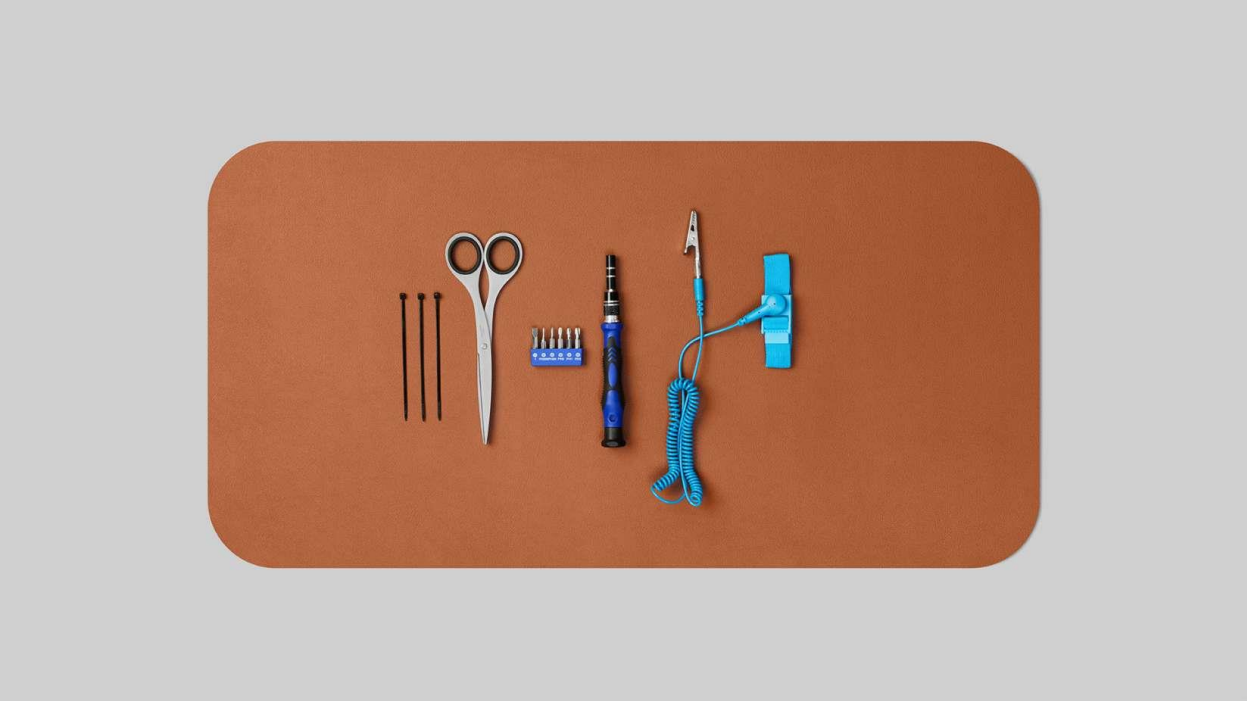
Building a gaming PC from scratch is the only sure-fire way to ensure that your system is capable of satisfying all of your personal preferences. When you determine everything that goes into your PC from the power supply up, you know that you'll be able to play the games you want at the frame rates you want. In addition, a home-built PC keeps the door open for upgrades—as technology changes, as your gaming tastes and needs change, or as your budget allows.

Though building a PC may seem complex—especially if it’s your first time working inside the chassis—you might find that it’s easier than you think. This comprehensive, step-by-step guide will walk you through the process of assembling your very own gaming PC, providing plenty of tips and tricks from our veteran builders along the way.

See if a pre-built vs. custom PC is right for you.

PREP 1: PC Build Tools



Before diving into your build, you'll need to gather some tools. Preparing your materials and workspace ahead of time will help to ensure that the build process goes smoothly.

- **Workspace.** You will need a large surface to work on, such as a table. To prevent an accidental electrostatic discharge (which can damage sensitive components), make sure you stand on an uncarpeted surface.
- **Screwdrivers.** You will need a Phillips #2 screwdriver for just about everything. If you're installing an M.2 device, you'll also need a Phillips #0 screwdriver.
  Tip: Magnetic screwdrivers help prevent screws from dropping inside the case and shouldn't damage components.
- **USB flash drive**. You will need an 8GB flash drive, or larger, to store the installer for the operating system you will use.

Show more

Additional prep tools

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PREP 2: Gaming PC Cases

Before you start picking out components, you should have a case—or, at least, a case size—in mind.

The main thing to keep in mind when picking a case is where you're going to put the computer.

Your PC's final location will dictate how big you can (or cannot) go, and it will also help determine whether various premium case features are worth splurging on. You probably don't want to pay for a tempered glass side panel if the computer will be hidden under your desk, for example.

Cases typically come in three sizes: Full-tower, mid-tower, and mini-tower. These are very general categories (case sizes are not standardized among manufacturers), but they're based on motherboard size.

Show more

More detail on cases

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PREP 3: Gaming PC Parts

Now it's time to get your components together. This step can be as hands-on or as hands-off as you like; you can thoroughly research each individual component on your own and create a custom build from scratch, or you can find a pre-made build online and adjust it to suit your specific budget and needs. Here are a few things to keep in mind as you get started:

- **Budget.** We definitely recommend coming up with a budget before you start picking components. You can always upgrade individual components later.
- **Compatibility.** Make a build list before you make any purchases—all components need to be compatible with all other components.
- **System requirements.** If you're building this PC because you want to play a certain game, check that game's recommended system requirements and plan accordingly.

In addition to your case, here are the components you need to build a gaming PC:

- **Central Processing Unit (CPU)**
- **Graphics Processing Unit (GPU)**
- **Motherboard**
- **Memory (RAM)**
- **Storage**
- **Power Supply Unit (PSU)**
- **System cooling**
- **Gaming peripherals**

- **Operating System (OS)**

Let's take a look at what each component does, why it's necessary, and what you need to look for while shopping around.

Central Processing Unit (CPU)

The brain of your PC, the CPU is responsible for executing instructions that are required for programs to run, dictating tasks to all other components. It impacts every facet of your experience, including gaming, streaming, content creation, and multitasking. Choosing the right CPU is essential when building a gaming PC.

When selecting a CPU for gaming, look for an Intel® Core™ processor with a high Max Turbo Frequency—which determines the fastest clock speed it can achieve using Intel Turbo Boost technology—as well as a high number of cores and threads. Both metrics can have a significant impact on performance.

- **A CPU with a high Max Turbo Frequency** excels at single-threaded performance, boosting your FPS in demanding games.
- **More cores and more threads**, meanwhile, enable you to do more at once, keeping your system smooth and responsive as you juggle multiple apps (e.g., your game, Discord, and streaming studio software). They also help you achieve smooth gameplay on games that are optimized for multithreaded rendering, like *Valorant*[1] and *Fortnite*, and games with extensive geometry, like *Minecraft*.

Graphics Processing Unit (GPU)

Discrete graphics cards—such as an Intel® Arc™ A-series GPU—are large, powerful components that plug into the PCIe x16 slot on your PC's motherboard. Together with the CPU, the GPU has a direct effect on your in-game FPS and is a must-have for anyone who wants to play demanding, graphics-heavy games.

Intel® Arc™ A-series GPUs are also capable of performing advanced rendering techniques like ray tracing and XeSS upscaling, the latter of which upscales 1080p resolution to 4K, delivering high-fidelity visuals with smooth performance.

When comparing GPUs for your build, research benchmark scores online, or look up the recommended system requirements for some upcoming games you'd like to play and go from there.

Learn more about Intel® Arc™ A-series graphics.

Motherboard

The motherboard is the main circuit board and is connected to everything. The CPU sits directly on the motherboard and every other component—graphics cards, hard drives, memory, optical drives, wireless cards—integrates into the motherboard.

One way to narrow down your selection of a motherboard is to shop by size. The most common form factors are Extended ATX, ATX, microATX, and Mini-ITX.

- **Extended ATX** motherboards are the largest (12 by 13 inches or 12 by 10.1 inches) and can often have eight RAM slots (for up to 128GB of RAM).
- **ATX** motherboards are only slightly smaller (12 by 9.6 inches) and usually top out at four RAM slots.
- **microATX** motherboards (9.6 by 9.6 inches) can also have up to four RAM slots.

- **Mini-ITX** motherboards sport the smallest form factor of the four (6.7 by 6.7 inches) and often have two RAM slots.

As all the components plug into the motherboard, it’s important to pick one that's large enough to fit current and future hardware.

Size alone is not the sole factor. Your motherboard needs to be compatible with the components you’ll connect to it, both for your current build, and with any hardware upgrades you make in the future. (The Intel® Desktop Compatibility Tool can help.)

Newer motherboards have the advantage of supporting the latest, cutting edge technologies and standards. Select Intel® 600-Series Chipsets, for instance, support powerful next-gen components, including DDR5 RAM, PCIe 5.0 graphics and SSDs, and integrated Intel® Killer™ Wi-Fi 6E.

Learn the details of how to choose a motherboard.

Show more

Tips on selecting more components

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STEP 1: Install CPU

Parts/tools: Motherboard, CPU

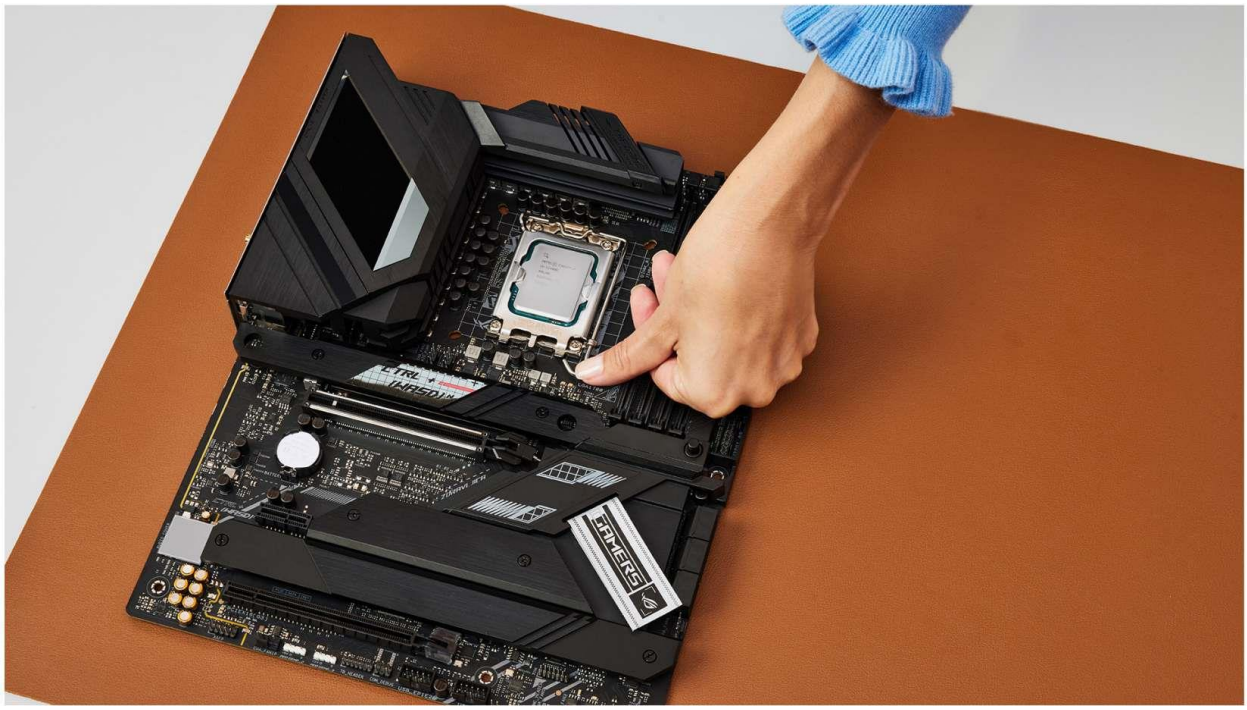
Take the motherboard out of its antistatic packaging and put it on your work surface. Find the CPU socket, which will be covered with a protective plastic cap. In one corner of the plastic cap, or more commonly, on the socket itself, you'll see a small arrow—take note of where this arrow is.

Next to the CPU socket, you'll see a small metal lever. Press down on the lever and pull it gently to the side (away from the socket) to open the socket tray.

Open the CPU and remove it from its packaging. Be very careful when handling the CPU as both the CPU and the CPU socket are extremely susceptible to physical damage. Hold the CPU on the edges—never touch the pins on the bottom of the chip since your fingers can imprint them with dust or oil, and try not to touch the top of the chip either.

In one corner of the CPU, you'll see an arrow. Line this arrow up with the arrow on the socket and gently place the CPU onto the socket.

Once the CPU has been *gently* seated, you can lower the retention lever down and push it back into place. Lowering the lever may require some force, but seating the CPU will not!



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Tips and troubleshooting

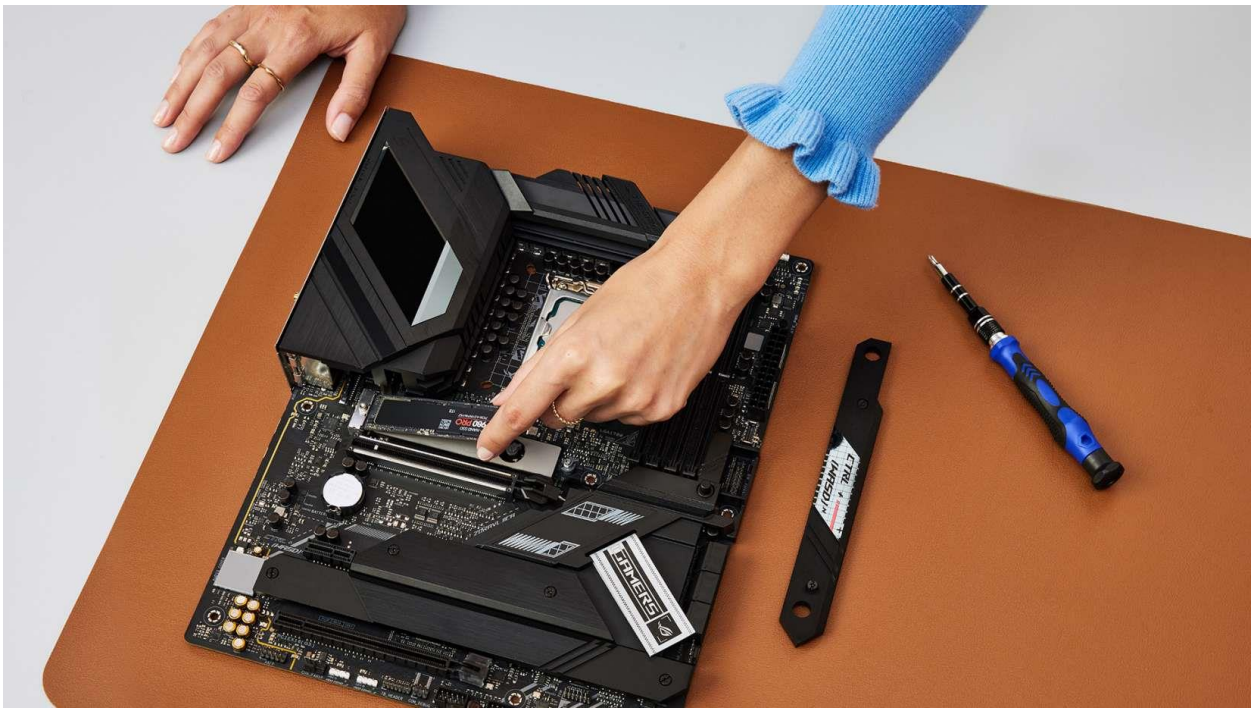
STEP 2: (Optional) Install M.2 SSDs

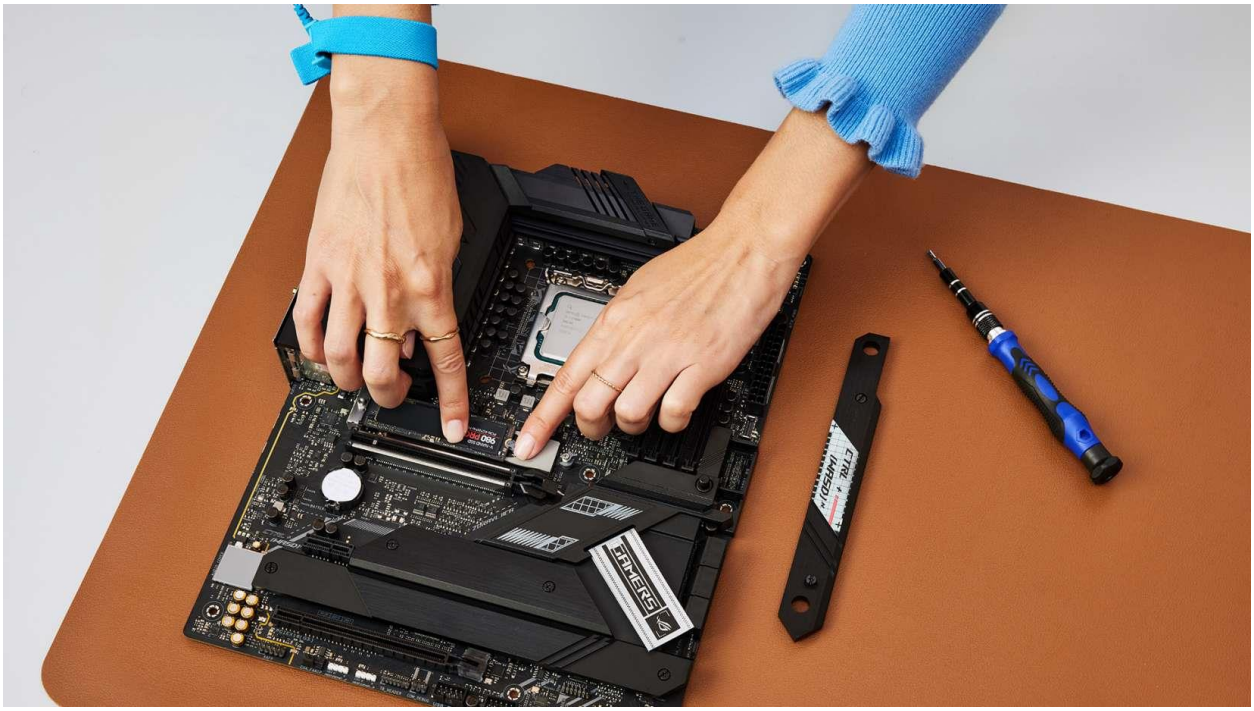
Parts/tools: Motherboard, M.2 SSD, Phillips #0 screwdriver, motherboard user manual

If you want to install an M.2 SSD, now is a good time to do so. First, find the M.2 slot on your motherboard. It's a small, horizontal slot with a tiny screw across from it. If you can't find it, if you find multiple M.2 slots, or if you are planning on installing more than one M.2 SSD, consult the user manual that came with your motherboard.

Remove the tiny screw with a Phillips #0 screwdriver. Don't lose it.

Slide the M.2 SSD gently into the slot. When it's fully seated, it will stand off the motherboard about a 35-degree angle. Push the SSD down and replace the tiny screw to lock it in place.





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Tips and troubleshooting

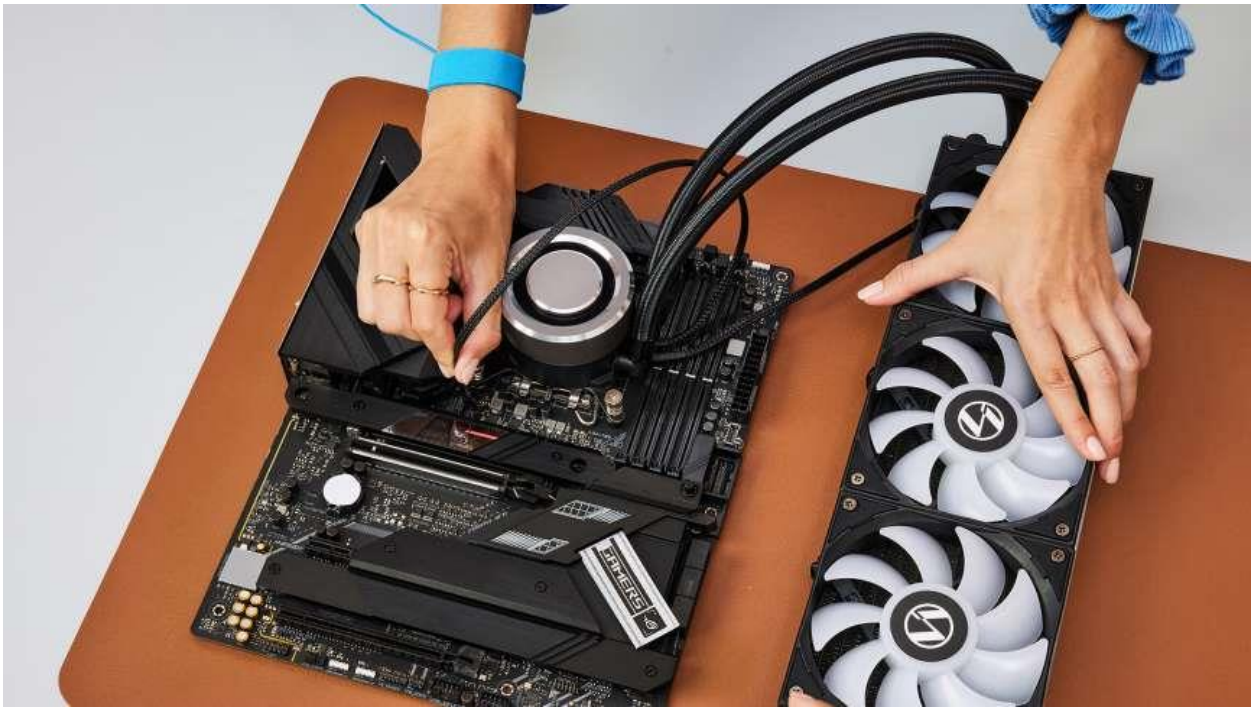
STEP 3: Install CPU Cooling

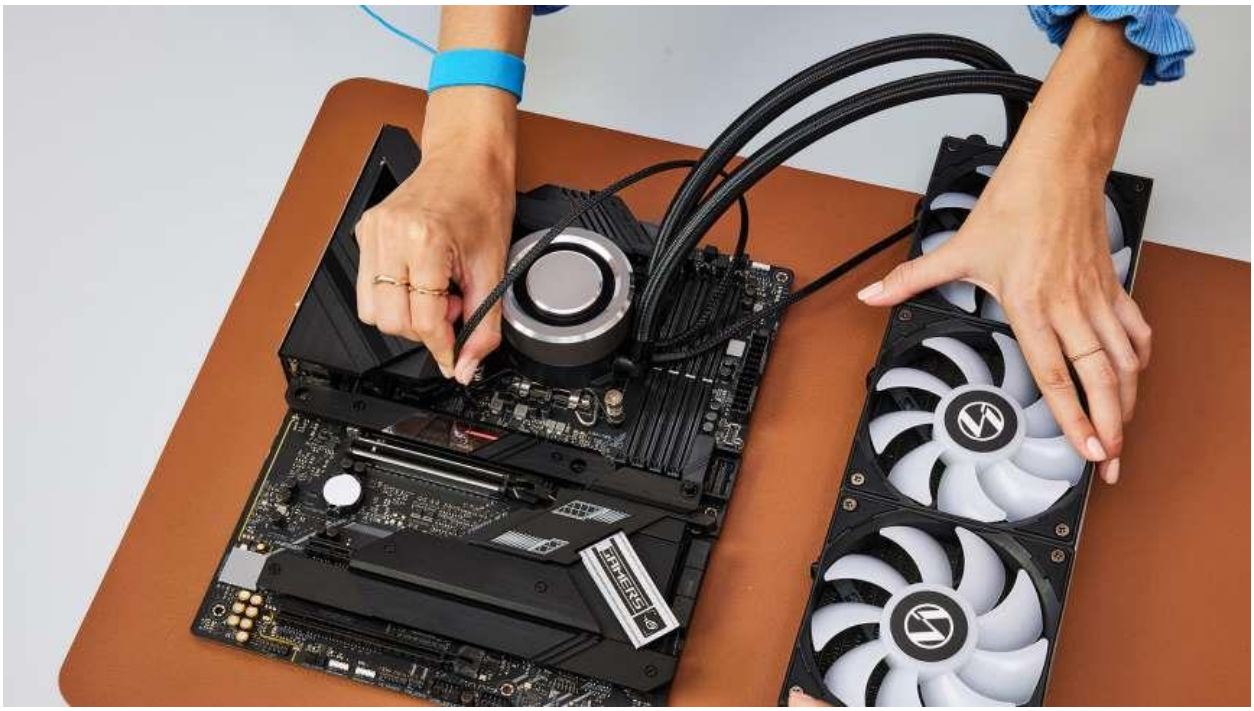
Parts/tools: Motherboard with installed CPU, CPU cooler, thermal paste, CPU cooler manual

There are different types of CPU coolers. For exact installation instructions, we recommend you consult the manual that came with your CPU cooler.

Some coolers require a mounting bracket. The motherboard may have a bracket pre-installed; you may need to remove this bracket if your cooler doesn't need a bracket, or replace this bracket if your cooler uses a different bracket. Do this before putting the motherboard inside the case.

Some coolers come with thermal paste pre-applied to the conductive material (which sits on the CPU) and some coolers do not. If your cooler does not have pre-applied thermal paste, you will need to manually apply thermal paste before you seat the cooler. To apply thermal paste, squeeze a small dot (no larger than a grain of rice) onto the middle of the CPU. Then, place the cooler on the CPU—the pressure will spread the thermal paste adequately.





Detailed instructions on how to apply thermal paste.

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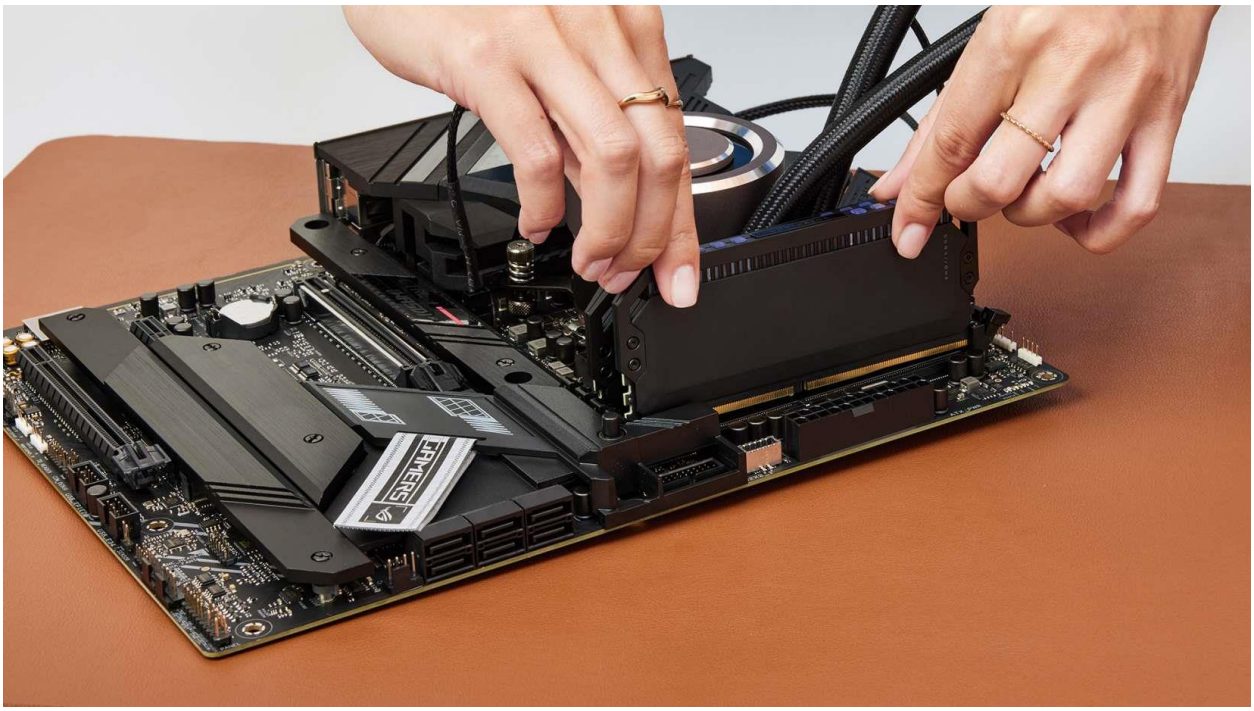
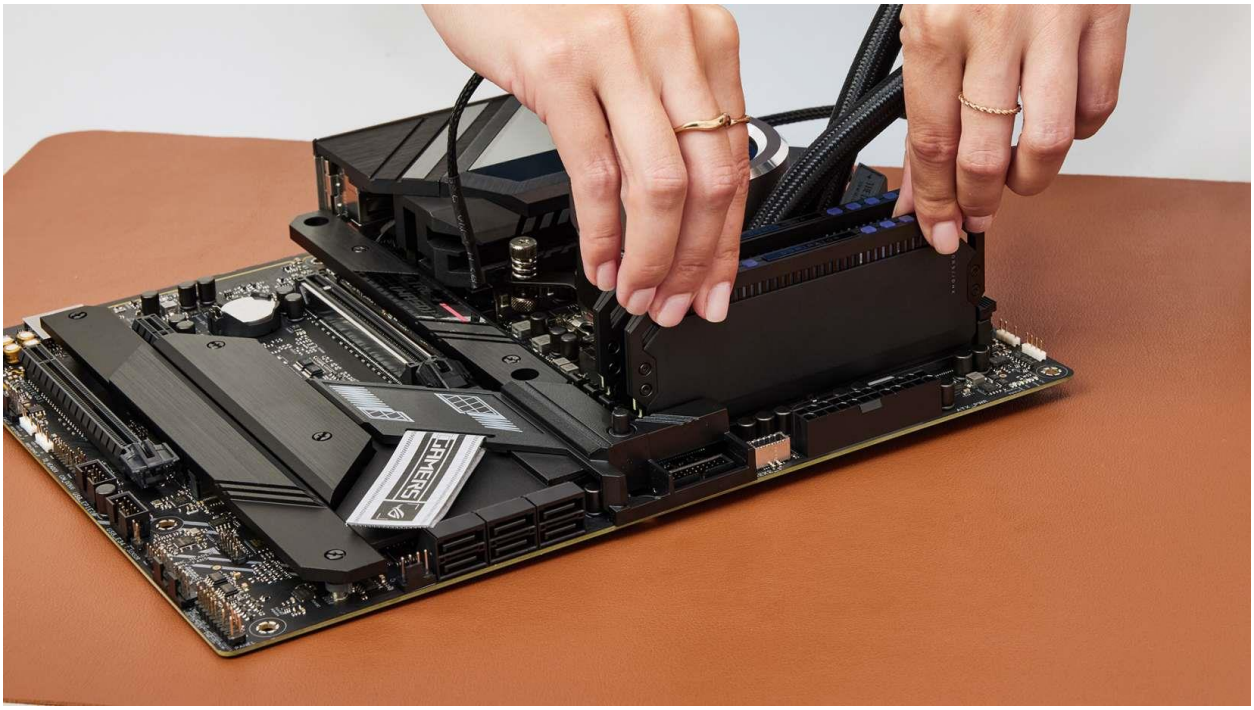
Tips and troubleshooting

STEP 4: Install Memory (RAM)

Parts/tools: Motherboard, RAM, motherboard user manual

Determine how many RAM slots your motherboard has (most have either two or four). If you're going to fill all available RAM slots, simply snap the RAM into place. If you're not going to fill all of the RAM slots, consult the user manual to find the correct configuration and populate the RAM slots accordingly.





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Tips and troubleshooting

STEP 5: (Optional) Do a Test Run Outside the Case

Parts/tools: Motherboard with CPU and CPU cooler installed, RAM, GPU, PSU, screwdriver, motherboard user manual, PC monitor (attached to GPU)

Now that you've installed the CPU and the CPU cooler, you may want to perform a quick test run of your components just to make sure they all work. This test is much more difficult to perform (and troubleshoot) once everything is installed in the chassis. To do this, install GPU and connect everything to the power supply (if you don't know how to install the GPU, see section below). Make sure the power supply is connected to the motherboard (both CPU 8pin and 24pin) and GPU, then plug it in and turn it on.

Some higher-end motherboards have power buttons, but many do not. If you don't see a power button, locate the power switch pins—small pairs of prongs sticking out of colorful nodules. The power switch pins may be labeled (something like "PWR_ON"). To turn the motherboard on, use a screwdriver to tap both power switch pins at once.

You should now be able to tell if any of your components are dead or otherwise malfunctioning. If the motherboard’s lights are blinking or it’s beeping, there’s likely a reason for it. Some motherboards have a post code display (two digits) to help you identify what the problem is. To figure out what it's trying to tell you, consult your user manual. If your motherboard has no post code display, connect a display to the GPU and see if your system POSTs (does a power-on self-test), or starts up and displays the motherboard's logo.

When you finish the test run, turn off the power supply and wait for any LEDs on the motherboard to go dark to ensure there's no residual power in the system. Then, uninstall the GPU and unplug all power cables before proceeding with the next step.

STEP 6: Mount the Power Supply

Parts/tools: PSU, case, PSU cables, Phillips #2 screwdriver

Unpack the PSU (or unplug it from the components if you opted for a test run) and set its cables aside (if it’s a full or semi-modular unit).

Take a look at your case and figure out where the PSU is supposed to go (probably on the bottom, near the back) and how it can be oriented. Ideally, you want to orient the PSU so that its fan faces outside the case (via a vent). If your case has a vent on the bottom, you can mount the PSU upside down, so long as the bottom vent will receive decent airflow when the PC is finished.

If your case has no vents, mount the PSU so the fan is facing up (into the case) and make sure it has enough clearance.

Attach the PSU to the case using the four screws that came with the PSU.

If you're using a non-modular or semi-modular power supply, now is the time to run the attached cables through the case to where they'll need to end up (make use of cable management features if your case has them).

STEP 7: Install Motherboard

Parts/tools: Case, motherboard, I/O shield (if not attached to the motherboard), Phillips #2 screwdriver, screws, motherboard user manual

If your motherboard came with an unattached I/O shield—a rectangular sheet of metal with cutouts for the motherboard's ports—you should first snap it into place in the back of your case (make sure it's oriented correctly). I/O shields usually have sharp edges, so watch your fingers.

Once the I/O shield is in place, you can install the motherboard. Double-check to make sure your cables are all threaded through to the correct place, and then place the motherboard (align it with the I/O shield, first). Using a Phillips #2 screwdriver, mount the first screw—the center screw—to hold the motherboard in place. Make sure you do not drag your motherboard across the standoffs attached to the chassis.

The number of screws that you will need to mount the motherboard will vary based on the board, but a full-size ATX motherboard usually takes nine screws. Fill all available screw holes.

Connect the power supply to the motherboard. There are two main connections—an 8-pin CPU connector toward the top of the board and a 24-pin connector from the side.

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Tips and troubleshooting

STEP 8: Install GPU

Parts/tools: Motherboard, GPU, Phillips #2 screwdriver, screws, motherboard user manual

Find the PCIe x16 slot on your motherboard. It will be the longest PCIe slot and may be a different color than the others. If your motherboard has more than one PCIe x16 slot, check the user manual to see if one slot needs to be prioritized. If any slot can be used, determine which slot you'll be using based on where other components are placed—you want your GPU to have some breathing room.

Depending on your case, you may need to remove I/O covers (small metal tabs blocking the back panel of your case) to accommodate your GPU's I/O (HDMI, DisplayPort, DVI, etc.) and make it accessible to the exterior of the chassis.

Remove the GPU from its antistatic packaging and carefully align it with both the rear retention bracket and the slot itself, and then gently push it into the PCIe x16 slot (you may hear a click). The PCIe tab on the motherboard may move into a locked position should you need to reseat the GPU.

Once the GPU is fully seated, secure it to the back of the case using one or two screws. If your GPU requires auxiliary power connectors, connect it to the power supply.

STEP 9: Install Storage

Parts/tools: Motherboard, SSDs, HDDs, Phillips #2 screwdriver, screws, case/chassis user manual

Firstly, inspect your case. Every case is a little different when it comes to drive bays.

You should be able to find a stack of bays in different sizes somewhere inside your case. They may have little plastic switches, in which case they are tool-free bays, or they may just look like metal brackets.

Storage generally comes in two sizes, 2.5-inch (HDDs and SSDs) and 3.5-inch (HDDs). Most 3.5-inch bays can accept 2.5-inch drives, but not vice versa (some 3.5-inch bays will have trays that aren't designed for 2.5-inch drives, but they can still fit 2.5-inch bays). You may also see larger bays in your case—these are for larger drives such as optical drives and are usually located in the front of the case, near the top.

If you have tool-free bays, each bay will have its own plastic lever or switch. Open or unlock the lever or switch and you should be able to pull out the tray. Place your drive in the tray—some 3.5-inch trays will be designed to accept 2.5-inch trays. If they are, you'll need to screw the 2.5-inch drive to the 3.5-inch tray so it doesn't move around.

Slide the tray back into the bay. It should click into place.

If you don't have tool-free bays, you'll see a metal bracket (it will be big, like a sheet), with slats or holes in it. To put a drive in one of these "bays," all you have to do is slide the drive between the metal bracket and the side of your case and screw it into place. Use as many screws as the chassis manual recommends, but if you don't have enough screws most drives will be fine with just two screws.

Once your drives are all in place, connect them to the motherboard (using a SATA cable, which should have come with either your drive or your motherboard) and to the power supply.

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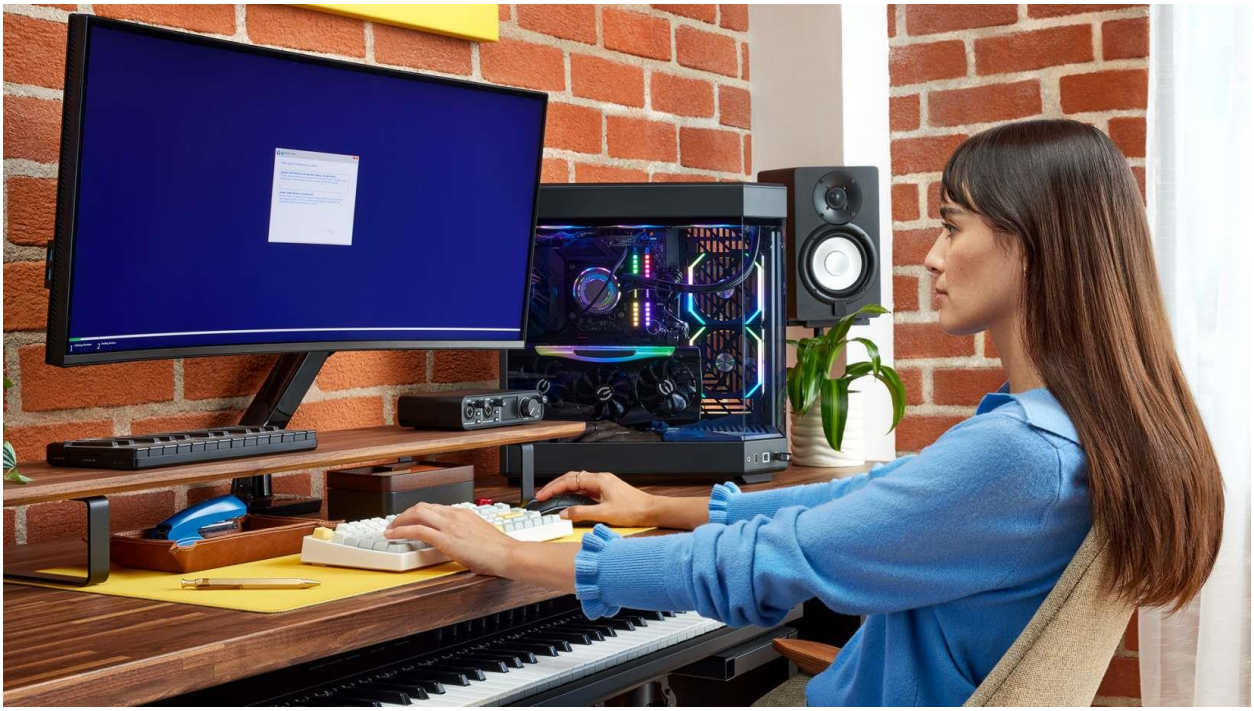
Tips and troubleshooting

STEP 10: Install Operating System

Parts/tools: PC, monitor, mouse, keyboard, OS saved to a USB flash drive

If you haven't already prepared your operating system (OS) on a USB flash drive, now is the time to do so. (See the above section on operating systems under "PREP 3: Select your components" for more details.)

Plug in the USB flash drive that contains your OS, as well as a monitor, mouse, and keyboard, and turn on your PC.



The first screen you see will tell you to press a key to enter the system setup or BIOS. Press the key to open BIOS. (If the screen flashes off too quickly for you to see the key, consult your motherboard's user manual.)

First, you'll want to check to make sure your components are all installed and being recognized. Find the page in BIOS that shows your PC's system info (different motherboards have different BIOS setups, but you should be able to find a screen that gives you this information) and check to make sure the system is recognizing everything you've installed so far.

Next, poke around BIOS until you find the Boot page (may be called "Boot Order" or "Boot Priority"). Change the boot order so that your USB flash drive is first and the drive you want to install your OS on (if you're using an SSD as a boot drive, you will want to install the OS here) is second.

Restart your computer. Your computer will boot from the USB and the OS installer will pop up. Follow the instructions to finish the installation.

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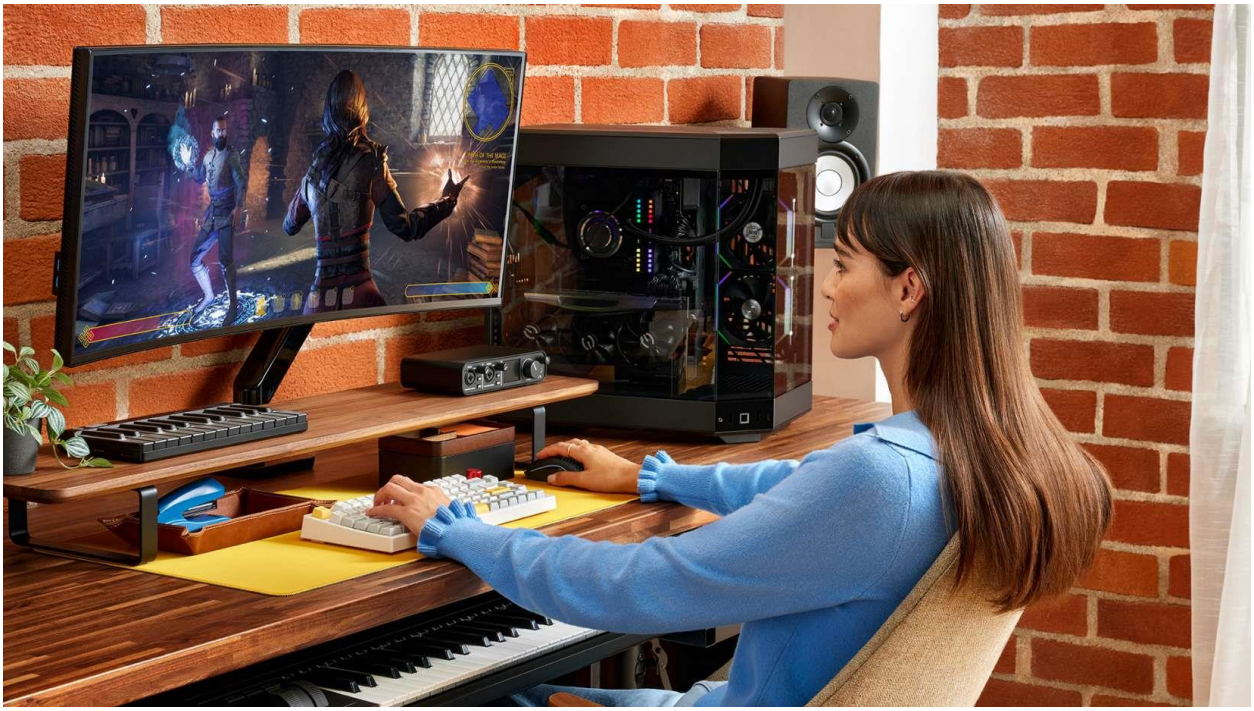
Tips and troubleshooting

It Doesn’t End Here



If you’ve made it all the way through our guide, congratulations on finishing your build (especially if this is your first time)! The work, however, doesn’t necessarily have to end here.

One of the best things about building a gaming PC is that the job is never truly finished. You can further customize your build to meet your needs and update it with the latest hardware as gaming system requirements advance. The custom PC you just built will serve as your foundation for all the gaming experiences ahead, and fine-tuning your components is all part of the fun of owning it.

Now that you know how to build a gaming PC, you can focus on getting the most performance from your custom build. After everything is up and running, be sure to:

- Explore all the possibilities your new system has to offer.
- Update your GPU with the latest drivers.
- Support faster memory speeds if you installed high-speed RAM.

- Overclock your CPU if you installed an unlocked K-series Intel® Core™ CPU.
- Optimize your system settings for peak gaming performance.