

# How many GB of SSD storage is enough for a computer?

What SSD capacity should you buy for optimal performance? Discover advice on choosing the right SSD capacity for your real-world needs and avoid wasting money here.

Choosing the right SSD storage capacity depends not only on your budget but also on considering operating system performance, software performance, and future updates. This article will help you determine the exact storage capacity needed for your specific requirements.

## Key points

1. The actual SSD capacity is always lower than the stated capacity due to calculation methods and the space occupied by the operating system.
2. It's recommended to maintain at least 20% free space to ensure stable SSD performance and a longer lifespan.
3. A 256GB SSD is the minimum for basic needs, while 512GB is the standard choice for most users.
4. Gamers and professional graphic designers should choose SSDs of 1TB or more to store AAA games and project files.
5. Combining high-speed NVMe SSDs with large-capacity SATA drives is a smart solution to optimize both cost and performance.

## 1. Three facts about SSD capacity you need to know before buying.

### 1.1. Actual format loss compared to published specifications

The reason stems from a difference in the numbering systems used for calculations. Storage device manufacturers use the decimal system (1GB = 1,000MB), while the Microsoft Windows 11 operating system uses the binary system (1GB = 1,024MB).

This difference results in a loss of SSD storage capacity that is proportional to the drive size. A 256GB SSD will have approximately 238GB of usable capacity, while a 512GB or 1TB drive will have 476GB and 931GB of usable capacity, respectively.



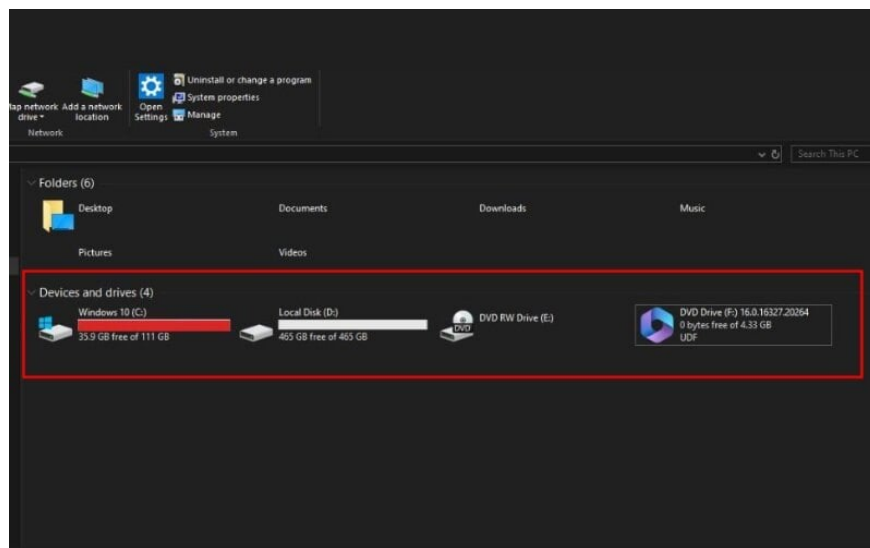
*The actual capacity is often lower than the stated specifications.*

## 1.2. Required space for the operating system and temporary files

Users cannot fully utilize 100% of the available storage space; the Windows operating system alone occupies 30-40GB immediately after installation. Storage space is further affected by the continuous generation of system files during use.

Here are some types of hidden data that frequently consume hard drive space:

1. **Windows update files:** Security patches and feature upgrades are downloaded periodically.
2. **Virtual memory (Pagefile):** A hard drive partition that is freed up to support RAM when multitasking.
3. **Browser cache and Temp files:** Temporary data generated by applications to speed up page loading.

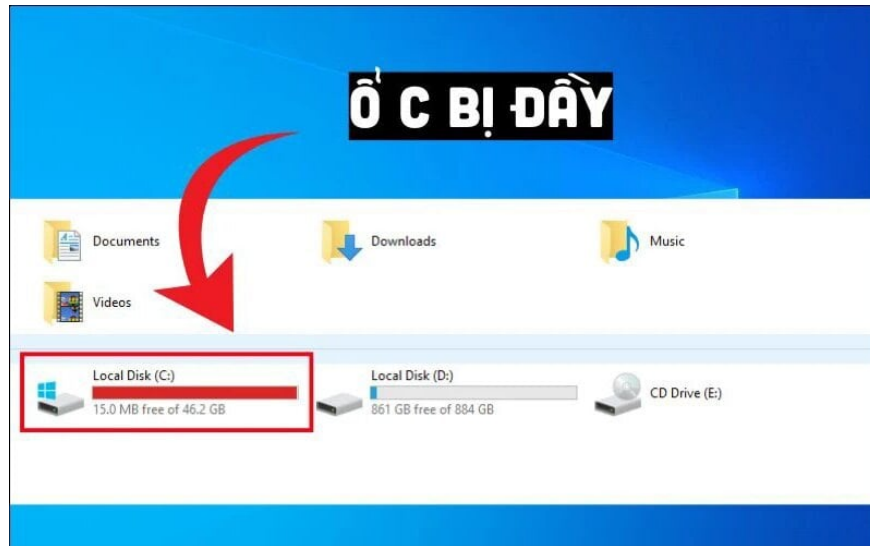


*Users are often unable to utilize 100% of their hard drive capacity.*

## 1.3. The 80 percent rule and component lifespan

NAND Flash memory chips need free space to perform the Wear Leveling algorithm, which distributes write data evenly across memory cells. When the drive is full beyond 80%, the controller takes longer to search for an empty block.

The consequence of overfilling your hard drive is a reduction in random read/write speeds (IOPS), causing system lag. Purchasing excess storage space from the start is the most effective way to maintain performance and maximize the total write width (TBW) of your components.



*A full hard drive will cause system lag.*

## **2. What SSD capacity (in GB) should I buy based on my needs?**

### **2.1. 128GB to 256GB SSDs for basic office laptops**

The current 128GB storage capacity is no longer sufficient to maintain stable operation for the latest operating systems. A 256GB SSD is the minimum standard, adequately meeting the needs of students and office workers who habitually store data in the cloud.

This capacity is best suited for basic document processing tasks. A 256GB hard drive can comfortably hold the following applications: office suite, web browser, and communication applications, etc.



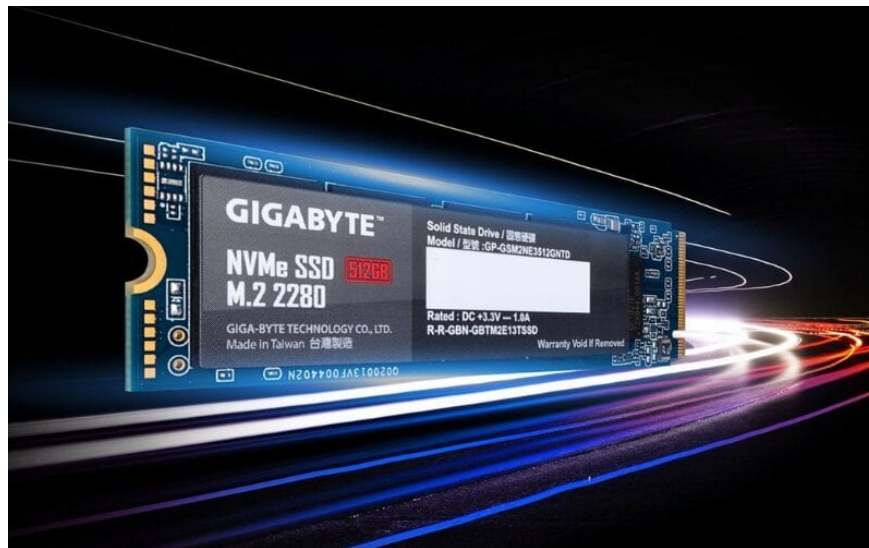
*For office use, you should choose a laptop with an SSD of 256GB or more.*

## **2.2. 512GB SSD for standard learning and entertainment needs.**

A 512GB SSD is currently the standard capacity, adequately meeting the needs of studying, working, and multimedia entertainment. This capacity is suitable for programmers or engineering students to install code compilation tools, etc.

The 512GB capacity offers several notable advantages:

1. Ample space for storing Windows and specialized learning software.
2. Feel free to install 1-2 popular eSports titles such as League of Legends or Valorant.
3. Optimize initial investment costs for student laptop and mid-range PC configurations.
4. Ensure stable data access speeds for at least 2-3 years of use.



*A 512GB SSD fully meets the needs for studying, working, and multimedia entertainment.*

### 2.3. 1TB SSD for gamers and graphic designers

Upgrading to a 512GB or 1TB SSD for a gaming PC depends on the size of modern games. Current AAA titles like Cyberpunk 2077 or Red Dead Redemption 2 typically take up 100-150GB of storage space per game.

In addition, a 1TB SSD also adequately meets the needs of video editing and graphic design. Software in the Adobe Creative Cloud ecosystem, such as Premiere Pro or After Effects, requires a large amount of cache space and high-quality source files.



*A 1TB SSD also adequately meets the needs of video editing and graphic design.*

### 2.4. SSDs of 2TB or more for workstations and creative users.

Hard drives of 2TB or more are a must-have for workstations and high-end PCs. Professional users such as AI engineers, 4K/8K video editors, or 3D renderers need massive storage space for continuous file output.

Furthermore, this storage capacity is also ideal for gamers who enjoy collecting games. Equipping a 2TB or 4TB hard drive ensures that the computer hardware is always ready to handle even the heaviest data loads without encountering read/write bottlenecks.



*Hard drives of 2TB or more are a mandatory choice for workstations and high-end PCs.*

### 3. Comparison table of costs and performance for different SSD capacities.

Capacity level	User segmentation	Estimated storage capacity	Average reference price
<b>256GB</b>	Basic office, students	Operating system + Office + a few lightweight applications	Short
<b>512GB</b>	Students, playing eSports	Operating system + specialized apps + 1-2 light games	Medium
<b>1TB</b>	AAA gamer, graphic designer	Operating system + Adobe suite + 3-5 demanding games	Quite high
<b>2TB or more</b>	3D Specialist, High-End PC	Huge 4K data repository + Large game library	Very high

### 4. Cost-effective storage solution combining NVMe and SATA drives.

A cost-effective yet high-performance solution for computer systems is to use a dual-drive configuration. By combining a small-capacity, high-speed NVMe SSD with a large-capacity SATA HDD /SSD, users can optimize their build budget.

The benefits of a hybrid NVMe vs SATA hard drive solution include:

1. Use an M.2 NVMe SSD (256-512GB) to install Windows and software, ensuring fast boot speeds.
2. Use a SATA HDD or SSD (1-2TB) as storage for raw data, videos, images, and as a local cloud storage solution.



*Combining SSD and HDD can save costs.*

## **5. Technical considerations when upgrading your computer's SSD yourself.**

### **5.1. Connection standards and physical dimensions**

Users must accurately identify the connection standards supported by the motherboard. Purchasing the wrong physical size or communication protocol will render the device unusable. Here's how to check motherboard or laptop compatibility before upgrading:

1. Read the technical documentation (manual) that comes with the motherboard or search for the laptop's model number on the manufacturer's website.
2. Determine which physical slot the device supports, the traditional 2.5-inch standard or the compact M.2 slot.
3. Check the M.2 slot's data transfer protocol; does it support SATA III (slow speed) or PCIe NVMe (high speed)?



*Users must accurately identify the connection standard that the motherboard supports.*

## **5.2. Memory and Heat Dissipation Technology**

Besides capacity and technology, users need to pay attention to the internal technical specifications of the memory chip. Here are some technical factors to consider when buying:

1. **The importance of DRAM on SSDs:** Choose a hard drive with DRAM caching to maintain stable read and write speeds when processing large files.
2. **NAND Flash technology:** Prioritize TLC memory chips for a balance between durability and cost, and limit the use of QLC if continuous data recording is required.
3. **Heatsink required:** PCIe Gen 4 or Gen 5 drives generate a lot of heat, so a metal heatsink is necessary to avoid throttling or overclocking.



*Equipped with a metal heatsink to prevent overclocking and speed throttling.*

## 6. Upgrade to a genuine SSD hard drive at GearVN.

GearVN specializes in providing high-end PCs, laptops, PC components ( RAM , CPU , SSD, etc.), and gaming equipment (monitors, headphones, keyboards, mice, etc.) to meet all the needs of gamers and technology users. GearVN also stands out with features such as:

1. **Diverse products and optimized configurations:** GearVN offers countless options from major brands such as Samsung, Western Digital, Kingston, Crucial, and Corsair. All products are carefully selected.
2. **Competitive pricing and numerous promotions:** GearVN regularly runs attractive promotions and discounts on special occasions. You can easily own your desired computer components at the best prices, along with attractive gifts or flexible installment payment options.
3. **Reliable warranty and after-sales service policy:** When shopping at GearVN, you can rest assured with our clear warranty policy and dedicated technical support team. Our experienced specialists are always ready to advise you on choosing the right product and answer any questions you may have during use.
4. **Convenient shopping experience:** Whether you want to experience our products in person at our showrooms or shop online through our website with fast delivery service, GearVN offers maximum convenience.

### GearVN Contact Information

1. **Hotline:** 1900.5301
2. **Website:** gearvn.com



*Upgrade to a genuine SSD hard drive at GearVN.*

## 7. Frequently Asked Questions about SSD Capacity

**7.1. Why does my SSD fill up quickly even though I don't have many applications installed?**

Hard drives fill up quickly due to the accumulation of hidden system files. The size of the Downloads folder, Recycle Bin, web browser cache, and Windows update backup files constantly increases. The operating system automatically generates temporary files, reducing free space.

## 7.2. Does a full SSD drive slow down a computer?

Yes. When the free space is below 15-20%, the controller doesn't have enough space to perform data rotation and optimize memory. The process of searching for free blocks takes longer, leading to a sharp decrease in read/write speeds and system lag.

## 7.3. Is upgrading to a 512GB or 1TB SSD for a gaming PC more cost-effective?

Upgrading to a 1TB drive offers better long-term cost savings. The price-to-performance ratio (P/P) of a 1TB drive is always more optimal. Furthermore, with the ever-increasing size of games, choosing 1TB helps avoid having to buy additional drives or upgrade after only 1-2 years of use.

### See more:

1. How to use your SSD effectively: Optimizing speed and lifespan.
2. Will upgrading to an SSD void your warranty? A detailed explanation from A to Z.
3. Should you buy a SATA or NVMe SSD? How to choose the optimal hard drive.

*Deciding how many GB of SSD storage you should buy depends directly on the amount of data and the specific software you use daily. Contact GearVN via hotline or visit our website for advice on the most suitable storage upgrade.*

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