

Overview:

Students work individually to understand and establish the specifications for a PC dedicated to a specific task or function. (The specific task or function will be assigned to the student from the list below.) The function and features of various hardware components are researched to develop a general understanding. Specific components and features are then selected based on appropriate need for the assigned task or function. The final product is a brochure that will be shared with other classmates during a trade show event.

Objectives:

- Use correct terminology to describe computer hardware, speed measurements, and size measurements
- Describe the functions of the internal components of a computer
- Describe the functions of common computer peripheral devices
- Assess user computing needs and select appropriate hardware components for different situations

Getting Started:

1. You will be required to design a “dream machine” personal computer (PC) for one of the tasks assigned to you from the list below.
2. To get started, develop a general understanding of what will be important features and what will be less important features of our dream machine. Consider the following:
 - a. Operating system software
 - b. Special application software
 - c. Processor & motherboard speed
 - d. Main memory speed and size
 - e. Secondary storage speed and size
 - f. Graphics and display speed and resolution
 - g. External devices (e.g. keyboard, pointing devices, joysticks, etc.)
 - h. Network connectivity
 - i. Power and data backup
 - j. Printers, scanners, and similar equipment
 - k. Portability and durability
 - l. Budget (cost) considerations

Specific Tasks & Functions

- A. **Game Computer:** Dedicated to playing PC games in a home environment
- B. **Photo Editing & Organization:** Dedicated to editing and producing photographs and images in a home or professional environment
- C. **Business Office Computer:** Dedicated to producing documents and presentations and communicating with other people in a professional office environment
- D. **Student Home Computer:** Dedicated to completing homework, paying bills, communicating with friends and other similar tasks in a home environment
- E. **Factory Floor Computer:** Dedicated to reading documents, filling in forms, processing orders, etc. in a factory or warehouse environment.
- F. **Media Production and Streaming Computer:** Dedicated to production and distribution of video and/or music media in a semi-professional environment
- G. **Web Surfing Computer:** Dedicated to surfing the web, streaming media, and communicating through on-line services in a home environment

Level 1: Processor & Memory

1. Research and summarize the main features and function of a CPU processor chip. Consider the following:

CPU: small chip that resides in computers and other electronic devices. Its basic job is to receive input and provide the appropriate output.

a. Physical packaging **shape and size**

A CPU has a silicon integrated circuit (small chip) and it consists of a square piece of crystallized silicon that's very thin. It has a pattern on top, which consists of the wires that have been processed into the silicon.

b. Processing **speed and power**

The speed of your CPU is known as clock speed. The faster the CPU runs, the more processes it can run at any given time. The speed is measured in GHZ. For example, the MacBook Pro 15 with Intel Core i7-8750H (six-core) has a speed of 2.2 GHz. Processor speed varies based on its type. There are many different versions but the manufacturers that are in the lead in terms of speed and quality are Intel and AMD. Intel's desktop CPUs include Celeron (1.4GHz), Pentium (4.5GHz) and Core (3.0 GHz). AMD's include Sempron (2.9 GHz), Athlon(2.4GHz) and Phenom (2.6GHz).

c. **Memory** speed and size

The processor's cache refers to the onboard memory, used to store information so the processor can access it quickly. The more cache your CPU has, the more data it can store and the faster it can run processes.

2. Research and summarize the history of how a **CPU processor chip has changed over the years**.

Consider the following:

- Typical processor speed, size, model numbers in the **early 1990's**
- Typical processor speed, size, model numbers in the **early 2000's**
- Typical processor speed, size, model numbers in the **current time**

Well, as an example, we can compare an Intel cpu chip in the early 90s (1992) would be Intel486 SL Processor. This processor had a bus speed/clock speed of 33Mhz, memory of 4MB and a cache of 8kB. Moving forward only two years later, the IntelDX4™ Processor had a clock speed of 100Mhz, bus speed of 33Mhz, 4GB memory, and 16kB of cache. Clearly, processors increased in quality for almost every aspect in only two years. By the time of the early 2000s, processors from Intel such as the Intel® Pentium® 4 Processor,2001, had a clock speed of 3.40-1.80 GHz but a bus speed of 800Mhz, 512 kB of cache, and 4GB of memory still. Clearly, this trend shows that speeds are increasing as well as cache. This trend continue as now on the Intel site, it is stated that some of their latest processors with the “ new 9th Generation Intel® Core™ desktop processors are packed with performance for mainstream and competitive gamers. With up to 8 cores, 16 threads, 5.0 GHz, and 16 MB cache the 9th Generation Intel® Core™ desktop processors are built for gaming.” Clearly, there has been a lot of improvement from some of the processors in the 90s.

3. Research and summarize the main features of **motherboards**. Consider the following:

a. Physical packaging shape and size

The motherboard connects all the components, peripherals and devices that build up the computer such as the processor, ram, power supply, ports, and graphics card. The Motherboard contains lanes of micro wires printed on the board along with all the components just listed. They are about 305mm x 244mm (ATX)

b. Speed and size

Motherboards come in different sizes which are known as form factors. The most common form factor is called the ATX. A smaller form factor is the ITX which comes in mini-ATX , nano-ATX, and pico-ATX size. A motherboards speed is called the Bus Speed which describes how fast a computer can move data from one computer component to another. Speeds can range from 66MHz to over 800MHz. MHz means megahertz which is one million cycles per second.

4. Research and summarize the **history of how motherboards have changed** over the years. Consider the following:

- Typical speed, size, model numbers in the early 1990's

Original PC motherboard has a minimum of integrated devices on it, only ports for a keyboard and deck for storage. Everything else like hard disks were components that would be connected through expansion slots. In the early 90s, parts began to start shifting onto the motherboard instead. Only graphic cards would sometimes be put in expansion slots rather than onto the motherboard. Memory, processors, network controllers, power source, and storage would be integrated into some systems.

- b. Typical speed, size, model numbers in the early 2000's
- c. Typical speed, size, model numbers in the current time

"The earlier versions weren't as efficient and dependable. Today's motherboards contain more or less of the following parts: Expansion card slots, Many computers come with a CPU directly welded to the motherboard, Logic and connectors that support input devices., They come with power connectors that use the electricity from a computer power supply to run the expansion cards, memory, CPU, and chipset, Integrated sound card, Slots or sockets that allow one or multiple microprocessors to be installed, A clock generator is a vital component that sets the system clock signal to help sync itself to a variety of components, There are non-volatile memory chips that contain BIOS or firmware of the system, Graphic card supporter with 2D and 3D graphic capabilities, USB controllers that can support about 12 USB ports Before the invention of microprocessors, computers were built into mainframes with components which were connected by a backplane that had countless slots for connecting wires. In old designs, wires were needed to connect card connector pins but they soon became a thing of the past with the invention of PCBs. The CPU, memory and other peripherals were all housed on this printed circuit board. During the late 1980s and 1990s, it was found that an increasing number of peripheral functions on the PCB were more economical. Hence, single Integrated Circuits (ICs) capable of supporting low-speed peripherals like serial ports, mouse, keyboards, etc., were included on a motherboard. By the late 1990s, they began to have a multifaceted platform integrated with audio, video, storage and networking functions. Higher end systems for 3D gaming and graphic cards were also included later." (Gupta, Sourabh. "History of Computer Motherboards." *Techspirited*, Techspirited, 9 Apr. 2018, techspirited.com/history-of-computer-motherboards.)

5. Research and summarize the main features and function of **RAM memory**. Consider the following:

RAM (Random Access Memory) is where data is stored that is being accessed by the CPU. More RAM usually means a faster computer. How it works: CPUs can't hold large amounts of data so a computer's memory system is necessary to provide a large-capacity location for the CPU to store and retrieve information.

- a. Physical packaging **shape and size**

Memory (RAM) chips have some similarities to CPU chips: both are made from silicon and are packed densely with transistors (little electronic on/off switches), Ram chips come in different sizes, speed and type are more important factors.

- b. **Speed and size**

RAM is measured by its speed (MHz) and by its size (megabytes or gigabytes). For example you could have DDR RAM (name) of 400mhz (speed of the RAM) 256mb (RAM size). The most common RAM sizes are, 16mb, 32mb,64mb, 128mb, 512mb, 1Gb and2Gb.

6. Research and summarize the history of how **RAM memory** has changed over the years. Consider the following:
- a. Typical speed, size, model numbers in the early 1990's
 - b. Typical speed, size, model numbers in the **early 2000's**
 - c. Typical speed, size, model numbers in the current time

Over time, RAM memory became capable of operating at greater speeds, operating on less power, and generating less heat. The following chart compares some models over the years and was created by: Thornton, Scott. "What Is DDR (Double Data Rate) Memory and SDRAM Memory."

Microcontroller Tips, 9 Apr. 2018, www.microcontrollertips.com/understanding-ddr-sdram-faq/.

Standard (Approximate Year Introduced)	Operating Voltage(amount of power taken to operate)	Amount of Data Transferred (Words per Clock Cycle)	Associated RAM Clock Rates (speed)	Approximate Transfer Rates(how fast data can transfer)
SDRAM (1993)	3.3 V	1	66 – 133 MHz	100 – 166 MT/s
DDR SDRAM (2000)	2.6 V, 2.5 V	2	100 – 200 MHz	200 – 400 MT/s
DDR2 SDRAM (2003)	1.8 V, 1.55 V	4	200 – 400 MHz	400 – 1066 MT/s
DDR3 SDRAM (2007)	1.5 V, 1.35 V	8	400 MHz – 1066 MHz	800 – 2133 MT/s
DDR4 SDRAM (2014)	1.2 V	8	1066 – 1600 MHz	1600 – 3200 MT/s

7. Research and summarize the main features and function of **Hard Disk Drives (HDD)**. Consider the following:

The hard disk drive is the main, and usually largest, data storage hardware device in a computer. The operating system, software titles, and most other files are stored in the hard disk drive.

a. Physical packaging **shape and size**

A hard drive is usually the size of a paperback book, but much heavier. The sides of the hard drive have pre-drilled, threaded holes for easy mounting in the 3.5-inch drive bay (space inside computers for hard drive specifically) in the computer case. Mounting is also possible in a larger 5.25-inch drive bay with an adapter. The hard drive is mounted so the end with the connections faces inside the computer. The back end of the hard drive contains a port for a cable that connects to the motherboard. The type of cable used (SATA or PATA) depends on the type of drive. There are many different types of hard drives, some very small, others very large.

b. **Speed and size**

Everything stored on a hard drive is measured in terms of its file size. Documents (text) are generally very small whereas pictures are large, music is even larger, and videos are the largest. A hard drive

determines the size of digital files in terms of megabytes (MB), gigabytes (GB), and terabytes (TB). Hard drives vary in how much they can store. Speed is referred to as spin speed (rotations per minute, or RPM) and is important because the faster, the better. Most desktop HDDs spinning at the standard 7,200 RPM.

8. Research and summarize the history of how **Hard Disk Drives (HDD)** have changed over the years. Consider the following:
 - a. Typical speed, size, model numbers in the **early 1990's**
 - b. Typical speed, size, model numbers in the early 2000's
 - c. Typical speed, size, model numbers in the current time

The capacity of hard drives has grown over time. When hard drives became available for personal computers, they offered 5-megabyte capacity. During the mid-1990s the typical hard disk drive for a PC had a capacity of about 1 gigabyte and when it comes to size, in the early 2000s, it was around 2.5 or 3.5 inch form factors. As of January 2019, desktop hard disk drives typically had a capacity of 1 to 6 terabytes, with the largest-capacity drives reaching 15 terabytes. When it comes to speed now, the standard is 7200 RPM.

9. Explain and justify the processor and memory requirements for your 'dream machine' task. Discuss the following:
 - a. Minimum and "would be nice" requirements for the CPU chip
 - b. Minimum and "would be nice" requirements for the Motherboard
 - c. Minimum and "would be nice" requirements for the RAM memory
 - d. Minimum and "would be nice" requirements for the HDD

(Done on level 3)

Level 2: Display & Peripherals

1. Research and summarize the main features and function of **Computer Display Monitor**. Consider the following:
 - a. **Physical construction (CRT, LCD, etc)**

Definition: A display screen is used to provide visual output from computer or other video generating device.

CRT: The cathode-ray tube (CRT) is a vacuum tube (vacuum that allows for electric current to pass) that contains one or more electron guns (device that produces narrow stream of electrons) and a phosphorescent screen (light emitted after exposure to radiation, or produced by something that doesn't produce flame or heat), and is used to display images. It deflects electron beams onto the screen to create the images.

LCD: LCD screens (liquid crystal display) have many small, tiny pixels in the screen that electronically turn on and off using something called liquid crystals to rotate light, which creates images on the screen

- b. **Display Standards (CGA, VGA, SVGA, XGA, etc.)**

Number of pixels: A pixel is a single dot displayed on a screen. Most screen images are made up of hundreds of pixels. Adding more pixels to the image makes the image more detailed. A screen image is usually described with two numbers. The first number is the number of pixels across the top of the screen, and the second is the number of pixels down the side of the screen. Number of colors: Graphics cards are limited in the number of colors they can display. The oldest monitors could display only two or four colors. Currently, 256 colors is the minimum for most systems. Numbers of colors above 256 are usually

described by how many computer bits are used to store the color in memory. 16 bits can store more than 65,000 colors, while 24 bits can store more than 16 million colors

- SVGA (Super VGA): One of the more popular labels placed on video cards and monitors. A SVGA card or monitor is capable of displaying more pixels (dots on the screen) and/or colors than basic VGA. For example, an SVGA graphics card may be able to display 16-bit color with a resolution of 800x600 pixels.
- VGA (Video Graphics Adapter): Currently the base standard for PC video cards and monitors. True VGA supports 16 colors at 640x480 pixels or 256 colors at 320x200 pixels.
- XGA: A standard used on some IBM PS/2 models. XGA supports 256 colors at 1024x728 pixels, or 16-bit colors at 640x480 pixels.
- GA (Color Graphics Adapter): The first color monitor and graphics cards for PC computers. Capable of producing 16 colors at 160x200 pixels." ("Indiana University Indiana University Indiana University")

"Indiana University Indiana University Indiana University." *What Are the Different Types of PC Graphics Cards and Monitors?*, kb.iu.edu/d/agpt.

c. Resolution & Colour depth

The more pixels, the more detail may be shown in a given amount of space. This is called the resolution. Each pixel may display a given number of distinct colours; this is the colour depth. Color depth can range from 1 bit (black-and-white) to 32 bits (over 16.7 million colors).

2. Research and summarize the main features and function of a **Computer Graphics Card**. Consider the following:

Definition: a Graphics Card is a piece of computer hardware that produces the image you see on a monitor. The Graphics Card is responsible for rendering an image to your monitor, it does this by converting data into a signal your monitor can understand

a. Physical packaging (e.g. On the motherboard, expansion card, etc.)

Graphics card is also known as video card. It's an expansion card (something that can be inserted into your computer) plugged into your computer that handles what your computer displays on your computer screen. The graphics card is put into something called an expansion slot on the motherboard, usually close to the CPU.

b. Speed and frame rate (2D vs 3D)

Frame rate: measured in frames per second (FPS), describes how many complete images the card can display per second. 2D and 3D refer to the actual dimensions in a computer workspace. 2D is "flat" so the image has only two dimensions and if turned to the side becomes a line. 3D adds the depth which allows for rotation and visualization from multiple perspectives.

c. Resolution, colour depth, and memory size

"Graphics cards are limited in the number of colors they can display. The oldest monitors could display only two or four colors. Currently, 256 colors is the minimum for most systems. Numbers of colors above 256 are usually described by how many computer bits are used to store the color in memory. 16 bits can store more than 65,000 colors, while 24 bits can store more than 16 million colors." ("Indiana University Indiana University Indiana University")

3. Research and summarize the history of how **Computer Display Technology** has changed over the years. Consider the following:
 - a. Display standards and capabilities in the late 1980's
 - b. Display standards and capabilities in the late 1990's
 - c. Display standards and capabilities in the 2000's

Wikipedia summarizes the history of computer "The cathode ray tube was the workhorse of text and video display technology for several decades until being displaced by plasma, liquid crystal (LCD) (90s) and solid-state devices such as LEDs and OLEDs (early 2000s). With the advent of microprocessors and microelectronic devices, many more individual picture elements ("pixels") could be incorporated into one display device, allowing graphic displays and video(now)."

4. Research and summarize the main features and function of **External Storage and Backup**. Consider the following:

External storage: devices that store information outside a computer. Such devices may be permanently attached to the computer, may be removable or may use removable media.

- a. **Removable media** (e.g. floppy disks, CD/DVD-RW, CompactFlash, etc.)
 - A floppy disk: a type of disk storage. Floppy disks are read and written by a floppy disk drive (FDD).
 - CD-RW (Compact Disc-ReWritable) is a digital disc storage format. A CD-RW disc is a compact disc that can be written, read, erased, and written again.
 - DVD-ReWritable: re-recordable DVD format similar to CD-RW or DVD+RW. The data on a DVD-RW disc can be erased and recorded over numerous times without damaging it
 - CompactFlash : a flash memory mass storage device used mainly in portable electronic devices
- b. **USB media** (e.g. Memory Stick, External HDD, etc.)

Examples:

- Memory stick: designed to serve as a storage and transfer method for digital data. It can store data in various form as text, graphics, digital images etc. transfer of data is possible between devices having memory stick slots. Memory sticks are available in various storage sizes ranging from 4 MB to 64 MB.
- External hard drive: portable storage device that can be attached to a computer through a USB or FireWire connection, or wirelessly. External hard drives typically have high storage capacities and are often used to back up computers or serve as a network drive.
- Memory cards are flash memory storage media used to store digital information in many electronics products
- A USB flash drive is a data storage device that includes flash memory with an integrated USB interface (this literally means the type of port you would insert it in)

c. **Cloud based storage**

Cloud storage: data is stored on remote servers accessed from the internet or "cloud."

5. Research and summarize the history of how **External Storage and Backup** has changed over the years. Consider the following:
 - a. Typical speed, size, model numbers in the early 1990's
 - b. Typical speed, size, model numbers in the early 2000's
 - c. Typical speed, size, model numbers in the current time

The 1990s: Floppy drives were too small, hard disks weren't portable, and rewritable CDs were expensive. There was the Zip Drive, a removable storage system that used disks shaped like heavier-duty floppies, each capable of storing up to 100 MB on them. A high-density floppy could store 1.4 MB. There was a successor to the Zip drive: The Jaz drive. When it first came out, it could store 1 GB

on a removable cartridge. Unfortunately, disks would get jammed in the drives, drives overheated, and some had vibration problems. Compact Discs had been around since the 1980s. CD burners connected to computers from the beginning, but they were huge and expensive like the size of a washing machine and tens of thousands of dollars. By the late 1990s technology improved, prices lowered and recordable CD burners – CD-Rs – became common. With the need for more storage, we moved on to DVD-R and DVD-RW systems within a few years, upping the total you could store per disc to 4.3 GB (eventually up to 8 GB per disc once dual-layer media and burners were introduced). In the 2000s, other models like SD cards, Blue Ray discs, picture cards, and HD DVDs became more popular. Models from the 90s became updated, and with time, storage and portability increased. Today, the cloud is the most popular, efficient, and way to store data.

6. Research and summarize the main features and function of Network Connectivity. Consider the following:

Definition: the extensive process of connecting various parts of a network to one another

a. Connection technology (e.g. Dial-Up, Ethernet, WiFi, BlueTooth, Fibre, etc.)

- Dial-up Internet access is a form of Internet access that uses the facilities of the public switched telephone network to establish a connection to an Internet service provider by dialing a telephone number on a conventional telephone line.
- Ethernet is the technology that is most commonly used in wired local area networks (LANs), that enables devices to communicate with each other. A LAN is a network of computers and other electronic devices that covers a small area such as a room, office, or building.
- WiFi is a technology that uses radio waves to provide network connectivity. A WiFi connection is established using a wireless adapter to create hotspots - areas in which devices that are connected to the network can access internet services
- Bluetooth is a wireless technology standard for exchanging data between fixed and mobile devices over short distances. Works by using radio waves instead of wires or cables.
- an Internet connection using fiber cables is an Internet connection in which data is delivered in light signals

b. Upload and download speed

A good speed is defined as 25mbps(megabits per second) download and 3 mbps upload. A connection around these speeds should satisfy the needs of almost anyone nowadays, provided that it is a good quality connection with little or no interruptions.

c. Security

Network security is any activity designed to protect the usability of your network and data. It includes both hardware and software technologies. Effective network security manages access to the network. It targets a variety of threats and stops them from entering or spreading on your network. Types of network security involve access control, antivirus software, data loss prevention, email security, firewalls, VPN, web security, and wireless security.

7. Research and summarize the history of how Network Connectivity has changed over the years.

Consider the following:

- Typical speed, size, model numbers in the early 1990's
- Typical speed, size, model numbers in the early 2000's
- Typical speed, size, model numbers in the current time

"Kalpana, a U.S. network hardware company, developed and introduced the first network switch in 1990. IPv6 was introduced in 1996 as an improvement over IPv4, including a wider range of IP addresses, improved routing, and embedded encryption. The first version of the 802.11 standard for Wi-Fi is introduced in June 1997, providing transmission speeds (how fast a network can move data) up to 2 Mbps(megabits per second). The 802.11a standard for Wi-Fi was made official in 1999, designed to use the 5 GHz (this is the Frequency which represents the speed at which data is transmitted and received among the devices on your wireless network) band and provide transmission speeds up to 25 Mbps. 802.11b devices were available to the public starting mid-1999, providing transmission speeds up to 11 Mbps. The WEP encryption protocol for Wi-Fi is introduced in September 1999, for use with

802.11b.802.11g devices were available to the public starting in January 2003, providing transmission speeds up to 20 Mbps. The WPA encryption protocol for Wi-Fi is introduced in 2003, for use with 802.11g. The WPA2 encryption protocol is introduced in 2004, as an improvement over and replacement for WPA. All Wi-Fi devices are required to be WPA2 certified by 2006. The 802.11n standard for Wi-Fi was made official in 2009. It provides higher transfer speeds over 802.11a and 802.11g, and it can operate on the 2.4 GHz and 5 GHz bandwidths. The Wi-Fi Alliance introduced WPA3 encryption for Wi-Fi in January 2018, which includes security enhancements over WPA2.” (“Computer Networking History.” *Computer Hope*, 16 Dec. 2018, www.computerhope.com/history/network.htm.)

8. Research and summarize the main features and function of Printer Technology. Consider the following:

Definition: Printing is a process for reproducing text and image

- a. Printing Technology (e.g. Dot Matrix, Ink Jet, Laser, etc.)
 - Dot matrix printing is a type of computer printing which uses a print head that moves back-and-forth, or in an up-and-down motion, on the page and prints by impact, striking an ink-soaked cloth ribbon against the paper (1925)
 - Inkjet printing is a type of computer printing that recreates a digital image by pushing droplets of ink onto paper, plastic, or others
 - Laser: computer sends a stream of data to your laser printer. It makes a laser beam scan back and forth across a drum inside the printer, building up a pattern of static electricity. The static electricity attracts onto the page a kind of powdered ink called toner. Finally, another unit bonds the toner to the paper.
- b. Connection Technology (e.g. Parallel Port, USB, WiFi, Network, etc.)
 - parallel ports send multiple bits of data at once (connected from printer to device)
 - USB ports allow USB devices to be connected to each other with and transfer digital data over USB cables (connected from printer to device)
 - There are several printers on the market that have WiFi transceivers built into them. Network administrators must first install the printer to the network so that other devices connected to the system can locate the printer. Once connected, compatible devices can send print jobs to the printer.
- c. How printing has changed over the years

“Inkjet printers were able to print from PCs in the 1970s. An inkjet printer uses a nozzle to spray ink on the paper. Improved nozzle and inks have made inkjets the preferred printers for high-quality images including glossy photos. Laser printing (1969) Laser printing is preferred for printing high volumes fast. This technology uses a laser beam to sensitize parts on a drum. These sensitized parts then attract toner and transfer it to paper. Digital printing (1991) This technology allows printing directly from PCs and other devices. Letters and images are digitized, and this image used to control the way toner or ink is deposited. 3D printing Although the first 3D printer was patented in 1981, this technology has been refined in the 2010s. A 3D printer adds layers of printable material onto a surface to make a 3D object.” (Inkton 2018).

Inkton. “How Printers Evolved Over the Years.” *Ink Toner Store Blog*, 12 Jan. 2018, blog.inktonerstore.com/printers-evolved-years/.

9. Explain and justify the processor and memory requirements for your ‘dream machine’ task. Discuss the following:
- a. Minimum and “would be nice” requirements for the Computer Display
 - b. Minimum and “would be nice” requirements for External Storage and Backup
 - c. Minimum and “would be nice” requirements for Network Connectivity

- d. Minimum and “would be nice” requirements for Printer Technology

(Done on level 3)

Level 3: Building Your Dream Machine

1. Identify the minimum requirements for each component of your dream machine as follows::
 - a. CPU processor chip speed and type
 - b. Motherboard type
 - c. RAM memory speed and size
 - d. HDD speed and size
 - e. Display Monitor resolution, type, and size
 - f. Graphics card resolution and type
 - g. Audio card type
 - h. Audio Speakers type
 - i. External backup type and size
 - j. Network interface requirements
 - k. Printing Technology
 - l. Other Peripherals (e.g. mouse, keyboard, joystick, etc.)
2. Prioritize your list of components from question #1 from those that are essential down to those that would be nice.

Answers to question 1 and two:

1. CPU Processor Chip Speed of at least 2.5 Ghz (2.0 is minimum, 4.0 would be nice) with at least two cores (4 would be nice)
2. RAM Slots (4 slots are deal, 2 is minimum, as many as possible would be nice). For speed, anywhere between 1200-2600 Mhz is fine and 8gb is good, more would be nice)
3. HDD- 250gb at the least (Much larger such as 500gb would be nice)
4. Motherboard(just needs to be able to hold all components listed and be anywhere within average speed, any modern motherboard will be fine)
5. Monitor- 21 inches at least (larger would be nice)
6. Network Interface Requirements (needs to be able to use wifi and bluetooth)
7. Mouse and Keyboard
8. Printing technology (wireless obviously)
9. Graphics Card Resolution (needs to be regular)
10. External Backup type and size (needs to be able to support usbs, disks, and cloud of course at the least but even more if possible)
11. Audio Card Type
12. Audio Speakers Type

3. Establish a target budget (cost) for your dream machine.
 - a. Justify your cost based on your projected component needs.
 - b. Justify your cost based on a realistic assessment of your application and target user

The budget for this computer is \$1000. Since it is meant to be a business office computer, it does not need to be portable so part of this budget would be dedicated to the monitor (\$100-200) and the rest towards the desktop pc (\$800). The processor is needed to be of high speed in a business setting, and an hdd or ssd of around 250 gb is required as well. Such requirements are more costly than others, therefore \$1000 is a good price for a computer than needs to be fast, spacious, and able to run all business applications.

4. Build your dream machine or locate a ready to buy machine using on-line vendor web sites.
- Find at least two sources for your dream machine
 - Provide a copy of the cost and feature list summary for each source
 - Explain how the machine from each source matches (or is different) from your ideal configuration.

Source 1

<https://www.dell.com/en-ca/work/shop/dell-desktops-workstations/vostro-desktop/spd/vostro-3670-desktop/smv3670w10ps1125ca>

Source 2

<https://www.bestbuy.ca/en-ca/product/hp-slim-desktop-pc-amd-a6-9225-1tb-hdd-8gb-ram-windows-10-english/12387269.aspx?>

	Ideal	Source 1: Dell Vostro Desktop	Source 2: HP Slim Desktop PC
Price	Around \$1000	Starts at \$799 (additional features can be added) and with the monitor it is \$1029	\$499 (\$678 with the monitor included)
Processor	A least 2.5 Ghz (2.0 is minimum, 4.0 would be nice) with at least two cores (4 would be nice)	8th Generation Intel® Core™ i5-8400 Processor (9MB Cache, up to 4.0 GHz)	2.6 GHz 7th Generation AMD A6-9225 dual-core processor
Ram	Anywhere between 1200-2600 Mhz is fine and 8gb is good, more would be nice)	8GB, DDR4, 2666MHz	8 GB DDR4-1866 SDRAM
HDD/ SSD	250gb at the least (Much larger such as 500gb would be nice)	256GB SSD (can be easily expanded up to 2TB)	1 TB, 7200 rpm
Monitor	21 inches at least (larger would be nice)	Dell 22 Monitor P2217H (available for \$230 on amazon, price not available on dell.com but it is 21 inches)	23 inches at https://store.hp.com/us/en/pdp/hp-23er-23-inch-display for the HP 23er 23-inch Display for \$179
Other Included Features	Needs wireless printing, bluetooth and wifi, needs enough ports to support disks and usbs	Tray load DVD Drive (Reads and Writes to DVD/CD) Dell KB216 Wired Keyboard English Black Dell MS116 Wired Mouse Black (there are multiple other	there is integrated wifi and bluetooth, usb ports, and disk reader

		ports included but not listed)	
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Suggested on-line computer sources:

- www.bestbuy.ca/
- www.dell.com/en-ca
- www.staples.ca
- www.tigerdirect.ca/
- www.canadacomputers.com

Level 4: Sharing Your Dream Machine

1. Prepare a brochure documenting your dream machine options and choices.
 - a. The target audience is other students in the class
 - b. You should explain your target task (e.g. game computer) and how this affects configuration choices.
 - c. You should explain your configuration choices in greater detail
 - d. Your two purchase options should be explained and compared
2. Share your brochure
 - a. By uploading it to your repository
 - b. By presenting it during the in-class tradeshow (date TBD)
3. Visit and report on other trade show presentations / brochures
Complete the Passport Template (TBD) as you participate in the in-class tradeshow