so you could use the worksheet to calculate formulas about the money, count of products, average order size, etc.

- Access and other databases don't do calculations, or graphs/charts.
- Excel can't efficiently process thousands of multiple columns and rows of seemingly redundant data.

TIP: Queries in databases like Amazon and Google. The Amazon query is the Search bar. The query in Google is also the search bar. The search for a Stephen King book at Amazon queries the database, and the Google search for Assistive Technology queries the Google database.

Forms

Database forms are used for inputting data into the tables of the database.

In Excel, one generally works with the actual raw data ranges or tables of data. In a database, however, working with the native table can lead to costly and messy inconsistency mistakes being entered into the fields.

Instead, an efficient and secure database uses one or more input forms for data entry input into tables. For instance, if we refer back to the separate customer table, product table, and sales rep table, what if you are doing data entry for new customer orders that need to populate fields in all THREE of these tables at once?

The form would be designed – using the relationships between the tables (via the Primary keys and other database magic). Then, the data entry specialist would simply open a dashboard form. Fill in all the customer order information, and the database would place the relevant data for each pf those 3 tables into them.

Reports

Access and other relational databases can also 'report out' information from tables and queries. It isn't an optimal use of reporting, but if no calculations or graphics are needed (hey Excel!) but some basic narrowing of data is, Access can generate a moderately attractive

form so you can print it, save it as a PDF, or otherwise distribute the report.

Review and distribution

In Word, Excel, and PowerPoint, one big step before distributing the work product (printing, PDF, etc.) is to do a spell check. You can also do this in Access and other databases, but the concern can be that data could be corrupted if a field of information that a query relies upon suddenly has a spell-checked batch of corrections hit it. Be very careful.

Another standard pre-distribution check for Word, Excel, and PowerPoint is an Accessibility check. This is to be sure that tables, inserts like images and SmartArt, and other document items that may go through a screen reader can pass basic accessibility standards.

The database, however, isn't so easy to do this with. The tables of data, the queries, and the input forms aren't designed for a real accessibility check. Instead, Microsoft works to

add accessibility tools to the overall Access interface.

However, the output Access database report can and should go through an accessibility check, just to verify that any design/formatting images can get alt text and other accessibility-related hiccups can be caught and corrected.

Special concerns

Future of databases

A future of databases is happening now. The chapter mentioned flat databases, which are not relational, and relational databases (Like MS Access). However, as more data is accumulated, needed, and has to be combined and synthesized for analysis, solitary non-relational databases of some complexity are needing to be accessed and used. This is due to so many database systems now being 'legacy' on legacy machines. The data is important, but can't be easily accessed, merged elsewhere,

and analyzed. Some U.S. Government database systems have this problem.

Applications are being developed to assemble multi-model databases, which are database management systems that organizes many NoSQL data models using a single backend, a unified query language, and API. They allow for several non-related databases, from different servers and systems, with different forms of data formatting, to be accessed and queried. The query then creates big data which can then be repurposed into a more central and secure database with more processing power access.

It is also likely that in future quarters, students may find themselves treated to very basic SQL coding for relational database work just to learn how to develop a very simple database.

Part 3: Internet Fundamentals

We've had an overview of computing essentials and some productivity applications. Now we'll discuss the Internet itself, and our relationship to it. Why is this important?

The Internet and Web give us almost unlimited access to information and connection. It seems to have democratized knowledge and opened doors to avenues of work, play, creativity, and influence. Free speech, paired with our need to absorb and parse incredible amounts of information, leads to both opportunity for growth and unintended consequences. We have to consider access, responsibility, privacy, security, policy, and what digital citizenship means.

We have become global digital citizens, which demands responsible use of technology by anyone who uses computers, the Internet, and digital devices to engage with society. At work,

in education, and in our personal lives, we have an effect in the world around us. Let's find out more.

Chapter 11: Internet Basics

- Internet Concepts
- Networking
- Interfacing with the Web
- Email Communications
- Remote access / VPNs
- Wi-Fi Networks
- Home Networks
- Security
- Information Tools
- Information Sharing
- Information Use
- Intellectual Property
- Downloading/Sharing
- Net Neutrality and Laws
- Website Information
- Special Concerns

As digital citizens, a big part of our education

and responsibility requires that we examine the playing field of which we are a part.

Internet Concepts

The Internet is a worldwide system of computer networks with billions of computers and devices linked up. Users at any one computer can "go online" to connect to and access information from any other computer with a series of network permissions. This allows people to communicate with anyone anywhere, share information, and add their own influence to the pool of knowledge we share.

What is the World Wide Web?

Often referred to as the Internet, the World Wide Web (web) is actually specific part of it, not all of it. The web consists of websites accessed through the Internet. A website essentially an easy user interface for

information, and included text, images, and other resources full of information.

MedAttrib: geeksvgs.com/public domain. World Wide Web illustration.

Websites simulate various forms of media, like presentations, brochures, video programs, games, articles, workplace portals, and so on. The purpose and style of websites can seem endless: advertisement, video media center, blog, newspaper, an online library, a forum for sharing content and images, an information portal, games, expanded instant messaging, streams of video activity, etc.

Part of the development of the web

community was to include some form of address to each website. This is what appears in the address bar of a browser and by default is to the home page of a website.. It is a unique "Uniform Resource Locator" (URL) address: http://www.domainname.domaintype. *Longer form example*: http://furnishings.shilpcrafts.com/decor

- **Domain**: This tends to be the location/ ownership of the site. The domain name would be, say, a company's or schools name. The domain type would be the entity your organization registers as on the internet, like commercial (com), business (biz) school (edu), government (gov), country (us), network (net), etc.
- **Scheme**: https//, which means Hypertext Transfer Protocol. Other schemes include https (secure), mailto:// (email), and ftp:// (file transfer location)
- **Sub domains**: A website usually has a number of sections/pages, and when one of these appears in the URL, it means that the address is taking you to a specific section of the website, not the default

home page.
- **Subdirectory**: The specific section of a webpage.

Since websites usually have more than one web page, they need to link those pages together so visitors can navigate to them. We'll discuss more about website parts and content later in the chapter.

Networking

Some types of physical networks

- *LAN*: Local Area Network, which is a network that connects computers and devices in a limited geographical area such as home, school, or office building. Uses existing home wires (coaxial cables, phone lines and power lines) and Ethernet cable wiring.
- *HAN*: Home area network, which is a residential LAN used for communication between digital devices typically used in the home, like personal computers and

peripherals.
- *MAN*: Metropolitan area network, which is a large computer network that usually spans a city or a large campus.
- *WAN*: Wide area network, which is a computer network that covers a large geographic area such as a city, country, or spans even intercontinental distances. Combines many types of communications media such as telephone lines, cables, and air waves.

Wired Connections

- Wired connections allow you to connect with other computers through physical wired technology that uses existing infrastructure.
- *Host Ethernet Adapter*: A physical Ethernet adapter that is integrated directly into the GX+ bus on a managed system. Needs an Ethernet cable to a router that in turn is wired to a service (like Broadband). Can automatically detect another computer connected with a straight-

through cable and then automatically introduce the required crossover.

• *Voice Modem*: A device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information. Older computers had a modem installed, which could work with telephone lines to transmit communications data to other computers.

Wireless connections

• Wireless connections allow you to connect with other computers using radio communication.

• There are wireless LANs, WANs, MANs.

• **Cellular Network**: radio network distributed over land areas called cells, each served by at least one fixed-location transceiver, known as a cell site or base station.

• **Bluetooth**: A wireless technology standard for exchanging data over short distances (using short-wavelength radio

transmissions) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security.

- *Radio modems*: Used for long-distance wireless connections, such as for direct broadcast satellite, Wi-Fi, and mobile phones.

Interfacing with the Web

The biggest hurdle to accessing information is being able to get to it. The web evolved in order to build the user interfaces (websites) in appealing and dynamic ways for us to get at information, and the addressing to locate the site. However, what also had to develop was how to find the address of and be able to reach these millions of websites. That is what a Web Browser (browser) is for.

When a user requests a web page from a particular website, the browser searches for and retrieves its files from a web server and then displays the default home page (usually) on the user's screen.

Browsers are used on every computing device that can connect to the Internet. The browser concept and design has become so standard that many software applications have adopted the browser format for presenting information and app section linkages, even when not an actual website. The website is the medium for the website owner's information, and the browser is the visual medium that interprets website code and displays it to the viewer.

There are dozens of browsers, which are free to use and often come paired with a computing devices OS. While browsers are generally universal (Google Chrome, Opera, Firefox), some are more tailored to an OS than others:

- **Mac**: Safari
- Windows: Edge

A browser lets you find and display a website. The **Search Engine** is the mechanism that queries the Internet to search the Web of pages and report back the results as a list of hyperlinked websites (often with summarized information.) The search engine behaves like the query of a database (the Internet database

of websites located by addresses), and the search results would be the output report. A **Web Crawler** is a search engine bot that does the searching. What makes this so fast is that web pages that are located are added into a data structure called an **Index** that adds data about the web page, like keywords and recency of use.

Search engines can search with a single word (like a company name),keyword (coffeehouse) a specific phrase (Assistive technology for disabled persons), or a concept (new horror novels like Stephen King).

Email Communications

Email is electronic mail, the mode of communication that uses electronic devices and data transmission to deliver messages between different computers. We covered email usage and tips in Chapter 6. This section is about the more technical aspects of how the email process of the Internet works.

When you send an email to contacts, there is a series of processes that happens in the background from when you send the email until the email is delivered to the recipient's Inbox. Here is a refresher from Chapter 6.

Email Processing

- Create then send the email.
- The email client (such as Gmail) connects to an outgoing email Simple Mail Transfer Protocol (SMTP) server.
- The email is handed over in a MIME (internet-standard encoded file) format, and the outgoing server validates sender details before processing the message.
- The mail goes into the SMTP server's Outgoing queue.
- The SMTP server looks up then connects with the Recipient email server mail transfer agent (MTA) and sends the email.
- The Recipient server initiates various security checks then accepts the email if it passes.
- The Recipient server validates the recipient

account and delivers the email to the user's mail account, based on the incoming email policies set for the account.

MedAttrib: author-generated. Email processing.

Email Access

Email can be accessed through an email client (like MS Outlook) or a web interface (like Gmail). These user interfaces often provide additional functionality for sorting and organizing emails, formatting your own outgoing emails, creating a contact list, modifying interface layout settings, filtering/blocking emails, and instant messaging.

Email Servers:

- **IMAP**: Internet Message Access Protocol, which has two-way communication with servers, and which saves a copy of every message on the server so multiple email clients can get them.
- **MDA**: The incoming email Mail Delivery Agent server
- **POP**: Post Office Protocol which gives the email user access to emails stored in the user account. Email travels one way, and is less effective because it doesn't manage different email interfaces.
- **SMTP**: The outgoing email Simple Mail Transfer Protocol server

Remote Access / VPNs

Remote Access to computers

In both the office and home environment, you may need to remotely access a computer to

get at work files, information for an assignment, or your own files when you are away from your own computer. With remote access, a computer or network you are accessing determines you are physically at its location instead of accessing it from elsewhere.

This technique is also useful when one person needs to assist another in solving a computer technical problem but can't physically do so. Tech agents at computer manufacturers do this to resolve problems for customers, such as when a computer microphone seems to stop working and the user contacts technical support. A tech rep at one's company can help with work-related computer issues, as another example.

Virtual Private Networks

A Virtual Private Network (VPN) creates an encrypted connection to another location on the Internet. The VPN provides an IP address instead of the user's, so that Internet traffic emerges without signs of where a user is

connecting from. VPNs can be installed on your computer, mobile phone or tablet. VPN services usually charge for their services.

A visited website knows the user IP address, and keeps server logs of what pages on the web site are visited, how long was spent on each page, etc. The VPN makes web browsing more private, since the visited website records the logs with the VPN's IP address, rather than an IP address that could more easily be associated with the user (e.g. home Internet connection).

VPNs can enhance online privacy, especially in public computing locations and for financial transactions. They are commonly used in the following circumstances:

- Adding encryption to unencrypted communications.
- Streaming media that is licensed for viewing in some countries, but not available in others.
- Watching geographically restricted tv & movies.
- When using a public Wi-Fi hotspot.

Access work network when out of office

A workplace may have software or files that can only be accessed from a computer that is connected to the office network. This helps keep these files and software more secure, as they are not directly accessible to the Internet. However, many people work from home, so how do they access these restricted resources? VPNs are one way of allowing this access. To the office network, employees connected via the office VPN can have all the rights to access software and files that they normally would if they were physically present in the office.

Wi-Fi Networks

Wireless (Wi-Fi) networks use a radio frequency signal instead of wires to connect devices to the Internet and to each other. The signal can be picked up by any wireless-capable device. Like a laptop, mouse, and smartphone certain distance in all directions.

Encryption

Encryption is the process of hiding the contents of information, which is particularly important as users send and receive information (like passwords, credit card information, other personal information, etc.) on personal and sometimes less-than secure-computing devices (smartphones while in public, for instance).

Encryption strength is measured in bits (e.g. 64 bit, 128 bit, 256 bit, 512 bit, etc.) The larger the number, the stronger the encryption. Currently 256 bit encryption is considered strong (i.e. difficult to decrypt without a key).

As an example, "dpnqvufs" is a simple form of encrypting the word "computer" by shifting each letter to the next one in the alphabet (i.e. "c" becomes "d", "o" becomes "p", etc.). However, simple encryption like this encryption could be considered very weak if it could be decrypted easily by a computer program.

When using a web browser on the Internet,

ideally a user should only deal with encrypted web sites (so that someone intercepting the communications between them, and the website can't easily decipher these communications). Financial and other websites that need personal and sensitive information are usually encrypted.

TIP: Encryption. The website's URL address should begin with https://, with the "s" indicating 'secure'. Alternately, the URL may show an image of a locked padlock before it. An UNencrypted website will show "http://" before the website address and/or an image of an unlocked padlock.

E-Commerce sites (banks, retailers, etc.) have typically always used encryption to protect financial transactions; however, there is a trend to having all websites use encryption.

Public Access Points

Public locations, like a hotel lobby, airport, or

some coffee shops may offers free Wi-Fi for public use. Unencrypted Wi-Fi networks won't require a password to join them, but. encrypted networks will.

When a user's device is in range of Wi-Fi connectability, a list of available networks will appear when trying to connect. Encrypted networks should show a closed padlock beside the networks name on the list.

On Wi-Fi networks without encryption, all communications between your device and the Wi-Fi router can be accessed by others. This can be a problem if a user is doing a financial transaction (paying online with a credit card), reviewing personal information (a workplace interface login), calling friends (showing access to one's contact list), and so on.

Home Networks

Routers

Many people have Internet service at home, and an Internet Service Provider (ISP) (like the local cable company) usually provides a router with Wi-Fi. Securing a home network is critical in order to keep Wi-Fi processes from being hijacked and opening the home and computing tools to outside users. A first step should be immediately enabling encryption, and creating a unique password to access the router's settings. The router's password should be different from the Wi-Fi network password.

If a new router device has a standard manufacturer's password, the user should change it immediately.

Whole Home Wi-Fi Coverage

In many homes, a single router will provide a

Wi-Fi signal to all parts of the home. In large homes, or homes (apartments) with concrete construction, sometimes the Wi-Fi signal is weak in certain parts of the home. The weak signal can be strengthened by either a:

- **Mesh Network**: This is more expensive technology will involve replacing the existing router and that can provide whole home Wi-Fi coverage using 2 or more nodes. It provides a more seamless Wi-Fi connection when moving from room to room, plus faster speeds.
- **Range Extender**: If it's just one room in the home with a weak signal, an extender can help. It extends the existing Wi-Fi network, and is a less expensive option than a mesh network.

Security

Firewall use

Firewalls are hardware and/or software that

inspects the Internet traffic coming into and out of a network or computer. It uses a set of rules (that can be configured) and it is designed to block malicious communications to your computer. A firewall is meant to assist in preventing a computer from being infected with malware: it doesn't provide any assistance in scanning or removing malware that is already on the computer: for that you need anti-virus / anti-malware software. More information on security measures will be in Chapter 12.

A home router (hardware) likely provides some firewall capabilities, as does a user's computing devices' operating systems.

Information Tools

Aspects of information tools have been noted in other chapters. This section combined a general overview since the following tools are specific to Internet/Web access and use.

- **Browser:** Browsers were developed to view

sites on the Web. Websites are an interface that gives access to the information and tools of the Internet, such as locating and reading the information on a webpage. The browser allows for searching for, finding, and viewing websites. Some browsers also offer options for accessing email, reading newsgroups, and/or connecting to a chatrooms.

- **Chat :** Online chat is like being in a room with other people, but not physically in person, Chat can be one-on-one, getting help from a retail website, in a conference, in an online seminar, etc. It is a tool paired with online conferencing programs like ZOOM and MS Teams and allows for silent chat to happen online while someone is presenting, or a group discusses something.
- **Domain/Domain types:** A domain is part of a web page address which indicates the entity that owns or licenses the use of the address and related entity name. Names like microsoft, starbucks, and shoreline would be examples.
- **Download / Upload:** Programs, work files,

videos, and other items are transferred from one computer to another. Downloading is when a user gets the file(s) from another computer. Uploading is when a use gives files to another computer.

- **Email:** Electronic mail allows user communication on the Internet. Messages are sent and received, and can be responded to, forwarded, stored sorted and filtered, and deleted.
- **FTP:** File transfer protocol which is a program for uploading and downloading files through the Internet from one computer to another. FTP is used for uploading website files, downloading work files and music. FTP needs an interface that shows an available directory structure of each computer so data can be transferred from one to the other in a matching directory location.
- **HTTP:** Hypertext transfer convention which is a communication protocol. Used as part of a web page's address, it tells a web browser about what kind of file is being requested so it will be displayed

correctly. http://. . .

- **Mailing List / Contacts:** A list of email addresses that can allow an email to be sent to one or several people at one time. It can be used as a listserv for coworkers, a group for people working on a project, a personal contacts list, a list for sending something like newsletters.
- **Search engine:** An application used in a browser to search for web pages and files. The search engine is a form field a user enters a keyword or phrase into, and the engine uses web crawling 'bots' developed to scan the internet for web content that meets the criteria based on the web content's own keywords and information.
- **Server:** A computer that a user connects to when visiting a web site. A server can be a single desktop computer, a mid-range computer connecting several other computers, and large computers in a server farm/data center that have petabytes of space.
- **Web page:** A page is a text file that contains codes that tell a browser how to display the contents of the page. Web

pages can contain text, images, audio/ visual media, and applications that perform in the browser. The code – written as Hypertext Markup Language (HTML) and styled with Cascading Style Sheets (CSS) – is interpreted by the browser based on developed universally-accepted standards for translating code language into user-friendly viewing.

Information Sharing

Sharing information means exchanging of data between organizations, people and technologies.

- **Downloads:** Users can get, use, and store information from web sources, like document files, PDFs, music files, videos, zip files containing data and/or executable files, etc. By default, browsers assist in downloading, as does the host of the web space that has the files. A user can download by using an FTP program, or by clicking a link on the file's website, or right-

clicking the item to be downloaded for a context menu that offers a download option.

- **RSS Feeds:** Really Simple Syndication (RFF feeds) allows for the real-time acquisition, organizing, presentation, and automatic updating of information like newsletters, online newspapers, a website's updates, notifications, etc. The information can be converted into an HTML format of headlines and summaries with longer-info hyperlinks, for easier browsing and absorbing. News aggregators and online publications also use RSS feeds to automate the availability and access to current information like stories and announcements.

- **Synchronization:** Synchronization (Sync, Syncing) enables users to keep information automatically synchronized across phone, tablet, laptop and desktop computing devices. This can include profile information, bookmarks, history, passwords, and preferences. With syncing on, changes a user makes (like adding browser bookmarks) are updated, Then

they are able to be used on the user's other computing devices and applications that use the account (like the Chrome browser on a laptop and on another tablet). Turning off sync still allows access to the various settings, but they will not update or sync to other devices and applications on the account, or accept changes from the other devices that might still have sync on. Turning off sync, however, can help if a service intrudes with constant login demands, or if battery life is draining fast due to data usage.

· **Throttling:** Internet throttling is when an Internet Service Provider (ISP) deliberately slow down connection speeds for high-bandwidth activities like downloading files, streaming activities, gaming, or using social media interactive options. Throttling is often about an ISP's attempt to balance or control computer network traffic, optimize performance, decrease Internet response time, and/or boost bandwidth.

· **Uploads:** Uploading puts web pages, files, and other data onto a web server using some kind of upload utility application for

file transfer protocol (FTP).

Information Use

The Internet, with all the files, web pages, and applications, seems to be free. There are discussions and expectations about what is and should be free for use, what should require payment, and what needs legislation. These are complex discussions, and several will be initiated in Part 4 of this textbook.

What is free information?

Free access and use of information, downloads, and online applications' use can mean that a user doesn't have to pay fees, and/or that ads appear that provide the creators with the revenue. Non-paid content is free for use, even though it likely takes effort/time/funds to create, develop, maintain, update, and monitor the results. For instance, consuming website content is free, online library contents are free,

using online government services and forms is free, and trying online cooking recipes is free. Open-source applications are free to use and modify. This textbook, which consists of years of the author's work and teaching experience and many ours of writing and editing, is being offered for 'free' through open educational resource options like Pressbooks.

Alternately, free can also mean that the user has no obligations when accessing and using online content. It isn't about money, but about who owns the rights, license, and usage of materials like images, music, programs, tools, etc. And about how it can be used by others.

Other information on the web does require fees, like an online subscription as a service (SaaS) for use of an application. There can be fees to legally download music files, or a charge to stream a film, or payment to download the components to start some online games. Some providers offer a free version of a program as a teaser for the full version; a free introductory level or time period hooks the user into making a purchase or signing up for a paid subscription.

Some information also comes under donations and gifts. Applications like Twitch and other live interaction/streams offer inducements of small monetary charges for rewards, attention, etc.

Intellectual Property

Who owns information, how, how much, and why? Intellectual property has to do with copyright, trademarks, registrations, fair use, and attribution (citations, referencing) of information. Just because the Internet has lots of 'free' information, that doesn't mean it is free from user responsibility, respect, and appropriate use. The same way that free speech offers much open speech, it also demands responsibility for the consequences of that speech and some education on how and why society can't be a free-for-all (no pun intended) on speaking one's truth.

Intellectual property law encourages creation and distribution of intellectual goods, like medicine, researched textbooks, series of novels, music for ballet and karaoke, clothing

designs, design plans for housing and multi-family complex buildings, etc. After all, most people don't want to work for free, since we need to eat, have shelter, have personalized life options / tools / experiences, get places for work and fun, take care of our health, raise children, and so much more. If we expect to get paid for work, why wouldn't someone who creates a new product line, a new source of jobs, new kinds of cars and computers and medicine and new restaurants? Especially since that intellectual knowledge goes well above and beyond just a day's work, and can represent hours, months, or years of costs, research and development, time away from the rest of life, and various sacrifices from failed attempts and delays.

Intellectual property should not be confused with real/tangible property, like a home, car, physical products, equipment in a workplace or library, etc.

So, any song on the radio, which seems freely played, is actually paid for by radio ads. So are television shows on network channels. Shows on streaming services and cable channels are

in part paid for by subscriptions. Even if a band puts out some free samples of their songs, and/ or allows filming and distribution for a live concert, they still need to eat, pay for travel, keep musical equipment in good repair, etc.

To achieve this, the law gives people and businesses property rights for a limited timeframe (years) for the information and intellectual goods they create. This allows creators to protect their ideas, prevent copying, and benefit from the time and resources used in the usually long and often costly research, development, and creation process.

Let's consider aspects of intellectual property (IP).

- **Abandonware**: Property like websites, web applications, games, and other inline content is ignored by the owner after a period of time, and seems abandoned. Any product support, updates, notes and memos, and possibly copyright enforcement are also "abandoned". This is not an automatic process, and **no** assumption that the work can be simply

taken and repurposed should be made.

- **Attribution**: Attribution is the process of citing, giving references, and/or attributing the source of a work product. For instance, this textbook gives attribution to several other textbooks that influenced some core content. A term paper giving evidence for a pro-con argument needs to cite examples and provide references so a person accessing the paper can verify information and read the source materials.
- **Copyright**: A creator/owner has exclusive right for a limited time to copy, distribute, adapt, display, & perform a creative work. Uses a copyright mark but is assumed for a creator even without a formal copyright registration process. A book copyright is an example.
- **Domain hijacking**: Domain theft is when the registration of a domain name is taken and/or changed without the permission of its original registrant. Domain squatters can watch for domains to reach their annual re-registration period, and if a domain owner responds at all late, the squatter can quickly register the domain

themselves, then ransom it to the original domain owner.

- **Fair Use**: The right to use a copyrighted work under certain conditions without the creator/copyright owner's permission. An example would be an image in this textbook of an Excel spreadsheet, which shows some of the Excel user interface and worksheet workspace in an assignment example.
- **Licensing**: A licensing agreement means that a creator/owner of intellectual property allows a user to pay for the right for some limited use of a product. An example would be the use of stock images under a specific paid license for web advertising for up to one year.
- **Open resources**: A license that allows a user to freely use a copyrighted work for some combination of access, adoption, revision, and distribution. There are several open educational resource licenses available. This textbook, for instance, is licensed for others to freely use to read, download, print, and use in part or in whole in a classroom curriculum.

- **Open source**: A work product that can be shared, modified, and published because the design is publicly accessible. An example would be mods created from code used in online games like 7 Days to Die or Sims 4.
- **Patents**: The creator/owner the legal right to exclude others from making, using, or selling an invention for a limited period of time. A new medicine is an example.
- **Public Domain**: Creative materials that are not protected by intellectual property laws, usually because they have passed the standard copyright/protection date without renewal, or because they are provided as part of government or other public sector information. An example would be a photo from the NOAA website.
- **Registration**: The registering of intellectual property for some kind of legal status/protections, like copyright, patent, trademark, etc.
- **Trademark**: Identifies a brand creator/owner of a specific product or service and uses the TM mark. A product like a new juice drink is an example.

- **Trade Secrets**: The creator/owner has right to restrict others from disclosing trade secrets of processes, formulas, designs, instruments, and/or a collection of information. A process like the development of a new computing system would be an example.

Infringement

Intellectual property rights infringement is a pervasive problem on the Internet. Users have become accustomed to the seeming free access to information, free applications and browsers, and the ongoing social media discussions of ideas and creative solutions. In addition, aggregators (collectors or related content) like Google Images often don't have IP attributions and they make tons of content seem free for any use. Different countries have different expressions of intellectual property and its protection. Security and privacy get bypassed by apps and browsers, so info seems free when it was considered protected. People even "lose' the right to their own photos and

content when they share it, since some services may claim that posting/sharing content give the service itself some intellectual property rights.

One thing that every user must take responsibility for, and must know: YOU are responsible for your own activity for each and every info object, app, transaction, and sharing of any information or resource. It comes down to YOU knowing and having good internet hygiene.

ACTION: Quick Task – Intellectual property and free use of information

- Should all online products/content be free?
- What do you think the hidden costs of having no intellectual property protections would be?
- If you wrote a book, or created songs with a band, or created complex artwork, do you think everyone should have it for free?

Downloading/Sharing

While the process of downloading and sharing has been mentioned before, this section calls it out because it is a big issue for infringement of intellectual property. There have been legal battles about it, with many users being the losers. Peer-to-peer sharing of files has caused losses of revenue for creators of music, books, apps, movies, games, and other creative products.

- **File sharing**: File sharing is part of P2P. Users may think of it as buying a book and letting friends read it. However, when this is done with products that are supposed to be paid for by subscription, downloaded for a specific fee, or limited use only, this is a form of stealing. It is still difficult when one looks at the lending friends your favorite book example, but in that case, the friend doesn't actually copy the book and give more copies of it out.
- **Peer-to-peer** (P2P): Peer to peer sharing is when a user downloads items then shares them with other users who can download

from the sharer. The sharing user might also upload items for sharing instead. An example would be a YouTube playlist in which a user has added links to videos that are not supposed to be free, and others can download the videos instead of purchasing them.

- **Piracy**: Piracy is the intentional copying and/or stealing of products from the intellectual property owner / business that handles them, and making the products available for sale or free download. This happens with movies, games, apps, music, and other things many users don't want (or can't) pay for.

Net Neutrality and Laws

Net neutrality is the concept that an internet service provider (ISP) needs to provide access to all sites, content and applications at the same speed, under the same conditions. An ISP shouldn't block or throttle speeds to give preference to some content or to content provider services. It shouldn't discern whether

the user's need is for work, entertainment, free content, or paid services. It also shouldn't promote the practice that a content provider should pay the ISP more for preferential service, or that the user should have to pay more for faster access. The goal should be equity of access, speed, security, and reliability for all users in any location.

The issue comes up that ISPs need to upgrade equipment, especially when content providers and users need and demand high performance. ISPs also have to balance their own use of power and resources to manage all users' access. Also, speed and other shortcomings may have to do with the content provider's product, the pushes for users to respond, the types of online transactions that are happening, and a region's infrastructure for Wi-Fi, broadband, and related equipment.

Concept: Open internet

An open Internet means that all resources in, and needed to access & use those resources,

should be free and easy to use, including fully accessible. Open internet doesn't consider licensing, intellectual property, costs of infrastructure and resources, time and management costs, etc.

The idea is that no one entity should have power over information, access, censorship, free speech, standards, speed and quality, etc.

Concept: Closed internet

Closed Internet is about having a specific determining power structure that monitors, censors, controls, and restricts access as desired or perceived as needed. Other than perhaps open libraries and repositories, all content would be managed as a product/ service, with costs, limits, and filters. Policing and monitoring would be a part of this, and user tracking would be pervasive. Some would benefit, others would go without.

There are countries that practice some level of this, particularly when having blackouts of

certain products, media/news information, games and entertainment seen as subversive or democratizing, and so on.

Part of net neutrality is the discussion, argument, and work towards a healthy balance for users, creators, ISPs, and the need for access to Internet resources. Some content and resources does need privacy, intellectual property protection, and infrastructure / equipment care. Some activity does recommend monitoring and limiting, such as illegal activity and content not meant for children. Much content may cost more and demand more intrusion on users than it should, which should be balanced and have barriers minimized/erased. Some costs might need to be assumed by the creators/owners that generate the most drain on infrastructure and harnessing of power and climate-affecting energy. Services and products people need and pay for in real-world situations can have comparable aspects on the Internet. Anything that is part of education, training, social knowledge, healthy interaction, social connection, etc., is something that needs neutrality and responsible democratization.

- Should the Internet be neutral?
- Can the Internet be neutral?
- What minimal practices do you think are needed to balance the arguments between open and closed Internet needs?

Website Information

Given that websites are a primary way users access and consume information on the Internet, it is work taking a look at them – what they do, what they are for, and how they work (in terms of visitor interaction)

Websites can be commercial (products), public service (government/informational), social (social media) and utility (providing resources). Some exist to sell and make money; some exist to provide work, education, and lifestyle information. Some exist for social interaction. Influence and related entertainment. Some exist to provide tools, knowledge, and applications for getting things done.

Website hosting

Web hosts are the servers on which websites live and function. It is the server space for web page content, files, images, interactive tools, etc.

Basic parts of a website

The goal of a website is always to move a visitor to take some kind of action. It may be for a visitor to make a purchase, to willingly provide information, to allow access to their own resources, or to change their behavior. A successful website design will seamlessly do this by drawing in a visitor, identifying and solving visitor needs, and not intruding on the visitor's time and patience.

Some components of websites are essential to web design that all sites need to utilize them for proper results.
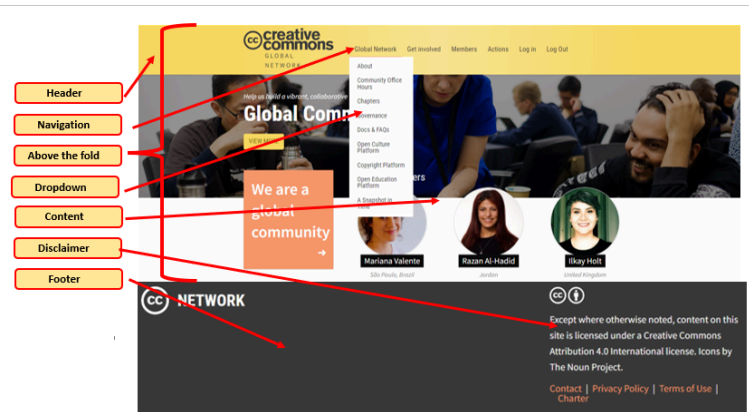
MedAttrib: Creative Commons 2023 website image, fair use.

Above the fold

We are inundated by so much more information and stimulation than likely any other time in our recorded history. We experience thousands of demands for attention, action, decisions, and commitments every day, in multiple and attention-draining ways. A website has to compete with this; often, its only advantage is that a visitor may have deliberately come to access it for a pre-existing reason. Otherwise, the website has to compete for attention and action.

A crucial way is for a website to provide key content and action prompts 'above the fold'. Above the fold refers in part to the newspaper term of what a reader would discover on a newspaper's front page before unfolding it. A website has to prompt attention and action on every page of the site at a user's first glance, which on a computer tends to be the average size of what appears on the computer screen. Smartphone have an entirely different size and "fold" dynamic, and websites have to be designed so that smartphones and small tablet equipment can still give critical information and action activities before the first 'swipe'.

Header

The header of a website tends to be the top segment that visitors experience first. At the top, it suggests top priority for attention, and would include the website owner's identity, affiliation, and topic/purpose of the website. This gives a visitor a sense of place and purpose. The header should be in some way replicated/ mimicked on every page of the website,

although the home page header might be more prominent.

Navigation

Website navigation needs to be designed to move the visitor to desired pages of the website that prompt the user to behave and perform in specific ways. For instance, for a commercial site, the navigation should take visitors to enticing content and the purchase funnel page. For behavior-changing sites, the visitor should be exposed to likely conflicts and problem-solving content.

Navigation needs to be prominent, not too complex, easy to follow, and also replicated on every page of the website so visitors don't get lost. If a website has more than five or so key sections, navigation might need sub navigation to direct visitors to sub content. Navigation should be near the top or on one side of the website page, and in the initial field of influence (above the fold).

Content

The website content is all the information, imagery, links, non-main navigation prompts, media, etc. It informs, convinces, leads, and instructs visitors what the website owner needs. It could be the database interface for a library, the attractions for a product, the lead-in to a streaming video, the chat section of a social media forum,, the demonstration of a product, the pricing of a service, or the shopping cart and purchasing process.

Streamlined, attractive, and accessible website design keeps things simple, elegant, and moves the visitor with an invisible sense of steps from beginning to end of the desired behavior transaction. The more garish, animated, jumpy, discordant, and/or slow-to-load a web page is, the more likely a visitor will lose patience and move on to another location.

Footer

The footer of a website in the bottom segment

(below the fold) that provides 'utility' information. Not information about computing utilities, but important yet secondary website structure utility. A footer would include copyright info, links to a website disclaimer, accessibility statement, privacy statement, website owner's contact information/address, and other need-to-know information about the access to the website owner/entity. The footer should also be replicated on every web page.

Links

Hyperlinks are part of websites, in that they are part of how the navigation links visitors to other pages on the site. In-content links may push visitors to other places on the page (like a table of contents linking to the headers of particular page sections), Other in-content links may push a visitor to related website owner resources, like a blog, forum, social media sites, and so on. Other links may take a visitor to other information sources, allow for downloads of documents, or activate apps to help the visitor accomplish something like uploading a

file or experiencing a video demo of a product's use.

Disclaimer

The website disclaimer can be a single page, or more likely a linked section of appropriate ''need to know' documents. The disclaimer tells visitors how any collected data will be used, what the website owner's responsibility is and is not for service, and legal/mediation-related information in case of conflicts. It may also attribute credit on the website for the use of other users' content, like images.

Additional disclaimer-like information includes:

- **Privacy notice**: Required by digital privacy law. Visitors can learn about their digital rights and how their personal data will be collected and processed. They may access options for setting consent preferences.
- **Accessibility statement**: Visitors can learn the website's policies on accessibility, standards the website follows, contact info

for reporting difficulties.

- **Index/Site Map**: A website can consist of dozens to hundreds of pages, organized into sections. A site index or site map page can be a much more detailed form of site navigation for the visitor to look for something specific.

Other options

Websites routinely offer additional options for organizing content and directing visitors to key behaviors and actions. These can include: sidebar, forms, forum, blog, calls to action, videos, and files.

Special Concerns

The Dark Web

One security concern that users face is something called the Dark Web. It is referred

to in reports and statements from security services like LifeLock. It is considered to be a part of the Web that houses access to unsecure and unconfidential information and the players/tools to access and abuse that.

The image below suggests the surface web, which is mostly want this textbook discusses. It demonstrates a deep web, which is where a lot of business and proprietary information resides that is not free or accessible for daily user life and needs – this would also be routine, just not obvious to all users at all times for most needs.

The dark web is a segment of the Internet / website presents with resources that focus on anonymity, less-than-straightforward daily activity actions, and insecurity issues. It is designed to provide anonymity for users and website owners and cannot be accessed with standard browsers. Currently TOR (The Onion Router) is the way to access it. *No, the author does not have that information or link, so don't even ask.*
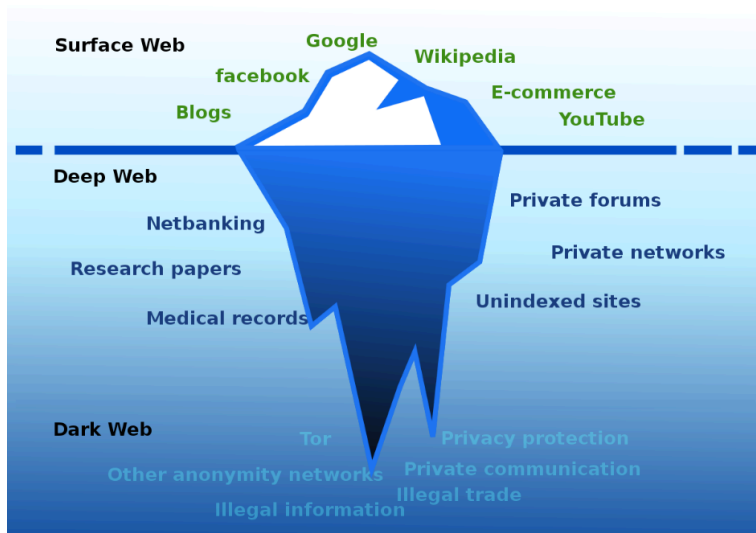
MedAttrib: "The Surface Web, Deep Web & Dark Web" by Ranjithsij. Modified by Flori4nK for a more accurate representation; licensed under a CC BY-SA 4.0 license.

The dark web can be used for:

- Activists and revolutionaries who want to organize with secrecy.
- Illegal activities like piracy and stolen information/resources.
- Users behind government firewalls who wish to anonymously access information (other than that provided by the state). Military uses may be included.

- Users in regions/countries who punishment for attempting free speech, like activists, journalists, sone politicians, some students.
- Whistleblowers and information-leakers.

Chapter 12: Technology Privacy and Security

- Technology Privacy and Security Concepts
- Privacy on the Internet
- Security on the Internet
- Internet Ethics
- Cyber Threat Prevention
- Information Security in the Workplace
- Special Concerns

This chapter focuses on privacy and security related to technology – computing and the Internet. Some of this has been touched on in other chapters as was relevant to that chapter. This chapter is an overview of privacy and

security overall, including tips and techniques for managing your own.

For instance, during the drafting of this course textbook:

- A ransomware attack hit the author's college workplace during Winter Quarter (finals) week, which had potential effects on the student population's access to communications, final project materials, due dates, end-of-quarter transcript updates, and stress levels.
- The author's data security vendor sent information about a possible data breach, which had potential effects on the author's secure identity information.
- An online sandbox/MMO game that the author enjoys had a server hacked and corrupted which required a several-play-days rollback to correct. On another server new players used hacking code broke into player bases to steal everyone's hard-won assets – just for kicks.

Because of the nature of online access to information and data, and contributed to by

human nature, online lives have exposed users to unprecedented risks and areas of concern about how their own information and property is secured and used.

Technology Privacy and Security Concepts

- **Privacy** in technology / computing / Internet has to do with user information and how it is accessed, used, protected, bought and sold, and sometimes abused.
- **Security** in technology goes to an additional level. Not only do users need to be aware of, and careful about, their own private data, they also need to deal with insecurity in the computing and digital equipment and resources. Sometimes there is a fine line between privacy intrusion and outright security risks on data.

Privacy on the Internet

Personal data has become a commodity, even with users reading disclaimers and signing off on forms regarding apparent acceptance of data use. In many ways every day, a user's right to privacy and control over their own information has been lost, byte by byte (yes, a pun). Laws are barely keeping track, much less offering and standardizing user control, protection, and full disclosure / opt-out.

- **Browsers capture information**: Searches and search results, and about which results were clicked and reviewed. Cookies indicate what sites were visited and what a user did. Addresses, payment info, and passwords can be recorded. Looking up a subject can be get linked on online retailers that start showing personalized ads for a related product or sending emails.
- **Computer usage**: Leaves traces about the computer, the identity of the computer user, and the applications/resources on the computer. Computer users have

accounts for the computer and many applications on it. The hard drive is full of personal data, like documents, homework, music, pictures, game settings, and application preferences. The computer also stores logs of usage: times, dates, prioritized systems, and more.

- **Internet resource visits**: Information is picked up about the user. How many hours did a user play a game through Steam? How many calls and chats did a user make with a technical problem? Downloads and uploads are logged by applications and the affected servers and processes. How long was a user on a website and which pages were visited? What was purchased and how was it paid for? Is there a chat log of the transactions?

- **Internet usage:** Our usage leaves traces. Emails carry information about the sender, as well as the email content. Having online accounts for bills provides surface info that hackers try to use to get direct contact with a user. Any communication application logs dates, times, what, how, etc. Cameras and microphones pick up

traces during meetings and streams.

- **Real-life activities**: In the presence of electronic devices, real-life has also been affected. Persons can find themselves directly or indirectly captured on smartphones then find themselves on someone's social media. Social media itself encourages quick and responsive behavior to offer entertainment and drama, while the evidence may never leave the records of the web. Some crimes are captured by cell phone; people's behavior in street protests are caught on camera and broadcast on the web.
- **Workplace and public services portals:** Pick up times, dates, and length of usage in the workplace and for the use of services.

Much of this was designed to improve speed, offer convenience, and personalize settings and options for users, such as for personal news aggregators or dashboards of favorite entertainment. Much was also enhanced and accelerated by vendors trying to increase sales, decrease their advertising costs, and make

getting users to part with their money much easier and more routine.

Web Browser Cookies

Web browser cookies are a small text file that records information about a user's visit to a website. The next time the user returns to the website, the browser reads the cookie file. Similar to a fortune cookie, a browser cookie contains a small amount of text or a message.

- Cookies aren't malicious, and don't harm a computer like malware potentially can.
- Cookies help customize web pages for future interaction.
- Cookies don't steal information; they only know what the user does on the website.
- Cookies don't have the ability to look at other files on a computer to access information.
- First party cookies are created by the website the user visits.
- Third party cookies are created when the visited website temporarily redirects the

user to a cookie tracking website.

Third party tracking cookies are considered a privacy issue, and government legislation has made many websites obtain your consent before they use a cookie on a site you visit. Currently, almost every commercial website immediately seems to pop up a 'cookies acceptance' alert.

Identity Security issues

Reports of data security breaches and cybercrime occur frequently. There is real-life damage that can and does happen when personal data is insecure.

- **Cyberstalking**: Use of electronic means to stalk, terrorize, harass, or otherwise control an individual, a group of individuals, or an organization.
- **Cyberterrorism**: Scams and attacks that are part of an organized effort by cyberterrorists and/or foreign intelligence services. Can include cyber warfare.

- **Fraud**: Unscrupulous people use data about you online to target you for phishing scams, access your money, and to commit other crimes.
- **Harassment**: Directed obscenities and derogatory comments at specific individuals focusing on gender, race, religion, nationality, sexual orientation, etc. May include actual specific threats.
- **Identity Fraud/Theft**: Stealing or using someone's identity in order to access resources, information, obtain credit, and/or steal finances or other benefits in that person's name. Identity fraud victims often do not know how their personal information was obtained – through malware, cyber attacks, skimming financial card info, finding published user information and privacy details, etc.
- **Identity Security**: The security and protection of your identity, accounts, and finances from intentional misuse and crime by others. Identity security is different from identity privacy (personal information shared/sold), although they have some overlap in effects to you.

- *Skimming*: Occurs when devices illegally installed on ATMs, and other payment card-access devices capture data or record cardholders' PINs. The data can be used to create fake debit or credit cards and steal from accounts.

Security on the Internet

While sharing information about security issues below, one important thing to note is that a user can protect their information security (and privacy) best by being aware, careful, and investing time in being diligent rather than being focused on convenience, speed, social acceptance, and open access.

Contextual situations

- **Communications**: Communications is an area in which the user has to take as much control as possible in order to boost privacy and security. Any of the standard

home tools, and expectations of workplace and transaction business tools being in play are likely not enough. A user needs to take more control over their own outgoing information, their own communication and access habits, and their own equipment and information management. Choosing quality and highly reputable programs, equipment, tools, and services can help minimize the issues that can come up with newer, more casual, and revolving-door type of service/product use.

- **Email**: Minimize the amount of personal information you keep in an email program. Have a professional-oriented attitude about outgoing emails. Avoid clicking email links, attachments, ads, and URLs. Assume that any email asking for personal information of any kind may be a scam.

- **Geolocation**: Geolocation is the ability of a computing device to know a user's location. ISPs can determine the location of the user's computer, and smartphone service providers can trace cell tower locations. When a user approves a device's OS ability to share a location, that can

become the default. While GPS can make using a map on the road more convenient, it also makes finding the user on the road easier.

- **Home/Personal:** Security can begin with equipment. While equipment can come with default security options, and many manufacturers make continued investments in upgrading security tools and applications, users might not take full advantage. This is in part because some security measures also intrude on the user – the speed of booting up the computer, the waiting to log in, the remembering of many passwords, the pausing of outgoing emails. In addition, many of the OS provided options are generalized, which isn't bad, yet likely not enough.

- **Social media**: Over the past few years, many users have learned that social media is not a friend. It may add drama, spice, a place in social hierarchy, and a sense of connection to life. At the same time, any video, chat, messaging, meming as a message, political and personal opinions, and a lot of bad behavior is also out there.

- **Streaming**: A user who is a streamer may thrive on attention, a casual social presence, and divulging personal information as part of the show. Anything you divulge, film, and tell is out there. Likely for always.
- **Transactions**: Organizations that provide transactions – financial, health, retail, government services – also have to have the kind of IT department services and expectations. Companies that have insecure financial transactions, poorly designed customer/product databases, and data breaches face legal issues, loss of customers, and a potential drop in market share that impacts portfolios and the company's own financial status.
- **Workplace:** In a workplace, the employer needs to worry about employee data, customer information, intellectual property, hardware security, software vulnerabilities, data breaches, and the behavior of the employees. For instance, employees using personal cell phones on the employer's wireless network can pass malware. Employees can open work

computers to malware during gaming breaks, doing personal business at lunch, downloading non-work files, and so on. Employee emails can be phished from outside senders. Work files accessed from home for home-office work may be vulnerable to the employee's computer or network weaknesses.
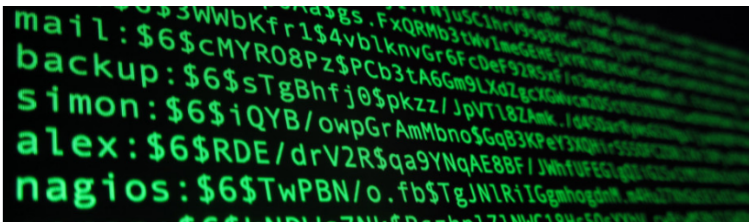
MedAttrib: Reese Wang (CC BY-NC-SA 4.0). Insecure data.

Common Internet security issues

- **Computer virus:** A computer virus is a specific type of malware that is designed to replicate (copy) and spread from one computer to another. It can make a copy

of itself over and over again, and spread between computers through email attachments, removable storage devices, and infected downloads. It can damage a computer by corrupting system files, sending spam, stealing data and personal information from the computer, destroy data, and/or delete everything on a hard drive.

- **Hackers:** A hacker refers to a person who can gain unauthorized access to (break into) a computer or a network to commit crimes, like:

  - Hijack usernames and passwords.
  - Gain access to personal information (credit card numbers, bank account, Social Insurance Number, etc.).
  - Steal, change, exploit, sell, or destroy data.
  - Damage or bring down the system.
  - Hold the system hostage to collect ransom.

- **Malware:** Malicious software (Malware) is designed to damage, disrupt, or infect computers. It refers to different types of safety threats like a virus, Trojan horse,

worm, spyware, etc. Malware can gain unauthorized access to a computer and continuously work in the background without the owner's knowledge, causing either immediate damage or damage over time (DOT – gamers should get that reference).

- **Phishing:** Phishing is a common attempt to scam information. Deceptive emails or websites can try to obtain valuable personal information like a user's username, password, account number, social security number, and credit card information. It is problematic because an email may seem to be by a product or service provider a user actually works with, like a retail store or utility company. It also may suggest some urgency that the user needs to solve a problem, like a declined credit card or some change in the user's account status that needs to be handled through email. It is like the email version of scam phone calls. Sometimes a text can be sent to your phone that behaves the same way.
- **Spyware:** Spyware is a form of software

that secretly monitors (spies) on user's online behavior and gets sensitive information about a person or organization without the user's knowledge. It can record a user's Web browsing habits, email messages, keystrokes on online advertisements, and personal information. Then it can forward that information to a third party. For instance, advertisers can use spyware/adware to target specific ads to a user's preferences. Spyware can also collect financial information (banking accounts, credit card information, password, etc.), then forward it as a data breach so your accounts can be accessed.

- **Trojan horse:** A Trojan horse (Trojan) is a type of malware that seems harmless but can cause harm to a computer system. It misleads users of its true intent, like claiming it can to get rid of viruses while actually introducing viruses onto the computer. A Trojan can take the form of innocent-looking email attachments, downloads.

- **Worm:** A worm is similar to a virus in its

spread. However, a worm does not require human action to replicate while a virus does. A virus spreads when a user opens an affected file whereas a worm spreads without the use of a host file.

Internet Ethics

Several things are considered unethical:

- Trying to gain unauthorized access to the resources of the Internet.
- Disrupting the intended use of the Internet.
- Destroying the integrity of computer-based information.
- Compromising the privacy of users.

ACTION: Quick Task – Personal Internet Ethics Questions

- Is it ethical to download music and videos?
- Are Peer-to-Peer sites/resources ethical?
- Is it ethical to repurpose images, text, and

media you get from the Web?

- Is it ethical to use employer internet resources for personal items?

Internet Ethics Considerations

In personal usage, you also need to consider the ethics of several things:

- Location, time, and amount of surfing that is **not** on your own time.
- Types of surfing and saving of information – porn, illegal downloads, selling information or work of others.
- Inappropriate use of email and other communications.
- Defamation of other people's reputations and information, libel and slander.
- Creating false and inaccurate personal profiles for yourself in order to mislead others.
- Understanding the technology and internet policies of your workplaces and school.
- Appropriate use and citation of Internet

resources, like text, images, and media.

Cyber Threat Prevention

Home/Personal

Security can begin with equipment. While equipment can come with default security options, and many manufacturers make continued investments in upgrading security tools and applications, users might not take full advantage. This is in part because some security measures also intrude on the user – the speed of booting up the computer, the waiting to log in, the remembering of many passwords, the pausing of outgoing emails. Computers tend to come with a few basics:

- **Browser firewall**: The default browser that comes wrapped with a computing device's OS can have a panel for setting some browser security choices.
- **Default system/hidden files protection**: An OS can default to keeping system and

hidden files inaccessible to any user but the computer's administrator, and require that admin to respond to every attempt.

- **Internet security settings**: The computer may come with basic Internet security settings for the user to select.
- **Login PIN / other options**: Computers can have a mandatory login process, with a password, or PIN, and/or optical or fingerprint recognition.
- **Network firewall**: Computers can have a protocol to allow/disallow network connections.
- **OS Virus protection:** An OS may come with some level of virus protection, which the user can schedule as part of regular maintenance.
- **Updates**: An OS, and other computer programs, can have an update alert when a software or hardware update has been offered and needs to happen. Updates can add more security protocols, may add more data to virus definition files, and may help equipment be more imperious to tampering.
- **User account control**: The controls for user

accounts can let a user be an administrator, set limits to other users who share the machine, and add extra protections for children.

A home computing device may come with a number of default security options, but they are just starting points for a user's computer. They may little effect on a user's programs, access to and use of Internet resources, personal and private data, in-the-moment virus and hacking problems, and so on. They may offer some coverage for the one computer, but not synchronized devices. They may not be able to support much from email or ad-delivered malware. They can't defend against other users that prioritize invading and abusing people's computing devices, information, files, work products, and personal life data.

Additional security options

Good Internet hygiene is a must. This means creating and maintaining a routine of actions to protect your data and equipment. It means

developing practices that put privacy and security above convenience, casual speed-oriented activity, and being accessible to anyone who asks. Consider:

- Avoiding download sites that specialize in free files, pirated files, or promised free downloads.
- Avoiding clicks on ads and free games.
- Backing up files and storing them in different locations.
- Clearing browser history, cookies, cache, and temp files.
- Creating secure and strong password protocol.
- Deleting suspicious/unknown emails.
- Ignoring / not responding to any pop-up windows. A user's response is what can initiate the scam / intrusion, not the pop-up or urgent message itself.
- Not opening links, images, attached files, or forms in emails.
- Not responding to any personal data requests in emails.
- Using a specialized virus / security application designed to clean a computer,

prevent intrusions, and quarantine questionable files.

- Using a backup service that protects data on its own server in case the user needs to recover data for a compromised computer.
- Using an online security service designed for information protection, both personal data and financial resources.

ACTION: Quick Task – Personal Internet Security Questions

- What do you currently use to check for computer viruses?
- What do you think of the risks of clicking on an ad or image of something appealing when a friend sends it to you?
- Is it safe to use websites designed to give free games or that promise faster downloads of content you want?
- Should you ever give any personal financial or security information out in response to an email from one of the services you pay bills to?

Browser security

Browsers have an option to change to a private browsing mode. This can be useful in a workplace at lunch, at a public location, and when doing personal transactions like banking. Different browsers have slightly different names for the private browsing mode:

- **Chrome**: Incognito
- **Edge**: InPrivate
- **Firefox**: Private
- **Safari**: Private

For each of these browsers look for three dots, three lines or a new window tab near the top right corner of the browser, clicking on this will open a menu, and then a new window in a private browsing mode.

The private browsing mode in the popular browsers provides some extra security in that web history is not saved on the computer being used; however, the IP address is still trackable. For an extra level of anonymity, there are browsers designed for private browsing which

hide history, mask the IP address and physical location, and can be encrypted to increase anonymity.

Information Security in the Workplace

In the workplace, an employer will use an Information Technology (IT, other acronyms) department/team of some kind which specializes in assessing and maintaining workplace privacy, security, and work product protection. An IT department is responsible for:

- Accounts: employees, external users and customers.
- Company website and Internet services support.
- Data loss prevention.
- Equipment/infrastructure upgrades and security applications.
- Internet access authentication and encryption processes.
- Intrusion detection and prevention.
- Malware and virus prevention.

- Network firewall.
- Preparation against cybercrime.
- Security event management.
- Software management of licenses.
- Storage of data.
- Technical support for employees and sometimes customers.

Special Concerns

What kind of privacy rights do employees have in the workplace? What is the workplace is in the home office although using the employer's network and data?

Employers need to balance legitimate business interests with employees' legitimate privacy expectations. Decisions need to be legally sound, transparent, well communicated, and invite discussion. It needs to consider employee conduct, the employment setting, and an employee's expectation of privacy.

Employee

Employees have a right to keep private facts confidential, such as home life issues, health, finances, religion, politics, partners, social media accounts, use of private time, etc. They also expect that their own property, like personal phone, personal calendar, auto, and personal computer (if applicable) falls under a right for privacy. They expect that their break time, lunch time, time away from the workplace, holidays, and weekends belong to them. They expect that personal leave and the appointments they need to keep are part of their right to privacy. They expect reasonable space from monitoring and scrutiny, and other invasive behaviors on behalf of the employer. Other than a general credit and pre-employment check, employees need respect for their privacy. They expect if there will be changes in policies, they should get sufficient notice and opportunity to adapt.

Employees also have various legal expectations:

- Americans with Disabilities Act (ADA)
- Fair Credit Reporting Act (FCRA)
- Family Educational Rights and Privacy Act (FERPA)
- Family and Medical Leave Act (FMLA)
- Federal Wiretap Act (FWA)
- Health Insurance Portability and Accountability Act (HIPAA)
- Labor-Management Relations Act (LMRA)
- National Labor Relations Act (NLRA)

While each of these laws establishes requirements and standards for employers, there is one commonality to substantiate a claim for a violation of an employee's right to privacy: For an employer's conduct to be actionable, it needs to amount to a highly objectionable or offensive act.

Employer

No matter what an employer's policy is about privacy and company security, the employer has a responsibility to be transparent, current, and respectful about the policies and

procedures with employees. At hire, as modifications happen, at annual reviews, and as part of annual refresher trainings, an employer would be most transparent by refreshing privacy and security policies in simple, respectful, and employee-facing methods. The policies should also be available in Human Resources and posted in a group employee setting, like a lounge or cafeteria, as OSHA requirements, Minimum Wage information, and other employee-related information already is. If the employer has an intranet for employees, policies should be readily accessible there for viewing and print; if no intranet is in place, then a segment of the company website should post it. A policy manual should be provided to employees, as well.

In addition, if there are specific computing concerns and policies, a short reminder message should be part of the company computer boot-up / in-company network.

An Employee Privacy Policy is a document that employers can use inform employees about personal data usage. It should be transparent,

and clearly stipulate instances in which an employee *should not assume* their data and communications are private. These could include:

- Basic video security for common areas for the safety of the workplace and employees.
- Behaviors that affect data and equipment security.
- Behaviors that indicate poaching of customers, vendors, or other resources.
- Communications that are transmitted on company-owned equipment.
- GPS tracking of company vehicles.
- Monitoring/tracking of actions like accessing the network and work with company assets. doing
- Use of company equipment, time, and resources for personal use and projects.
- Use of company vehicles and machines, in the office and/or at a home office.
- Use of timesheet / time-keeping methods for confirming work activity.

ACTION: Quick Task – Personal

Employment Resources Security Questions

- Should you use company computers for private use, even if it is just at lunch or on a break?
- Should you use a company vehicle for any private business, even while on a break?
- Should you assume that any email you send out on an employer's system is private to only you?

Privacy Intrusions

There are intrusions that can trigger liability for employers under state and federal law. These include:

- Appropriation of employee's name/likeness.
- Giving employee information out for non job-related reasons.
- Inappropriate intrusion on employee's personal space.
- Publicity of employee's private life.

- Publicity which distorts the employee in the public eye.

Chapter 13: Communications Media Accuracy

- Communications Media Concepts
- Digital Citizenship
- Information Accuracy
- Information Bias
- Information Integrity
- Information Bubbles
- Social Media
- Your Online Presence
- Reputation Management
- Special Concerns

This chapter will focus on the various ways that online communication and media affect perceptions of information, information integrity, and analysis/critical thinking.

Communications Media Concepts

Communications media includes anything that fosters, provides, and spreads information. In the context of this chapter and Internet fundamentals, we'll consider topics that affect accuracy and bias of information, and reputation. Mediums include standard media sources, social media, info research, and personal profiles.
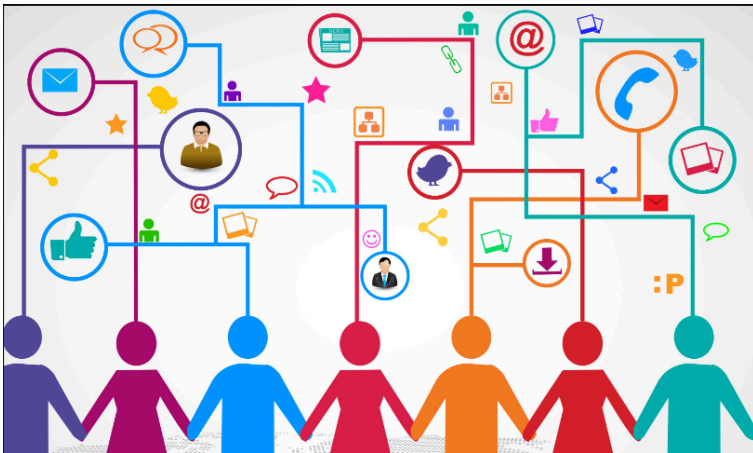
MedAttrib: researchleap.com (CC BY 4.0). Communications media.

Who are the players?

We are all the players in the world of communications and information. We have the data, we create and organize and distribute the data, and we often ARE the data.

- **Controllers**: The controllers of information are those that compile it, store it, and distribute it. This includes repositories like libraries, or public sector data warehouses for data analysis. It includes the owners of websites that present content to inform or push action – their own and content from contracted providers. It includes product and service providers that decide how marketing and advertising shapes public perception. It includes news and media outlets that report and inform the public.
- **Customers**: Customers provide much more information that they might expect. As discussed in an earlier chapter, all behaviors and actions of prospective and real customers is routinely collected, stored, and used for advertising, setting policy, prompting behaviors and actions,

and pushing financial agendas.
- **Users**: Users of any computing and digital resources provide information by their actions, preferences, communications, downloads, info sharing, etc. Users can be students, employees, travelers, homeowners – essential people from any and every interest and lifestyle group.

Digital Citizenship

Digital citizenship refers to the responsible use of technology by anyone who uses computers, the Internet, and digital devices to engage with society on any level (CITE1).

That makes most of us digital citizens of some kind.

Positive digital citizenship: Users who are flexible, engaged, connected with one another, develop empathy with and for each other, and create lasting relationships with digital tools.

Damaging digital engager: Users who behave in antisocial ways – as predators, bullies,

irresponsible social media generators, and users with reckless and unsafe Internet behaviors.

We've observed the results of damaging digital engagement. Misleading media stories, cyberbullying, data breaches, trolling on social media, influencers with little regard for the real people in the audience, hacking, etc.

In the end, all any technology user can do is work to themselves aim to be a positive digital citizen. This takes the effort of getting informed and using computing and Internet resources respectfully and, whenever possible, holistically:

- **Developing empathy**: Aim to understand motivations and situational awareness, rather than snapping to judgement and execution.
- **Focusing on digital wellness**: There IS a real life offline, and it IS possible to turn off the smartphone and dm tools. Live a little for oneself, without need for online attention or feedback.
- **Making digital device usage secure**: Do

your own part to secure your devices/data and not create insecure situations for other users.

· **Practicing digital and Internet literacy**: Focus on accuracy and minimal bias in using and spreading information. Also respecting intellectual property.

· **Recognizing the digital divide**: Acknowledge and understand the disparity of users who don't have the same access to technology, resources, or support for digital citizenship.

· **Respecting and protecting user data**: Avoid data mining for sales and/or malicious use, and for protecting one's own data and reputation.

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ACTION: Quick Task – Who are you as a digital player?

· Do you consider yourself a positive digital citizen?

· Are there areas you can improve your digital footprint in practicing your own

digital literacy?

- Is it okay to make judgements about people and situations based only on what you get in an Internet communications media transaction?

Information Accuracy

Information accuracy is one of the most alarming casualties of the democratization effects of the Internet. What has become most alarming – especially to the generations before the daily use and push of all things Internet – is just how much information is inaccurate, biased, misrepresented, and misunderstood by people encountered in classrooms, social media, town halls, the workplace, and community spaces.

When discussions arise about polarized views, disparate values, and who is 'right' or 'wrong' on an issue, a lack of information accuracy becomes apparent. Inaccurate info – based on unsubstantiated perception, 'alternate facts,' 'personal truth', and misleading language –

leaves people unable to use critical thinking skills to recognize, express, address, and resolve problems. Instead, more problems arise, and people seem to retreat to separate corners of the room. Even more concerning is how much seems to happen in uneven power structures in which people depend on truthfulness and accuracy; the result questions who is in control of any given information and situation arising from it.

What does **inaccurate** information include?

- **Agendas with alternate 'truths'**: basing decisions and/or actions on an agenda of control, rather than fully and accurately informed consent.
- **Emotion-provoking language**: headlines and presumptions of culpability that can stir fear, anger, angst, apathy, and damaging action.
- **Fuzzy logic**: overgeneralized standard logic which offers only a degree of truth.
- **Gossip and opinion presented as fact**: assumptions that people should act upon irresponsible use of free speech.
- **Insubstantial arguments**: straw-person or

bipolar either-or arguments designed to box in perceived opposition.

- **Lies and half-truths presented as facts**: prompts for behavior and action based on deliberately false and misleading information.
- **Misleading priorities**: information prioritized to lead someone(s) to specific behaviors rather than to inform / debate accurate information.
- **Not in Good Faith**: The concept of 'in good faith' is that open and honest dealings yield sustainable results. Information *not* presented and articulated in good faith can lead to bad decisions.
- **Replacement of facts and data with perceptions**: used in challenging accepted and educated work and conclusions, and/ or suggesting if one thing is still under consideration the entirely is false.
- **Unattributed information**: disrespect and ignorance of intellectual property.

How does a digital citizen treat information? How do we assess information accuracy, and analyze content to make more informed and

empathic decisions? Here is a rather long list to consider, yet it needs to be recommended to information pass the 'sniff text.'

- **Authority/Reputation**: This is considering the source. Does the source have a sustained history of minimal bias, of neutrality, of informing rather than trying to 'convince'? Is there research, cited sourcing, and reference listing?
- **Comparison of sources**: Given neutrality and a solid reputation, does more than one source share similar core facts and information?
- **Coverage**: Is the coverage both targeted to the information/issue at hand, and still provide enough range to draw the full situation?
- **Currency**: Is the information current or contemporary to when the issue at hand was occurring?
- **Integrity of data**: Does the data and detail provided have integrity in treatment, range, and fact vs opinion? Is it balanced?
- **Neutrality**: Is the language used neutral, appropriate to the concepts and

conventions of the subject at hand, and focused in informing rather than persuading?

- **Objectivity**: Does the treatment rely on objective content rather than assumptions or subjective opinion?
- **Placement**: How is the information placed? Is it part of a campaign? Is it surrounded by ads?
- **Relevance**: Is the content relevant to what needs to be presented; does it stay on track, and have a context and structure that supports the discussion?
- **Researchability**: Can the content be followed-up on? Are there accurate citations, attributions, and sources that can be fact-checked?
- **Sustainability**: Does the information meet the goals of the objective without sacrificing other needs and accuracy?
- **Value**: Does the information add value to a pool of knowledge needed for consideration and action? Or does it rehash and offer empty summaries of previous works?
-

- Do you look at more than one source for news and event stories?
- Do you look at citations/ references in articles and online content to get more information?
- Can you determine if content language is dramatic and emotion-provoking?
- How do you determine the authority/ reputation of the information source?

Information Bias

Information bias is a phrase used in various contexts, including research and science fields. In terms of cognitive thinking – like what this textbook is touching upon, information bias is a form of inaccuracy based on perceptions and belief systems, like prejudice or not having all the needed detail yet rushing to a decision. Information bias can fall into:

- **Artificial construct**: Misrepresent or ignore uncomfortable facts and details, which fashions an artificial context.
- **Isolation**: Calls out something that isn't really relevant to the context of the subject.
- **Invisibility**: Excludes relevant and needed sourcing from content due to perceived lack of importance.
- **Language**: Language used to evoke specific responses and behaviors, often about a group of people or a perceived conflict.
- **Selectivity**: Presents only one interpretation of an issue, situation, or group. Not balanced.
- **Shared information**: A tendency for group members to focus on already familiar content and less time and energy dealing with the problem to be resolved.
- **Stereotypes**: Gives an objective set of characteristics to a selection/group instead of acknowledging nuances.

Information bias can lead consumers of data and information to focus on the wrong

observations, details, and priorities. For instance, consider a discussion on "being offended" when it focuses on the language and assertiveness expressed in a discussion, instead of the actual issue that is at hand: the problem of too-expensive housing which left a large number of people homeless during Covid. The offensiveness is **supposed** to be the situation, not whether someone misspoke, misspelled in a chat comment, or spoke loudly and urgently from experience.

Some observations can help discern information bias in an article, online discussion, social media argument, etc.:

- Endorsement-directed
- Entertainment-slanted
- Extreme language and temperament
- Facts/ingredients belong to a product by a seller
- Frame with only selected info that pushes an agenda
- Ideologically/politically motivated
- One-sided/opinionated and unbalanced
- Persuasion-oriented
- Sales-oriented

- Sensationalized
- Sense of urgency / time limit
- Unknown expertise or authority
- Unsupported / generalized claims
- Source is advertising / sales-oriented

ACTION: Quick Task – What are your own information bias challenges?

- How do you know that news or information from a social media contact is unbiased and balanced?
- Do you consider information sources from different countries, perspectives, and coverage style?
- Can you tell the difference between established talking points and discussion-intended prompts?
- How do you feel about information if someone ties urgency and/or a time limit to act upon it?
- How do you determine if article content is neutral or pushed by sales/marketing?

Information Integrity

Information integrity is the dependability and trustworthiness of information and its sourcing. It should be accurate, reliable, and consistent so that it can be approached with critical thinking and enough detail for sustainable problem-solving. Aspects of information integrity include:

- **Academic integrity**: Honest, respectful, and responsible work derived from valid and attributed sources. Work is not reliant on cheating, copying, or false information.
- **Attribution integrity**: Giving proper attribution for any and all use of intellectual property, like quotes, examples, images, etc. Attribution should include citations, references, foot- and end-noting as appropriate. Not using copyrighted/patented/trademarked work or products without permission.
- **Ethical integrity**: "In good faith" presentation of content with balance, needed facts and data, and an aim to inform and help expand a pool of

knowledge and opportunity.

· **Intellectual integrity**: Originality of work, research, discussion, and conclusions. Based on solid qualitative and quantitative information that can be reviewed. An example would be a research paper, a newspaper article. Variants include a novel, a music piece, a clothing design, a schematic, and other creative work derived from original skills, experience, and information.

Information Bubbles

Access to reliable information is a needed for the social contract of which people are a part. Information spreads quickly, and if without checks and balances in the moment, it can be polluted. People can respond based on mood, perceived urgency, or on what seems tribal or popular. It can result in division and conflict for little reason other than having been reacted upon without validating it and using critical thinking. This is an issue when information bubbles come into play.
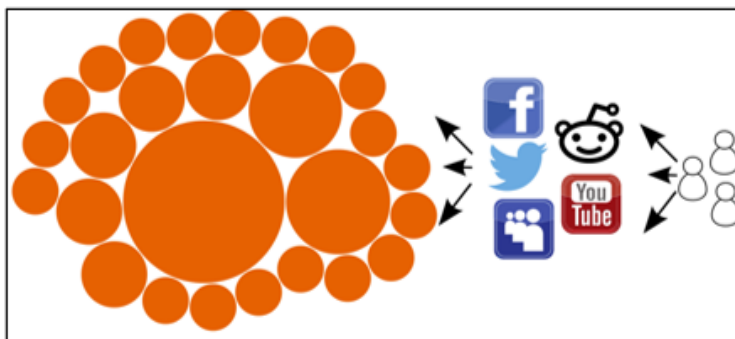
MedAttrib: peerj.com, CC BY 4.0. Image of information bubbles.

An information bubble is the sphere of information that a person accesses. It can be curated by machine-learning algorithms that predict familiarity and preferences, based on a user's past consumption and social network. It acts as a way to filter out what the user doesn't consistently consume or look for, and leaves a user with a small pool of information that seems to cover most needs while actually being imbalanced and incomplete. *Examples include* a news aggregator that pulls stories from news sources leaning in a particular ideological direction, or songs only like those in a listener's online playlist, or movie selections based on one or two categories that the viewer recently chose movies from.

On the Internet, social media and aggregators drive a lot of a user's access to content. It gets automates based on algorithms using data from past purchases, browser searches, visited websites, social media activity, livestreams watched, etc. A bubble then recommends content, social media groups, specific products, particular resources, and the other users that offer them. However, it also can seem representative of overall reality, while leaving out a lot of diversity, detail, and richness.

Beating information bubbles

While it is useful and often necessary to limit the influx of information that demands attention, adding abundance and diverse choices in the content that enhances life is also useful. This means pushing past the familiar and standard, and being open to a vigorous range of options and content experience. How to start?

- **Recognize what an information bubble is**:

It tends to be an imbalanced, one-size-fits all but based on your own preferences and past activity.

· **Acknowledge when you are in one:** If you feel caught in a rut with the same people, same viewpoints, same conflicts, and same decisions, it's a good time to move away from the norm and consider what else you might also need.

· **Take steps to exit it**: This is as simple as looking for information that is different and varied from what you already consume. Look for additional sources and viewpoints. Add more voices of different perspectives in your social media. Do more real-life non-digital things too.

· **Avoid getting into another bubble**: With any new endeavor, there can be a honeymoon period when everything is exciting, before being tempted to relax and settle into a new normal of new familiar options and assumptions. Consider how you can break routine regularly, and keep enhancing and expanding what you experience in digital media.

·

ACTION: Quick Task – What is your own information bubble?

- Do you have a particular political identity that is the main focus of all your information about current events and legislation?
- Do you focus your daily information consumption on social media?
- What do you think the main 3-4 areas if interest are that your daily information relates to?

Social Media

Social media consists of online platforms that allow sharing and collaborating with an online community. A user can post, comment, upload and download items, and interacting with others in chat, live feeds, and in some cases online meeting.

- **Attractions:** Social media can have loads of pictures, memes, anecdotes, film clips, links to other media, news, satire of news,

opinions, and feedback on any number of topics. It is immediate gratification, a way to check on friends, a place to connect with others with similar likes, an opportunity to argue and share insights, etc. You can get reminders, instant messages, links to other media, and invitations to like and/or participate on others' pages and posts. You can be exposed to other ways of life, cultures, choices in products and experiences like restaurants, movies, games, and events.

- **Consequences:** It can also be addictive, prompting a need to check back repeatedly for feedback and perks. Friendships bloom fast and die even faster, with drama and user blocking. Users feel a need to 'share' everything, with strangers. And it is so instant, with so many people showing images and videos of aspects of their lives, a user can get bored with real life. Opinions and gossip are popular and dramatic, and feedback is rapid. Many don't have any facial expressions or body language involved, so users can totally miss social cues, hurt feelings,

misunderstandings, etc. Young users can tie social media opinions and bullying into their own sense of self worth.

· **Ownership**: Some social media platforms can try to lay claim to your own content – images, opinions, creative work you demoed, etc. They can try to establish that they own the right to your pictures of your pet or example of your own artistic sketch, because you distributed it on their platform.

· **Privacy Issues:** Social media platforms let you share details of life, family, work, travel, pets, etc. It can be easy to overshare, especially since when it goes online, it can be picked up and passed around and never go away. Your reputation, privacy, and security can be affected. Also, the default privacy settings may be too broad, allowing a larger audience than you might intend to have access to drunk pictures, snide comments, political views, confessions of workplace errors, etc. Imagine the setting being public enough that your boss can scrutinize your timeline and work-related comments? Oops!

- **Security issues**: Also, details that are public can be "scraped" (collected by software that also records the information). That data can show up elsewhere without your knowledge or permission. Recent stories indicate that hundreds of millions of users had fata scraped from LinkedIn and from Facebook.

Tips to minimize privacy issues:

- Avoid buying things through social media.
- Avoid sharing real information that could reveal security question answers.
- Don't feed the trolls.
- Keep phone numbers, birthdate, address, and other trackable information private – or don't list it at all.
- Limit how much of your personal information is public or shared.
- Limit the audience of your posts to friends; get off 'public'
- Minimize details in your profile.
-

ACTION: Quick Task – Is Social

Media your frenemy?

- How many daily/weekly social media sources do you participate in?
- How often daily do you check your favorite social media provider?
- How much of your real-life time do you capture and share with social media connections?
- Do you know that employers can probably see most of your social media presence – including your embarrassing moments, colored comments, and real opinions?
- If you could use your social media only a couple of times a week, for checking on only the real, important people you know, could you?
-

Trolling

Whether for drama, social awkwardness, or being a damaging digital engager, there are users who troll. Trolling is when a user focuses on upsetting others, while starting fights and

provoking conflict. It may or may not be malicious in intent, but the result can be. The behavior can be bullying, racist, homophobic, argumentative, misogynistic, and/or spammy. Just like a Terminator, a troll "*can't be bargained with, it can't be reasoned with, it doesn't feel pity or remorse or fear, and it absolutely will not stop... EVER, until your head explodes!*" CITE2

There is just one solution: Don't feed the trolls. They can be ignored, quietly blocked, and otherwise removed from the posts/reaction cycle.

Your Online Presence

Compiled online data about each of us creates a representation of who we seem to be. This online presence is taken in by employers, friends, community, government, advertisers, news media, social media contacts, and disruptors. Some is for our convenience, some is to push purchasing or social behavior, some is to build socio-economic demographics data,

and some is unpredicted consequences of social media and our interactions.

Most of the data is pulled from sources a user doesn't consider or have deep awareness of. Everything you do in the digital world is captured, shared, sold, sorted, stored, analyzed, and used, and has been with increasing frequency over the past twenty years. Everyone seems to have a piece of you.

Moreover, much of the data seems hidden, fixed, and to be assembled and analyzed in ways that remove you as a person and reframe you as 'material.'

Sources of information

- **Activities**: Browser searches, website visits, clicks, uploads and downloads, preferences, information bubble, blogs, forum posts, gaming, comments and reviews, cookies, website policies agreements.
- **Collateral contact**: Mentions of you by

others, other people's streams and photos, wrong place at wrong time, news media, accidents, group activities, presence in online meetings and workshops, facial recognition, being a witness

- **Computing devices**: Computer usage and connections with websites, email, services, website cookies, wireless home, smartphone, fitness and apps, passwords.
- **Demographic captures**: Employment applications, demographic questions, health care access, big data.
- **Life experience**: Education history, work history, classmates, dating, trainings, travel, accomplishments (creative, professional), law-related incidents, political affiliations, medical care, consumed films / books / music.
- **Professional networking**: Work-related groups and trainings, workplace activities, professional profile, resume, skills-building, student loans and grants.
- **Purchasing/financial**: Browsing products, purchases, online banking, credit card, credit scores, car-research and licensing, taxes, healthcare, fitness, home-related

needs.

- **Social media**: Interactions with any social media comments, posts, images, livestreams, gaming, commentary and reviews, trolling, dating, political groups, selfies.
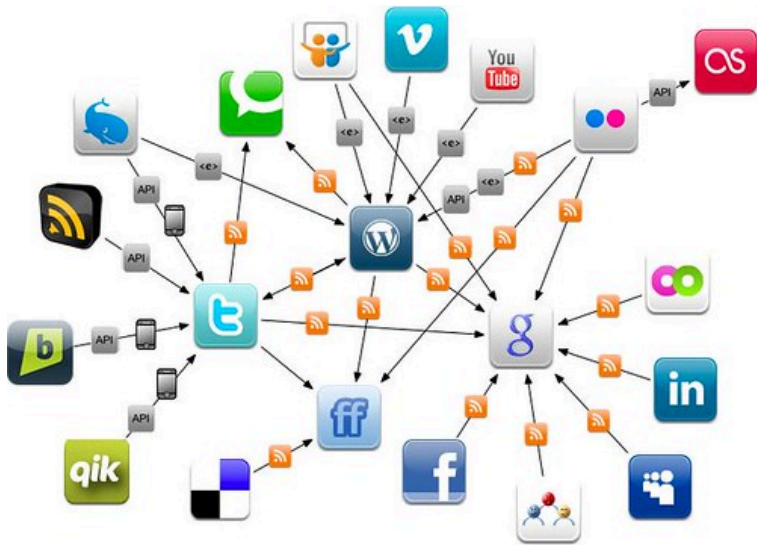
Anne Helmond, May 2009

MedAttrib: "Social media dataflows" by Anne Helmond is licensed under a CC BY-NC-ND 2.0

Reputation Management

As part of the hiring process for many companies, a Human Resources (HR) department surveys the online presence of potential job applicants. A top candidate may not be offered a job after their online presence has been searched.

An opportunity for being published, included in a valuable workshop, renting an apartment, being considered for a loan, getting decent loan rates, or having your expertise taken seriously can be affected by online data and reputation.

In addition, during legal proceedings like being under suspicion, being arrested, being a potential witness, and even being a victim can be influenced by your online reputation. So can travel, especially outside your own country of residence.

Personal reputation is like personal hygiene, where you define your own life. Consider searching your own name using a search engine and notice what you find. This will

usually be surface-level information, and that which prospective employers, lenders, and other professionals can discover.

Your surface-level presence and reputation will likely have many quirks, most of which are situational and easily dismissed or not even noticed. However, some things can rise, like bad behavior, unprofessional dealings, a noticeable mistake, involvement in a publicized event, and/or a general disadvantaging angle to your overall online presence. What options do you have? What can you do?

Here are a few tips – not all inclusive, and with some in need of work on your part to find reputable, current, and of-value tools.

- **It is what it is**: A useful axiom to add to your life is: 99% of everything that happens to you, with you, around you, and even seemingly catalyzed by you, is not ABOUT **you**. The world moves in a blur around us, and we have very little control over anything not in our immediate sphere of influence. Everything else is just out there, and stressing about it, being angry, or

committing to 'disappearing' likely won't enrich your life. This pertains mostly to big data and you as a commodity. Accept what is and move forward.

- **Identify weaknesses and gaps**: Learning more about life as a digital citizen is one way to recognize problems that combine to influence your own online identity. Gaps to be shored up include understanding how social media and other communications are not your "friend." That any purchasing/financial-oriented activity is not about serving and valuing you but about someone else's bottom line. That falling for your conveniences is a big part of what has made you a product and consumer, rather than a customer, website visitor, patient, friend, etc. That being involved in 'influencing' doesn't make someone really influential to 99% of the entities that really matter in life. Dealing with the weaknesses comes from identifying your computing device habits and lack of security; how you choose to interact with websites and entities that provide products and services, and your

own social communications and activities.

- **Minimize continued data leaks**: Secure your computing devices and practice regular, consistent, and effective habits that you control. Retreat from having a lot of accounts and social interactions while selecting a very valued few and monitoring them regularly. Turn off cameras, microphones, and smartphones expect for deliberate and necessary use. Use strict security settings on accounts, and avoid using information from your real life as identifiers, passwords, and security answers.

- **Change the narrative**: You can't change any demographic, shopping, or past activity. You *can* refocus on what is really important and invest time and energy into that. Are you a student? Work with student and career-related activities that help design the impressions you want to move forward with. Employee? Focus on upskilling and professional behavior/ connections, rather than binges of 'weekend in Vegas' behavior in social media circles. Like music / films / reading?

Add thoughtful reviews, discussions, meet authors/creators, and become a presence people value.

- **Develop a personal profile**: Create and routinely manage your own single-source web page profile about yourself. Include authenticity, a careful resume, information you want people to know, updates on your education and professional accomplishments, and a link to an ePortfolio; this may be a self promotion piece but promote your value, not your opinions or fluff. If you don't want your own web page, look for a reputable professional network that lets you do that instead, and use strict privacy and security settings. LinkedIn has been around for years and may serve as an option.

- **Create a lifelong ePortfolio**: It is never too late to develop an ePortfolio of the accumulation of your education, work, and accomplishments. It should be a collection of work (evidence) in an electronic format that showcases learning and accomplishment over time. Link it to your resume, your online profile, and whatever

professional network you participate in.

- **Manage information routinely and consistently**: Beyond minimizing continued data leaks, learn how to manage your own reputation. Look into well-established and vetted online reputation management sources and their tips/advice (**not** necessarily their services or paid options); some privacy and security software options may also include reputation management options. When you develop an online profile / ePortfolio / professional network presence, learn how to direct search engine results to go there first. Find out what is in public records about you and determine what can be removed. If something bad is mentioned about you, take the high road and be gracious while firmly setting the record straight – if the situation is something that can't be just ignored. Stop trying to influence with opinions and build real expertise to contribute to non-digital community. Remove damaging / unhelpful images, clips, comments, and other social media problems from your

own account. Be consistent and professional in all your future interactions. Consider deleting and restarting a social media account fresh, and stick to just one or two really valued ones. Much less is more.

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unhelpful images, clips, comments, and other social media problems from your own account. Be consistent and professional in all your future interactions. Consider deleting and restarting a social media account fresh, and stick to just one or two really valued ones. Much less is more.

- **Live out loud**: All this being considered, **LIVE**! Rebalance life between real activity and the allure of being digital. Shut things off, get out and live without selfies and livestreams. Be a person who lives first, has fun just for fun, and explore new places, taste new food, go for drives and walks, and pet-sit. Explore more culture and *other* cultures, groups, hobbies, skills-building, contributions, civic participation, etc. You do you.

ACTION: Quick Task – Do you know what your online reputation really is?

- What are the first 5 search results about

you that come up in an online search for **you**?

- If a prospective employer looks you up as part of a pre-interview process, would they actually choose to interview and maybe hire you?
- How much personal data do you put out yourself that others could use to crack your passwords and personal identifiers?
- Have you made a practice of creating and maintaining a balanced and proactive online reputation/portfolio?

Special Concerns

Bots and information

A web robot (robot, bot) is a software app that completes automated tasks (scripts) over the Internet. Internet bots mimic human activity, like messaging, but on a large scale. A bot acts in a client-side role, and performs automated simple repetitive tasks much faster people can.

IMAGE NEEDED

- **Censorbots**: Some bots act as censors for profanity. Some use pattern matching to help translate conversation attempts. Some are part of algorithms used in social media apps to block – or promote – certain communications.
- **Chatbots**: Bots that perform instant messaging tasks, like the automated chat on a retail or tech site Depending on their programming and the complexity of customer-needed assistance, bots may be the entire chat option, or the entry point to guiding the user to a live person for more extensive assistance.
- **Malbots**: Bots have been used to carry out denial-of-service attacks. They can execute click fraud, generate spam, and attempt to register on sites (a reason for CAPTCHA protection). They can scrape data from websites for incorrect use or sale. They can redirect users to malicious sites.
- **Socialbots**: Algorithms that imitate human behaviors to converse with patterns similar human user. Users might think they are

talking with other users in a social media conversation, and not be. Botnets (collection of malware infected bots) allow a computer to be remotely controlled by an external operator

- **Viewbots**: Bots created to "watch" videos or live streams, which affects the number of live view counts, channel statistics, and the perception that the program is more influential than it is. A staple of driving unreal messaging perceptions and 'fake news.'
- **Web crawling**: Bots 'crawl' the web when a user queries a search engine. An automated script (the bot) fetches, analyzes and files information from web servers, then returns the results to the user.

Recent issue: USA Presidential elections

Were bots influential in social media? Currently, insufficient resources seem to be available to fact-check how much social media activity was

politically programmed bot-generated. The concept is that bots were programmed with search filter capabilities that targeted keywords and phrases that favored political agendas, then repeated and spread them. This could have contributed to additional polarization and volatility of social media users, arguments, and possibly influence of votes.

Part 4: Global Business Technology

In this section, we'll discuss business technology in terms of the world around us. While this part of the book is referred to as 'global' business technology, the emphasis is more on the impact *of* and *on* us of our digital reality. Big data, changes and advancements in technology, issues of privacy and security, use of supply chains and energy, worldwide connectivity, and our own places in the workplace qualifies because we live in a 24/7 multinational market of products, services, experiences, jobs, and peoples' diverse needs.

This textbook is meant to be a starting point for instructors and interested readers. Instructors may choose to add specific global topics and context into their curriculum as they relate to business technology. Also, world events,

politics, situations, challenges, and influences of and on us are complicated, vast, and more suited for coverage and discussion in specific courses/programs like:

- Anthropology
- Civics
- Ecology (and related)
- Economics
- History
- International Studies
- Journalism
- Business (marketing, supply management)
- Multiculturalism
- Political Science
- Sociology

Chapter 14: Current Issues in Technology

Issues in Technology

Technology is ever-changing, and new advantages, concerns, and challenges come up frequently. Current discussion on relevant topics is something that instructors using this textbook can select and add to their own curriculum as the topics come up. This chapter will mention some issues that seem to be long-

term, to be affecting the present (early/mid 2020s), and likely will be future-influencing. Some have been referenced elsewhere in this book, but are being aggregated here for timeliness and convenience.

- **Artificial Intelligence and Machine Learning**: Part of automation (listed here). Artificial intelligence (AI) and machine learning are processes behind the functionality of automation tools. Finding/developing the needed AI / machine learning algorithms for business is a challenge because this development is still in its infancy and affected by costs, need for more testing and long-term use, etc.
- **Automation**: Doing more with less, more efficiently, and for lower cost is always a business objective. Industries/demands like manufacturing, machining, auto assembly, packaging, and quality control, use automation to accelerate process, reduce cost, and increase employee safety. Mundane and repetitive forms of work are using more automation in the form of robotics and AI programming. Other

businesses use automation tools to manage big data and work product inventory. Automation affects the normal operations of companies and employee training/workflow.

- **Cloud solutions**: Cloud networks provide space, support, ease of access, and data security for big data and business materials. They need dedicated support and service to integrate them into business operations and develop security contingencies. Businesses also need to move from legacy systems that are often incompatible with cloud-based technology.

- **Data management**: Employees need to securely access business data unique to their jobs to facilitate operations. Risks include various kinds of cyber attacks to access, steal, corrupt, and repurpose business data and work product. Employees' use of multiple devices (computer, smartphone) can contribute avenues to outside access of company data. Businesses need data management strategies to minimize unauthorized

access and compromised data assets.

- **Data security**: Data breaches are continuous and costly challenges. They affect the reputation, financial health, and competitive advantage of a business. They also affect the customers of the business, whose data and financial dealings can be misused. Continued creation and implementation of malwares, bots, and scam strategies keep this challenge active.

- **Digital transformation**: Organizations are tasked with developing digital integration plans for bringing business resources and operations into a reliable, secure, and future-facing system. Many businesses faced making rapid decisions and changes, which led to often unintegrated systems and uneven results. Others haven't had the budget or the time/personnel bandwidth to do more than cosmetic change. Others have been forced into dealing with security issues quickly, but not much else. The US Government's huge agencies still use many legacy computing systems that can't keep up or scale with current and projected needs.

- **Infrastructure**: Major changes, like new server systems, computing equipment, digital security tools, and other IT infrastructure are expensive and disruptive. Employees need to work around changes, upskill, deal with updates and patches to new software and hardware.
- **Integrations/Upgrades**: Upgrades, patches, and integrations of enhancing technology are necessary, ongoing, and often disruptive to workflow and data consistency.
- **Internet Of Things (IoT)**: The IoT is the name given to a set of technologies which allows exchange of information between two or more devices connected to each other through a communications network. It isn't *the* Internet as we think of it, but a mini net for connected devices. Technology infrastructure in a business need to account for this as well as their overall technology plan and Internet-related network(s); otherwise, small but significant device and data insecurity can result. IoT devices can be accessed which

can compromise business data.
- **IT talent shortage**: IT professionals are in high demand due to all the technology-facing infrastructure, data management, and networking support that businesses require. Some businesses have IT departments; others outsource, depending on cloud-based systems' use. The availability of trained and experienced IT professionals may not meet demand.
- **Remote workforce**: Changes in workforce deployment to home offices during Covid has changed the consciousness of many employees about the work environment. Much non-industrial work can be accomplished in home offices and mobile locations rather than in a static business complex cubicle or conference room. "Work from home" policies have been evolving to accommodate the availability of employees, ongoing health concerns, and the lowered costs from needing less physical business infrastructure. At the same time, IT departments and business systems need to develop and manage secure, cost-effective, and efficient remote

workplace support, like cloud-based solutions.

- **Social media**: Employee use of business time and resources on social media activities is a challenge. Business infrastructure and networks can be affected by insecure social media access. Time, focus, and productivity is affected if employees move beyond break and lunch-time use, especially since social media can be addictive and seems to require frequent check-ins. Company environment and product confidentiality can be affected if social media includes interactive streaming, taking pictures, and chats with microphone and cameras on. Even work-at-home environments can be an issue if the business network can be affected.

MedAttrib: webgrrl.nl, CC BY-SA 4.0. Art image of IoT.

Impacts of Technology

These are not exhaustive, yet they can be useful indicators of what we face.

Advantages of technology

- AI/machine-supported workforce.
- Continuous learning opportunities.
- Cost-savings from downsized physical infrastructure.
- Data-driven sales leads.
- Easy, fast and efficient communication.
- Efficiency improvements in inventory management and ordering systems.
- Employee productivity.
- Lowered costs (potentially) for consumers of care, support, and products.
- Mobility in enterprise/devices management.
- More efficient and automated manufacturing techniques.
- Robust and networked marketing and promotion options.
- Tech-enabled solutions development.
- Technology solutions providers with storage, security, and support capacity.

Challenges of technology

- Always "on" employees and burnout.
- Closures of physical spaces favor of online business.
- Continuous employee upskilling needed.
- Costs to replacing legacy systems and managing upgrades.
- Cybercrime.
- Data and cyber security risks.
- Hot zones of technology presence and energy needs.
- Increased dependency on technological solutions.
- Insecure communications.
- Jobs affected/cut.
- Malfunctions that stop workflow.
- Off-site and vendor-reliant data management.
- Over-monitoring and surveillance of workplaces.
- Regulatory and legal policies that are inconsistent/lack currency.
- Slow adoption/catch up – government, small businesses, legacy systems.
- Students/employees soft-skills and life-

management readiness deficits.

Behavioral impacts of technology

- **Mental health**: burnout, anxiety, depression, attention deficit.
- **Physical health**: Sleep deprivation, sedentary lifestyle, repetitive motions, eye strain, lack of exercise.
- **Preparation**: Lack of support with learning and disability barriers, constant upskilling, reputation management, loss of personal data control, constant refocus on what skills are needed.
- **Communication**: Decreased in-person communication, fewer social cues, decrease in intimacy, lowered empathy, increased reactivity.
- **Behaviors**: Cyberbullying, rapid judgement, technology dependency, time-wasting, procrastination, distraction, cheating through technology, binary polarization.
- **Security**: Loss of privacy, cybercrime

victimization, data inundation.

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THE IMPACT OF HYPERCONNECTIVITY

Surveyed technology experts and shareholders are evenly split when asked if hyperconnectivity will turn out to have a net positive or net negative influence on the younger generation by 2020.

55% Agreed the future of the hyperconnected would be positive.

Agreed the future of the hyperconnected would be negative: 42%

They'll be able to count on the Internet as their external brain.

Consequently, they'll be able to learn more information.

Young peoples' brains are being wired differently to adapt.

They'll develop a thirst for instant gratification.

They will become shallow consumers of information.

They'll settle for quick choices, due to a lack of patience.

They will become nimble, quick-acting multitaskers.

They'll be adept at finding answers to deep questions efficiently.

It will allow future generations to transform things like education.

They'll lack deep-thinking capabilities and won't be able to retain information.

They'll lack face-to-face social skills and have short attention spans.

They'll depend on their devices and connectivity in unhealthy ways.

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ACTION: Quick Task – Technology advantages / challenges

- What are your top 3 most valued technology advantages?
- What are your top 3 biggest technology challenges?
- Do you ever feel that you can turn completely "off" from technology intrusions?

- Do you feel able to keep upskilling to stay current?
- What kind of technology-impacted jobs do you see affecting you in the next 5-10 years?

Digital Divide

Access to technology is a key part of how much technology can be leveraged and the lowering of costs for the people participating in it. Even now, in the first quarter of the 21st century United States, we still face big challenges in inexpensive and available access to computing tools, connectivity, and systems. People are required to depend on technology for their jobs, education, access to products and services, communications, and socio-economic problem-solving needs. What happens when that access isn't available, low-cost, or supported?

An introduction to the DIGITAL DIVIDE #EID100

Sheraz Khan, Daniel Grieco, Robin Ha, Spiros Xanthios

WHAT is it?

Definition: The gap between demographics and areas that have access to modern information & communications technology from those who don't.

WHO does it effect?

OLD VS. YOUNG

ABLE-BODIED VS. DISABLED

WEALTHY VS. POOR

- 62% of households making >30k use the internet.
- 77% of older people require a walkthrough to set up a device.
- 27% of disabled adults have never used the internet.
- In the U.S., 75% of urban residents use the internet, compared to 69% of rural residents.

RURAL VS. URBAN

WHERE is it located?

- 31% of the world does not have 3G coverage.
- 15% of the world has no electricity.
- South Koreans pay as much as half of what Americans pay for internet that is 200 times faster in speed.

Lowest Amount of Access
Ethiopia 8%
Uganda 11%
Pakistan 15%

Internet

Highest Amount of Access
Canada 90%
Australia 93%
South Korea 94%

HOW can we fix it?

that the :

Learn more more about other solutions, such as new political policies, for the digital divide here:

The Raspberry Pi Foundation is dedicated to creating affordable solutions in computer technology.

Google labs has researched and tested Project Loon, a state-of-the-art balloon technology that brings internet to the masses.

MedAttrib: Learning in the Digital Age. Infographic of Digital Divide.

Digital Divide: The divide refers to unequal computer and internet access due to

socioeconomic & geographic barriers. It exists across the world, with different nations' policies and reasons. It also exists in parts of the United States. The Pew Research Center indicates that statistically, it is experienced most by lower income persons. Non-white ethnicities seem to have lower adoption/access, as do persons in rural regions compared to urban regions.

The digital divide continues to persist in part because of:

- **Access locations**: Public locations that can offer broadband and Wi-Fi access can help bridge the access gap. These include schools, workplaces, libraries, community centers, café hotspots, and lobbies, and other shared community spaces. Many were closed during COVID and the resulting economic difficulties, which left a lot of users unable to access the Internet. Many remained closed if funding didn't reappear to open them, or employees return to provide support. Other locations in rural and underserved areas of the country don't have enough supportive infrastructure.

- **Affordability**: Personal costs are a problem for depressed regions which experiences job losses, underfunding state government services, and the general costs for equipment and Internet access subscriptions. Families don't have the disposable income after primary bills and monthly crises are handled. \Add the lack of funding for expanding digital infrastructure and closures of public spots, and even minimal computer tech doesn't have the Internet access. Smartphones don't require broadband, so they are frequently used instead of other computing devices.

- **Desire**: Urban environments, with a lot of business and school presences, tend to need and use connectability and technology for daily life. Rural and underserved areas don't necessarily have the same intensity of need, especially if the services and access has remained an infrastructure and cost issue. When Covid changed the in-person nature of education to home-schooling, a lot of families were left behind if the tool and

access wasn't available. Also, Covid education policy and response was patchy and inconsistent. Students/families who didn't get support or continuity lost interest and felt "turned off" aby digital schooling. It will take time to collect and analyze data on how many students at what grade levels were irrevocably affected by and fell behind in school.

- **Device options**: A lot of academic and workplace functions still rely on the bigger power, screens, and storage capacity of desktop and laptop computing. Tablets and smartphones tend to work on smaller, lighter apps, a lack of keyboard and large visually supportive monitors, and space for multiple productivity applications. Yet, when it comes to access and costs, smartphones are often the only option for rural and underserved populations due to lack of broadband and more affordability to getting one for a family.
- **Infrastructure**: Large areas of the US haven't invested in current and scalable broadband and infrastructure. Some is due to cost, some is due to State priorities

of how fiscal support should be used, and some seems to be due to a segment of underserved people not considering this infrastructure as a government responsibility.

Results

In the United States, the digital divide of broadband access has affected students' ability to manage schoolwork and career training. While smartphones have made access to digital services and options more viable, the divide still affects the amount of time, quality of school and work output, and the adoption of more digital services in life.

ACTION: Quick Task – Digital Divide and you

- What is a primary digital divide challenge you face?
- What affordability issues do you recognize in having personal access to the Internet

and its resources?

- Where you live, what connection infrastructure challenges to Internet access do you face?

U.S. Government and Digital Policy

The United States has a patchwork of policy and law governing data privacy and digital access. There is has been no comprehensive federal policy, although several laws are on the books regarding privacy. Much of this was covered in Chapter 12.

- **Digital Government Strategy**: Formed in 2012 by the US Government, which aimed to develop common standards; ensure privacy and security, produce data in a device-agnostic way, and develop interoperable systems and security. It has been quietly managed by the U.S. General Services Administration. It is difficult to recognize what tangible impact this has had on U.S. policy, law, or funding of these

standards in government agencies.

- **Connected Government Act**: In 2018, this was signed into law. It required that new and redesigned federal agency public websites to be mobile-friendly. It has also been managed by the U.S. General Services Administration. Its progress is also difficult to trace.

- **Ensuring Responsible Development of Digital Assets:** Signed Executive Order in March 2022. The policy, which was informed by several U.S. government agencies, has a focus on protecting US citizens, financial system, and assets form digital threats.

- **Federal Communications Commission** (FCC): The FCC does not currently regulate the Internet, or censor it. It does require broadband providers to have transparent about offered services and consumer choices for speed, price, and network administration standards.

ACTION: Quick Task – Government and Digital Policy

- Does government (of any country for its own country) have a responsibility to legislate policy for digital privacy and security challenges?
- Should the private sector have a role in creating policy for digital privacy and security challenges?
- What are lines you think that a government should not cross in setting digital policy?

Chapter 15: Business Technology Advancements

- The Future in Business Technology
- Home Automation
- Workplace Automation
- Artificial Intelligence
- Hardware
- Software
- Access to Technology

The Future in Business Technology

This textbook has covered a lot about

computing, productivity, and the Internet. It might be hard to recognize what that all has to do with business technology, specifically.

As covered at the beginning of this book, Business technology refers to the technologies and systems that help employees accomplish activities. It is related to use in school and the workplace, and includes computers and their peripherals, software and utility programs, and systems/use of the Internet. Business technology is about all the uses that make finding and getting a job, getting the work done, and providing results for stakeholders like customers, vendors, shippers, colleagues, and students.

All that this book has covered has been supporting information and reference to issues and challenges that support business technology. Often the technology discussed wasn't specific to the workplace (sometimes school, sometimes behavior, sometimes general technology). However, in one way or another the business/work market is impacted, because we as students, prospective employees, and actual workers are impacted.

Essentially, there are aspects of technology / the digital world that can't really be separated from the core definition of "business technology". It is all inter-related.

This chapter will discuss current and possibly pending advancements in technology, which in one way or another is inter-related to the business world.

Home Automation

Home automation impacts the business world because it is a series of products and services, because information privacy and security are part of the equation, and because more people work in home offices that are affected. Employees in this business market are responsible for the development, assembly, and management of the products, as well as the technical and customer-service support.
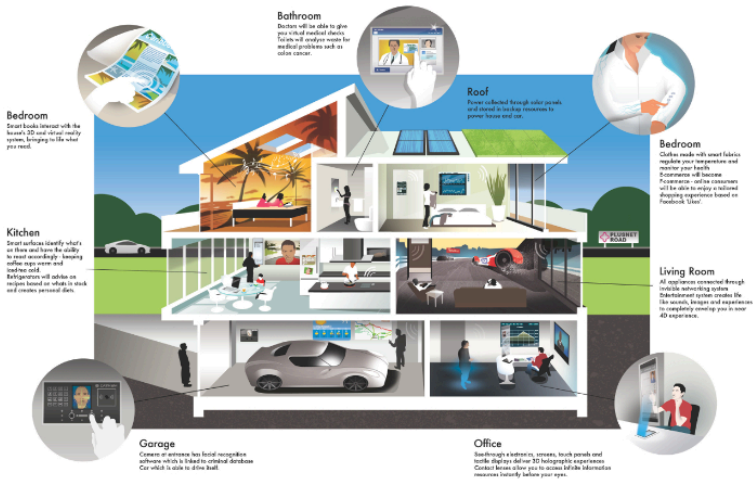
MedAttrib: technofaq.org CC BY-NC-SA 4.0. Image of smarthome.

Initially, most people's home networks had just a few connected devices, like a computer and a printer. This has changed in recent years. An important need is to keep firmware updated, and consider a 2nd Wi-Fi network so that computers/work assets don't mix with the smart home.

Smart Devices

Home automation allows many devices to

connect to our home network. Typically, these "smart" devices work just like their regular counterparts, like light switches, and they also have programmable smart features. They allow for tracking usage of power/energy, and by people who have access. They can help automate some chores. Programming can happen on the device, by smartphone, and by voice.

- **Smart Appliances**. Get reminders if something is finished with a process, like the washing machine or oven. Set the coffee to brew before you wake up. A smart fridge can let you know food is spoiling, keep a shopping list and deliver it to your smartphone, and narrate recipes. Smart ovens can preheat and turn off with the recipe instructions.
- **Smart Lighting**. Smart wall light switches work like a normal light switch, but can be turned on or off using your computing device. They can be programmed to activate the lights at certain times. Smart light bulbs are similar, but you leave the old light switch always turned on, and turn

the smart bulb on and off through the app or a secondary switch.

- **Smart Locks**. A keypad can be programmed with a specific code, including ones for different people to track use. The door can also be locked and unlocked from a smartphone app.
- **Smart Smoke Alarms**. A low battery can prompt a reminder message before the alarm goes off.
- **Smart Speakers** (with microphones). Don't want to use your phone or your watch to control your home automation, then give it a voice command instead. "Answer the phone" when it rings, or just to "Set the timer for 3 minutes" are just two of many possibilities.
- **Smart Thermostats**. This can be programmed for temperature ranges at different times.
- **Smart TVs**. Video streaming services such as Netflix provide on demand access to movies, documentaries, etc. A smart TV will have apps to access common streaming services, and also allow you to connect your phone or computer to the TV

so you can view your photos or computer screen on the larger TV screen.

- **Video Doorbells**. The doorbell can notify your smartphone, and display the visitor. You can talk with them, and consider the tool as a security system that takes a picture of whoever comes in range of the doorbell's camera.

Workplace Automation

Workplace automation uses technology systems to do repeatable / predictable workflows without requiring manual intervention. The technology systems are a blend of artificial intelligence (AI), machine learning algorithms, and robotics. Programmed effectively and correctly, automation can improve efficiency, reduce repetitive motion injuries, minimize human error, and support customer interactions that require standard information.

We already experience many of these uses when visiting websites and needing customer

support. The key to making this workable is it put the customers first. The digital interfaces have to be well programmed to really be responsive and be able to resolve most problems, so that a customer can get rapid assistance and ask for a live person only when needed.

Uses of workplace automation

- **Asset tracking**: Digital tags can also be applied to warehoused products, to automate tracing, reporting, and ordering.
- **Automated Data Collection**: This cab be configured to generate data entry input forms for a customer to use online, and/or for a phone customer's call responses to be translated into a form and added to a database. Once in the database, the data can be sorted, analyzed, scheduled, and acted upon, with tracking and documentation.
- **Customer Relationship Management**: Some or most of customer management – depending on the business – can benefit

from have automated problem-solving options. Customers can experience a CRM digital voice on the phone or a digital assistant on a website chat. They can receive bot-scheduled return calls to avoid waiting on hold. The live person can pull up database information to verify the customer's identity and follow up on the problem resolution.

· **Digital tracking**: Using digital tags and electronic shelf label can allow for the automatic syncing and updating of pricing, and update in-store inventory's stocking needs.

· **Human resources**: Recruiting can be done with attaching a database-reading application form onto job listings. Applicant data goes into the database and is there for tracking through the process: initial phone calls, comments, interview, and hiring process. Trainings can be assigned for onboarding, and some trainings can be automated digital scenario-based programs. Scoring, plus employee accomplishments and annual reviews go into the database.

- **Industrial automation**: Heavy, body-stressing, small-space, and detail-oriented work on an assembly floor can be assisted by robotic counterparts. An example would be Boeing (because the author temped at the Everett plant and daily watched the assembly line). Boeing now uses an automated drilling system for plane exteriors, and a robotic painter for the 777 wings. Other examples in industry could be machining, welding, and other metal fabrication work.
- **In-person support**: An office that has rare customer visits and does a lot of online work might not need a fully staffed front desk reception all day long, which can allow job sharing or only 3-4 hour in-person reception.
- **Managing financials**: A lot of a company's financial work can be automated. Online forms can let employees input expenses that need to be reimbursed, timesheet info, vacation hours, etc. Payroll just needs access to timesheet data to auto-process salaries and deductions then and deposits.
- **Marketing automation**: Much of the

acquisition of customer data is about being able to personalize marketing plans and advertising techniques. Bulk ads and print ad campaigns aren't cost-effective and tend to be one-size fits all. For lower cost, through automation and digital delivery, prospective and repeat customers can be targeted with personalized ads, deals, discounts, and preferences. This is already common on Amazon and other sites.

MedAttrib: technofaq.org CC BY-NC-SA 4.0. Relationships management.

Artificial Intelligence

Artificial intelligence is a lot more routine than we may think it is. People have memories of the Terminator film regarding AI, robotics, and 'Skynet'. However, at this time most AI is about programming algorithms to apply to bots, computer systems, and some people-facing automation tasks. This book doesn't have the bandwidth to devote sufficient time and space to what is happening even now, and other articles/books will be popping up all over that will cover every aspect of AI as it develops and moves forward. However, it is worth some coverage, given that in the past couple of years we have been learning more about, and been given access to, generative AI use. It is poised to affect and transform many of our basic computing, business technology, and information technology realities – as well as impact our sense of information integrity and personal privacy.

Basics of AI

Artificial intelligence is the development of computer systems able to perform tasks that normally require human intelligence. It requires a computing device to be able to learn through experience to expand on basic programming. This is what 'deep learning' and 'machine learning' refers to: a method of teaching computing devices to recognize complex patterns things like language, images, and other data to produce accurate insights and predictions. Software algorithms are able to learn and become better at carrying out specific tasks as they are exposed to more data that helps them refine and limit the need for repetitive input by the user because the AI adapts to the input and integrates it into future use.

- **Machine learning**: AI programming that can automatically adapt with little human interaction.
- **Deep learning**: Artificial neural networks mimic the learning process of the human brain.

- **Foundation model**: AI training on massive amounts of data with different sensor modalities to be able to perform a variety of tasks, rather than being designed for only one purpose.

Applications are can include:

- AI with language and pattern-recognition training will become better at detecting plagiarism, cheating, and other patterns in social and education output.
- AI with sufficient exposure to big data and case studies can research and identify diseases more quickly and accurately, and streamline drug development.
- Conversational search, which would allow a dynamic conversation with an AI to produce specific search results.
- Decision-making, approving a job applicant for an interview, or determining qualifications for unemployment, etc.
- Predictions (outcomes inferred by big data analysis). An example would be climatology.
- Robotaxis may become a common

transport option given that driverless cars have moved so far in research and development.

MedAttrib: L.J. Bothell image of "Artificial Intelligence in College" generated from DeepAI generator. (*yes, I planned on the irony here, just to demonstrate. :0)*)

Issues in AI

On September 26, 2023, your author (Mesozoic age), who uses MS Windows 11 on a laptop, received another Microsoft update. This update included a rollout of MS Copilot, (Preview) which one would like to think is a new version of what MS Cortana and the old MS Clippy paperclip bot used to be. However, it is expected to be much more, and is an "AI companion" that is fully integrated into Microsoft products/apps.

Now, one doesn't need to go look for and sign-up to use ChatGPT, Dall-E 2, and a bunch of specific AI tools for specific uses like creating art, turning legalese into straightforward language, cleaning up audio, etc. One can just click the Copilot icon and a window pops up to allow you to choose a conversation style for your input, and ask it anything. Say I ask it "how long do Tabby cats live?", I get a response that the AI draws from aggregated information on the Internet. Interestingly, the response added small footnote hyperlinks so I could click and see the source material, which is an approach

to offering information integrity and attribution. The same question posed to ChatGPT did not offer links or attribution information. Dall-E 2 requires one to purchase 'credits' to use it, so I did not ask it.

AI Accessibility

This little exercise in just getting a Microsoft update reveals several things about AI in general:

- A push for AI companion use tied to an OS (implying use of your whole computing experience and computer data to for the AI to access for workflows)?
  - The MS Copilot as a preview is free, but currently seems designed to be for Enterprise users (corporate paid account use, like at colleges, companies, etc.). It may also be available for consumers of MS Office 365 for $30/month (as of 9/23).
- Copilot does offer the approach to attributing source information for the user to see where the data is referenced.
- Another approach (ChatGPT) requires you

to set up a currently free account to start using it (implying your consent and use of your information). It does not seem to attribute the generated information so it could come from anywhere, including inaccurate or wrong information.

- Another approach – called an Open Source tool, seeks to monetize even before you can use it.

Overall, whether paid or not, whether needing an account or not, the AI tools are being designed so you can input a question or ask for some kind of process/product, and get a varying degree of responses and results, depending on how the AI tool is designed and the algorithms it is programmed with.

AI Uses of Concern

Research starter: You can type in a question and the AI can generate a response. This is a step beyond just Googling something and getting a list of links to check out. The AI does the aggregation work and responds back. The issue can be if the user doesn't really understand the information in depth, which

affects the information integrity, the attribution/citation of sources, and mostly copies/pastes the response in lieu of personalized learning in job and academic situations.

Workflow integration: According to the goals of the Microsoft Copilot, you can also streamline your workflow across applications. It promises to (paraphrase here) "comb-sort across your 'entire universe of data at work' and the web, and have a 'deep understanding' of you and your job/priorities/organization to a head start on . . . complex or tedious tasks". What will this mean? It may mean taking various notes you have kept on a work process or subject, and pulling it all together into a single document so you can decide what to use. It may mean the creating of AI-enhanced or designed images using MS design tools. It may mean personalizing information for you for shopping, planning an event, preparing a report, etc. It may help with predictive analytics from your Excel workbooks and database information, and other programs you use. It also may mean that nothing on your computer that can be reached by the AI app is private

or fully secure, especially you don't know if the information shared to the Cloud is truly yours, the employer's, or somehow considered nobody's because the AI generates from it.

Automation of repetitive tasks: Sorting through surveys or data to summarize specific information will become easier and, as the AI learns, more accurate. It can check code, review resumes, check digital inventory information for needed ordering, etc. Depending on the algorithms used and the human oversight, this can be very useful or allow for information bubbles that leave out important considerations when decisions are made.

People Management: AI is seen as a very useful way of assessing customer and employee information in order to personalize experience, market more efficiently to specific demographics, determine the viability of products, build contact lists, identify needs, and streamline workflow and costs. In the workplace managers can see who is thriving, who needs training, what the workplace needs are related to the number and type of employees, etc. However, people management

by **algorithm alone** is a risk, especially if it is part of one's heathcare, one's employment, ones banking/finances, and so on.

- For instance, various Global 2000 companies use 'digital managers' which allow workers to be be hired, have pay and benefit disparities, be compared statistically against other employees, and **be fired** by algorithms – *without* any human intervention or contact/follow-up with the employees.

Data analysis: AI will be able to scan vast amounts of data for trends, incongruities, and specific criteria, faster and more accurately than humans in data analysis positions. AI might also, depending on the algorithms, be able to support or make decisions from the data analysis, such as for marketing, job candidates, and employee success/failure. Consumers will be able to refine and personalize their needs for information from a much larger bank of data with more accuracy and efficiency. Vast data analysis can be very useful; algorithm/AI-based decision-making

may be problematic if there isn't sufficient human oversight and redundancy to get past the 'process'.

Product creation: Generative AI, in giving responses to questions and prompts, are being used to write actual research reports, executive summaries, articles, emails, essays, stories, and more. AI can also generate digital art, music, video, etc. Instructors are recognizing that students. The tool is "supposed to be" used responsibly, such as for idea prompts, research collation, creativity for fun, etc. It can be used for generating suggested outlines of content for a paper, find sources, help draft your own information into resume formats, and make an illustration example of an idea you are trying to communicate or a small soundbyte for a website you want to attach a personalized sound effect to.

- In academics, teachers are seeing more situations of students relying on generative AI for composing the bulk or entirety of their assigned coursework. Teachers can expect students to use AI to generate essay and project ideas, help

them find sources for their research, generate a structural outline based on a project's available information, and maybe even help refine out redundant content that would bloat an assignment. Teachers themselves may use AI tools for brainstorming and streamlining assignment ideas.

- However, AI can be a problem when students cheat with it by using full content instead of doing their own work. Why? One, cheating/plagiarizing is unacceptable in any case, since the student clearly doesn't learn the content and attempts to apply it to the real world and on a job – like as a nurse with medications, a mechanic with working trucks, a graphic artist with a cheat portfolio, a psychologist interfacing with people's mental health – *is a lie*. However, with generative AI, it steps up to worse when AI content sourced from multiple creators has no attribution/ citation information, and when one can't even trace where the information came from. Does it have currency, relevance, authority, accuracy, and a specific

purpose? Or is it hearsay, chatbot-based, social-media, slanted, or worse – using the copyrighted intellectual property of others without license or payment?

- This problem persists when consumers use generative AI to create 'stories'. "artwork', 'music',, 'news articles' or other seemingly personal 'intellectual property', then pass it off as their own original work while trying to profit and create an artistic reputation. Does it copy the work-style of specific music artists, or slander a public figure, or 'look' like a Monet or H.R. Giger, or a Jane Austin story, or a James Cameron script?

- This problem also allows publishers of various media (written, music, film, photography, visual) to try to replace human creatives with generative AI content in order to avoid giving credit, negotiating fair and appropriate use, and paying salaries, royalties, & licensing fees.

As you can see, AI is a growing tool, benefit, workplace need, and issue full of unfolding problems, concerns, and ways to continue

evolving. Definitely for other books and articles to cover!

Hardware

How is computing hardware progressing? The discussion in Chapter 2 covered the basics of how things work; what's coming up?

We've been accustomed to the Moore's Law that every 2 years the processing power we can pack into a square inch doubles. That is how we moved from room-sized supercomputers to small and slim smartphones that can do almost anything.

Now, the research and development process is moving away from silicon-based transistors made from materials like graphene. Deep-learning software is enhancing programming and responsiveness. Noises are being made about quantum computing: moving from standard bits to quantum bits (qubits) , which can surpass standard binary 0 and 1. *My brain can't handle it*, but the results could allow a

quantum computer to find solutions in fewer steps than a standard computer, which would speed up processing. The quantum solution wouldn't necessarily replace existing computer technology, but supplement is with an additional specialized chip.

A survey of Google results for various "future computing" keyword phrases suggests:

- **Battery improvements**: R&D is being done to create longer-lasting batteries that don't need as much recharging, and using materials with lower environmental impact.
- **Chip advancements**: To develop more efficient and cost-effective chips, the industry is working toward imprinting learning algorithms on chip architecture as another example of AI.
- **Computing input/Holographic tech**: Touchscreen capacity is being researched to develop predictive touch, which would rely on machine learning to predict user actions. Holographic virtual tech is working to create line-of-sight 3D images the need for glasses / interfaces. This could

accelerate the possibility of holographic screens and allow for air-sweeping motion.

- **Distributed computing**: Multiple computers work by sharing their computing power. A network would behave as a single computer that provides large-scale resources to deal with complex problem solving.
- **Energy costs**: Technology – the development of computing devices, and the management/operating of vast server data centers (power, cooling), will have to be dealt with. Greening data centers to get to net zero emissions and 100% efficiency is underway; however, significant progress will need to be made to repurpose generated heat for the grid and for much more energy efficient equipment.
- **GPU dominance**: Graphical Processing Units (GPU) co-work with the Central Processing Unit (CPU) on computers. The GPU's purpose is to enhance computing with parallel processing to handle a lot of workloads at the same time. Big graphics, CAD, and gaming have been the beneficiaries; GPUs are also being tasked

with training artificial intelligence (AI) and deep learning models. GPU performance will have to evolve rapidly, and in time they may supplant the CPU.

- **Neuromorphic technology**: Elements of a computer hardware and software elements are modeled after systems in the human brain & nervous system. This could allow devices to search for new info, learn, retain data, and make deductions.
- **Scalability**: A goal of computing is to increase the scalability of processing, harness the resources of multiple machines, and make cloud environments "agnostic" – independent of being designed for specific computing architecture and instead being able to serve any device. This in turn may cause a shift in hardware acquisition itself. Currently we have software-as-a-service (SaaS) with subscription software like MS Office. Computing hardware may undergo a similar path, with organizations moving away from requiring large expenditures on equipment and instead leasing hardware-as-a-service (HaaS).

Software

How is computing software progressing? A survey of Google results for various "future computing software" keyword phrases suggests:

- **Application programming interfaces (API)**: An API is a software interface that helps developers link cloud computing services which make data/computing multifunctional for numerous programs. This allows data from isolated locations to be pulled and harnessed.
- **Augmented reality**: This will continue to be developed to reach personalized immersive experiences with tethered and standalone devices. Immersive experiences will need a huge push for 3D assets, and generative AI will be able to accelerate this.
- **Blockchain-oriented software**: Through a blockchain database process, data in systems is replicated, closed in a set called a block, and decentralized. Blocks are lined in a chain (blockchain) which, with

transaction recording and public-key cryptography, ensures data security. Data can be viewed but not modified or hacked.

- **Continuously deployed software updates**: Code changes to an application are automatically tested and released automatically into the production environment. Version control, code review, and configuration management helps bypass the need for quality-assurance testing and human approval.

- **Cybersecurity applications**: With expectations of growth in cybercrime, like ransomware, AI /machine learning is being applied to security automation software. Software will have to become multifunctional to accommodate cloud security, IoT devices' security, and the unique challenges of blockchain coding.

- **E-commerce platforms**: A content management system (CMS) and commerce engine that webstores use to manage products, purchases and customer relationships. Future improvements will need to blend user-friendly web presences with support for

IoT, voice, and augmented reality aspects of e-commerce stores.

- **Low code development**: Low-code allows the creation of coded applications without needing developer skills, because a visual UI allows drag & drop pre-made code blocks. IT support will still need to supervise and test the results, concerns include security and ability for the apps to integrate with other business functions.
- **Microservices**: The process of monolithic architecture, in which application processes are grouped and handled as a single service, is having to be updated because grouped code needing complete app changes is not agile. Microservices architecture modules are built as independent services that use API communication. Modules can be built, managed, and changed independently of the others, can be scaled easily, and be reused in other projects.
- **Multi-model databases**: A database management system that organizes many NoSQL data models using a single backend, a unified query language, and

API. There is a growing trend toward databases offering many models and supporting several use cases. Different than relational databases because different data models from diverse databases can be queried and combined with a specific query language.

- **New computing languages**: New programming languages are being developed to solve problems like speed optimization, scalability, and a need for user-friendly learning curves. Pluses in a language include being "memory safe," or able to translate into and secure JavaScript syntax, or being hybrid like F#, or having early code-error detection.
- **Online marketing**: Like other software development plans, online marketing platforms are increasing reliance on augmented reality, AI, chatbots, and other digital tech. Omni-channel experiences are being promoted in order to improve customer retention; a customer should be able to expect the same experience in a store, online marketplace, social media, or by phone.

- **Progressive Web Applications (PWA)**: PWAs work are coded with HTML, CSS, and JS like websites without a browser interface or a need to download. They are platform agnostic for mobile, tablet, and desktop computing. *Examples include* retail storefronts, social magazines, game apps, etc.
- **Sharing Economy**: Collaborative consumption platforms connect users with suppliers in real-time with GPS, data analytics, and AI. Focus is on personalized experiences, security, and the use – not ownership – of products and resources. Uses include crowdfunding, lodging, transportation, co-work spaces, and goods recirculation.

Access to Technology

A constant challenge is access to computing tools, the Internet, and efficient connections that provides security, speed, and no interruptions of service.

Part of the issue, as previously discussed, is a limitation of infrastructure in various regions in the U.S. and various countries around the world. Another issue is cost, for subscriptions to broadband service and for equipment that can do the work needed in education and workplace contexts. Another issue – which is outside the scope of this book – is standardization of services, as was recognized in education during Covid. Different workplaces – even branches of the same company, might have a lack of standardization of employee resources and management platforms.

Connectivity

5G: Now being rolled out and promoted is 5G, another generation of mobile networks. 5G is expected to have lower latency, which should effectively support AI, IoT, and augmented reality. It promises faster download speeds than the current 4G, which could improve video conferencing and automated tasks than at present.

Interconnectivity: Distributed IT infrastructure of many companies will be using hybrid-cloud or multi-cloud platform. Data and processing will be managed in the cloud although may be accessible to devices faster. More web platforms will be multifunctional and reliant on this interconnectivity so that companies can keep costs low, productivity high, transactions and data highly secure, and customer relations personalized.

Digital accessibility: Everyone, including persons with divergent needs, needs full access to digital content. Accessibility standards processed by usability engineers need to be personalized and applied to computer interfaces. The goal needs to be Universal Design, which would remove most or all barriers altogether, rather than just behaving as assistive technology. This goal still seems distant, although AI and robotics in web platform usability could offer significant advancement, especially since the continuing increase in technical layers can be off-putting to users with divergent capabilities.

Some emerging accessibility benefits include:

- Improved voice-to-text functions.
- Connecting with a virtual assistant.
- Smart home functionality.
- Assistive technology tool Morphic that personalizes the computer to a user's needs.
- Possible public access bots/interface add-on that could assist a variety of accessibilities.

Chapter 16: Workplace Readiness

- Life/Work Balance
- Workplace Readiness
- In-person Workplace
- Hybridized Workplace
- Mobile Workplace
- At-home Workplace
- Legal Rights with Technology
- Tips and Techniques
- Special Concerns

This chapter will focus on the business technology workplace. The workplace – unlike when the author was a young 'un slogging barefoot through miles of snow to a one-room office building – is rarely a single 'workspace' for people. It has completely blown apart and

come back as an assembly of workspaces connected by technology tools and resources. Certainly, many jobs remain tied to a physical workplace, like a mechanic's workpit, an industrial plant's assembly floor, a hospital setting, restaurant kitchens, etc. However, more support work and professional data/product/services workplaces have become mobile, only tethered by equipment and access to company resources.

Much high-value support has also been evolving to be primarily cognitive in nature. It requires constant data access, analysis, and manipulation to express and serve complex needs like customer management, financial administration, and education / skills-provision. Inventory, healthcare, manufacturing, travel, entertainment, transportation, energy & utilities, and most other industries have moved into a much more cloud-based and tech-reliant stage. The digital work market demands new ideas, information and business models that continually expand, combine and shift into more new ventures. Employees must consistently upskill so digital dexterity can meet ever-changing business needs.

Life/Work Balance

Before delving more into this chapter, I am going to step out of 'author' identity and into 'colleague.' I want to share some important things to consider.

We are exposed to unending waves of advice, articles, tips, and training on how to find, get, keep, and live a job. The focus and priorities change from year to year, but they are all the same: you are your work, you are a 'worker,' your life is supposed to revolve around all things employment. *Okay. . . no.*

This chapter will cover information that are based on general career intelligence and experiences of a lot of people. However, our priority in life should be our own sense of life / work balance. Work is hopefully a personal 'drive' and contribution, and certainly a way to earn income and tools for personal needs and security. It isn't and shouldn't be our full identity, a sole purpose of living, a soul-sucking trap, or something that isolates us from family, life experiences, hopes and goals, etc. We need

to keep all that in mind, and focus on balance, flexibility, and continuously growing so we can open more doors for ourselves. AND, think of yourself as "talent," not 'employee' or 'worker' or 'material.' You'll be able to thrive and be able to find diverse ways to employ your skills and abilities.

Back to author mode.

Workplace Readiness

Workplace readiness includes personal qualities, people skills, and professional traits that are necessary to maintain employment. These skills are important because they are the most desirable skills employers are searching for in potential talent. They also give the best chance of career mobility.

Work readiness skills include:

- **Communication**: Communications is a range of verbal, written, body/face expression, and actions. It takes place in person, in video conferences, in chats, in

email, in documents, and in forms for customers, payroll, and regulatory needs. Clear language skills are necessary, and when one is working with (for instance) English as a second language, a priority has to be to keep learning ways to be clear, consistent, and easy for others to understand and work with. Communications also requires logic/ reasoning, respect for others, and an ability to follow-up to 'resolve' a subject. Finally, timing is important: communicating the right things at the right time, early and often in processes, when as soon as possible when there is a challenge to be handled, etc.

- **Digital**: Includes computing skills like keyboarding, file organization and storage, basic computer care habits, and productivity tools. Digital/Internet skills like connecting, maintaining privacy and security, searching and accessing information, and practice of understanding of computer security fundamentals. Behaviors like ethics in using digital assets and professional

communication standards for social connections.

- **Interpersonal**: People-facing skills like teamwork, conflict resolution, respect for diversity and equity, and inclusive win-win strategies. Be able to read and respond positively to body language; focus on people as individuals like yourself rather than material to get something out of. Avoid judgementalism, prejudice, and discrimination.
- **Job-specific**: Core academic skills, job industry kills training, and in-the-job environment expertise. You need to bring skills and experience, and be able to learn employer-specific routines, practices, activities, and equipment.
- **Life management**: Adulting skills like being able to prioritize, manage time, organize yourself, take responsibility, and use sound personal financial practices. Keeping personal stuff personal. A mobile and ever-changing work market also requires flexibility, reliability, and the ability to keep learning new skills.
- **Problem-solving**: Ability to find and

recognize accurate information, perceive and minimize info bias, prioritize steps of action, use critical thinking practices, have creativity in seeking solutions, and focus on win-win results that support everyone involved.

- **Work ethic**: Focus on adding value to the work and results – especially for those in customer positions (like you in other non-work situations). Sense of responsibility to a safe and positive workplace. Doing work well because it should be. Willingness to keep upskilling. Separating personal things from the workplace. Recognizing a healthful balance between life and work demands.

In-person Workplace

An in-person workplace involves going to a work location every day. Considered desk-bound, or workplace bound, in-person workplaces can be in office buildings, industrial factory locations, design and media workshops, restaurants, oil rigs, hotels, retail storefronts,

hospitals, law-enforcement, schools, etc. Some transit-related services are in-person workplaces, like work on buses, trains, planes, ships, filming locations, and other places in which colleagues and infrastructure of some kind present in person. It is characterized by:

- Commuting to employer's workplace.
- Desk/cubicle assignment.
- Dress code and behavior expectations.
- Employer managed on-site computing, data, and tech support.
- Employer-provided work resources, like infrastructure, computers, servers, desks, shared spaces, digital connections, machinery, and company knowledgebase.
- Employer responsibility for workplace safety, security, ergonomics, monitoring, etc.
- Hierarchy of prioritization of work and expectations.
- In-person connections like visiting offices, hallway chats, etc.
- On-site meetings and teamwork.
- Shared spaces like kitchen, cafeteria, restrooms, lobby.

- Work product and services provided from employer-provided location.

The Covid pandemic challenged this traditional work model in a lot of industries and support positions when a significant portion of the workforce needed to stay out of public areas like commuting transit, lobbies, elevators, shared workspaces, etc. There are pros and cons to the in-person workplace:

Benefits

- Assets and work product clearly belongs to employer.
- Clear policies and regulatory expectations.
- Equipment and resources are maintained by the employer.
- Feeling more productive in the work space than at home.
- No home-related interruptions from children or visitors.
- Clear line between work and outside life.
- In-person team building and interactions.
- Face-to-face contact with customers,

colleagues, vendors, and supervisors.
- Networking with colleagues, workshops, and conferences.
- Professional appearance standards.
- Sense of being recognized and accessible for promotion.
- Working directly with vendors and providers.
- Worker productivity high with employer-supported resources.

Concerns

- Commuting time, costs, and inconvenience.
- Expenses for dress code and for work time meals.
- Impersonal or 'canned' environment.
- Inflexibility of work hours and workflow.
- Lack of privacy from monitoring.
- Limited autonomy.
- Sense of being judged for promotability.
- Work and home life balance driven by the employer.
- Workplace safety and security issues.

Hybridized Workplace

A hybrid model involves employees going to a primary in-person workplace a percentage of the time and spending the rest of their time working from home, such as three days in and two days home. It is a flexible model that can translate to a fixed number of days per week or visiting the office on a required as-needed basis for important meetings and check-ins with the team. It requires employer support, access to employer infrastructure, and reliable from-home access to employer tools, connection, cloud space, etc.

Benefits

- Access to onsite equipment and resources some of the time.
- Assets and work product clearly belongs to employer.
- Balance of work and home life.
- Daily autonomy balanced in favor of worker.

- Limited commuting.
- Maintaining some professional presence and appearance.
- Meetings can be attended in person or remotely.
- Regular work resources connection through cloud resources.
- Semi-regular in-person interactions with colleagues and teams.
- Semi-regular visibility in the workplace.
- Worker productivity high with employer-supported resources.

Concerns

- Day-to-day challenges making hybrid model seamless.
- Difficulty meeting and teamwork schedules.
- Disconnect between in-office and remote employees.
- Employer's lack of a commitment to the remote model needs.
- Lack of daily/assigned office work space.
- Mismatch of equipment and resources

between workplace and home.
- Perception of employees getting away with something.
- Risk of being "on" more worktime – and overworked – because of lack of delineated 'work-away' environment and excessive use of online communications.
- Unclear policies, regulatory expectations, and safety support regarding home workplace.

Mobile Workplace

A mobile workforce doesn't have employees bound by a specific workplace environment, even if they often work in-person. Workers function primarily between different work bases, in 'the field,' in vehicles (taxi/freelance drivers) and/or in shared coworking spaces designed for consulting/freelancing. Can include temp/project workers, freelancers and gig workers, traveling sales, inspectors, etc. Employees are connected by various types of mobile technology: computers, smartphones and other mobile devices.

Benefits

- Assets and work product negotiable.
- Balance of work-related and home work space.
- Choices about commuting.
- Control over most of work equipment and resources.
- Flexible scheduling and location.
- Home and work life balance driven by the worker.
- Personalization in professional presence and appearance.
- Work resources connected through cloud resources.
- Regular interactions with colleagues in person and/or remotely.
- Work-for-self autonomy.

Concerns

- Assets and work product can be controlled by work-for-hire agencies.
- Challenges of stable, as needed, and

affordable cloud and resource access.
- Disconnect from regular in-office workplace standards.
- Gig and contract work ratings, invoicing, payment, and taxes.
- Home life and work balance can be driven by clients/customers and/or employment agencies.
- Irregular work schedule.
- Juggling other workers' schedules.
- Lack of daily/assigned work location.
- Lack of stable employment, salary and benefits.
- Lack of policies, regulatory expectations, or safety support regarding mobile workplaces.
- Primary/sole responsibility for work equipment and resources.
- Perceptions that worker isn't 'working.'
- Risk of being overworked because of too-flexible client needs and excessive use of online communications.
- Stress of separating work from life.
- Worker productivity depended on clients, agencies, and sometime uneven access to resources and connections.

At-home Workplace

An at-home workplace involves the work location being solely/mostly a worker's home location. It can be considered desk-bound, or workplace bound, but support and cognitive-level work is be done away from a centralized employer workplace – with the right employer commitment and groundwork. It is characterized by:

Benefits

- Assets and work product clearly belongs to employer if on employer time and resources.
- Access to employer equipment and resources at home.
- Daily autonomy balanced in favor of worker.
- Flexibility (some) in daily schedule.
- Lower employer infrastructure needs and costs.
- No commuting.

- Online meetings, conferences, and teamwork.
- No workplace monitoring other than equipment/cloud hours.
- Small budget needed for professional appearance or workplace lunches.
- Worker productivity high with employer-supported resources.

Concerns

- Can't monitor employee daily activities other than by computer.
- Challenges of accessing employer resources.
- Complexity of tax preparation for home office status.
- Disconnect between employees.
- Employees may have limited at-home workspace.
- Home interruptions to workflow and in tele-meetings.
- No visibility in the employer's workplace.
- Risk of being "on" more worktime – and overworked – because of lack of delineated

'work-away' environment and excessive use of online communications.
- Routine non-work interruptions.
- Separation of work from home space and time.
- Technical support of hardware.
- Unclear policies, regulatory expectations, and safety support regarding home workplace.
- Unclear ownership of assets and work product on employee resources and time.

In any environment, the biggest worry for employers is productivity, given any limits of oversight of employees and variable access to and responsiveness of work equipment, resources, and connectivity.

Workers may feel as productive in a home workspace, dependent on stable access to equipment/resources and minimal interruptions.

Legal Rights with technology

Rights to work-related activity are in flux, especially with the nature of Internet and digital aspects of work. In-person workplace rights, policies, and regulations tend to be the most clearly delineated and able to be managed with human resources and legal systems. Rights of mobile work-related activity has different but still somewhat delineated rights, policies, and regulations related to self-employment. The lines blur when dealing with hybridized and at-home workplaces, since employees may experience a mix of employer-supported resources/services and responsibility for some of their own tools and environment.

Employers can and do set policies, procedures, and actionable consequences for workplace-related concerns. US labor law favors employers, and employment is usually considered to be 'at will' which means that employers can terminate employees at any time, for any reason, with little requirement to prove 'just cause'.

It has to be up to every employee – of any kind – to find, access, and digest work-related regulatory information about: work product ownership, use of and responsibility for employment assets and connections, what time-keeping of work hours should account for, and what is supposed to be covered by privacy, safety, and security regulations.

TIP: Employee Responsibility. It is also up to every employee to "adult" in the workplace. Whether you like an employer/job or not, you are agreeing to rules and accepting compensation for working on behalf of them, and others (like customers, patients, students, vendors) rely on you. That makes you responsible for your own work-related behavior. *If you don't want to be messed with, don't mess with work.*

If you do mobile work and and/or any kind of self-employment, you also need to look into protections and policies for that, including taxes and deductions. In general, you need to make a point of knowing about:

- Access to legal clinics/assistance
- Employment security
- National labor practices policy
- Occupational Safety and Health Administration (OSHA)
- Privacy Rights laws as (discussed in Chapter 12, Special Issues).
- State minimum wage laws
- [U.S. Department of Labor](#)
- Worker compensation
- **Your** state's worker rights

Each state, and each type of work, has differences which realistically cannot be listed or linked in this textbook. However, here are a few considerations.

Employee rights

Employee privacy rights are rules that limit employer's access to an employee's possessions/person; limit monitoring employee actions and communications; and limit intruding on personal lives. The more technology you use in the workplace, the more

accurate and detailed a picture **of you** can build up about your personal life, habits and activities. Keep this in mind about all workplace activities.

Rights to consider:

- Freedom from discrimination.
- Privacy in workplace areas like restrooms, and changing rooms, and some personal space in cubicles and offices.
- Privacy in workspace communications like emails and phone calls; *questionable* if done on work equipment, connections, environment, and time.
- Privacy of *personal* equipment and things brought *to* the workplace; *questionable* if personal equipment use is part of the workplace hiring agreement.
- Right to fair compensation, including for overtime.
- Privacy to personal communications and accounts handled *outside* the workplace, regarding personal social media, passwords, and communications.
- Right to use break and lunch time as desired; *questionable* if workplace

resources and location is being used.

Employer Rights

Federal workplace privacy / employee monitoring regulations come mainly from the Electronic Communications Privacy Act of 1986. Business owners are allowed to monitor all employee verbal and written communication with a legitimate business reason for doing it. More monitoring can happen employee's give consent.

- It is not supposed to allow monitoring of employees' personal and business communications, although any use of employer workspace, tools, network connection, and worktime makes employers push against this.

Employers expect discretion to dictate personal computer usage policies in the workplace when they own the computers, and workplace data accessible by and transmitted with them. Security reasons are another

employer concern, since systems can become vulnerable to malware when employees use the workplace Internet for personal downloads and connections. Security is also an issue when employees violate company confidentiality rules, even by chatting or complaining about work on social media.

IT departments/employers can and do try to limit problems by:

- Archiving email for later reference and review.
- Blocking access to non-work related websites.
- Installing biometric technology on machines and in the workplace.
- Monitoring hard drives and computer terminals for use and timekeeping.
- Monitoring use and sharing of licensed software packages.
- Tagging inventory for data management and tracking.
- Tracking and reviewing internet usage and email contents.
- Use tracking software to alert about violations.

- Using cameras and recording for security monitoring in common and work spaces.
- Using equipment and vehicle GPS systems for usage and timekeeping.

Employees may have very few *electronic* privacy rights when working from home, since according to federal law, employers have a right to monitor use of employer-provided equipment and computer networks, including files, visited web pages, and work email. At-home or hybridized work environments are not a situation for employees to relax workplace ethics and standards.

As noted in Chapter 12, no matter what an employer's policy is about privacy and company security, the employer has a responsibility to be transparent, current, and respectful about the policies and procedures with employees. As an employee, you have a responsibility to learn about what those are, document and keep that information, and be savvy in your workplace dealings. Learn what your employer's policies are for:

- Access to employee-owned material,

equipment, and accounts
- Employee data collection, privacy, and security
- Equipment and network/Internet use
- Privacy
- Time use
- Workplace data protection/security

Tips and Techniques

Back in the day (the Stone Age), when I (the author) was young, I chose to become a professional temp. This was because permajobs seemed to rarely give raises or move you up in the company, and lay-off firings were becoming the norm. As a professional temp, I could control where I went, how long I stayed, travel light, play to my strengths, and keep learning & earning more.

Back then, I got articles published about what I practiced – mobile workplace skills. I bought and brought my own few office supplies. I carried my own zip disk (later USB drive) with my own utilities and key tech needs. I created

my own workplace/timesheet form for my own reference. I learned how to take each new temp assignment by the horns from moment one by asking key questions. I was highly organized, communicated fairly well, and always focused on how I added value to the employer I was temping with. I worked to solve, mitigate, and prevent problems. I got asked back by a several employers, and hired longer term by a couple of them.

That was in the 1990s and 2000s. I started teaching in 2009, but never totally lost touch with my temping/gig experiences. However, at the same time, technology has rushed up and bitten us all, and there are additional tips and tricks I would use now – in the spirit of what used to work but with an emphasis on how many more technological changes we face and now live with. *I have come to realize that people come first, everyone matters, and we're all in this digital world together (Digital Citizenship).* Even the listed non-techy tips are useful in our techy world. This is that chapter for the "me" who would be in the workplace now if I stopped teaching and re-entered the workforce job search.

- Always be aware of and prepared for a low-privacy-protected environment, including the workplace.
- Always be well stocked up on living basics (and fave items) and tech needs/fees, then set emergency money aside so you have flexibility and freedom in work-lean times.
- Always keep your resume updated and accessible. Focus on skills, projects, and continued learning, and how you add value in situations.
- Be a Positive Digital Citizen (Chapter 13).
- Be a problem solver, minimizer, and preventer.
- Be able to measure/record your own learning and productivity and report it to employers/job agencies.
- Be clear to yourself about your needs, expectations, and personal "red line" of unacceptable conditions.
- Build a few reliable and solid connections rather than multitudes of shallow social media contacts.
- Clarify what is YOUR time and resources, and what is an employer's. **Don't ever take risks with workplace assets and time**.

- Create and maintain an e-profile, e-portfolio, and professional network account, with regular updated accomplishment samples and certificates.
- Create your own workplace reporting worksheet / timesheet and use for your personal records.
- Hybridize your skills for mobility and flexibility, whether working at home, in a workplace, or in a blend.
- Learn constantly: social skills, worldview, and upskilling.
- Learn to separate yourself from your phone/email and an employer's post-worktime needs.
- Learn to communicate minimalistically – no one needs to know all you are thinking, and less is more. Diplomacy, respect, and kindness will serve you well.
- Secure your own devices with privacy and security tools/protections.
- Time and skills management are yours to handle.
- Win-win workplace and responsible social communication success: be aware of and part of *Diversity, Equity, Inclusion and*

Accessibility (DEIA); *Justice, Equity, Diversity, Inclusion (JEDI)* is also a valuable approach.

In Conclusion

Technology Essentials has offered a survey of computing and digital coverage and skills necessary to engage in school and the workplace. With a survey of practical computing skills, coverage about digital citizenship, application practices, and overviews on various business technology-related issues, learners have been able to gain additional skills and knowledge.

This book is definitely not an exhaustive reference, and much of the coverage was fairly generalized. Technology and digital citizenship changes so quickly that more specific information and resource links would be obsolete almost immediately. However, learners and instructors should be encouraged to research, explore, and learn more. The content can prompt discussions of main points as a starting point for debates, reviews of current needs and topics, and practices of workplace computing competencies.

Author and Attribution

About the author

L.J. Bothell has taught with both Seattle Central College in Seattle, and Shoreline Community College in Seattle/Shoreline. Subjects include: web design, business technology concepts, Adobe Creative Suite programs, Microsoft Office applications, and keyboarding skillsbuilding.

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