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IntroCS pd5
L1 -- On Wednesdays We Wear Pink
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Building a Computer for AutoCAD 2020

TASK: Peruse the three use cases below and pick your favorite. Use your class jargon glossary and pcpartpicker.com to design a machine and price it. Design a pitch to convince your chosen user to purchase your creation.

Architect Tyrone is an architect. He is currently working with a computer that runs AutoCAD 2017; however, he wants to purchase and run AutoCAD 2020. Tyrone needs you to design a new computer to make his designs come to life.

Tyrone does not want to spend more than $3,000 (including peripherals, but not software)

Significance of each part:
CPU: For CAD softwares in general, one of the main factors that performance comes down to is the number of instructions per cycle. Instructions per cycle depend on the clock speed which are measured in gigahertz (GHz) and **the higher the GHz, the higher clock speed**.
When referring to the number of cores for AutoCAD specifically, AutoCAD **does not require** a **multi-core** CPU since to fully benefit from multi-core processors, you need to use multi-threaded software and AutoCAD is predominantly a single-threaded application. Multi-core CPU refers to two or more CPUs working together, allowing a system to perform more tasks with greater overall system performance. AutoCAD only supports multi-core technology in specific instances such as 2D regeneration and rendering.
-    TDP: Thermal Design (point, power, or parameter) and is the measurement, expressed in watts, of the maximum amount of heat a CPU generates under intense workload.

CPU Cooler: lowers CPU temperature and increases efficiency and stability, can increase noise of the system, sometimes comes with the CPU

Motherboard: connects the different components of your workstation. Make sure to look at
-    Memory slots for RAM
-    SATA ports for hard drives, SSD drives

Case: needs to be compatible with the motherboard, look for **ATX, MicroATX, and MiniATX**, which tells you the size of the motherboard that can fit in it, with ATX being the largest, and MiniATX being the smallest.

Graphics Card: Most CPUs come with a graphics unit, but a graphics card **will allow for more FPS** (frames per second), which allows for smoother transitions. Choose a workstation graphics card instead of a gaming card. Gaming cards focus on fast loading, but workstation graphics cards focus on precision and details, which is important in AutoCAD.

RAM: **AutoCAD Map 3D needs 16GB**, but having more will allow your apps to run more smoothly, and you can have more apps open.

Storage: **AutoCAD Map 3D needs 16GB disk space.** AutoCAD is limited to multi-threading (the ability to process multiple requests by more than one user), hence when using more cores, having high clock speed is more necessary. SDD (Solid State Drive) is faster, more durable, and lighter than HDD (Hard Disk Drives).

Operating System: Operating systems are easy to choose from since AutoCAD is **built for running on Microsoft Windows**. The most typical system has 64-bits, and AutoCAD 2018 only runs on a 64-bit operating system.

Keyboard and Mouse: any does the job but as a professional, but since AutoCAD and rendering takes a long time,you want one that is comfortable for the user

PSU: A **more efficient power supply will use less power** but still give your computer the wattage it needs. **80 PLUS certification** label is a certification program that manufacturers use to assure that their products meet certain efficiency requirements.

Monitor: Rendering and AutoCAD uses a lot of details, so a monitor with high specs will make it easier to see details and be more precise.

Network: A network adapter is what allows a computer to communicate over a network with other computers.

Specifications:

When building the best computer system for AutoCAD for Tyrone, we first had to research what a Windows computer with AutoCAD program required and the recommended characteristics. Since we are on a budget, it was crucial to first focus on the major pieces of a computer, and then build upon the major pieces with specific parts and details that would maximize the AutoCAD experience. As pieces and parts were chosen, we had to maneuver around incompatibilities. At last we had developed a computer for AutoCAD with the latest tech and at the most beneficial price. After hours of negotiation and comparison between the highest rated brands and products across the net, we had finally derived our specially crafted computer for Tyrone.

Total cost for buildout below: $2,818.18
CPU: AMD Ryzen 9 3900X - $434.00
Motherboard: Gigabyte X570 AORUS ELITE - $199.00
RAM: G.Skill Ripjaws V 32GB - $172.99
Storage (SSD): Corsair MP600 Force Series Gen4 - $399.99
PSU: EVGA SuperNOVA G3 - $169.99
Case: Fractal Design Meshify C - $97.98
OS: Microsoft Windows 10 Home OEM 64-bit - $109.99
Network: D-Link DXE-820T - $315.27
Graphics Card: Asus STRIX GAMING Advanced - $584.99
Keyboard: Logitech K830 - $88.99
Mouse: Razer Mamba Wireless - $45.00
Monitor: Lenovo L24q 23.8" 2560x1440 60 Hz Monitor - $199.99

How we came down to our choices:

CPU: AMD Ryzen 9 3900X

AutoCAD requires a 2.5 to 2.9 GHz to download and use the app. However, they highly recommend a 3+ GHz. The AMD Ryzen 9 3900X comes with a core clock of 3.8GHz but has a boost card (highest guaranteed clock speed) of 4.6GHz. And although not necessary, this allows it to multitask between different applications sufficiently. In addition, this procesor spins more cores and threads, at 12-Cores/ 24-threads, compared to Intel's competing 8-Core/16-threads CPU. With more cores, it's able to process more threads, which is very important when rendering (3D Photorealistic rendering in this case) and using multiple applications.

AMD Ryzen 9 3900X Processor Specifications

Clock Speed	3.8 GHz / 4.6GHz (Core/Boost)
No. of Cores	12 Cores / 24 Threads
Maximum Supported Memory	128 GB

Socket Type	AM4
TDP	105 W
Integrated Graphics	None
Includes CPU cooler	Yes

Price: $434.00

Motherboard: Gigabyte X570 AORUS ELITE
This is a wallet-friendly AMD X570 chipset motherboard for third generation Ryzen Processors. It is an ATX form factor motherboard and supports overclocking (increasing clock rate, running the computer at a higher speed). The motherboard comes with all of the basics, including PCIe 4.0 support, dual PCIe 4.0 M.2 slots, an integrated I/O shield, large heatsinks covering the VRM and front panel USB Type-C support, among other features. The four DIMM slots are capable of supporting up to 128GB of RAM and speeds of up to DDR4-4000 (when overclocked).

Gigabyte X570 AORUS ELITE Specifications

Socket Type	AM4
Form Factor	ATX
Chipset	AMD X570
Memory Max	128 GB
Memory Type	DDR4
Memory Slots	4
Memory Speed	- DDR4-2133 - DDR4-2400 - DDR4-2666 - DDR4-2933 - DDR4-3200 - DDR4-3300 - DDR4-3333 - DDR4-3400 - DDR4-3466 - DDR4-3600 - DDR4-3733 - DDR4-3800 - DDR4-3866 - DDR4-4000

SLI/CrossFire	CrossFire Capable
PCI-E x16 Slots	2
PCI-E x8 Slots	0
PCI-E x4 Slots	0
PCI-E x1 Slots	2
PCI-E Slots	0
Onboard Ethernet	1 x 1000 Mbits/s
SATA 6 Gb/s	6
M.2 slots	2
mSATA Slots	0
Onboard USB3.0 Headers	Yes
Supports ECC	No
Wireless Networking	None
RAID Support	Yes

Price: $199.00

RAM: G.Skill Ripjaws V 32GB

AutoCAD recommends 16GB of RAM, but we chose one with 32GB, which will allow more applications to be opened and will increase performance. It has a speed of 3600 GHz and maintains a CAS latency of 16, which is good compared to other RAM with the same speed. The high speed and low CAS latency allows for more efficiency.

<div align="center">G.Skill Ripjaws V 32GB Specifications</div>

Speed	DDR4-3600
Type	288-pin DIMM
Modules	4 x 8GB
CAS Latency (the lower the better)	16

Price: $172.99

Graphics Card: Asus STRIX GAMING Advanced

AutoCAD recommends 4GB GPU, but this graphics card has 8GB. It has a core clock of 1650MHz, but it has a boost clock of 1860 MHz. This helps render graphics faster. The graphics card is one of the most important components when it comes to rendering because it handles the graphics and allows your computer's CPU to handle other tasks. The card also has a sufficient heatsink that keeps the processor cooled. With the GeForce RTX 2080 SUPER chipset, it allows your screen to run more smoothly and react with more light, reflections, and other details, giving it a more vibrant look.

Asus STRIX GAMING Advanced Specifications

Manufacturer	Asus
Chipset	GeForce RTX 2080 SUPER
Memory:	8 GB
Core Clock	1650 MHz
Boost Clock	1860 MHz
Interface	PCIe x16
Frame Sync	G-Sync

Price: $584.99

Storage: Corsair MP600 Force Series Gen4
We chose a 2TB SSD to ensure that there is enough storage for many years. HDDs are cheaper than SSDs, but SSDs are much faster, more durable, and more power-efficient.

Corsair MP600 Force Series Gen4 Specifications

Capacity	2TB
Type	SSD
Cache	1024 MB
Form Factor	M.2 2280
Interface	M.2 (M)

Price: $399.99

OS: Microsoft Windows 10 Home OEM 64-bit
The operating system AutoCAD 2020 for Windows can be any of the three listed in the System requirements for AutoCAD 2020 including Specialized Toolsets (Windows) table.

Microsoft Windows 10 Home OEM 64-bit Specifications

Manufacturer	Microsoft
Part #	KW9-00140
Type	Windows
Mode	64-bit
Version	Windows 10 Home
Maximum Supported Memory	128 GB

$109.99

Power Supply: EVGA SuperNOVA G3
With 850W, this PSU will be able to consistently supply the computer with power. It will also be prepared for any future upgrades that will increase the amount of power the computer uses. It has an efficiency rating of 80+ gold, which guarantees that power can efficiently be generated and converted. In addition, this power supply is fully modular which allows excellent cable management.

EVGA SuperNOVA G3

Manufacturer	EVGA
Efficiency Rating	80+ Gold
Wattage	850W
Modular	Full
Type	ATX

Price: $169.99

Case: Fractal Design Meshify C
The tempered glass side panel will help with air flow. It is more scratch resistant than acrylic side panels, and acrylic side panels can warp when hot.

Phanteks ECLIPSE P350X Specifications

Type	ATX Mid Tower
Power Supply	None
Side Panel Window	Tinted Tempered Glass
External 5.25" Bays	0

Internal 3.5" Bays	2
Internal 2.5" Bays	3

Price: $97.98

Network: D-Link DXE-820T

We chose a wired network over a wireless network because although less convenient, a wired network is generally much faster and secure than a wireless since the only way to access the network is through the cable connecting to the device, so there's nothing interfering between them.

D-Link DXE-820T

Manufacturer	D-Link
Part #	DXE-820T
Interface	PCIe x8
Ports	2 x 10 Gbit/s
Features	Product type: 10 Gigabit Ethernet Card

Price: $315.27

Keyboard: Logitech K830

The Logitech K830 has an all-in-one design, while still sustaining a full sized sturdy keyboard. Although the keyboard is light, it still has a solid build to it, making it comfortable, convenient, and sturdy. What's exciting about this composition is the touchpad that's attached to it, which can successfully operate basic functions that a mouse can perform. And even with this multifunctioning keyboard, it possesses long battery life. The keyboard is finished off with a sleek backlit LED lighting. Maintaining the overall convenience, this keyboard is wireless and supports both bluetooth connections and a dongle system - where you use a removable USB cable- making it compatible with most computers.

Logitech K830 Specifications

Manufacturer	Logitech
Style	Standard
Backlit	White
Connection Type	Wireless
Mouse Included	Touchpad

$88.99

Mouse: Razer Mamba Wireless
The Razer Mamba Wireless mouse has a built in battery balancing it out to the perfect weight, but also has rubber grips on the side making up for the bulkier build. This mouse also contains pads surrounding the 16000 DPI. With such a high DPI, it allows the mouse to detect and react to smaller movements. And with the wireless feature, the mouse can be used more conveniently.

Razer Mamba Wireless Mouse Specifications

Manufacturer	Razer
Connection Type	Wireless
Maximum DPI	160000
Hand Orientation	Right

Price:$44.99

Monitor: Lenovo L24q 23.8" 2560x1440 60 Hz Monitor
This monitor has high definition that allows you to view the smallest details, its screen is also a near-edgeless infinity screen providing an enhanced viewing experience. You can tilt the screen from -5 to 22 degrees based on your preferences. As someone who works on a computer for possibly hours continuously, this monitor allows your viewing experience to be one of minimized reflection and will not leave your eyes feeling tired. It is built with HDMI and DP interfaces, allowing you to connect to your PC, laptop, and more.

Lenovo L24q 23.8" 2560x1440 60 Hz Monitor Specifications

Manufacturer	Lenovo
Model	L24q
Part #	65D2GCC3US

Screen Size	23.8"
Resolution	2560x1440
Refresh Time (G2G)	4 ms
Panel Type	IPS
Aspect Ratio	16:9
Brightness	350 cd/m²
Widescreen	Yes
Curved Screen	No
Interface	● HDMI ● DisplayPort
Frame Sync	None
Built-in Speakers	No
DisplayPort	1
HDMI	1
Viewing Angle	178º H x 178º V

$199.99