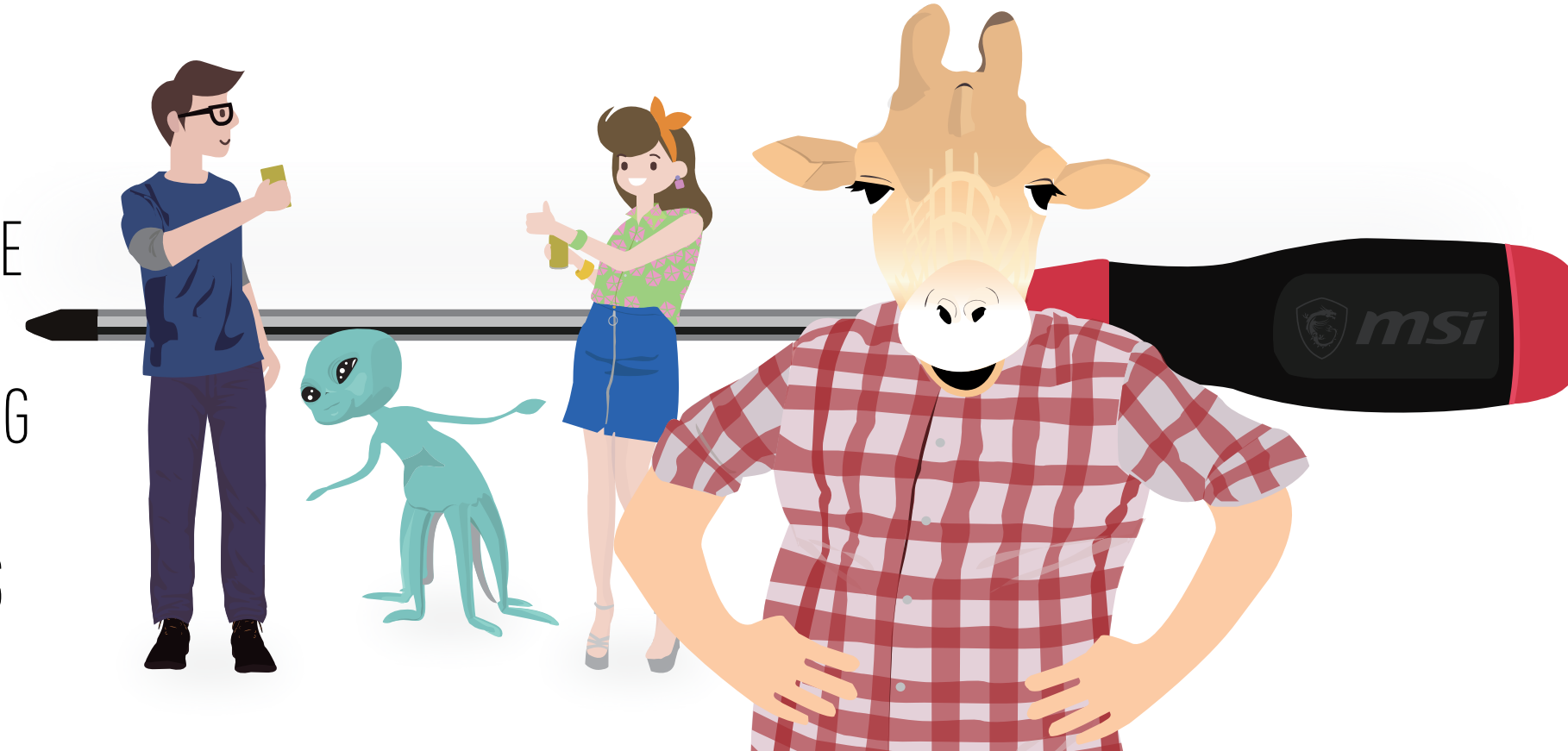
HOW TO BUILD A PC

A COMPLETE HOW-TO PC BUILDING GUIDE FOR BEGINNERS



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HOW TO BUILD A PC

WHY WE BUILD

WHY SHOULD YOU BUILD YOUR OWN PC?

We choose any combination of components we want to fit our requirements.

We make the best use of our limited [or unlimited] budget.

We can upgrade and maintain our PC with ease.

In a nutshell...

Building it yourself is just cooler!

PART1:

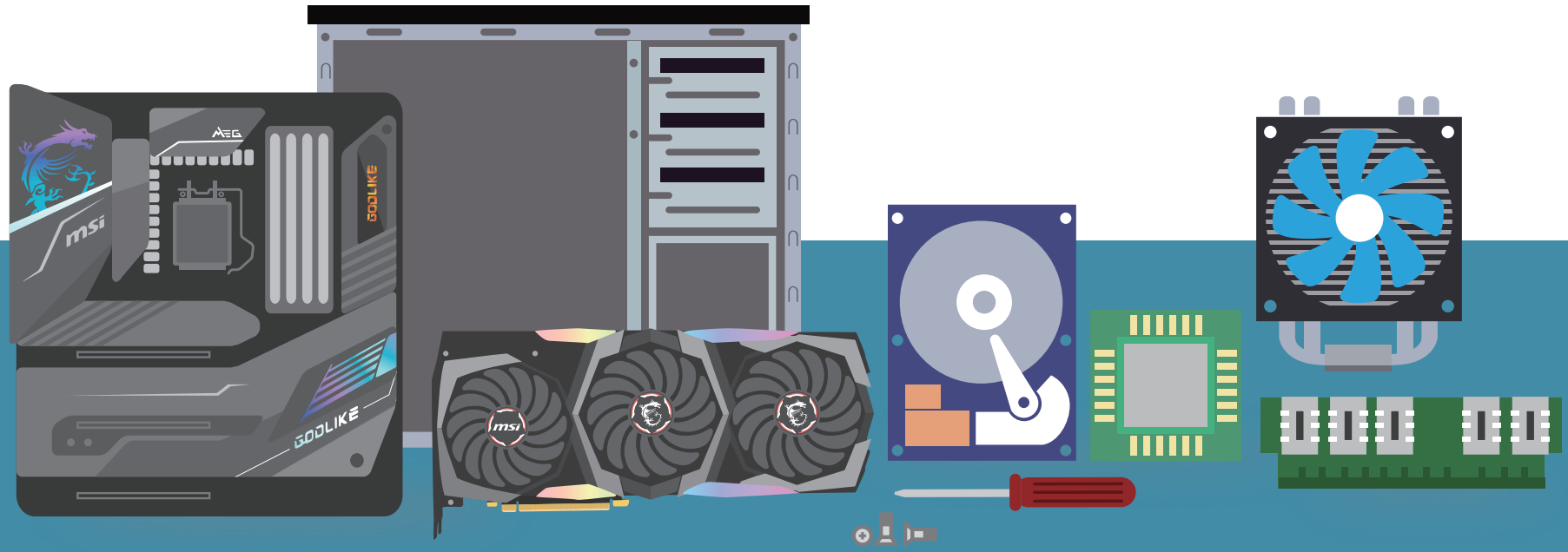
INTRO TO PC COMPONENTS

WHAT DO I NEED TO BUILD A PC?

Although building a PC is as easy as putting together a LEGO set, you should know about the building blocks before starting.

PC builds can have many styles and uses, but some components are fundamental and must be a part of every PC.

Let's learn the basics of each part, shall we?



CPU

CPUs are essentially the brains of computers – responsible for interpreting instructions and processing data. There are two major high-performance desktop CPU players in the market: Intel and AMD.

AMD

AMD's CPU lineup:

AMD starts with Ryzen 3 and Ryzen 5, an upgrade over legacy Athlon and Sempron lines.

- **Ryzen 3 and 5 :** Suitable for casual gaming and office applications. Although most Ryzen 3 and 5 processors offer simultaneous multi-threading (SMT), the very entry-level Ryzen 3 products do not. Make sure you check before you buy. AMD processors with "G" at the end feature integrated graphics; all other Ryzen processors will require a separate graphics card even to display an output.
- **Ryzen 7 :** The Ryzen 7 has more cores, and this line is suitable for gaming at a mid-tier level.
- **Ryzen 9 :** Ryzen 9 chips currently have the most cores when we're talking about the mainstream consumer CPU segment – making them great for both high-end gaming and CPU-intensive tasks like video editing and rendering. The top-end Ryzen 9 processor boasts 16 cores and 32 threads.
- **Threadripper and Epyc :** AMD's top-tier Threadripper and more powerful Epyc CPUs are geared towards the workstation and server market.

Intel

Here's Intel's CPU lineup:

- **Celeron series:** A series that houses Intel's entry-level products. It caters to users who don't need to handle CPU-intensive work. Celerons are suitable for users who just need something to handle tasks like watching/streaming videos, surfing the web, or running Office applications (word processing, spreadsheets, presentations, and so on).
- **Pentium series:** Offers a higher level of performance than the Celeron but features weaker integrated graphics performance and a smaller cache than the Intel Core series.
- **Core series:** The current mainstream Intel CPU lineup.
  - **Core i3:** Perfect for tackling daily tasks, light gaming, watching videos, and browsing the web.
  - **Core i5:** The Intel 10th generation i5 processors have up to 6 cores and 12 threads. They (the non-F models) also come equipped with decent integrated graphics, making them suitable for light gaming/graphics editing.
  - **Core i7:** Deliver exceptional performance and boast significantly better multitasking abilities than the weaker processors in Intel's lineup. It can run most games and heavier applications like graphics editing software programs effortlessly.
  - **Core i9:** The most powerful processor in the Intel Core family. They are perfect for hardcore gamers, streamers, and content creators.

- **Core X and Xeon:**Tailored for workstations and servers. These processors usually feature higher core counts and more enterprise features than other processors in Intel's product lineup.

Here's a list of the mainstream intel and AMD CPU compatibility with motherboard:

Processor	Socket	Compatible Motherboard
Core i9-10XXX / Core i7-10XXX Core i5-10XXX / Core i3-10XXX	LGA1200	Z490 Platform / Z590 Platform
Core i7/i5/i3/Pentium/Celeron	LGA 1151	Z390 Platform
Core™ X-Series Processor	LGA 2066	X299 Platform
AMD Ryzen	AM4	B450/A320/X470/B550/X570 Platform
AMD Ryzen Threadripper	sTRX4	TRX 40 Platform

CPU COOLER

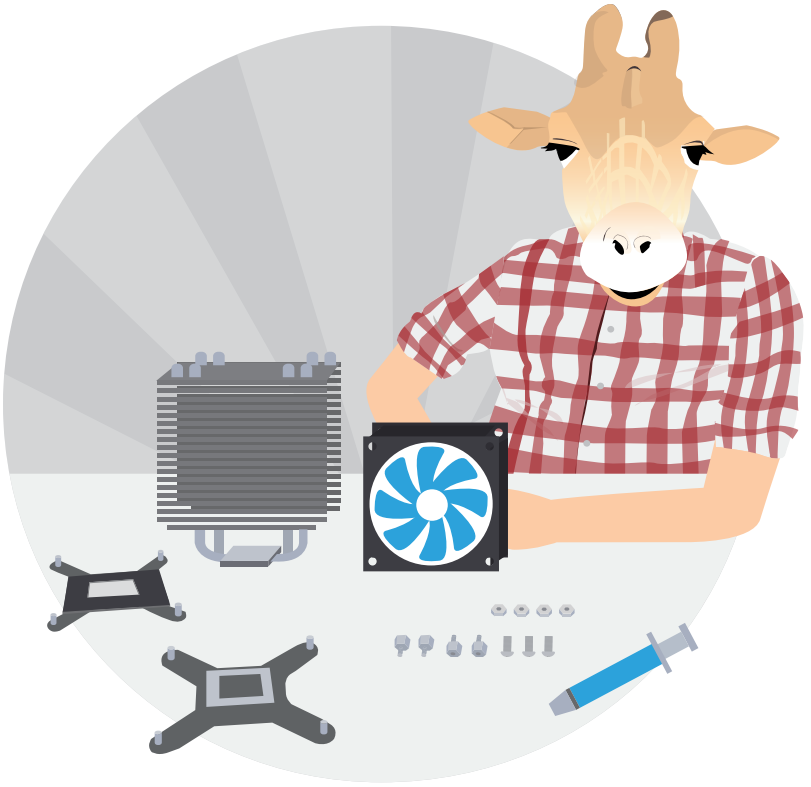
CPUs produce a lot of heat. High temperatures can cause the system to shut down in order to protect important components, and may even cause permanent damage. Fans and heatsinks are therefore necessary in order to keep the CPU running cool. Except for some high-end CPUs, most boxed CPUs are bundled with a corresponding CPU cooler which can meet basic demands for heat dissipation.
For better system performance, it is suggested to buy a better CPU cooler.

The cooler can be classified in terms of heat dissipation medium into two types: liquid cooling and air cooling. Air coolers can be further classified into tower-style, downdraft and updraft coolers, depending on their appearance and airflow direction. Users should choose a cooler that fits their product and circumstances.

AMD Stock Cooler | Air-cooling | AIO Liquid-cooling

When choosing a CPU cooler, make sure you consider the following:

- Coolers need to provide compatible brackets, as bracket positioning may vary slightly depending on the motherboard socket.



- Each CPU cooler supports a different thermal design power (TDP), indicating the upper range of heat output that it can handle. More powerful CPUs need better coolers to ensure stable operation.
- Choose a cooler that fits your case. High-performance coolers often have large heatsinks, so it's critical to pick a cooler that can fit into your case without obstructing other components.

MOTHERBOARD

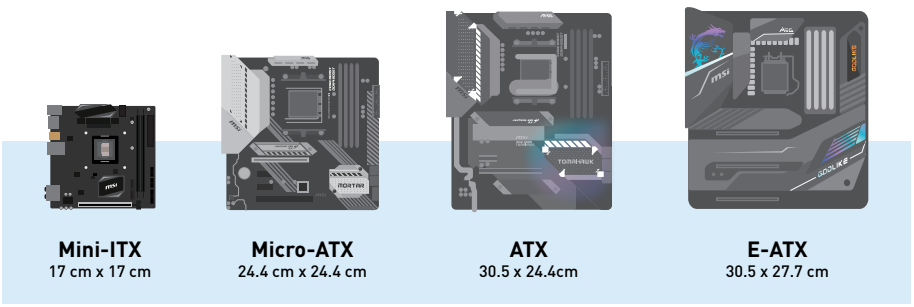
The motherboard is a platform that holds all the parts and components in a computer. It links the various components of a computer, including expansion cards, hard drives, memory and peripherals such as keyboard and mouse, as well as handling communication and transmission between these devices.

The following considerations should be taken into account when choosing a motherboard:

Motherboard Dimensions:

Just like clothes, motherboards come in different sizes.
Common sizes include:

- Mini-ITX, Micro-ATX, ATX and E-ATX, four types of motherboard dimension.



Mini-ITX
17 cm x 17 cm

Micro-ATX
24.4 cm x 24.4 cm

ATX
30.5 x 24.4cm

E-ATX
30.5 x 27.7 cm

The motherboard is the second most important choice when building a PC. The motherboard, also called the mainboard, links all the components of your computer, connecting your processor, memory modules, graphics and expansion cards, hard drives, and connections for your network, keyboard, mouse, and more.

Intel

Intel's 10th gen CPUs work with H410, B460, H470, Z590 and Z590 chipsets, with Z490 and Z590 the only two to support CPU and memory overclocking. In general, the CPU with a “K” in the name and the motherboard with a “Z” in the name support overclocking.

AMD

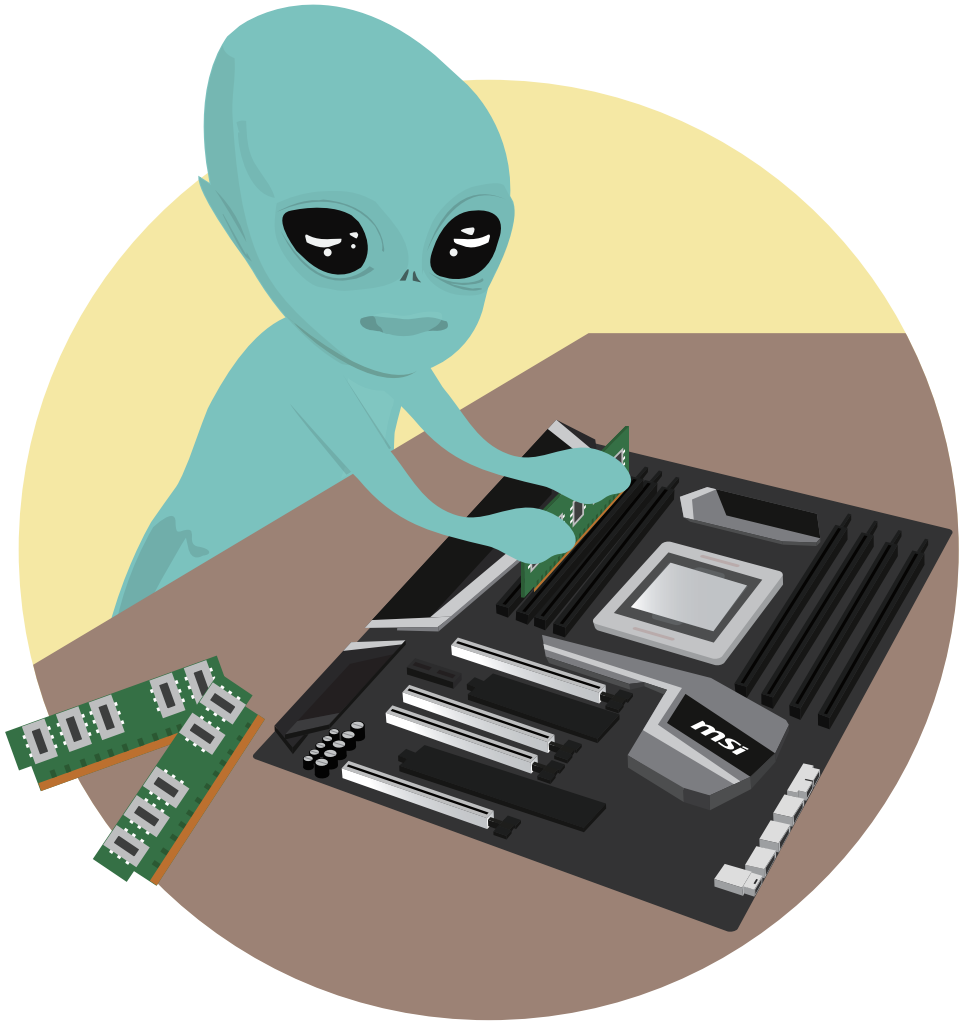
For AMD, high-end Ryzen CPUs should get a B550 or X570 chipset. You can pair mid or entry level with B550, or older X470 or B450 chipsets. All Ryzen CPUs are overclockable and motherboard memory too, available on almost all matching motherboards.

If you get a motherboard that supports overclocking, it may require dual ATX 8pin for the CPU, check to make sure your power supply has them.

MEMORY

In simple terms, memory is used to store data temporarily, increasing the speed at which the CPU can access data from the hard drive. Both memory capacity and frequency affect computer performance. The higher the memory frequency, the faster it is. Having more memory means more space for temporary storage, and better performance as a result.

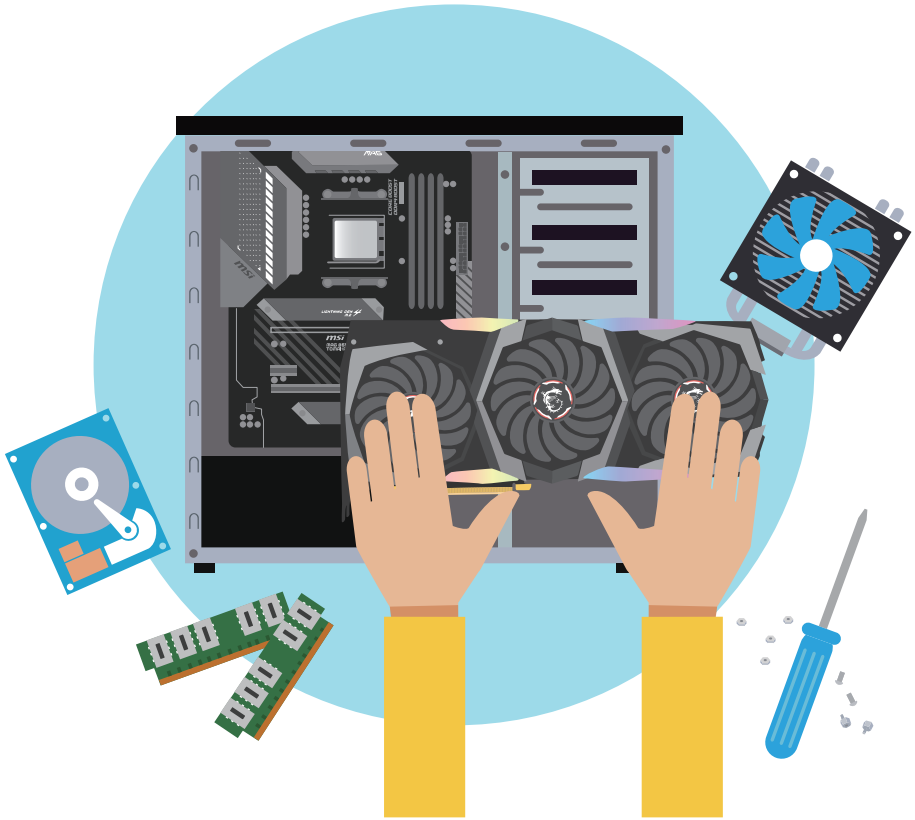
DDR4 is the current mainstream, starting at DDR4-2133 for entry-level computers.
Higher frequencies such as DDR4-2400 and DDR4-3000 are typically targeted at hardcore gamers and overclockers.



GRAPHICS CARD

The graphics card takes data from the computer and outputs it as text, images and colors on a display monitor.

At present, the two main graphics manufacturers are NVIDIA and AMD.



NVIDIA

AMD

The two main GPU manufacturers are NVIDIA and AMD, and at MSI we offer cards for both GPU brands, ranging from entry-level to ultra high-end

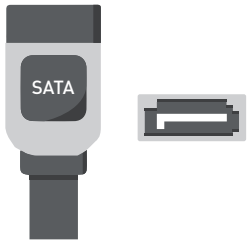
NVIDIA : 3000-series cards offer a huge leap over the 2000-series, and the current models are the entry level RTX 3070, the powerful RTX 3080, and high-end RTX 3090 cards. The “R” stands for “Ray Tracing”, Ray tracing is the holy grail of gaming graphics, simulating the physical behavior of light to bring real-time, cinematic-quality rendering to even the most visually intense games.

AMD : starts with the Radeon RX 5500XT, up to the RX 5600 XT and RX 5700 XT, For the high-end we have the RX 5700.

HARD DRIVE

The hard drive is the computer's storage device.

Whether we're talking hard disk drives, solid state drives or SSDs, or NVMe or SATA m.2 drives, these are all forms of storage for files in your computer. Storage has evolved from hard drives that use magnetic technology to store data on spinning disks. Reaching 20 terabytes or more, 4 to 8 terabyte hard drives are a cost-effective option for mass storage. But, with data transfer around 140 to 180 megabytes a second, speed is far surpassed by SSDs and m.2 drives. Solid state drives, whether SSDs or M.2 drives, use memory to store data. Whereas the DDR4 memory in your computer is emptied when there's no power, SSDs and M.2 drives can store data without power. For SSDs, they use the same SATA connectors as hard drives, but good drives offer read and write speeds of over 500 megs a second, triple the speed of hard drives. These go up to 2 terabyte capacities, some reaching 4 terabytes.



SATA interface

M.2 interface

POWER SUPPLY

The power supply converts AC power into DC power for computer components.

The following considerations should be taken into account when choosing a power supply:

Wattage

General guidelines- a PC for the web, word and excel can get by on 500 to 600 watts. For NVIDIA GPUs, a last gen RTX 2000 series needed about 650 to 750 watts. The new RTX 3080 GPU requires 750 watts, and the high-end RTX 3090 needs 850 watts or more.

Energy Efficiency

The 80 Plus certification program for power supply units features the following ratings – 80 Plus, 80 Plus Bronze, 80 Plus Silver, 80 Plus Gold, 80 Plus Platinum, and 80 Plus Titanium. The most efficient (and most expensive) Titanium tier offers more than 94% energy efficiency at 50% load.

Titanium Platinum Gold Silver Bronze White

Power Supply Design

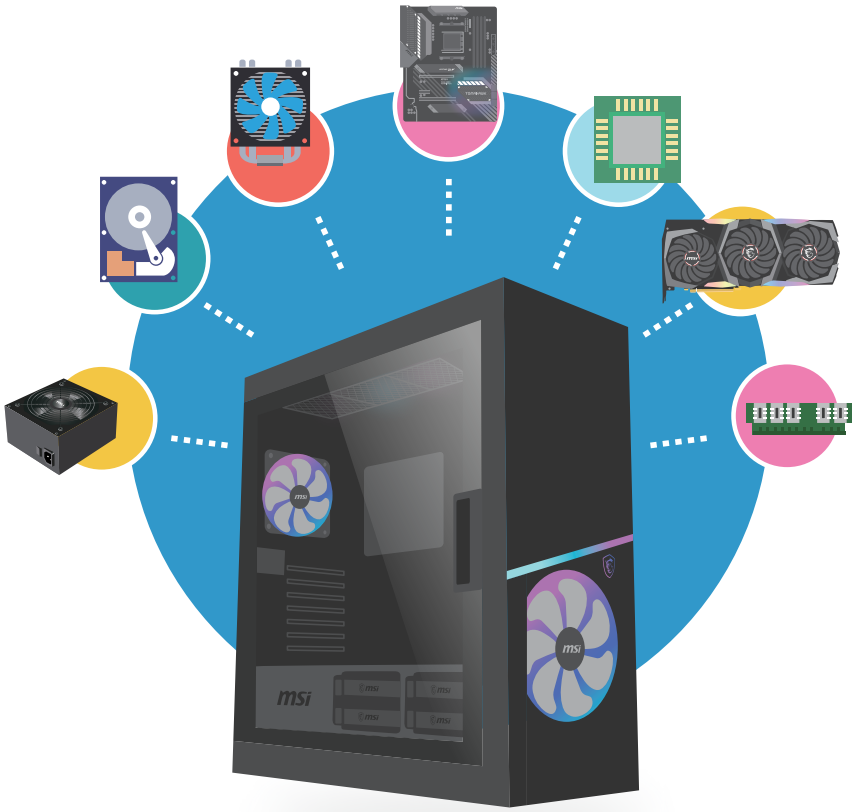
	Full Modular	Semi-modular	Non-modular
			
Air Flow	Excellent air flow due to less cable clutter	Good air flow with good cable management	Bad air flow due to cable clutter
Temperature	Low temperature reading due to less cable clutter	Good air flow with good cable management	Poor cable management will result in high temperature
Aesthetics	Easy to organize and manage for good looks	Good looks with good cable management	Messy looks due to too many cables
Convenience	Convenient PSU replacement	Easier PSU replacement with less cables to unplug	Need to remove all the cables when switching PSU
Customization	Can be fully customized	Limited customization options	Customization not an option

CASE

Selecting a case can be done mostly to personal taste, but there's a few factors to keep in mind.

1. Airflow: The case needs to have good airflow, so there should be lots of fan mounting spots. Also look for wide openings at the front for air to enter, and having them filtered will help keep dust out of the case.

2. Dimensions: Check what size motherboard your case will accept, most motherboards are ATX sized and won't fit in smaller cases. Check the case specs, or consider a smaller case to match. Also you'll need to check the length of the graphics card the case accepts, as newer graphics cards can reach 27, 30 or almost 33 centimeters in length. And do you need spots for SSDs or hard drives? Check the case has mounting spots for your storage. Next, what kind of CPU cooling solution will you be using? For air cooling, check the case's maximum CPU cooling height in millimeters, at least a few mils more than the height of your actual cooler.



PERIPHERALS

Keyboard

The keyboard is mainly used for text input. Keyboards use the USB or PS/2 interface.
USB keyboards are the norm, with only a few high-end or low-end products employing PS/2.

The mechanism and actuation method on a keyboard determines its tactile response when typing.
The two main switch types are membrane and mechanical.

- Mechanical keyboards are actuated by an independent physical switch. Different mechanical switches have different tactile responses; the main types are brown, blue, black and white.
- Membrane keyboards are cheaper and make up a majority of the market. One problem that membrane keyboards may encounter is registering simultaneous key presses, so competitive gamers may want to choose keyboards that support N-Key Rollover (NKRO).

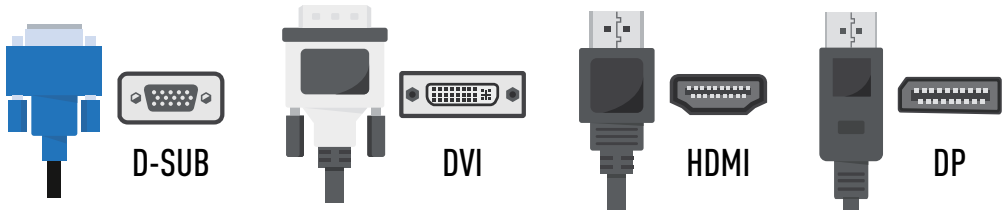
Mouse

Mice are typically classified according to their method of connection - wired or wireless. They can also be classified according to their sensor type, depending on whether they employ optical or laser sensors.

Wired mice typically connect via a USB port, while Bluetooth and 2.4GHz WIFI are the norm for wireless mice.For gaming, we recommend using a wired mouse to avoid wireless signal and battery life issues.

Monitors

A monitor connects with one DisplayPort or HDMI cable, and high-end models may have a USB-C video input. Often there's legacy VGA, also known as D-Sub, or DVI inputs. Monitors can be flat or curved, and 1080p is the basic resolution, but 1440p is becoming the gamers choice as you can see more game detail. There are 4K screens for high resolution media playback, and creative professionals. Refresh rate is important for gamers; most 1080p and 4K screens have a 60 hertz refresh rate, but 1440p can do 120 or 144 hertz, this is often a TN type display. Your display can update twice as fast, and the split-second difference may help you win competitive online games. AMD Freesync or NVIDIA G-sync features can reduce screen tearing.
You should pay attention to contrast and especially brightness, rated in candela or nits, same thing. Panel type can be In-Plane Switching or IPS, with better color accuracy and wider viewing angles, or Twisted Nematic or TN, known for its ultra-fast refresh rate. Vertical Alignment or VA panels used to sit in-between these two.

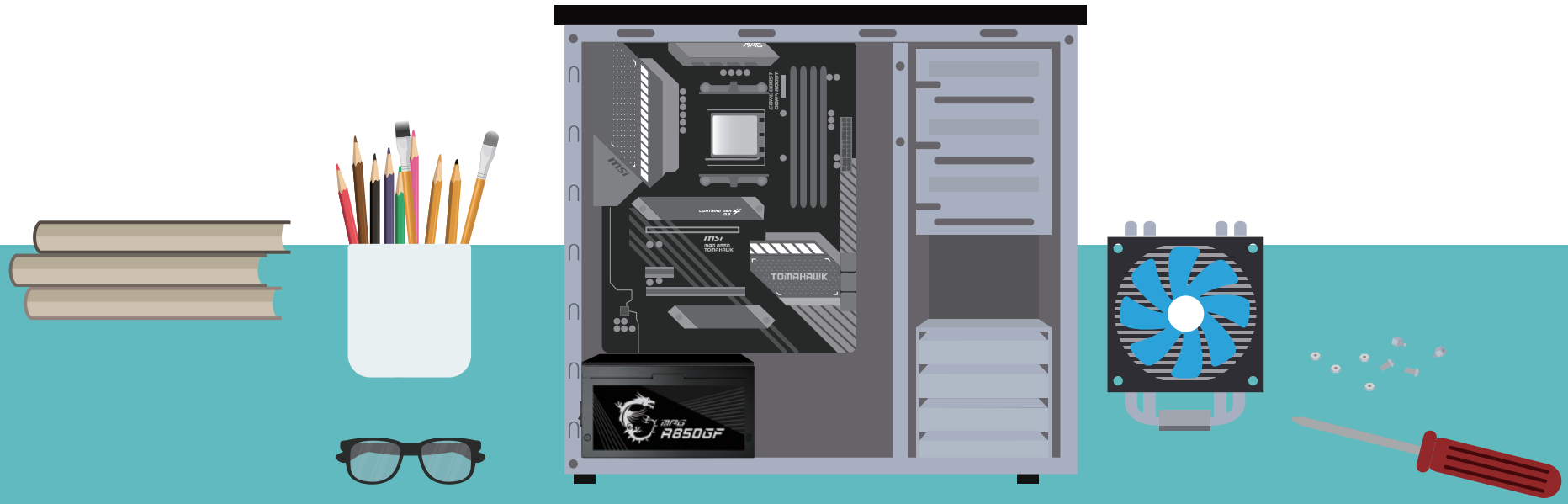


PART2:

PLAN YOUR PC BUILD

HOW TO CHOOSE PARTS FOR MY PC?

Do you need a PC for intense gaming or heavy multimedia production? Here are some tips you need to take into consideration when choosing your parts.



STREAMING PC

A POWERFUL STREAMING PC IS ALL YOU NEED.

You may be a relatively new or even a pro streamer who needs a powerful streaming PC to broadcast your gameplay. When you're streaming a game, your system has to handle two heavy tasks simultaneously, and a more powerful CPU will come in handy. That said, your requirements would be highly dependent on what games you play, its graphics settings, and your streaming quality.

We'll go through a few considerations when building a PC for streaming.

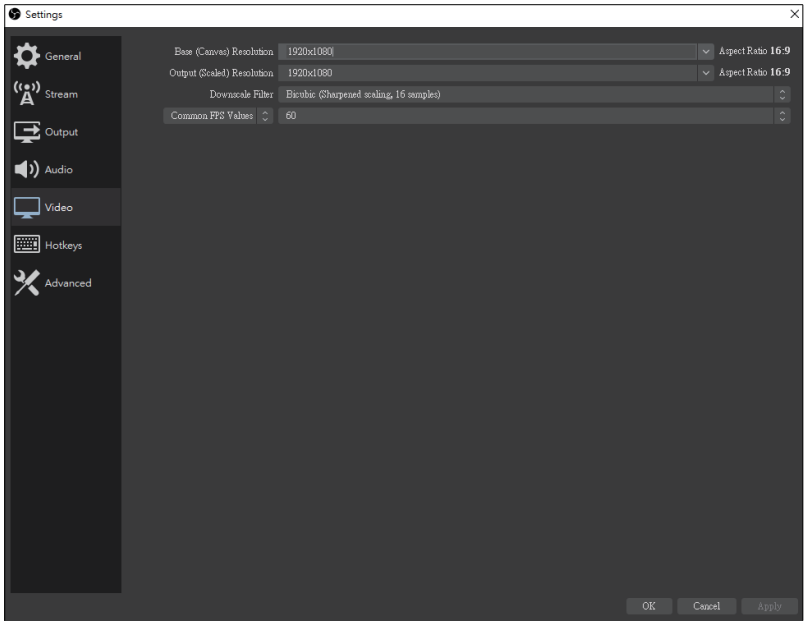
HOW TO BUILD A STREAMING PC

Live streaming has become an indispensable form of new media in the Internet Age, enabling you to share your gaming skills and experiences with friends remotely. Building a streaming PC may sounds professional, but don't let it intimidate you. Here are some useful advice you should know before you start.

WHAT SHOULD I KNOW WHEN BUILDING A STREAMING PC ?

Gameplay and Streaming Quality

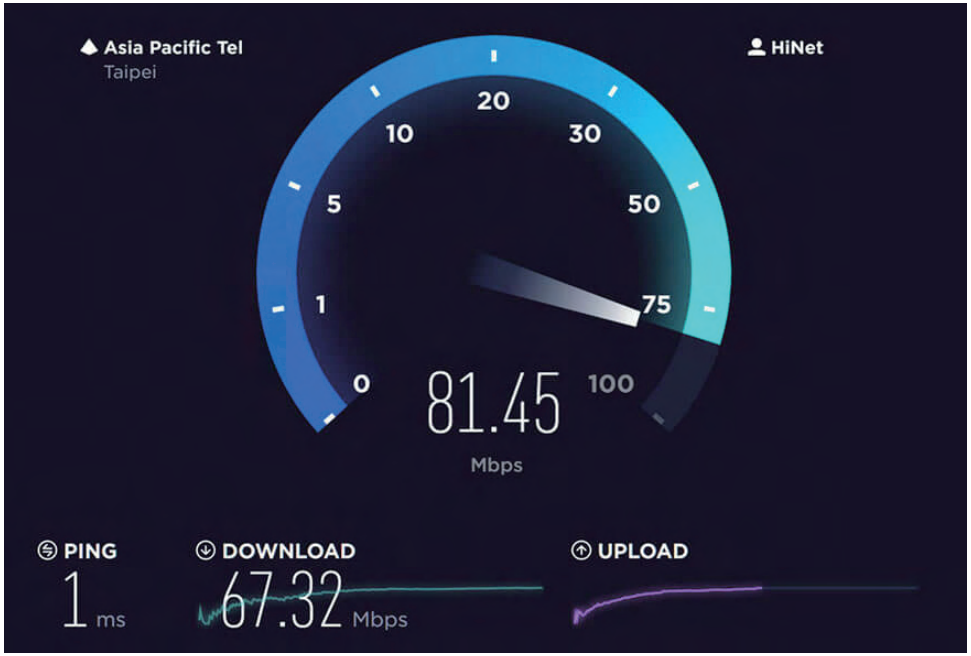
Every game has its minimum and recommended hardware requirements, but when it comes to streaming it at a decent quality, minimum requirements will not be good enough. In general, a 1080P, 60fps/30fps stream is an excellent point to start. Your CPU and GPU performance plays a crucial role when it comes to this particular workload.



Is your Internet fast enough?

A 20Mb/s connection is more than enough for most streaming purposes. You can even have a smooth streaming experience just by tethering an internet connection with your cell phone if you have consistent signal strength and speeds in your area.

Reference Link https://www.speedtest.net/



SINGLE OR DUAL PC ?

Single :As the name implies, a single PC is all you need to start streaming with this setup. But if you're streaming a game, your system has to handle two heavy tasks simultaneously, which is why having a powerful CPU and GPU is essential for this kind of setup.

Dual : In this type of setup, you offload the streaming workload to another PC so that your primary gaming PC can focus on doing one thing – gaming. The other PC will need a capture card and all the other streaming peripherals (mic, camera, so on) connected to it. However, this setup does increase the costs involved because you need an entire PC and a capture card in addition to your gaming PC.

CHOOSE THE RIGHT CPU

The CPU affects both livestreaming and gaming performance, so with a single PC streaming setup, make sure your processor is up to the task. In this type of streaming setup, sub-par streams are usually the result of a weak/inadequate processor.

For casual streamers, intel's i5/i7, AMD's R5/R7 series should work just fine.

For serious streamers who are more likely to stream the latest games at the best possible quality to their audience, we'd recommend intel's i9 and AMD's R9 range CPUs.

PRO TIPS

We recommend at least 16GB DDR4 RAM for live streaming.

Choose your live streaming software

Regardless of the type of streaming setup you pick, you'll need applications that capture and livestream your content to your audience. Although there are numerous ways to do this, the two most popular ones used by streamers today are:

- **XSplit Gamecaster:** https://www.xsplit.com/gamecaster
- **OBS Studio:** https://obsproject.com/
- **StreamLabs OBS:** https://streamlabs.com/streamlabs-obs

Open Broadcaster Software

XSplit | Gamecaster

GAMING PC

TRUE GAMER DESERVES A MONSTROUS GAMING PC.

It's all about ultimate gaming experience, nothing is more satisfying than playing games at the highest resolution and graphics settings, which you'll need a mighty gaming PC. Here we will go through a few considerations that you have to keep in mind when building a PC for gaming. Let's get started!

HOW TO BUILD A GAMING PC

WHAT SHOULD I KNOW TO BUILD A GAMING PC?

Every game has a set of minimum system requirements. For example, AAA games place great importance on graphics and sound quality, while FPS games may be less demanding on those but emphasize good connection quality. Before building a computer, visit the right websites to learn about your game's system requirements. This will help you avoid spending too little or too much on your PC.

Reference Link: http://gamesystemrequirements.com/

Choose the right graphics card

The two main GPU manufacturers are NVIDIA and AMD, and at MSI we offer cards for both GPU brands, ranging from entry-level to ultra high-end. For NVIDIA, 30-series cards offer a huge leap over the 2000-series, and the current models are the more entry level RTX 3070, the powerful RTX 3080, and high-end RTX 3090 cards. AMD starts with the Radeon RX 5500XT, up to the mid-range RX 5600 & 5700 XT. For the high-end we have the Radeon RX 6800, Radeon RX 6800 XT and Radeon RX 6900 XT.

You'll need to consider the amount of VRAM on the card too, crucial to your GPU's performance, along with fans for good cooling. Gaming in 1440p requires almost double, and 4K requires 4 times as much power as 1080p. Fast 120 or 144 hertz display rates are double the normal 60 hertz, so there's another doubling or more of the power required.

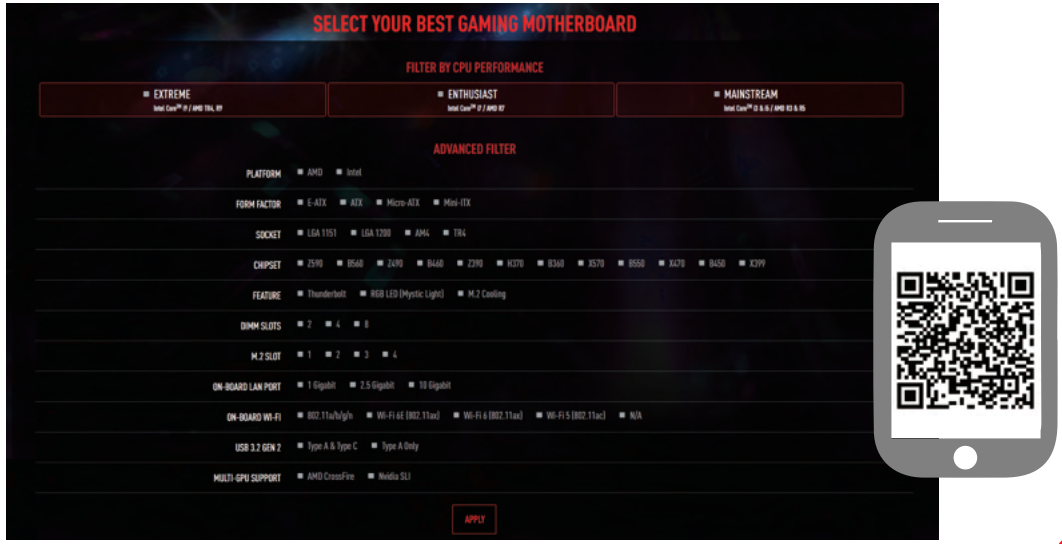
Decrease the loading time of games with an SSD

Loading times are an issue for many gamers around the world. It's primarily affected by your network speed and storage. Hence, another way to improve your gaming experience is to use an SSD (Solid State Drive) drive that offers a higher read/ write speed. It will decrease game loading times and increase the general responsiveness of your system.

PRO TIPS

Choose the right motherboard

Not only does a good gaming motherboard allow for future upgrades, but it also offers low-latency voice communication for an enhanced gaming experience. The MSI official Best Of The Best website can help you find the best motherboard for gaming to perfectly suit your gaming requirements.



Reference Link:
https://www.msi.com/Landing/best-motherboard-for-gaming-pc-build

ADD SOME RGB TO YOUR PC

In a addition to performance, there are also a lot people paying more attention on making their PC look great and unique from others. One of the easiest way is adding some RGB lighting for your rig, there's only a few simple steps away from making your PC different from others. Let's get to it.

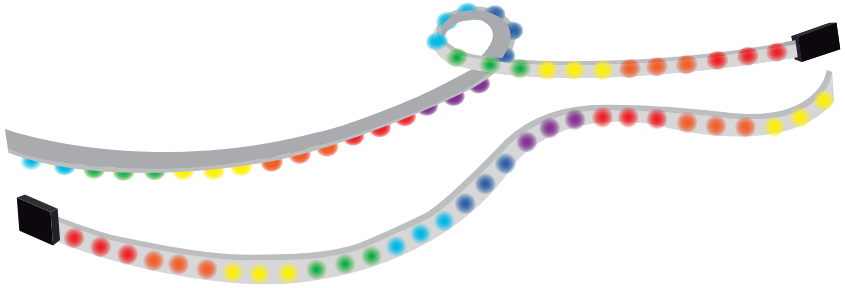
Reference Link: https://www.msi.com/Landing/mystic-light-rgb-gaming-pc/

Start with the color scheme

In recent years, various manufacturers have begun releasing products with special color schemes, such as MSI's all-white Arctic motherboard series, the all-black SLI PLUS series, and the silver Titanium series. As a starting point, getting matching components from the same series helps maintain consistent color throughout your rig.

Add RGB Lighting

Nowadays, many computers are equipped with RGB lighting devices. You can add RGB lighting by installing a LED strip, or choosing components that come equipped with lighting. Proper mixing and matching is the key to getting good lighting effects. MSI's Mystic Light Sync allows you to connect and control RGB devices inside and outside the case, delivering a brand new visual experience through a variety of color and mode settings.
While RGB lights typically run on 12V power, digital LEDs that run on 5V power are also available. Digital LEDs offer greater potential for customization by allowing the user to adjust lighting color on an individual basis.The user is free to configure lighting effects according to their own taste.

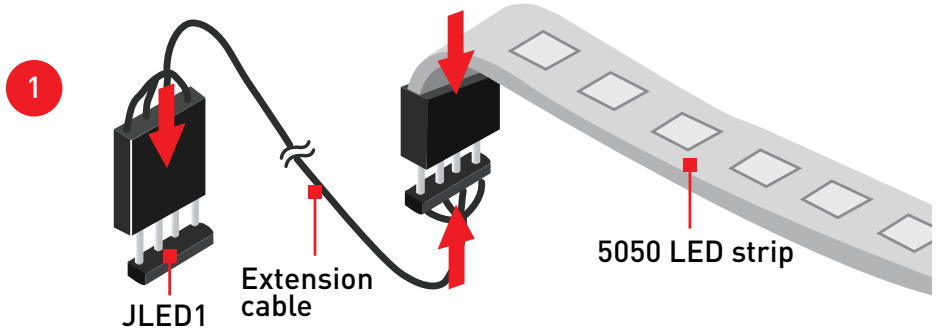


How to install RGB device

1. Check the definition of pin headers on the purchased RGB accessory and the motherboard (for example, 12V/5V)
2. Plug the 4-pin (3-pin) RGB connector to the RGB header on the motherboard
3. Plug the power connectors additionally when connecting an RGB accessory if necessary

   ØFor fans, connect to the fan connectors on the motherboard

   Ø For non-fan products, connect to the 4-pin connectors of the power supply



USEFUL TOOL : PCPARTPICKER

PLAN YOUR BUILD LIST: PCPARTPICKER

PLAN YOUR BUILD LIST: PCPARTPICKER

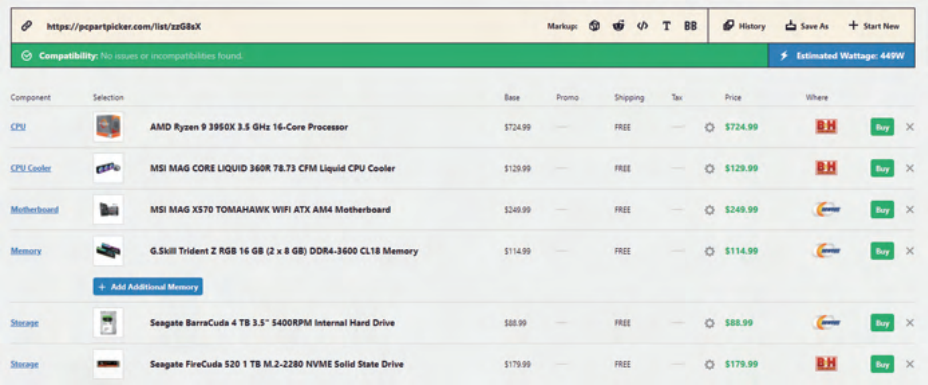
PCPARTPICKER

The most crucial part of building a PC is not the "building" itself; it's crafting a part list that aligns with your needs. After all, what significantly affects your PC's performance is its hardware. To help you tailor your own build list, we recommend using a helpful resource like PCPartPicker(https://pcpartpicker.com/)

CHOOSE THE PARTS

PCPartPicker offers stunningly detailed product information, including user reviews, and even offers links to buy said product. By switching the website to different regions, buy links will correspondingly link to the local e-tailer website. It not only provides a wide selection of available products, but it also gives you a reference of price and place to buy them – helping you save both time and money.

All you need to do is to enter https://pcpartpicker.com/list/ and you can choose your parts.



READY AND GO

When you finish creating your ideal build list, there are a few functions you can leverage:

Save. Simply save the planned build list first if you haven't yet decided to purchase your rig at the moment. Take your time to compare and consider.

Share. You can share the build list with your friends or to the forum for more opinion on you PC build.

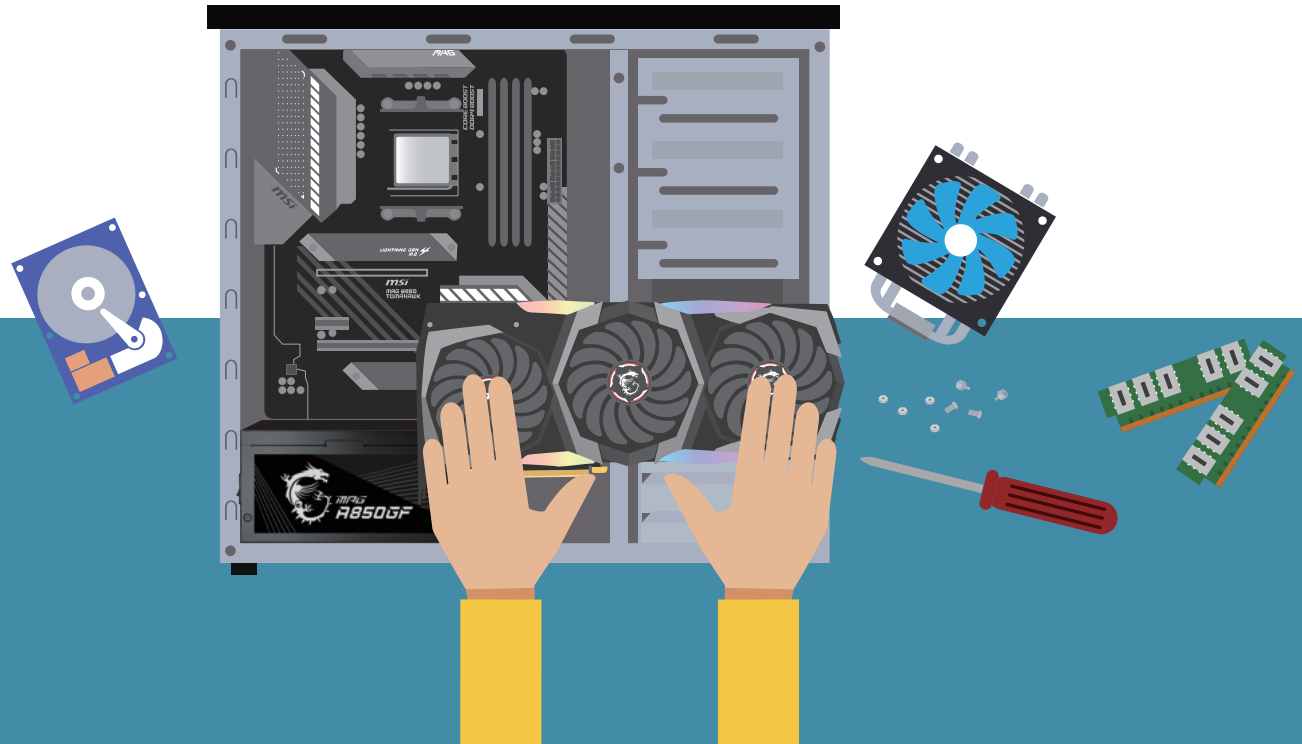
Buy. An easy button for you to buy the product on the e-tailer sites with ease.

PART3:

HOW TO BUILD A PC

STEP-BY-STEP BUILD GUIDE IN 10 STEPS

Time to get your hands dirty! With hands-on PC building instruction, even first timers can build a gorgeous, high-performance PC. Grab a screwdriver, up that passion, and you're good to go!



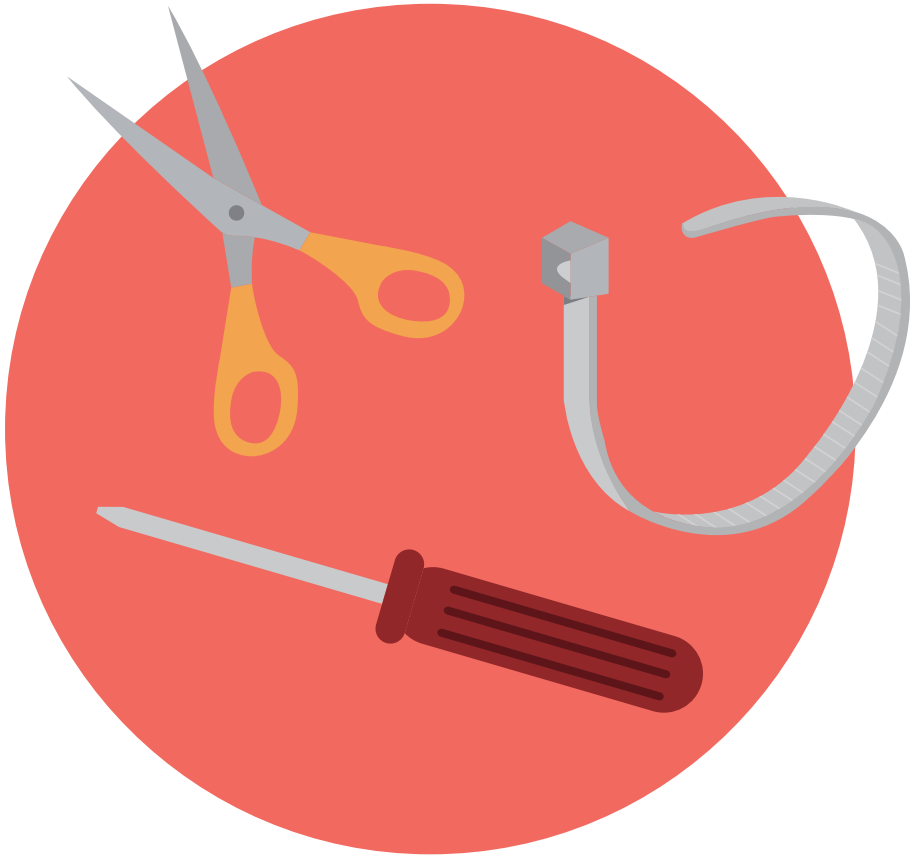
STEP 0. PREPARATION

Before start, some simple things to be prepared:

1. A magnetic screwdriver.
2. Some zip ties /velcro strips and a pair of scissors.
3. A clean non conductive surface to build your PC onto.
4. Take a deep breath, read the manuals first and you are good to go!

Caution:

Pins on the motherboard are vulnerable, so be careful to not bend them.

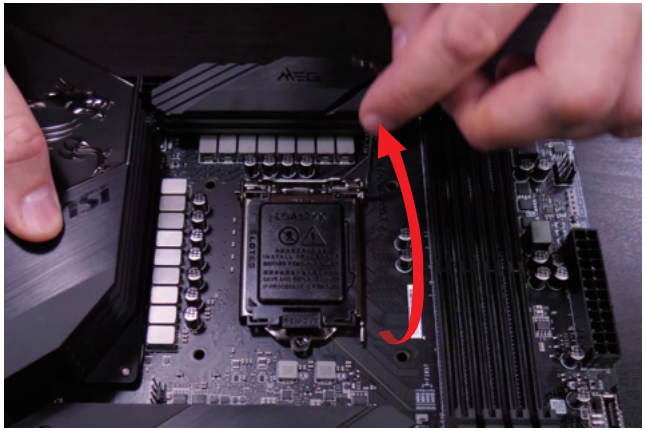


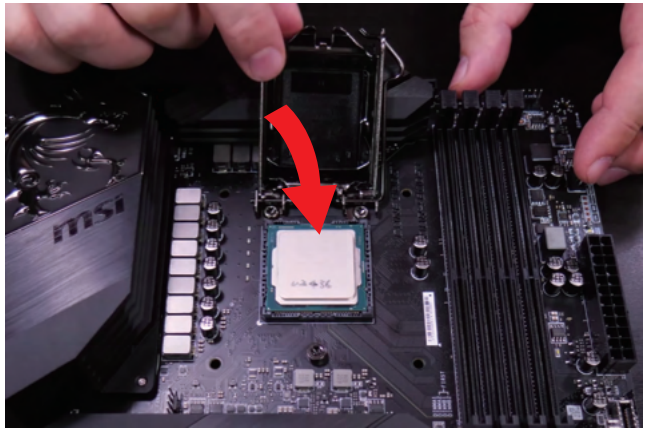
STEP 1. CPU INSTALLATION

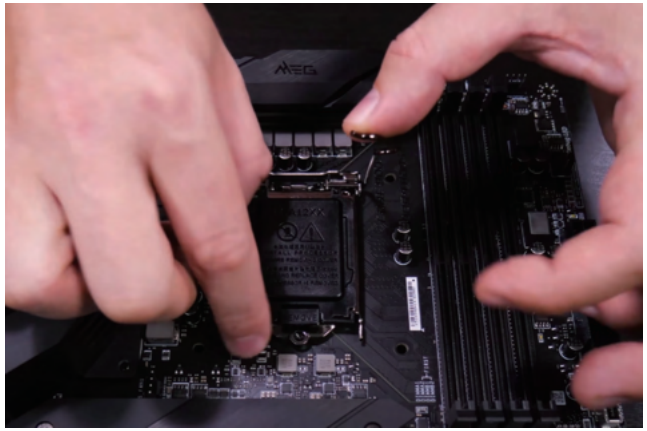
1. Unlatch the lid of the CPU socket.
2. Line up the notch printed on the CPU with the guiding notches marked on the socket; carefully insert it inside the socket.
3. Make sure the CPU is placed properly then resecure the lid and lock it onto the processor.

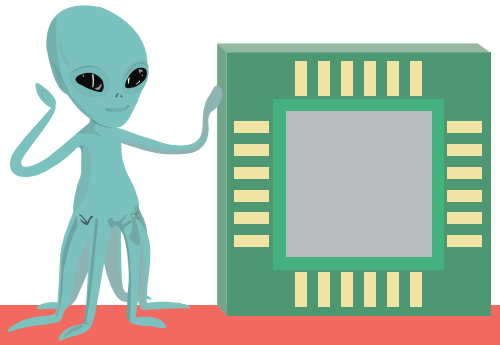
Caution:

Be careful with the CPU socket pins (or CPU pins), as it is made of gold, which is soft material. They are exceedingly fragile, any slight collision can bend the pins, which might cause functional errors.







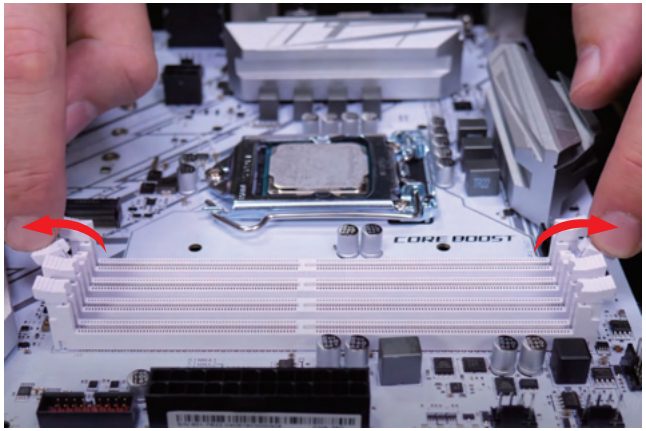


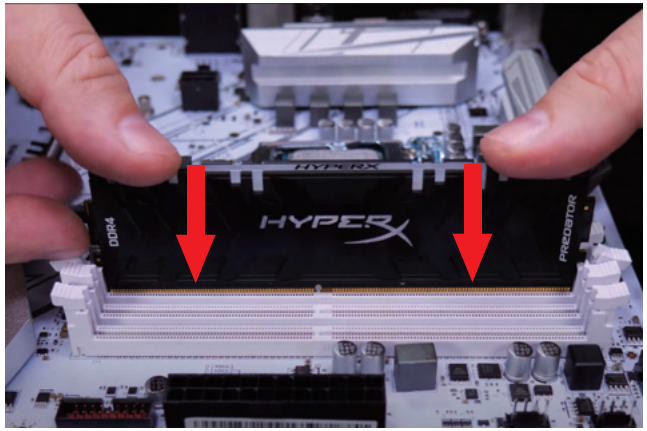
STEP 2. MEMORY INSTALLATION

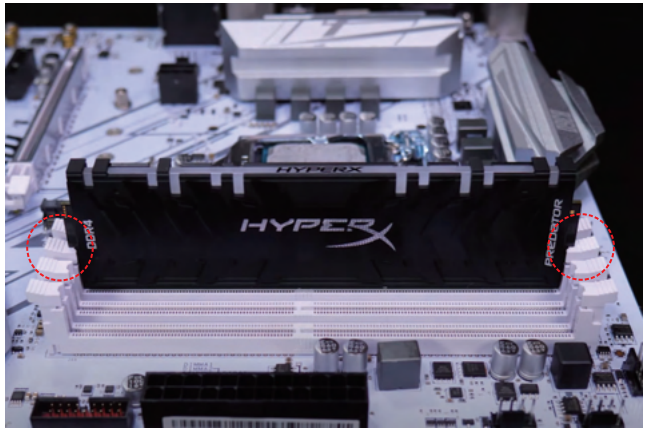
1. Pressing down on the lock/ejector tabs that are located at the ends of the memory socket.
2. Check the memory module installation order outlined in the motherboard manual, and make sure which the suggested matching memory slots to insert first.
3. Push the modules down until you hear a “click” as the retention clips are pushed upwards and lock the module.

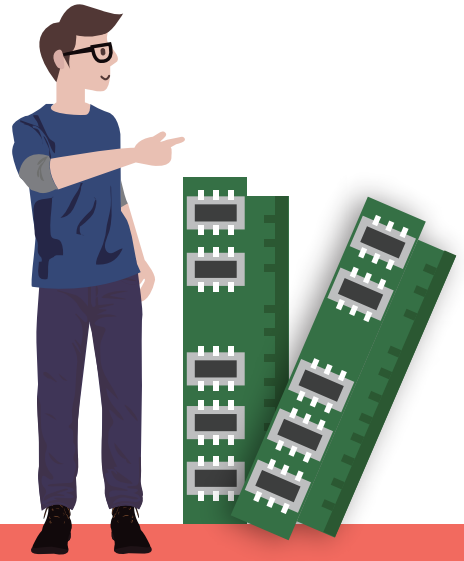
Tips:

The suggested sequence of which memory slots to be installed first may differ due to different motherboards. Take MSI motherboards as example, you are suggested to insert the memory kit into Dimm1 slot first.







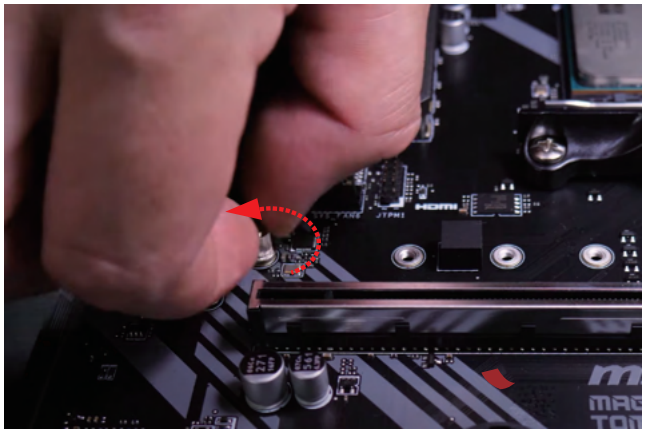


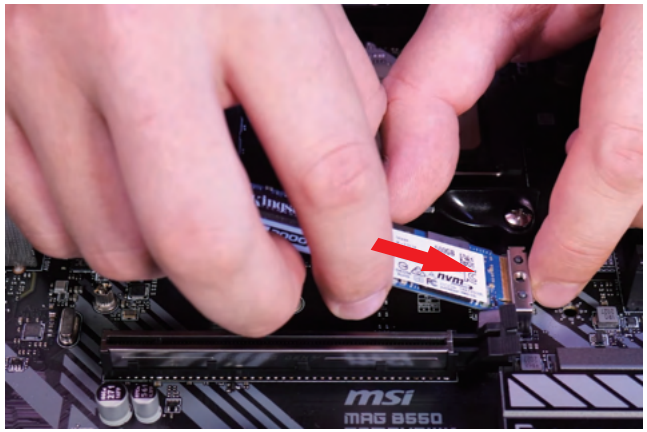
STEP 3. M.2 DRIVE INSTALLATION

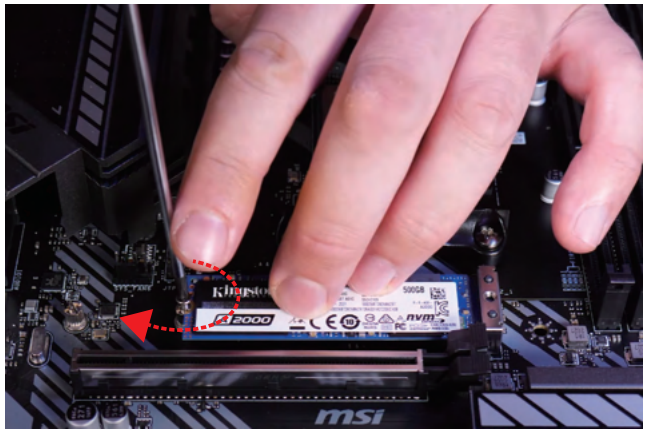
1. Move and fasten riser screws on the M.2 standoffs.
2. Take your drive and gently insert it into the connector at a 45 degree angle.
3. Push it down towards the standoff and secure it with the little screw.

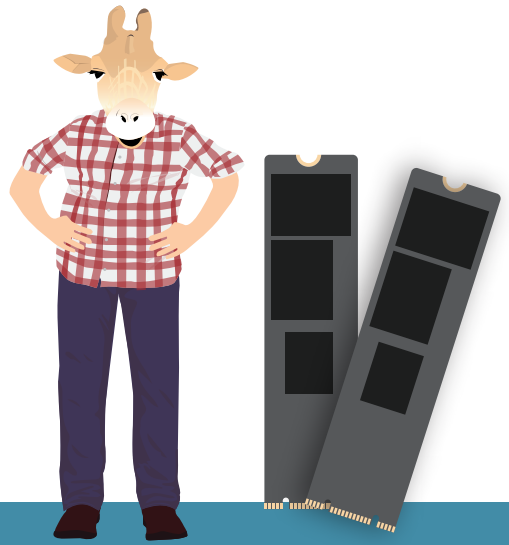
Tips:

Some high-end motherboards come with special cooling solution for M.2, such as M.2 shield and M.2 FORZR. You can refer to motherboard manual for additional installation steps.









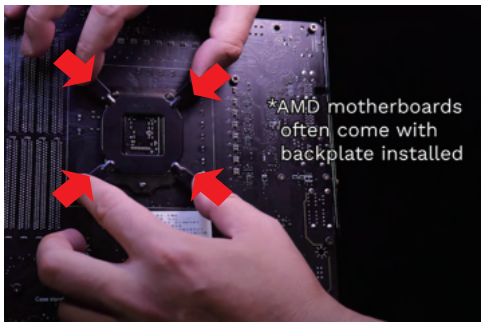
STEP 4. CPU COOLER INSTALLATION

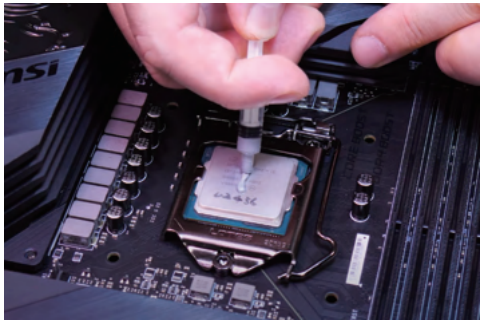
1. Mount the back- plate onto the back of the motherboard. (If you have one)
2. Apply a drop of thermal paste onto the surface of the processor.
3. Connect CPU Fan Cable to CPU Fan Header on the motherboard.
4. Lower the cooler vertically and place it onto the CPU.
   Secure it evenly tightening opposite screws progressively.

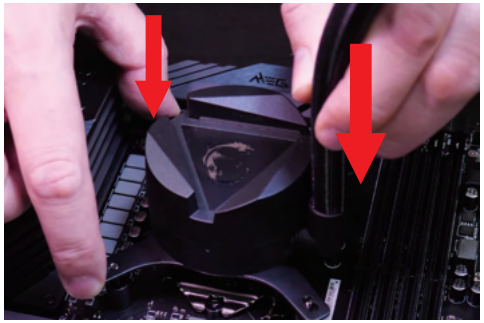
Caution:

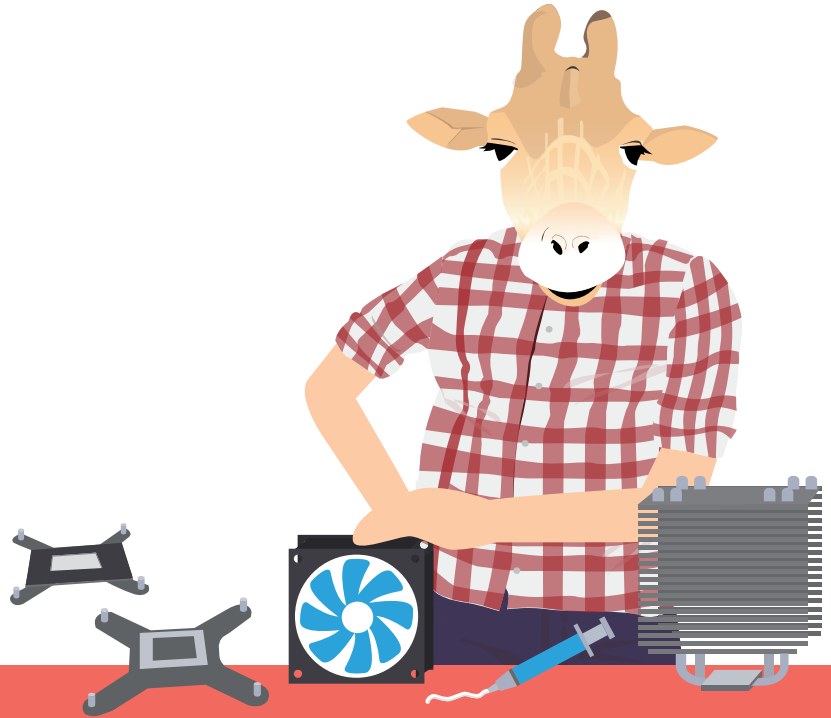
Make sure you apply thermal paste with the right amount. Too little or too much will cause bad contact or get paste into the socket relatively.

Make sure the screws are tightened properly, and the pressure applied at the corners is even to avoid CPU damage and cooling performance degradation.







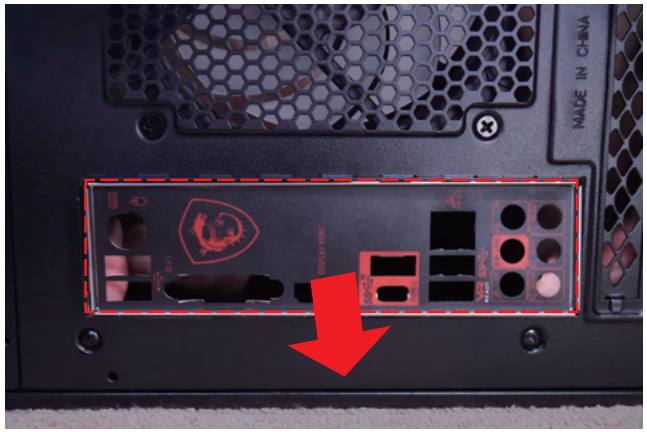


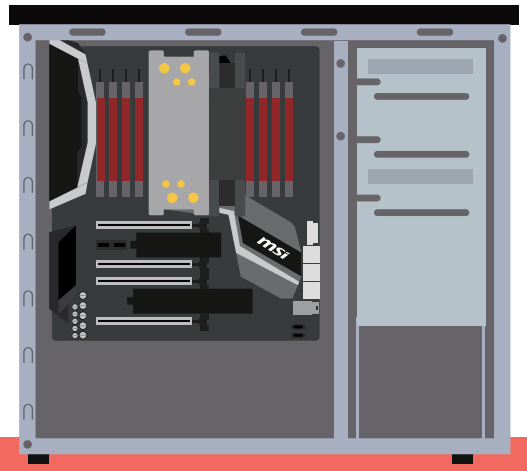
STEP 5. MOTHERBOARD INSTALLATION

1. Install I/O shield onto the back of the case.
2. Take your motherboard and gently lower it at a 45 degree angle into the case.
3. Match the mounting holes on the motherboard with the stand-offs in the case.
4. Secure the board with each of the supplied screws.

Tips:

Don't leave out screws - a solid mount will be very helpful to secure the motherboard in place to avoid unsteady movement.



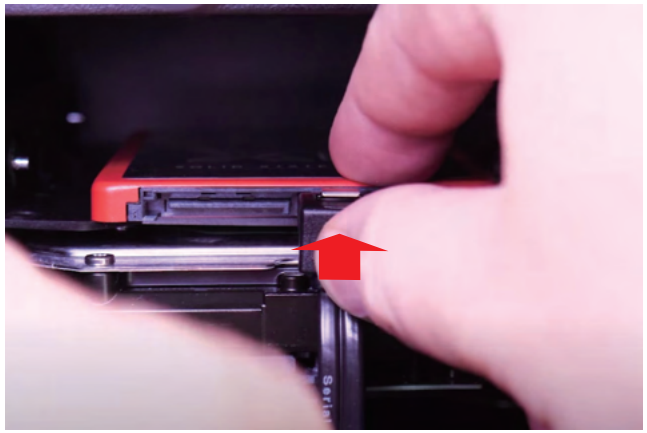


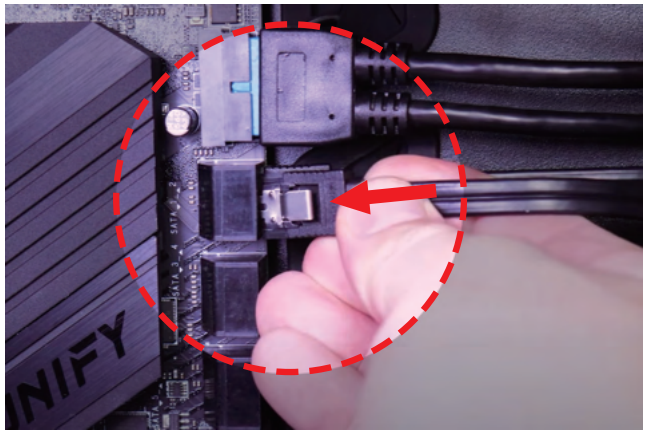
STEP 6. STORAGE INSTALLATION

1. Connect one end of the SATA cable to the SATA ports on the motherboard, and the other end to the storage devices (2.5'' inches / 3.5'' inches) itself.

Caution:

Make sure you mount the hard drive tight to avoid damage.



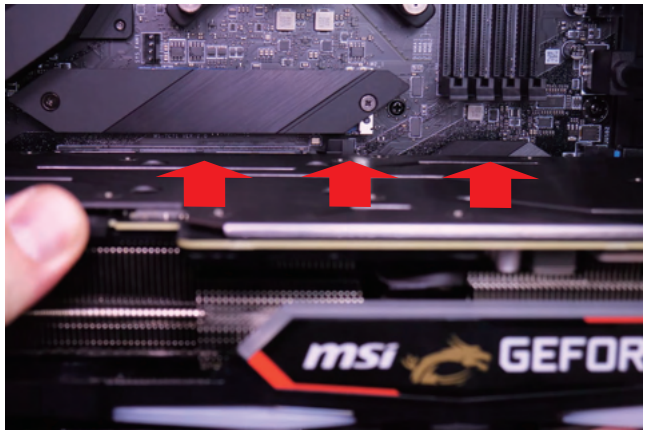


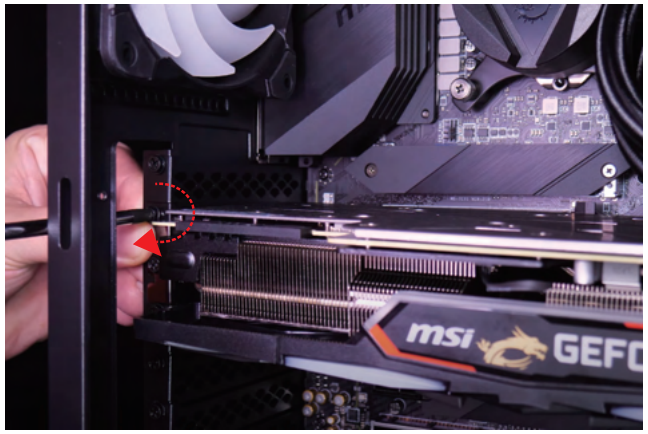
STEP 7. GRAPHICS CARD INSTALLATION

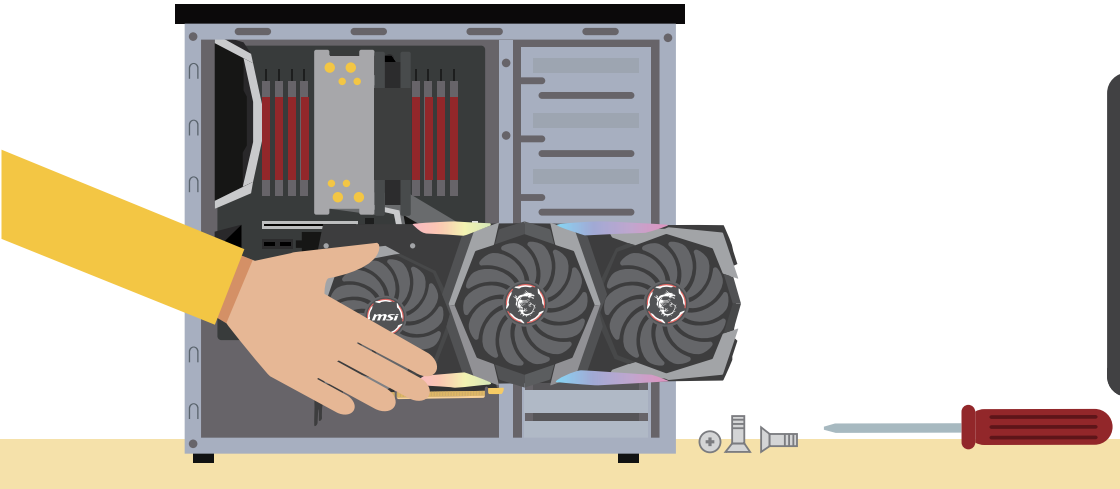
1. Remove rear PCI-e bracket from the case.
2. Unlock the PCI-e slot by pushing back the small plastic lock located at the rear of the slot.
3. Hold the card with two hands, lower the graphics card into the case and install into the PCI-e slot of the motherboard.
4. Secure the graphics card with the required screws to the back of the chassis.

Caution:

Some high-end cards are longer or use up even more PCI space. Make sure to check that beforehand to choose the appropriate case that could fit the graphics card.





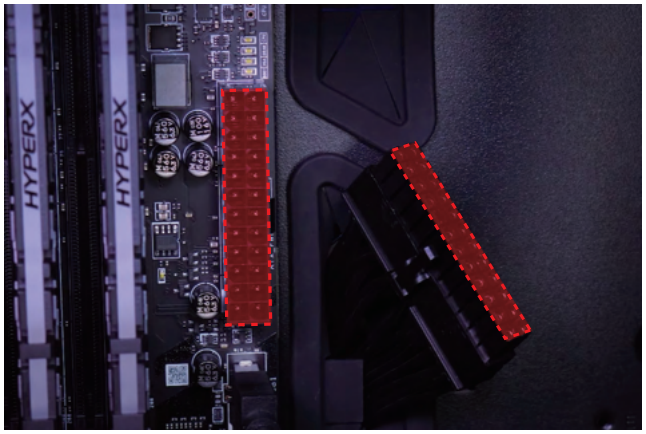


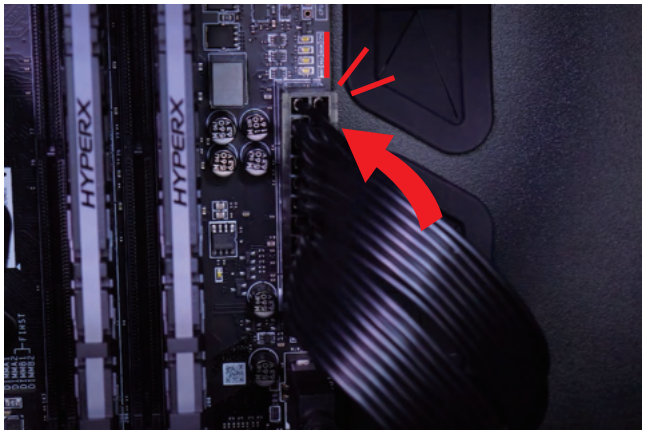
STEP 8. POWER SUPPLY INSTALLATION

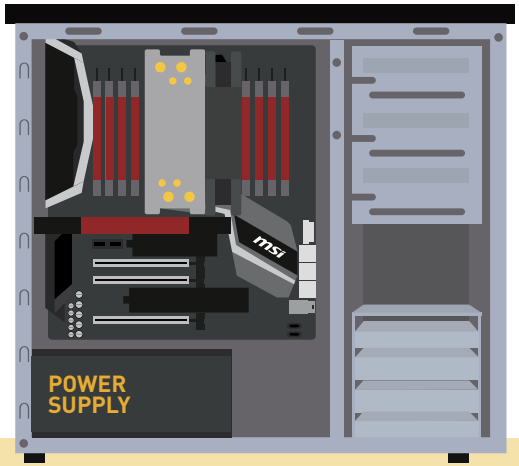
1. Mount the Power Supply (PSU) into the chassis and secure it with all the screws.
2. Connect 24-pin power connector into the socket on the motherboard.
3. Connect 8-pin CPU power connector to motherboard.
4. Connect 6+2 Pin PCI-E Cable to graphics card (it may vary by graphics card products).
5. Clip in your SATA power connecter to hard drive.
6. Connect other Molex connectors(with 4 horizontal pins) to extra devices (e.g. DVD/CD Optical Drives).

Tips:

Choosing the appropriate wattage for a Power Supply is essential. You can use online PC build simulators such as PC Part Picker or MSI Power Supply Calculator tool to get an estimation of the power required by your build. Make sure to purchase a Power Supply with a little headroom to account for future upgrades.







STEP 9. FRONT PANEL CONNECTORS AND CABLE MANAGEMENT

1. Connect Power switch / Reset switch / Power LED/ HDD(Hard Drive) LED Cable to motherboard JFP1 Pin header.
2. Connect front USB cables to USB pin headers on the motherboard.
3. USB 3.0 / USB 2.0 Cable to USB 3.0 / USB 2.0 Pin Header.
4. Front USB Type-C Cable to Front USBType-C Pin Header.
5. Connect the Audio(Speaker) Cable to the motherboard JAUD1 Pin header.
6. Use zip ties or velcro strips to secure the cables in tight bundles to the back of the case.

Tips:

Check the maximum amount of USB ports on the motherboard before purchasing a PC case. Make sure the case you want to purchase also support enough USB ports as the motherboard does.

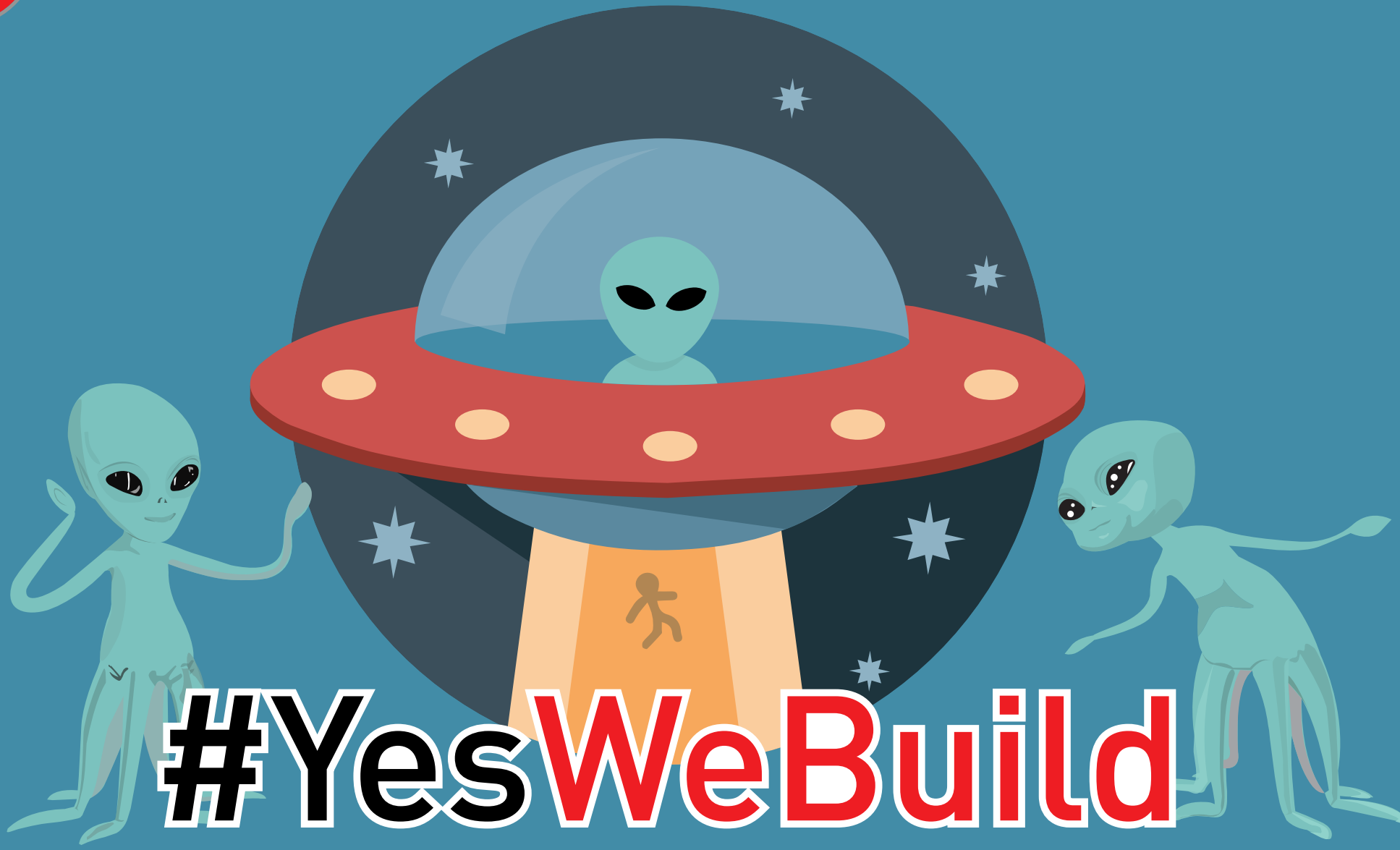
STEP 10. OPERATION SYSTEM INSTALLATION

1. Insert the OS device (CD / USB)
2. Follow the OS installation steps
3. Download the latest device driver from the website and Install.

Tips:

If your system can't be booted from the installation devices, enter the BIOS and prioritize the boot sequence.

msi



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