

A Guide for Building a PC

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Introduction

Welcome to “A Guide for Building a PC”, designed to help you navigate the complexities of building a PC and successfully help you build your very first PC. Whether you’re an experienced builder looking to refresh your memory or a new builder trying to build their very first PC, this documentation provides comprehensive guidance to enhance your experience.

Building your custom PC can be a rewarding experience, providing you with a machine tailored to your needs. This step-by-step guide will walk you through the process of installing the components of your PC. Putting together a PC might sound like an impossible task, but through this guide, you will learn that it is much simpler than you think.

Getting Started

All the necessary screws for assembly are included in the motherboard box or come with the case. Other tools you might need include a Phillips #2 screwdriver, a small tray to hold screws, manuals for reference, cable ties, and a clean workspace.

What is a PC?

A "PC" stands for "Personal Computer," and it refers to a type of computer designed for individual use by an end-user or you, rather than for specialized, industrial, or commercial purposes. PCs come in various forms, including desktops, laptops, and even tablets, and they are distinguished by their general-purpose nature, which means they can be used for a wide range of tasks, such as word processing, web browsing, gaming, programming, video editing and much more.

Computer Case

The computer case, also known as chassis or tower, is the enclosure that houses and protects the internal components of the computer. It comes in various sizes and designs, providing space for hardware components and ensuring efficient airflow to prevent overheating.



Left Panel



Front Panel



Right Panel

Motherboard

The motherboard is the main circuit board for the computer, connecting all hardware components. It is the main body of the PC. It contains the CPU socket, RAM slots, expansion slots, and interfaces for connecting storage, peripherals, and more. The motherboard acts as the central nervous system, facilitating communication between all parts of the computer.



Processor (CPU)

The Central Processing Unit or CPU is the "brain" of the computer, responsible for executing instructions and performing calculations. It determines the computer's processing speed and is a critical factor in its overall performance. Processors from manufacturers like Intel and AMD power computers.



RAM (Memory)

RAM (Random Access Memory) is the computer's short-term memory, storing data that the CPU needs to process quickly. More RAM allows the computer to run multiple applications simultaneously and handle tasks efficiently without the risk of slowing down.



Power Supply

The PSU converts electrical energy from an outlet into a form that the computer's components can use. It provides power to all parts of the computer and ensures stable and reliable operation.



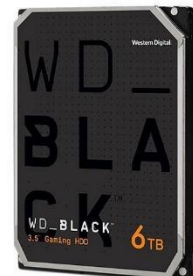
Graphics Card (GPU)

The Graphics Processing Unit or GPU handles graphics rendering and is essential for tasks like gaming, video editing, and graphic design. It can be integrated into the processor or a separate more powerful dedicated graphics card for enhanced performance. NVIDIA and AMD produce popular GPU options for gaming and professional applications.



M.2/SSD/HDD Storage

Storage devices, M.2 SSDs, Hard drives (HDDs) or Solid-State Drives (SSDs), store data and the operating system. HDDs offer more storage capacity at a lower cost but are slower, while SSDs are faster and more durable but typically more expensive. M.2 SSDs are currently the fastest and most expensive storage device.



Installation/Assembly Steps

Start with the Case

- Remove the case from its packaging or box.
- Unscrew the top and bottom screws found at the rear of the case to remove the left and right panels.
 - The left side provides access to the interior where all the components will be installed. The right side allows cables to route behind the motherboard to conceal any clutter from view.



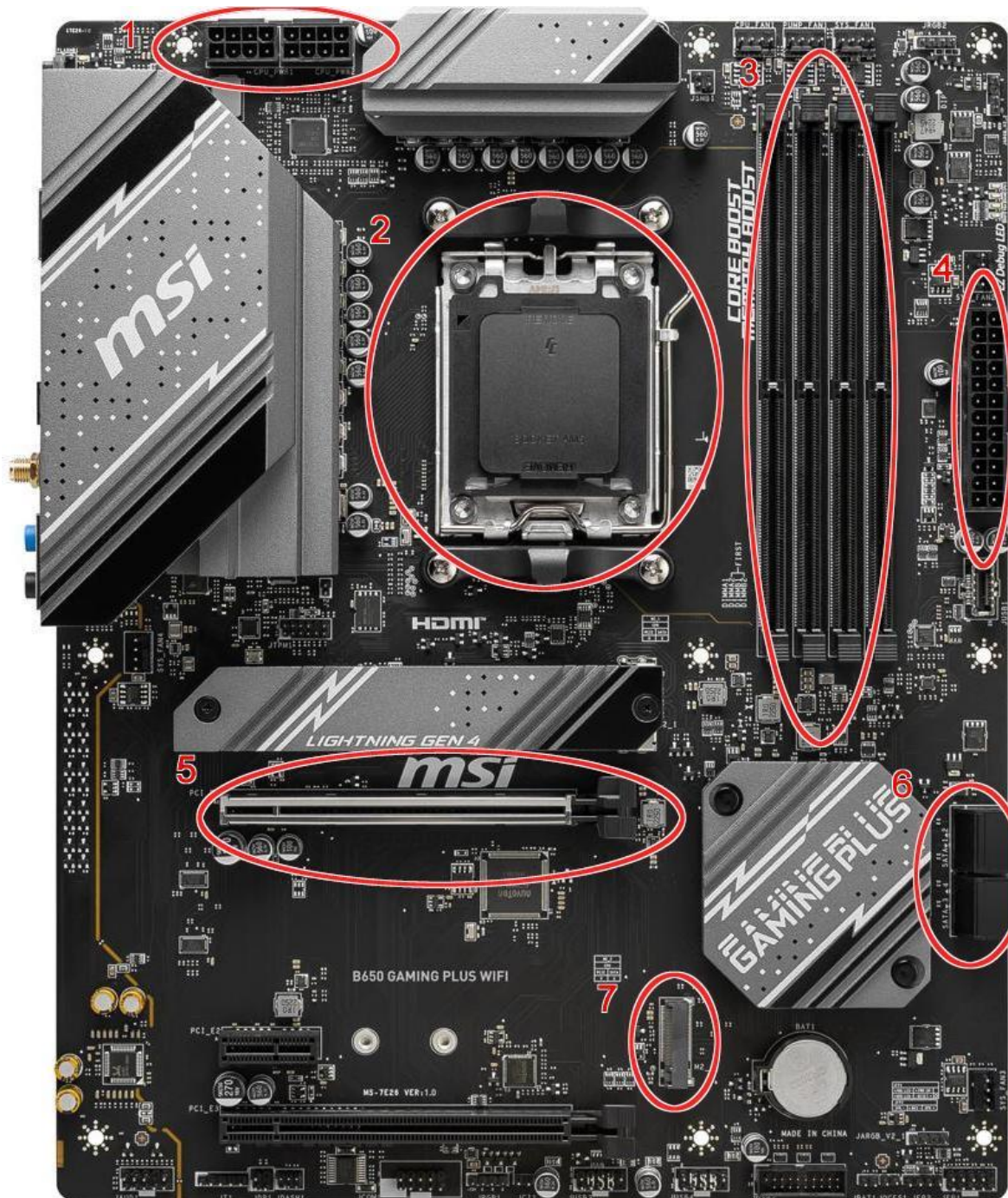
- Lay the case on its right side. This makes it easier to install the components.
- There are several holes in the interior of the case. Screw the standoff screws that come with the case into these holes.

Note: Standoffs screws fix the motherboard to the case and in some computer cases, this is already done for you.



Diagram of the Motherboard

Here are the most important parts of the motherboard that you will need to know about for building your PC.



- | | |
|-----------------------|---------------------|
| 1. 16 pin power | 2. Processor Tray |
| 3. Ram slots | 4. 24 pin power |
| 5. Graphics card slot | 6. SATA connections |
| 7. M.2 Connection | |

Attaching Components to the Motherboard Before Installation in Case

It is best to install the processor and ram sticks on the motherboard while the motherboard is outside the case, so you will have more room. Some cases can be small and make reaching into the case to install components more difficult.

Setting up the motherboard

- Remove the motherboard from the box and place the motherboard on top of the box.

Installing the Processor on the Motherboard

- Find the processor tray on the motherboard. Press down and to the right on the lever next to the processor tray. The lever should be free. Pull the lever up fully to gain access to the tray.
- Seat the processor in the tray, ensuring that the arrows on the processor and the processor tray line up.



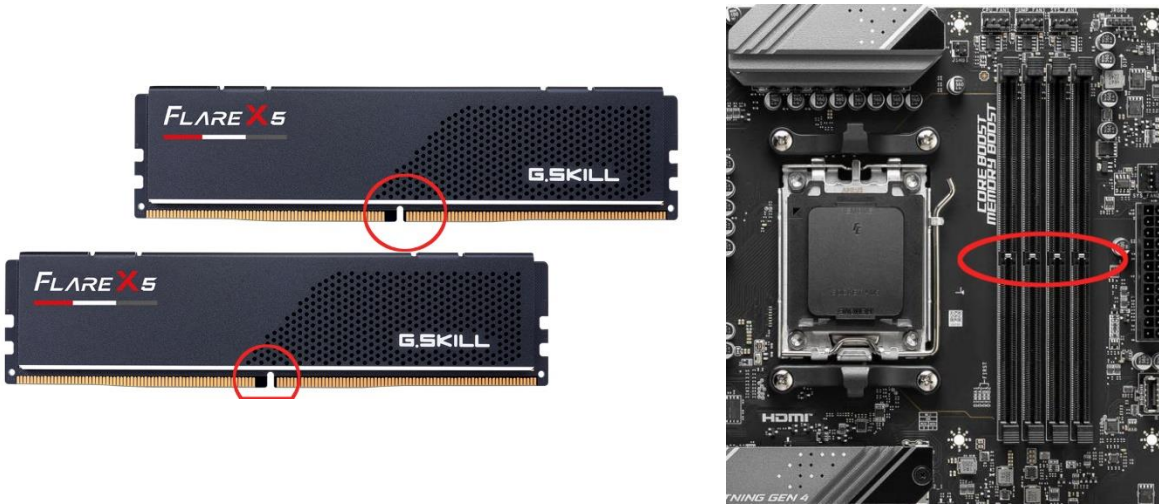
- Close the tray and engage the lock mechanism by pushing down on the lever and sliding it underneath the clip sticking out on the right.

Note: It is normal to occasionally hear a light crunching noise when engaging the lock.

- Install the included cooling fan on top of it. Each processor manufacturer may have slightly different steps depending on their cooler design, but most will have you unscrew preinstalled tabs to gain access to the screw holes around the processor.
- Make sure that the screw locations on the fan match with the holes on the motherboard.
- Screw the cooler in until secure.
- There are two major brands for processors, Intel, and AMD. Refer to instructions provided with the hardware for more specific instructions related to each brand.

Installing the RAM on the Motherboard

- To the right of the processor are slots for the RAM. There is a notch on the RAM sticks that corresponds with a similar notch on the motherboard slots.



- Align the RAM and push the RAM sticks into those slots until you hear the lock mechanism click.

Note: The motherboard may have two or four slots.

Placing the Motherboard in the Case

- Install the I/O plate that comes with the motherboard in the rear of the case.



- Test the placement of the motherboard in the case making sure that each mounting hole in the motherboard lines up with a standoff screw.
- When the placement is correct, fix it in place with the proper screws.
- Install the 4-pin motherboard speaker to its correct spot. The location of this spot is unique to each motherboard. Refer to the motherboard manual for the exact location for your motherboard.

Connecting the Graphics Card (GPU)



- Locate the large slot below the processor and RAM slots.
- Slot the graphics card in ensuring that the tab properly aligns until you hear a click from the lock mechanism.
- Secure the graphics card to the case by using a screw on the metal tab of the graphics card.

M.2 Drive Placement

- Find the connector for the M.2.
- Insert the M.2 drive at a 45-degree angle and push down until it is flush with the screw hole.
- Secure the drive with a screw.

Solid State Drive (SSD) Placement

- Most computer cases have mounts for SSDs either on the backside of where the motherboard mounts or in a tray behind the front panel.
- There are multiple mounting holes on the SSD. If there is a mounting plate from the case that mounts to the SSD it will use the holes at the bottom. If it mounts into a sliding tray, it will use the holes on the sides. Choose the ones that best match against the hardware of the computer case.
- Grab a SATA cable that comes with the motherboard. Plug one end into the SSD and plug the other end into the motherboard's SATA connectors.

Hard Drive (HDD) Placement

- Mount the Hard drive in the tray located right behind the front panel.
- Mounting hardware from the computer case will screw into the sides of the hard drive.

- Grab a SATA cable that comes with the motherboard. Plug one end into the SSD and plug the other end into the motherboards SATA connectors.

Connecting the Power Supply

- The power supply has several different connectors. Each one is appropriately labeled with a tag.
- Take the power supply out of its box and slide it into the compartment at the bottom of the case.



- Secure the power supply to the case by screwing in the proper screws.
- There should be an opening in the case near the bottom of the mounted motherboard that allows you to route cables through the back of the case.
- Find the 24-pin power connector and connect it to the 24-pin connection on the motherboard.
- Find the CPU 8-pin power cable and connect it to 8 pin connectors on the motherboard.
- Find the SATA power cable and connect it to the SDD or HDD.

Keeping Cables Tidy

- Now that you understand how to put a PC case together and know where all the connections need to be made if you would like to go back through the case and improve your cable management you are welcome to do so.

Cable Management Best Practices

Effective cable management in a computer case is essential for maintaining a tidy, efficient, and well-ventilated system. Here are some best practices for cable management to ensure that your PC is well organized.

1. Plan Ahead:

Consider cable management while planning your build. Choose a case with good cable routing options.

2. Use Modular Power Supplies:

Modular power supplies allow you to attach only the cables you need, reducing clutter.

3. Group Cables:

Group similar cables together using cable ties or Velcro straps. This makes it easier to manage and locate specific cables.

4. Route Cables Behind the Motherboard Tray:

Many cases have space behind the motherboard tray for routing cables. Use this space to hide excess cables.

5. Use Cable Channels and Grommets:

Cases with built-in cable channels and rubber grommets help route cables neatly, improving aesthetics and airflow.

6. Cable Ties and Velcro Straps:

Use cable ties or Velcro straps to bundle cables together. Avoid using too many ties, as this can make future changes challenging.

7. Prioritize Front Panel Cables:

Route front panel connectors (USB, audio, power buttons) first, as they are typically the shortest.

9. Use Cable Combs for PSU Cables:

Cable combs help maintain a neat arrangement for power supply unit (PSU) cables, especially when they are visible.

10. Custom-Length Cables:

Consider using custom-length cables to avoid excess slack. Some manufacturers offer cables in various lengths.

11. Install Components Before Connecting Cables:

Install components like graphics cards, RAM, and CPU coolers before connecting cables to avoid interference.

12. Label Cables:

Label cables, especially when dealing with multiple drives or components. This simplifies troubleshooting and upgrades.

13. Keep Unused Cables Tucked Away:

Store unused cables in areas designated for cable management or use cable ties to bundle and secure them neatly.

14. Regular Maintenance:

Periodically check and tidy up cables, especially after hardware changes or upgrades.

15. Consider Cable Extensions:

Cable extensions can provide a cleaner look, especially for visible cables like GPU power cables.

Troubleshooting

The computer doesn't cut on.

Make sure all power connections are snug. Sometimes connections may look as though they are plugged in fully, but aren't.

How long does it take to build a PC?

It largely depends on your experience. The more experience you have, the less time it will take to build a PC. If you're less experienced, it will take you longer. For a beginner, it can take anywhere between 3 to 5 hours to build a PC from scratch.

Do I need to buy extra case fans?

If your case does not come with many fans but has several locations that allow for fan expansion, adding more fans to increase airflow throughout the case would be beneficial.

Do I need to buy everything at the same time?

If you want to build your PC immediately, then Yes you will need to buy everything at the same time. However, if you plan to buy computer parts over time as your situation allows, then you can slowly buy the necessary parts and put everything together once you have everything.

Do I need to buy any extra cords or cables?

Most of the cables and cords that you will need will come with the parts.

Do I need to buy a CPU cooler?

Most CPUs come with a fan cooler in the package. More high-end CPUs use more power and generate more heat requiring aftermarket coolers.

Are PC's more expensive than gaming consoles (PlayStation/Xbox)?

There are a variety of different variables that contribute to the cost of a PC. Overall PCs can be more expensive than consoles up front but provide benefits that last for many years after purchase before needed to upgrade. PCs also offer you the ability to upgrade individual parts.

Nvidia vs AMD brand graphics cards, which one is better?

Each card has its pros and cons related to price, power, and features. The right choice depends on your current needs or wants.

Can I use any case that I want?

For the most part yes. Some cases come in a very small form factor that may require a smaller motherboard. Larger cases can accommodate both large and small motherboards.

My computer won't turn on.

Make sure that all connections are snug. It is possible that some connections may appear to be made but aren't pushed in all the way.