How to Build a Desktop PC

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Submitted to
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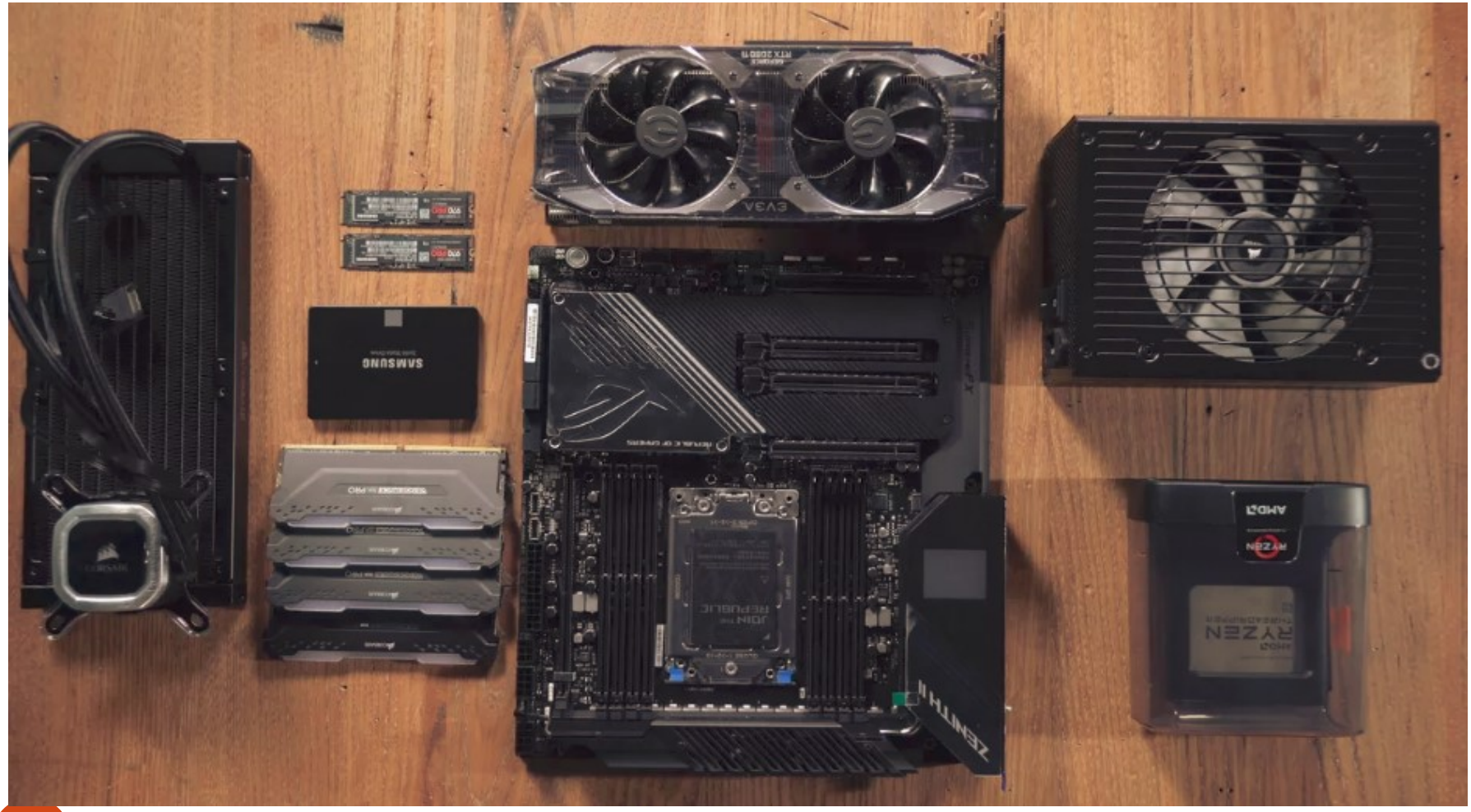
Contents

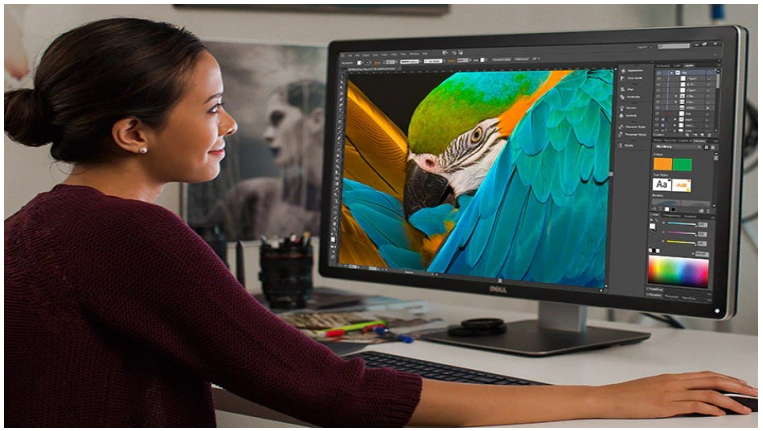
- PC Building And Steps
- Choosing Components
- Useful Online Tools
- Installing Hardware Components
- Installing Operating System

Build Up A Desktop Computer



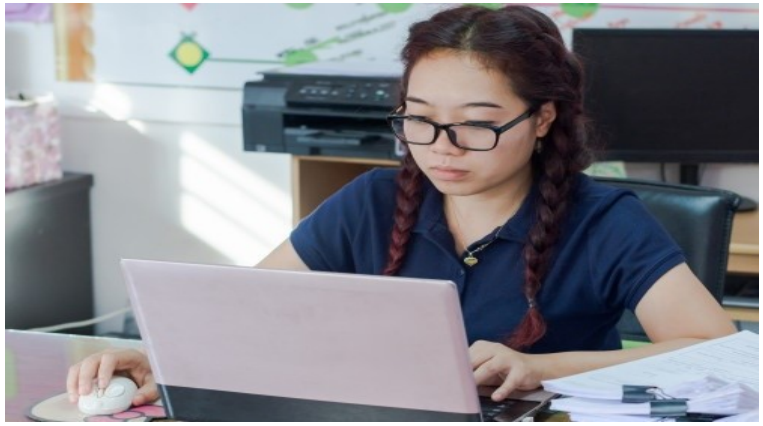
Determine the use of the Computer

For Gaming



For Graphic Designing

For Programming



For General Work

Required Materials

Case with Power Supply

Motherboard

Processor with Cooler

Primary Memory

Secondary Memory (HDD)

Optical Derive

Required Materials

Monitor

Keyboard

Mouse

Cables

Operating System Software

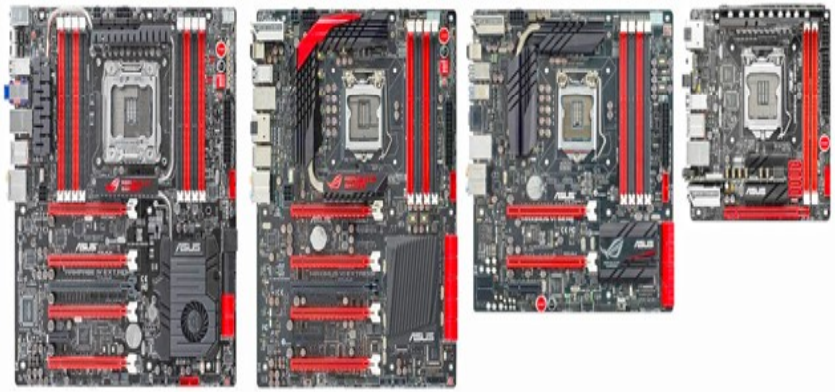
Additional Required Items

- Screw Driver
- Screw, Cable Tie
- Thermal Paste
- Blade/Anti Cutter/Sharp item

Choosing Mother Board

- Here's a listing suitable motherboards for various purposes based on features, performance, and compatibility:

Purpose	Motherboard	Key Features	Price Range
Gaming	ASUS ROG Strix Z790-E Gaming WiFi	PCIe 5.0, DDR5, advanced cooling, RGB lighting, Wi-Fi 6E, high-end VRM	$400+
Gaming	MSI MPG B550 Gaming Edge WiFi	PCIe 4.0, DDR4, Wi-Fi 6, good VRM for overclocking	$250+
Graphic Designing	Gigabyte Z790 AERO G	PCIe 5.0, Thunderbolt 4, DDR5, multiple M.2 slots, advanced audio	$600+
Graphic Designing	ASUS ProArt X670E-Creator WiFi	PCIe 5.0, DDR5, dual Thunderbolt 4, multi-GPU support	$500+
Programming	ASUS TUF Gaming B760M-PLUS WiFi D4	PCIe 4.0, DDR4, reliable build quality, budget-friendly	$150+
Programming	MSI PRO B550M-VC WIFI	PCIe 4.0, DDR4, compact design, solid performance	$160+
General Work	Gigabyte B760 DS3H DDR4	DDR4, PCIe 4.0, affordable, basic connectivity	$100+
General Work	ASRock B450M PRO4	DDR4, compact design, cost-effective, good enough for general tasks	$120+

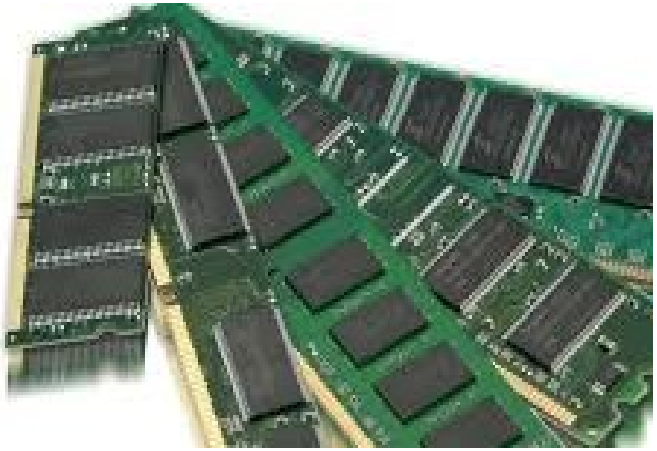


Choosing CPU

Purpose	Recommended CPUs	Key Features	Examples	Supported Motherboard
Gaming	- AMD Ryzen 7 7800X3D - Intel Core i7-13700K - AMD Ryzen 5 7600X	- High core clock speed - Good single-threaded performance - Moderate cores	- Best: Ryzen 7 7800X3D for its gaming optimization with 3D V-cache - i7-13700K offers strong gaming and multitasking performance	1. ASUS ROG Strix Z790-E Gaming WiFi 2. MSI MPG B550 Gaming Edge WiFi
Graphic Designing	- AMD Ryzen 9 7950X - Intel Core i9-13900K - Apple M2 Max (macOS-specific)	- High core count - Multi-threaded performance - Fast memory support	- Ryzen 9 7950X for heavy workloads - i9-13900K balances design and 3D rendering	1. Gigabyte Z790 AERO G 2. ASUS ProArt X670E-Creator WiFi
Programming	- AMD Ryzen 5 7600 - Intel Core i5-13600K - Apple M1/M2 (for macOS users)	- Balanced performance - Multi-core for compiling - Efficient cores	- i5-13600K for a budget-friendly, reliable option - M1/M2 excels for macOS development	1. ASUS TUF Gaming B760M-PLUS WiFi D4 2. MSI PRO B550M-VC WiFi
General Work	- Intel Core i5-12400 - AMD Ryzen 5 5600 - Apple M2 (macOS users)	- Cost-effective - Energy-efficient - Moderate performance	- i5-12400 for daily productivity - Ryzen 5 5600 offers great value for general tasks	1. Gigabyte B760 DS3H DDR4
Budget Option	- AMD Ryzen 3 5300G - Intel Core i3-12100	- Affordable - Enough cores for light workloads - Decent GPU support	- Ryzen 3 5300G includes Vega graphics for entry-level gaming or light work	

Choosing RAM

Use Case	Recommended RAM Size	RAM Type	Speed (MHz)	Key Considerations
Gaming	16 GB - 32 GB	DDR4 / DDR5	3200 MHz - 6000 MHz	Focus on high-speed RAM for better performance in modern games. Ensure compatibility with your motherboard.
Graphic Designing	32 GB - 64 GB	DDR4 / DDR5	3200 MHz - 4800 MHz	More capacity is better for handling large files and multitasking. Consider ECC RAM for critical workflows.
Programming	16 GB - 32 GB	DDR4 / DDR5	2666 MHz - 3600 MHz	For heavy IDEs or multiple VMs, prioritize capacity. Casual programming can manage with 16 GB.
General Work	8 GB - 16 GB	DDR4	2400 MHz - 3200 MHz	Sufficient for office tasks, browsing, and light multitasking. Consider 16 GB for smoother performance.



Choosing Hard Disk Drive

Feature	SATA HDD	SAS HDD	SSD (Solid State Drive)
Full Name	Serial ATA Hard Disk Drive	Serial Attached SCSI Hard Disk Drive	Solid State Drive
Storage Capacity	500GB - 10TB	300GB - 15TB	120GB - 4TB+
Interface	SATA III (6Gbps)	SAS (12Gbps or 24Gbps)	SATA III, NVMe (PCIe), M.2
Speed (RPM)	5,400 - 7,200 RPM	7,200 RPM - 15,000 RPM	500MB/s - 7GB/s (depending on type)
Performance	Moderate performance	High performance, optimized for servers	Very high performance, much faster than HDDs
Durability	Less durable (susceptible to shocks)	High durability and reliability	Highly durable with no moving parts
Power Consumption	Moderate power consumption	High power consumption	Low power consumption

Choosing Power Supply

	Full Modular	Semi modular	Non-Modular
			
Air Flow	Better airflow due to fewer cables in use	Decent airflow, but partially limited by fixed cables.	Restricted airflow due to unused fixed cables.
Temperature	Lower temperatures due to reduced cable clutter	Moderate temperatures, depending on cable .	Higher temperatures due to poor cable.
Aesthetics	Clean and minimalistic look, fully customizable cables.	Clean look with fewer loose cables	Messy look with unneeded fixed cables
Convenience	Easy to install and manage cables, fully customizable.	Moderately easy, with some fixed cables	Challenging to manage cables, less flexibility
Customize	Highly customizable	Partially customizable.	No customization

Case

- **Air Flow :**

  Fan Placement: Cases with pre-installed fans or space for additional fans can improve airflow.

  Intake/Exhaust Design: Ensure there's adequate intake (front) and exhaust (rear/top) venting for optimal air circulation.

  Cable Management: Cases with good cable routing options help avoid airflow obstructions.

  Dust Filters: Cases with dust filters prevent dust buildup, maintaining efficient airflow over time.

- **Dimensions :**

  Full Tower: Large cases for E-ATX motherboards, multiple GPUs, and extensive cooling setups.

  Mid Tower: Most common size, supports ATX motherboards, good for general builds.

  Mini Tower: Compact cases for micro-ATX or mini-ITX boards, limited expandability.

  Small Form Factor (SFF): Ultra-compact cases for mini-ITX boards, ideal for portable setups but with limited airflow.

Useful Tools

- There are some websites that provide incredibly thorough product details, along with user evaluations and links to purchase the item from verified e-commerce sites. Two of them are

- https://pcpartpicker.com/
- https://www.startech.com.bd/

Precautions

Fig: Do not connect with Power

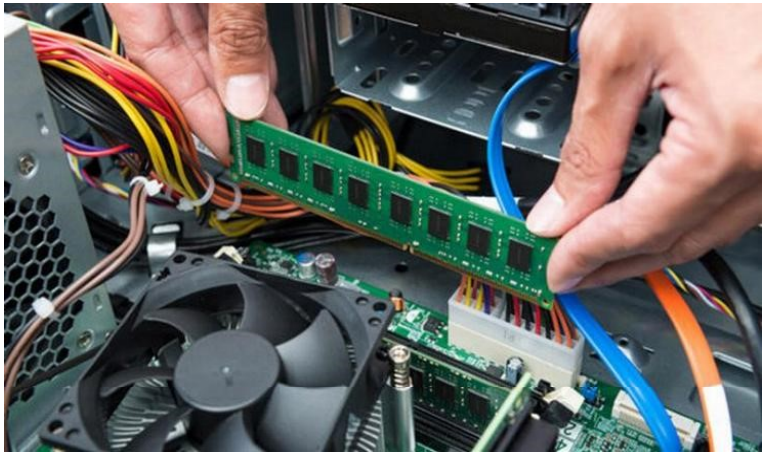


Fig: Place each component far from other

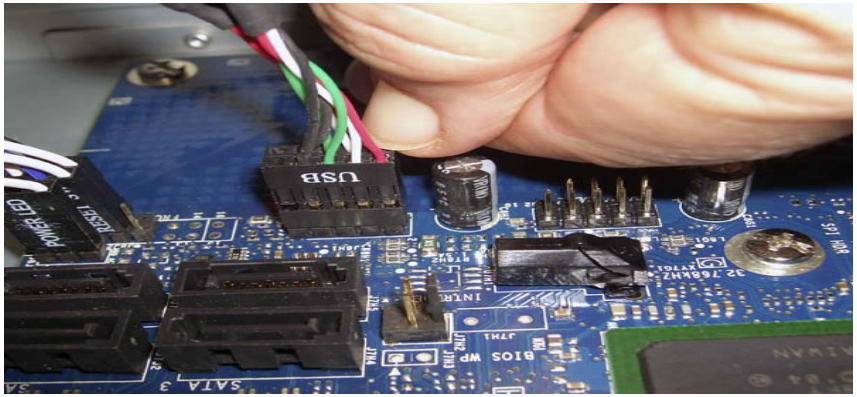


Fig: Take cares to join the connectors

PC Assemble Step-1

Fig: Get the computer case Ready

Step-2(Motherboard Installation)

I. Ensure ports fit snugly into the I/O shield.
II. We will take the motherboard and gently lower it at 45 degree angle.
III. Use screws to fasten the motherboard to the standoffs. Do not overtighten.
IV. Lastly we secure the broad with each of the supplied screws

Fig: **Install the motherboard**

Step-3 (Install the Power Supply)

I. Determine the PSU placement and open the PC case.
II. Set the voltage on the power supply to 110v or 115v.
III. Insert the power supply and screw it into place.
IV. Attach both power cables to the motherboard.
V. Attach the power supply's smaller cables to other components.

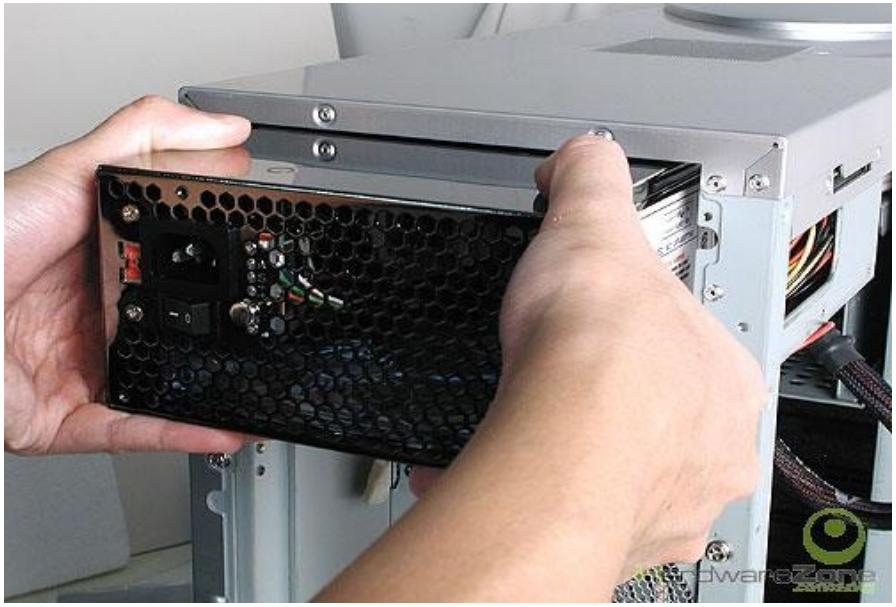


Fig: **Install the Power Supply**

PC Assemble Step-4

- Determine the PSU placement and open the PC case
- If necessary, remove the motherboard from the case.
- Clean the socket.
- Install the new processor.
- Place the thermal paste on the processor.
- Install your processor cooler.

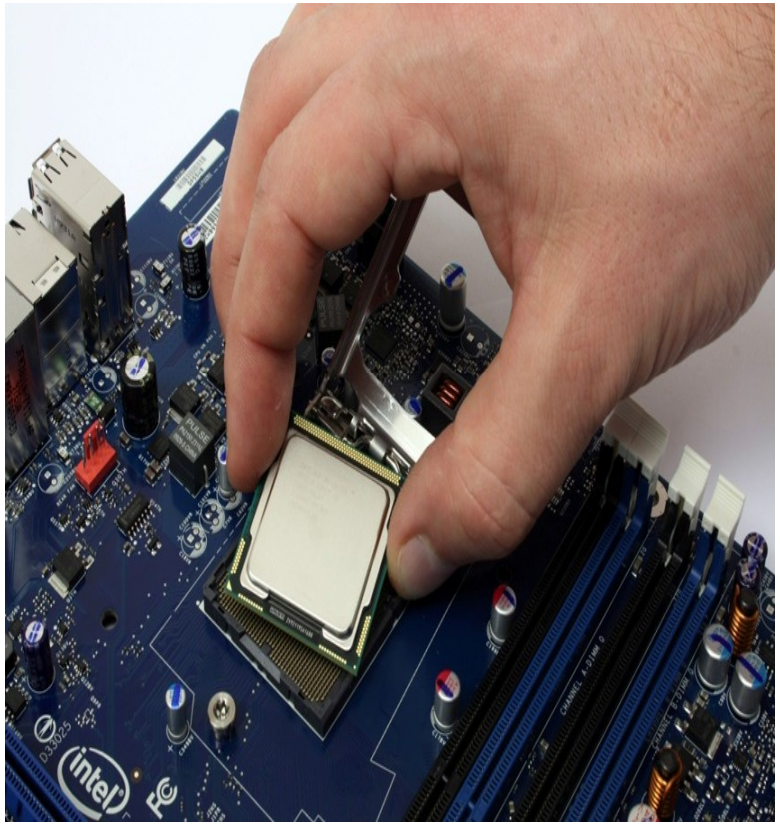


Fig: Install the Processor

Step-5(Place the Heatsink)

- Attach fan to heat dissipater with screws, using spacers between.
- Attach fan/dissipater to chassis.
- Situate mounting ring according to diagram.
- Place special screw extenders into mounting ring.
- Apply thermal paste to the center of the CPU mounting position on the motherboard.

Fig: Place the Heatsink and Fan

Step-6(Insert a memory module (RAM)

- Locate the RAM Slots. Find the RAM slots on the motherboard.
- Install the RAM Modules. Open the clips at both ends of the RAM slot.
- Verify the Installation. Ensure the modules are firmly seated.

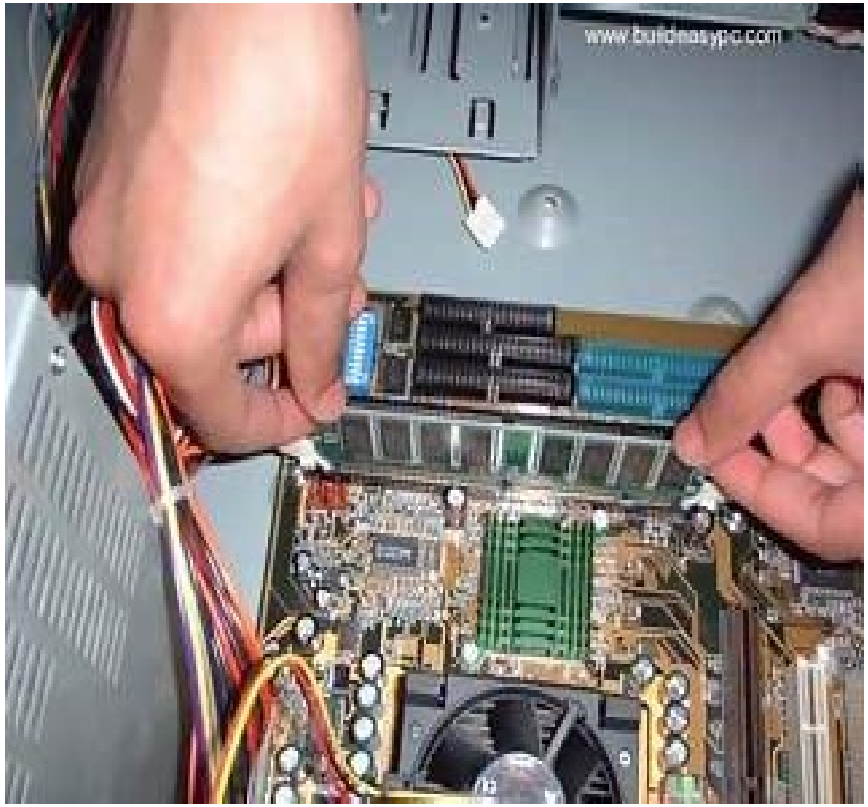


Fig: Insert (RAM)

Step-7(Install Hard drive (HDD)

- Locate the existing drive or storage location .
- Connect the SATA cable and power cord to the hard disk.
- Connect the SATA cable and power cord to the board of the machine

Fig: Install Hard drive (HDD)

Step-8(Join all the cables with connectors)

1. This PCIE port consists of eight pins, two rows of four.
2. Connect the "Power LED+" pin to the pin at the top right corner.
3. Connect the "Power LED-" segment to the pin next to the "Power LED+" segment in the top row.
4. Connect the "Power SW" segment to the two pins on the left side of the top row of pins

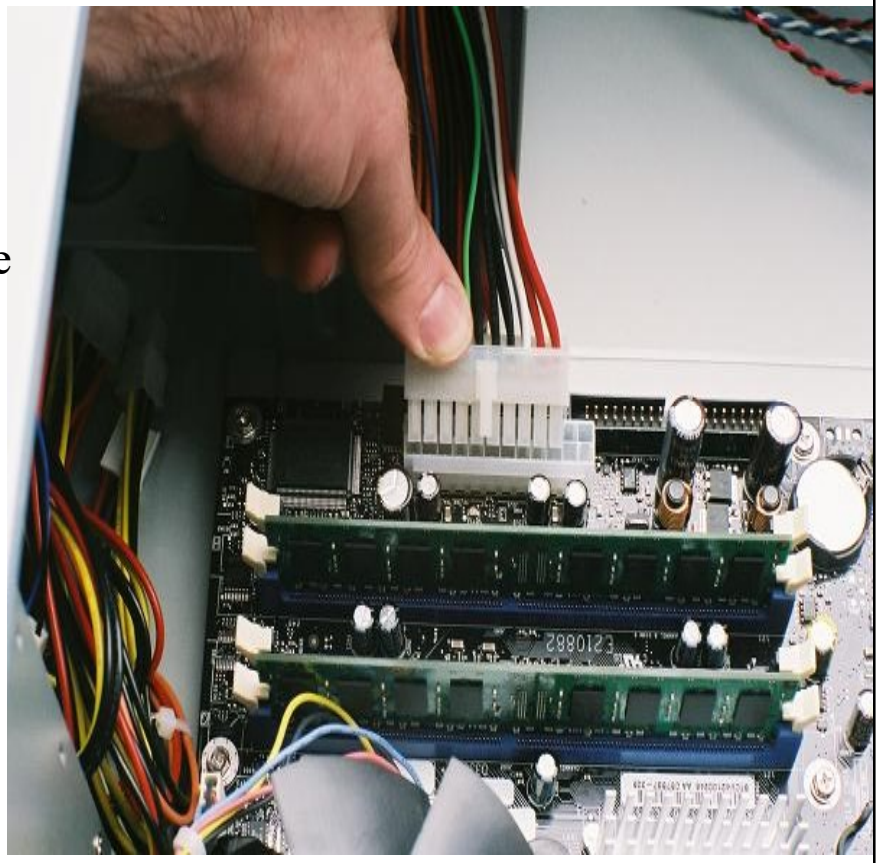


Fig: Join all the cables

PC Assemble Step-9

Fig: Cover up the System Case

Step-10(Connect Peripherals)

Keyboard: Keyboard use the USB or PS/2 interface.

Mouse: To connect a mouse to a motherboard, you can use a USB cable or a Bluetooth connection

•Plug the mouse into a USB port on the motherboard

•Plug the Bluetooth dongle adapter into a USB port on the compute

Monitor: A monitor can be connected to a motherboard using a cable that plugs into a port on the motherboard. The type of cable and port depends on the monitor, motherboard. Common cables include HDMI, DisplayPort, USB-C, VGA, and DVI.

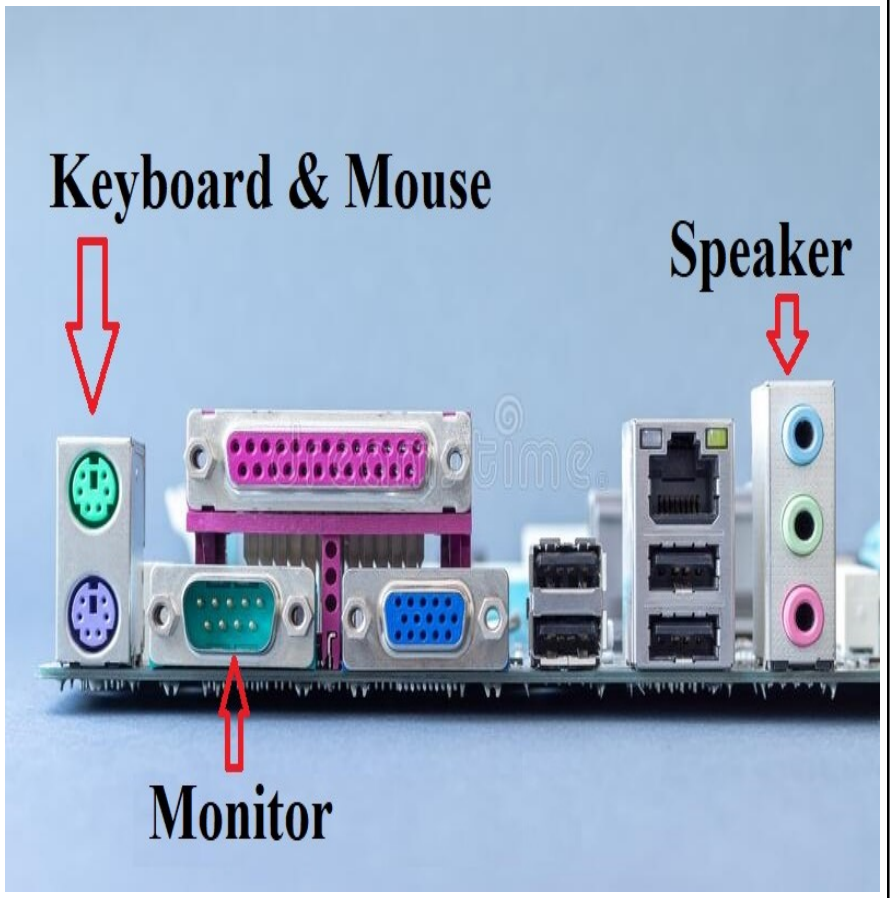


Fig: Connect Mouse, Keyboard & Monitor from the Back panel

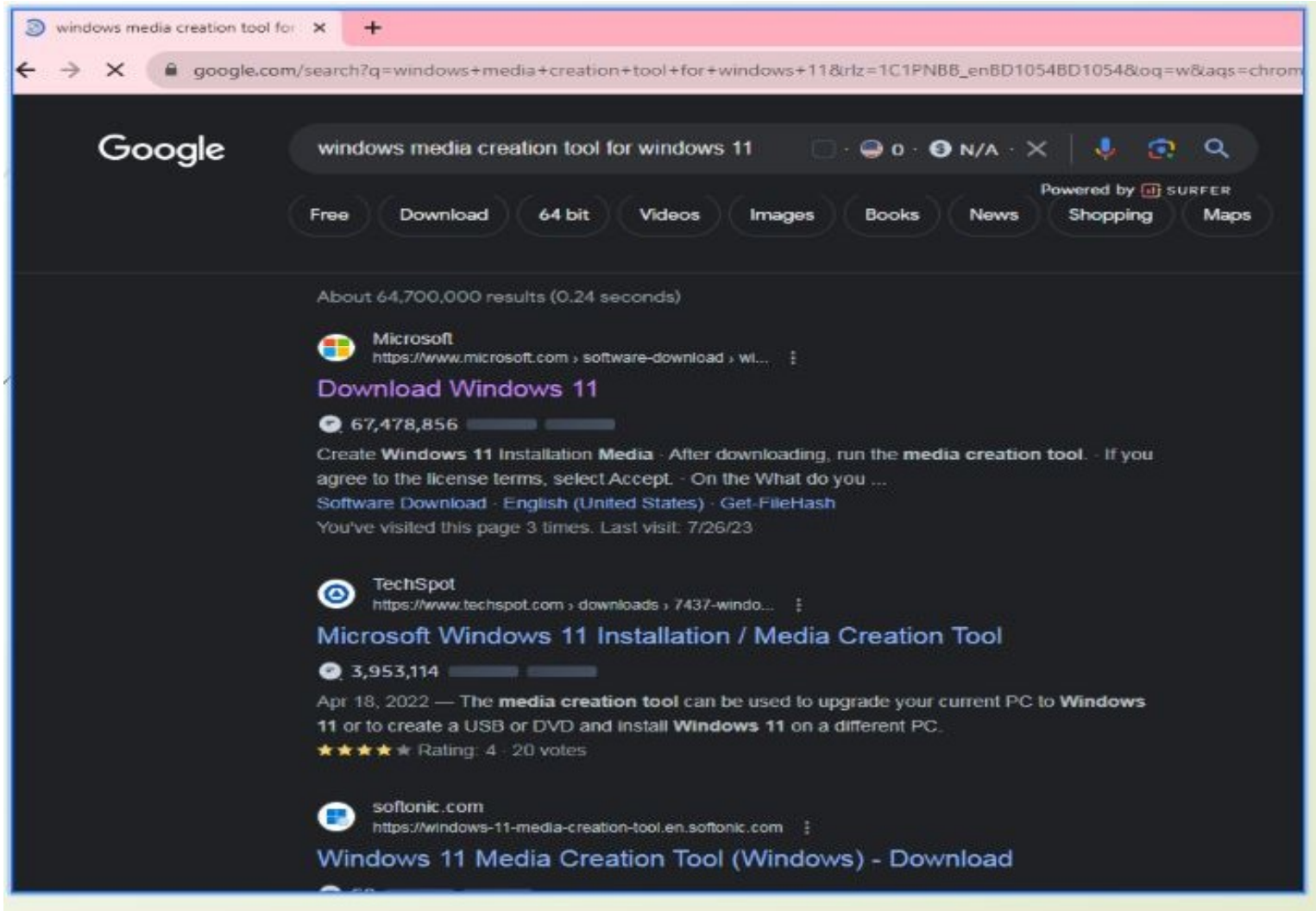
PC Assemble Step-11

Fig: Install Operating System

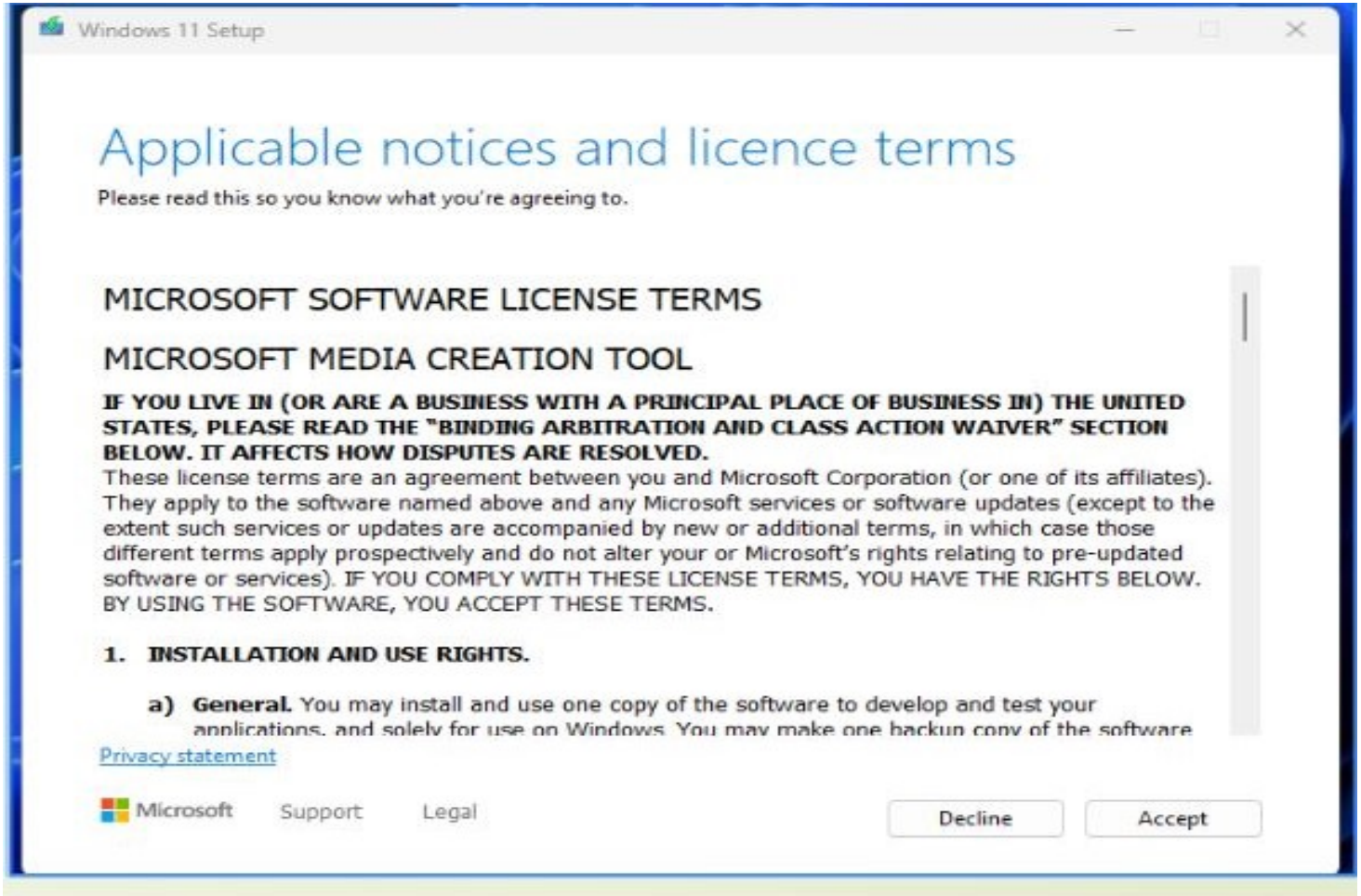
Requirements to install Windows 11

- **Processor:** 1 gigahertz (GHz) or faster with two or more cores on a compatible 64-bit processor or system on a chip (SoC).
- **Memory**: 4 gigabytes (GB) or greater.
- **Storage**: 64 GB or greater available disk space.
  Graphics card: Compatible with DirectX 12 or later, with a WDDM 2.0 driver.
- **System firmware:** UEFI, Secure Boot capable.
- **TPM**: Trusted Platform Module (TPM) version 2.0.
- **Display**: High definition (720p) display, 9" or greater monitor, 8 bits per color channel.

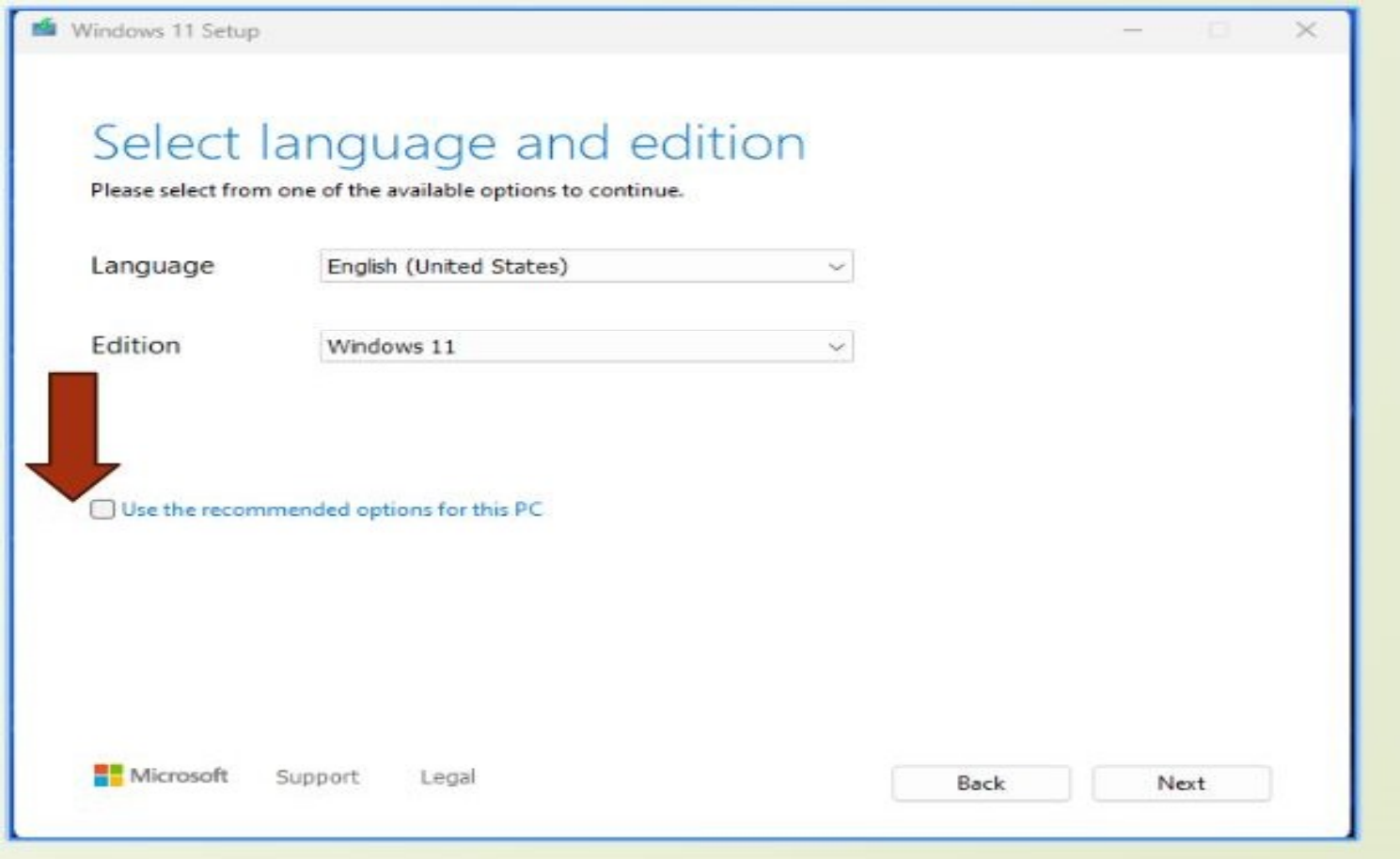
Booting USB Flash Drive



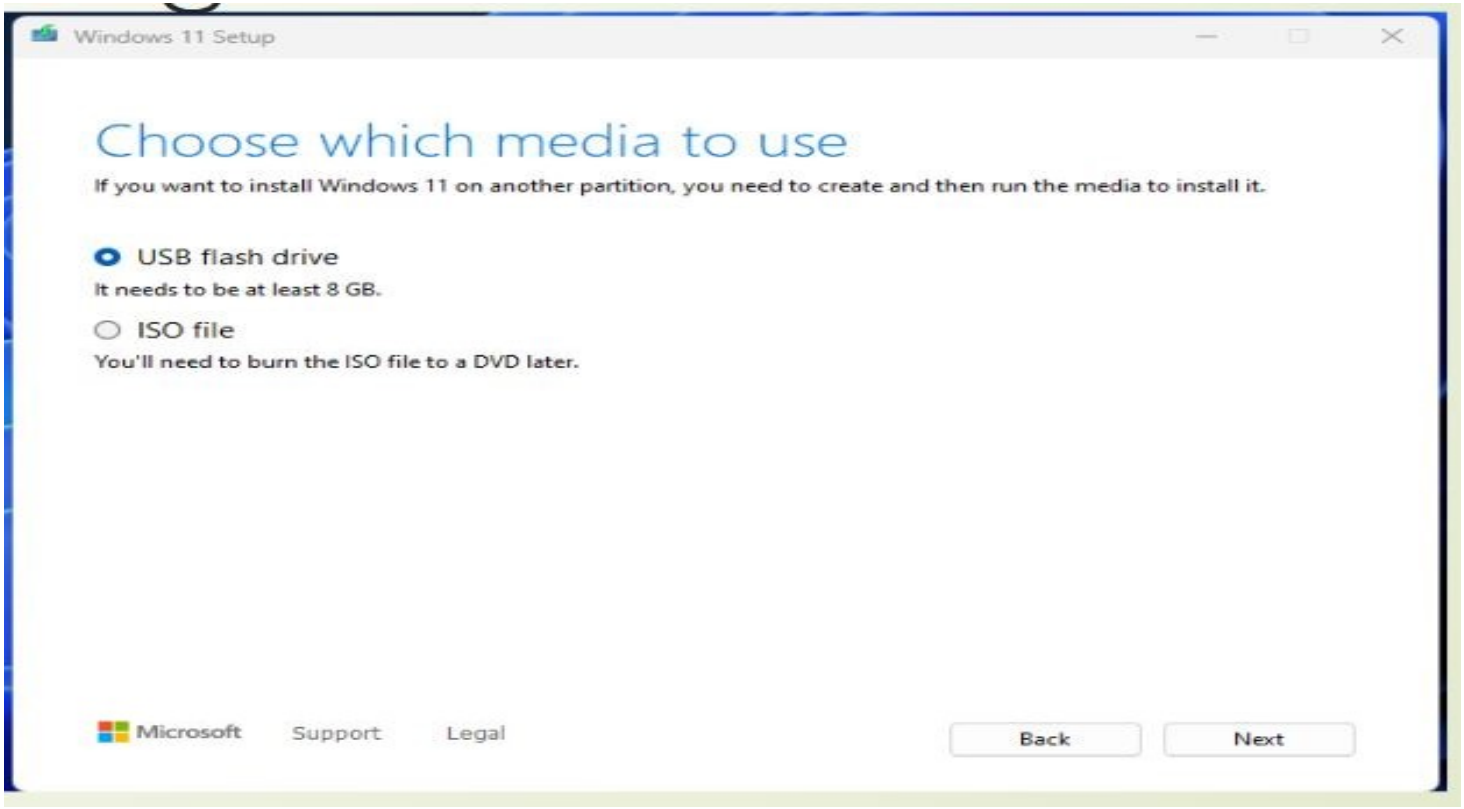
Booting USB Flash Drive



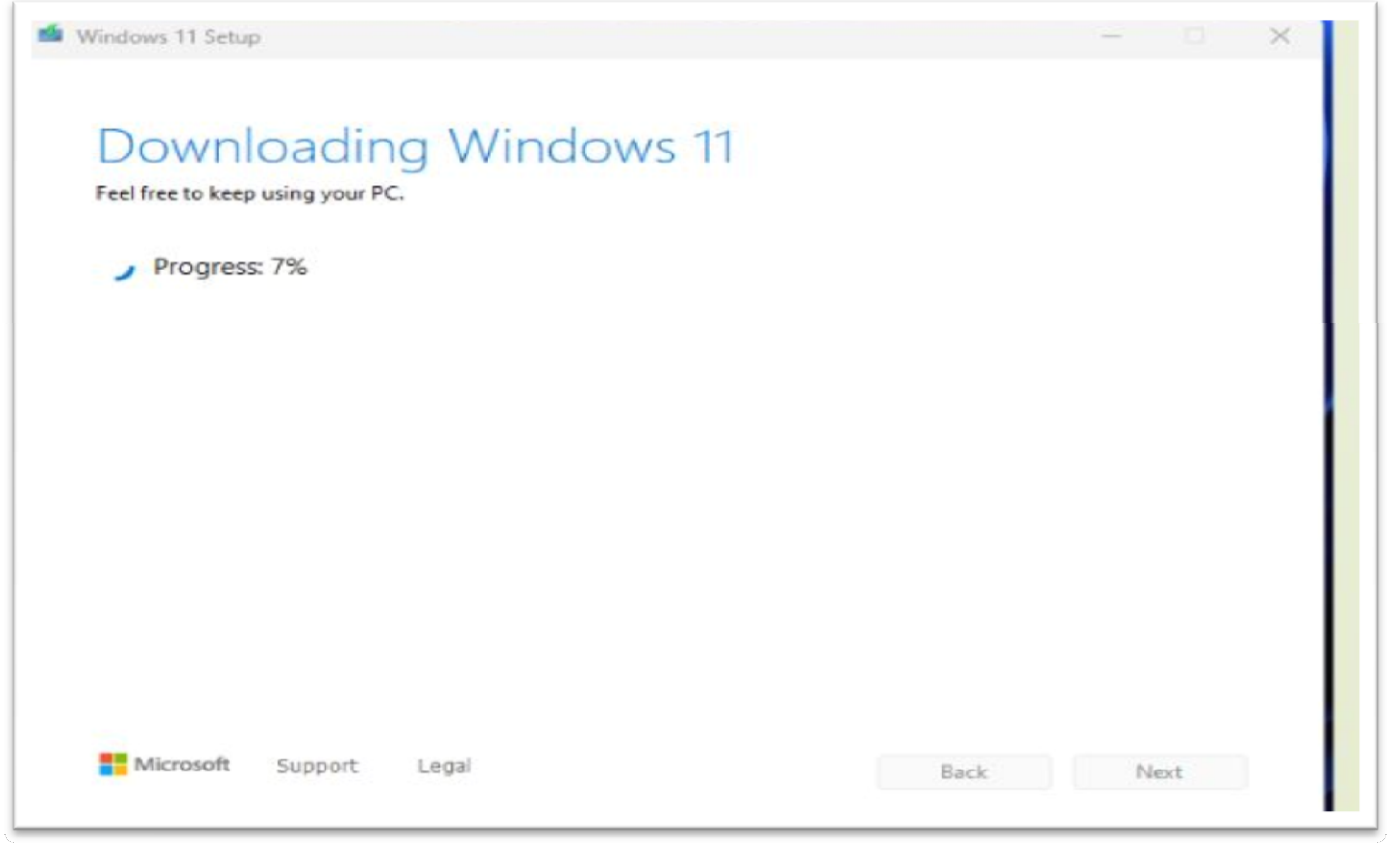
Booting USB Flash Drive



Booting USB Flash Drive



Booting USB Flash Drive

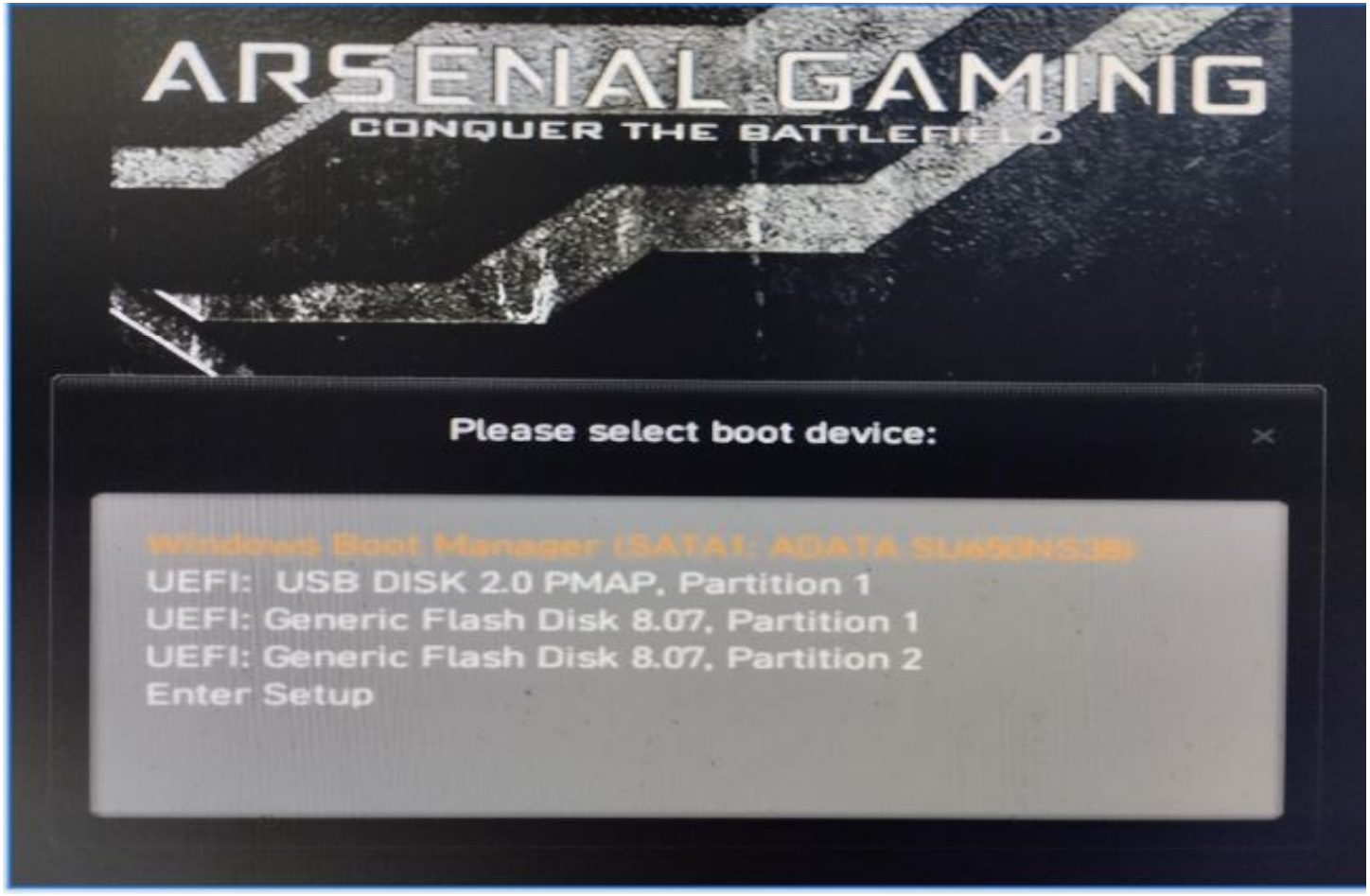


Entering into the BIOS or CMOS

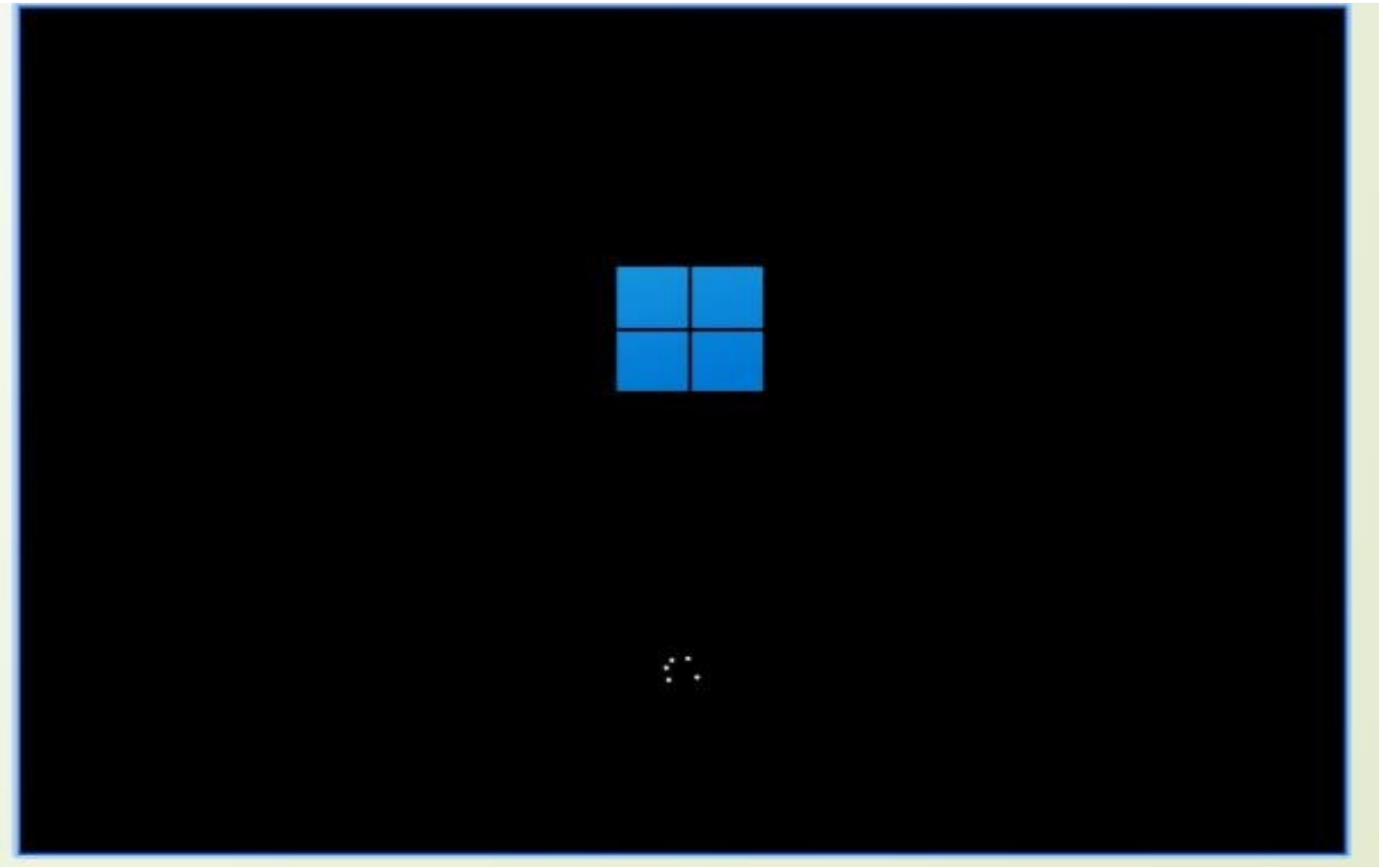
- **ASUS**: F2 or DEL
- **Acer**: F2 or DEL
- **Dell**: F2 or F12
- **Gigabyte:** F2 or DEL
- **HP:** F10/Esc
- **Lenovo (Laptops):** F2 or Fn + F2
- **Lenovo (ThinkPad):** Enter then F1.
- **MSI:** DEL/F11
- **Samsung:** F2
- **Toshiba:** F2

Check the Boot Priority

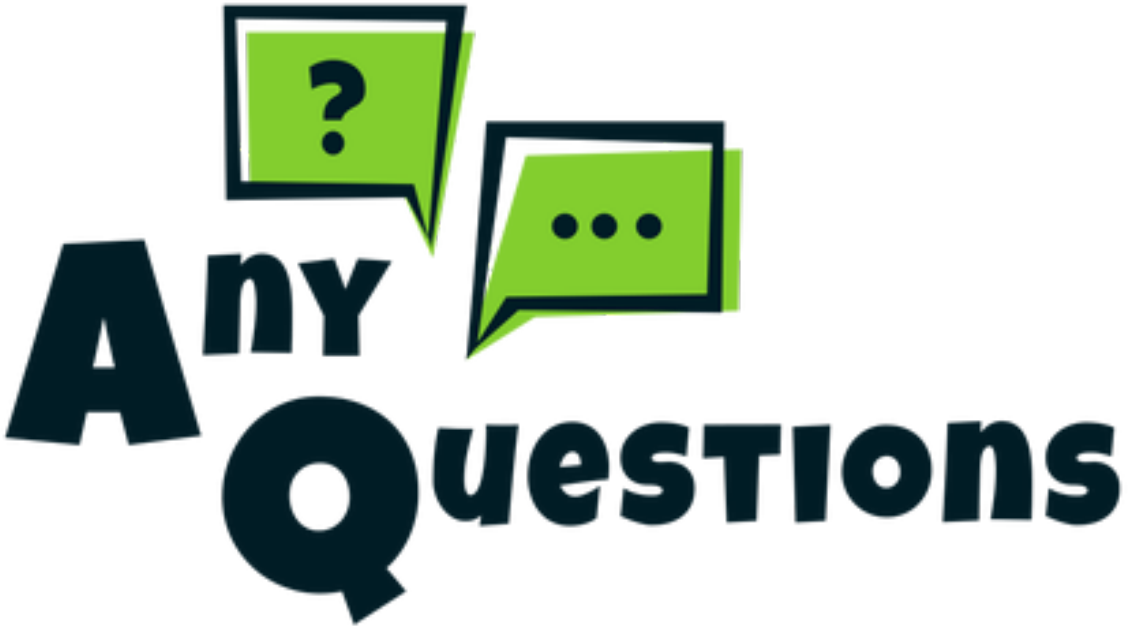
Select the Boot Device (F11)



Installing Windows Process



Ready to use


Any Questions