



Operating systems

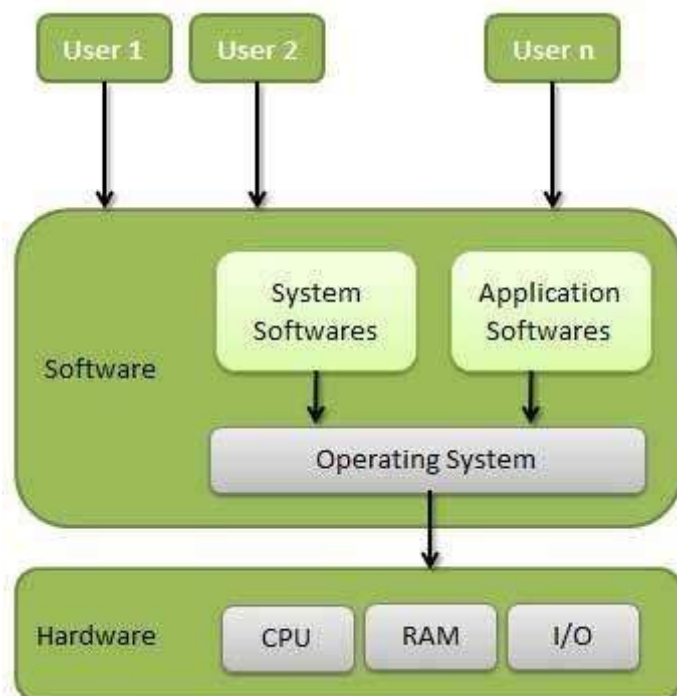
KT1801 Functions of an operating system: e.g. managing hardware, resources, data, and making user interaction easy through the use of a graphical user interface (GUI)

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

Some popular Operating Systems include Linux Operating System, Windows Operating System, VMS, OS/400, AIX, z/OS, etc.

Definition

An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.



Following are some of important functions of an operating System.

Memory Management

Processor Management

Device Management

File Management

Security

Control over system performance

Job accounting

Error detecting aids

Coordination between other software and users

Memory Management

Memory management refers to management of Primary Memory or Main Memory. Main memory is a large array of words or bytes where each word or byte has its own address.

Main memory provides a fast storage that can be accessed directly by the CPU. For a program to be executed, it must in the main memory. An Operating System does the following activities for memory management –

Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.

In multiprogramming, the OS decides which process will get memory when and how much.

Allocates the memory when a process requests it to do so.

De-allocates the memory when a process no longer needs it or has been terminated.

Processor Management

In multiprogramming environment, the OS decides which process gets the processor when and for how much time. This function is called **process scheduling**. An Operating System does the following activities for processor management –

Keeps tracks of processor and status of process. The program responsible for this task is known as **traffic controller**.

Allocates the processor (CPU) to a process.

De-allocates processor when a process is no longer required.

Device Management

An Operating System manages device communication via their respective drivers. It does the following activities for device management –

Keeps tracks of all devices. Program responsible for this task is known as the **I/O controller**.

Decides which process gets the device when and for how much time.

Allocates the device in the efficient way.

De-allocates devices.

File Management

A file system is normally organized into directories for easy navigation and usage. These directories may contain files and other directions.

An Operating System does the following activities for file management –

Keeps track of information, location, uses, status etc. The collective facilities are often known as **file system**.

Decides who gets the resources.

Allocates the resources.

De-allocates the resources.

Other Important Activities

Following are some of the important activities that an Operating System performs –

Security – By means of password and similar other techniques, it prevents unauthorized access to programs and data.

Control over system performance – Recording delays between request for a service and response from the system.

Job accounting – Keeping track of time and resources used by various jobs and users.

Error detecting aids – Production of dumps, traces, error messages, and other debugging and error detecting aids.

Coordination between other softwares and users – Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

KT1802 Big three operating systems: Windows, Linux, and Mac

Windows, Mac, or Linux? We compare the pros and cons of these computing platforms

[Latest computer news at CNET](#)

By mid-2019, most people are fully entrenched with their favourite operating system choice. But, if you're upgrading from an old machine, you might want to re-evaluate your options. If you're choosing an operating system for your desktop or laptop computer, there are three main choices: Windows, MacOS, and Linux.

In this article, we're going to take a comprehensive look at the differences between these platforms for desktop use. Before we get started, let's establish a few ground rules and recognize a few realities.

We're looking at desktop and laptop use only. Choosing a server, IoT, or infrastructure operating system is a very different beast, something we don't have room to discuss in this article.

Also: [Small business servers: Why and how you can say 'no' to the cloud](#)

We are well aware of the nearly religious affinities for each of these platforms. We'll touch lightly on some of the fundamental features that drive these affinities, but we're not preaching. Each choice works for different people. We're not telling you what to do, we're just discussing some factors you might want to keep in mind when making a choice.

We will consider how these well-understood OSs differ in 2019. We've started each OS off with six key considerations, so if you want to just skim, you'll get a good feel for the pros and cons of each system merely by scanning the 18 considerations in our pro and con lists.

And, with that, let's take a deep dive into today's three leading desktop platforms.

Use and cost

Let's start with the key questions I ask when anyone comes to me for advice about computer purchasing:

What do you want to do with it?

How much do you want to spend?

Which of those two (use versus spend) is more important?

Windows typically comes with new PCs. If you have an old PC, it almost certainly came with Windows. Pretty much the only time you're going to pay to buy Windows is if you're building one of your own, and we'll address that later. Macs always come with MacOS, so there's no cost there. And, of course, Linux is free. The much bigger cost for all these environments will be your ongoing maintenance expenses.

Also: [Laptop vs. Chromebook: Picking the best computer for you](#) CNET

Choosing a computer is always about making trade-off decisions. If you've got a very limited budget, then your choice is often going to be Windows or even Linux. If you're going to do heavy graphics or video production, your choice might often be Mac. The point is, before you choose your desktop platform, it's important for you to identify your needs.

I find that the trade-off between use and spend is often the deciding factor. I recently bought [a new main desktop machine](#). In my case, I didn't want to spend all that much, but my bigger priority was getting my job done.

Because of the amount of work I have to do, I'm always finding ways to save time. If my computer choice increases productivity at the expense of cost, well, then I'm probably going to be spending more money. I need those hours back.

You may have a hard-and-fast budget, or you may have a key need. As you work your way through your choices, keep these factors (and the balance between them) in mind.

Understanding Windows

Let's talk Windows. Windows went through [a rough period during its Windows 8 generation](#). Microsoft removed the Start menu, forcing users to rely on gestures to find features and launch applications. Microsoft also introduced [a limited version of Windows called Windows RT](#), which only allowed Windows Store apps and didn't run on the Intel platform.

Also: [Next for Windows 10: What to expect from the May 2019 Update](#)

Three years later, in 2015, Microsoft [introduced Windows 10](#), a substantially improved version of Windows that returned the Start menu. Microsoft improved the user interface, streamlined many of the settings, and eliminated [the odd inconsistencies that had haunted Windows 8](#). Windows 10, which has had some substantial interim upgrades, is a truly strong Windows release.

By most accounts, Windows runs on roughly 90 percent of PCs worldwide, with desktop Linux usage accounting for a very low single digit percentage of usage and MacOS making up the rest. In developed markets like the US, the Mac percentage is considerably higher, at around 20 percent. But corporate usage, with the exception of some companies like IBM, is almost all Windows. For most people, Windows is the default choice.

Windows means choice

In fact, choice is Windows' outstanding feature. No matter what kind of computer you want, what configuration, or what form-factor, there's a Windows machine for you. Microsoft has long embraced touch-screen computing with Windows, a feature not found in Macs anywhere. Windows machines are built by hundreds of manufacturers, and users have long built their own machines from easily-available components.

That means if you want [a Windows computer that's really a tablet with a detachable keyboard](#), an [all-in-one](#), a [super-beefy tower machine with lots of blinking colored lights](#), or even a system on [a USB thumb drive](#), along with so many more options, there's a Windows machine for you.

When it comes to customization, that choice increases exponentially. If you want to build a machine yourself, you can add nearly any configuration of cards and features you want. Do you want four beefy graphics cards working in tandem? Windows can do it. Do you want on-board instrumentation inputs? Windows can do it. Do you want to be able to run 10 drives internal to the machine? Well, of course, Windows can do it.

KT1803 Control panel**Sections of the Windows Control Panel**

There are eight main areas on the Control Panel, containing different tools designed to optimize your computer.

System and Security - A section to check your computer's status, backup and restore, and others.

Network and Internet - View network status.

Hardware and Sound - View which devices are on your computer and add devices.

Programs - Uninstall programs.

User Accounts - Change user accessibility.

Appearance and Personalization - Change desktop options, like fonts and screen readers.

Clock and Region - Change date and time.

Ease of access - Optimize your display settings.

KT1804 Remote assistance

Remote Assistance

Remote assistance refers to a connection that is intended to provide technical support from a distance. In this mode, a user who is sitting at his or her computer can invite a technician to see what is happening on the screen remotely. The remote user receives an invitation from the host and cannot log in without responding to it.

If allowed within the settings of the host computer, the remote user can also share control of the host computer, opening files, accessing information and inputting data by mouse and keyboard. This is extremely helpful for an IT professional who can handle a problem from a distance by running scans or checking the registry. While this type of connection originated within the confines of a LAN, remote assistance is now possible over the internet regardless of the users' locations.

An important distinction in remote assistance vs. remote desktop is that both the host user and the remote user are seeing the same screen. Both can take part in the process.

Remote Desktop

Remote desktop refers to the connection made when a user obtains full access to a host computer or device from a distance. For example, a user connects to their work computer from a personal computer at home.

In a typical Windows remote desktop connection, the host computer's screen locks when the session begins. Only the remote computer will see any video output. Although viewed on a remote screen, the host computer does all the processing. The user only sends keyboard and mouse input, and the host computer only sends back video and audio output. If someone makes a remote connection and saves a file to a hard drive, it will be on the hard drive of the host computer and would have to be transferred to the remote computer when the connection has ended.

A remote desktop connection is mostly about productivity. It allows an employee to connect to his or her computer and access files from somewhere else in the workplace or, with some configuring via the internet. In short, remote desktop aims to increase efficiency whereas remote assistance facilitates technical support.

Remote Assistance Vs. Remote Desktop: Setting Up The Connection

In considering the difference between remote desktop and remote assistance, the means of connection is an important factor. Because each mode has a different function, the connections between each mode vary. One commonality is that the host computer must set up the connection. Typically, the host computer needs to give permission to accept a remote connection.

These kinds of connections were originally designed for use within a business's LAN as opposed to connecting to computers across the country. This is especially true for remote assistance, which allows IT professionals to work on a computer without leaving their offices.

Now with the help of a [remote access app](#), remote connections can be successfully carried out between nearly any devices that have internet connections.

How to Connect Remote Assistance

Remote assistance involves users on both ends of the connection: both at the remote station and at the host computer. Advanced software allows a technician to troubleshoot multiple computers at once, or even have a few technicians connect to the host machine at the same time if the problem is really complex.

Here is what the process for establishing a remote assistance connection will look like:

The host user sends an invitation to the technician.

The technician, using the remote computer, must accept this invitation in order to gain access to the host computer.

Depending on the configuration, the host user may choose to simply share their screen or give full control over to the technician.

The connection continues until either side ends the session.

How to Connect Remote Desktop

A Windows remote desktop connection involves a single user operating another computer at a distance, which means the connection process is going to look a little different:

Prior to leaving the host computer, the user must navigate to the control panel and toggle the option to allow remote access.

Once the host computer is configured to allow remote access, the user must have proper credentials at the ready.

From the remote computer, the user is prompted to enter the IP address of the host.

Then, the user is prompted to enter the login credentials of the host.

At this point, the remote screen displays information from the host computer, allowing the user to interact with it like normal, even if the computer is miles away.

Remote Assistance Vs. Remote Desktop: Security Needs And Concerns

In terms of [remote control security](#), how does remote assistance differ from remote desktop? While making remote connections is important for proper support and productivity, it also opens a computer and the business that owns it to heightened security risks. This is one of the dangers of using remote connections outside of a LAN. No matter where you land when making a remote assistance vs. remote desktop decision, the host computer is only as safe as the user who allows the connection.

Security Concerns of Remote Assistance

In looking at security threats of remote desktop vs. remote assistance, they're both vulnerable to cyber-attacks. But when it comes to the security of remote assistance, the primary difference is the nature of the connection. Unless the host user is acting improperly, there is always someone on either side of the connection. The host user must invite the connection and monitor it throughout the session.

In addition, when someone is giving remote desktop assistance and wants to take control of functions like the keyboard and mouse, it's important to make sure the host user actively grants those permissions.

Security Concerns of Remote Desktop

Employees often use remote desktop to connect to a work computer from home or on the road. However, this can lead to dangerous security breaches [if precautions are not taken](#). It's important to make sure remote workers use a VPN or something similar to keep connections encrypted—and monitor the network for unusual activity. If the remote user's device is compromised, it could allow a malicious actor easy access to the corporate network.

If a cybercriminal can obtain the IP address of a computer that can make RDP connections, that person then only needs to obtain the login credentials. If an employee uses a weak password, a criminal can log in and potentially access information and data on the work computer—or elsewhere on the network. This is why many IT teams implement strong authentication protocols, such as multi-factor authentication, to make sure any users who try to remotely connect are actually who they say they are.

Impero Connect For Remote Connections

If you are evaluating the benefits of Windows remote assistance and remote desktop in 2022, you may want to look at an [RDP alternative](#). Impero recognizes the need for a variety of remote connections beyond the LAN network. RDP's most common uses come with well-known risks which is why considering all options before you select your software is important.

Impero Connect gives businesses [secure remote support software](#) that controls both the access and abilities of remote connections. Some of the features that make Impero a better choice in the remote assistance vs. remote desktop comparison include:

End-to-end encryption: Both sides of the connection remain secure.

Role-based access controls: Administrators limit which employees can access which computers.

White-listed applications: Administrators can limit the applications available to a user during a remote session.

Video logging: Impero Connect can record videos of remote sessions to help monitor issues and check for security breaches.

Simple cross-platform access: Users can make connections between devices on multiple platforms.

KT1805 OS command prompt

What is a command prompt?

A command prompt is the input field in a text-based [user interface](#) screen for an operating system (OS) or program. The prompt is designed to elicit an action. The command prompt consists of a brief text string followed by a blinking [cursor](#), which is where the user types command prompt commands.

Command-line interfaces ([CLI](#)) and prompts were the standard interface for computers from the early days of computing into the 1980s. Microsoft [MS-DOS](#) systems and other early consumer-based computers used CLIs. Current [Windows](#) systems offer the CLI for administrative tasks. The CLI is still an essential part of the [Linux](#) OS.

The command prompt is an [executable](#) CLI program, cmd.exe. At the command prompt, the user types a statement including a base [batch file](#) or a command name and any arguments to specify running conditions, logging and so on for the program. In Windows systems, such as Windows 10 and many previous versions of Windows, the command interpreter and executioner are referred to as the [Windows Command Processor](#).

Command prompt interfaces can be powerful and succinct. Some tools that aren't available through the graphical user interface ([GUI](#)) can be accessed through the command prompt. It also offers superior automation through [scripting](#), but mastering the commands can be challenging.

How to use the command prompt

Many Windows users regularly use the GUI. However, it is helpful to know how to execute system functions in the command prompt window. For example, basic functions such as changing a [directory](#) or performing an examination of the system disk are easy to execute at the command level.

There are various ways to open command prompt. A common one in Windows is to use the command prompt shortcut located in the Start menu or on the Apps screen.

The basic command level might look like this:

```
C:\Windows\system32\>cmd.exe and <enter>
```

This results in the following:

```
C:\>
```

The OS is now ready for a command. Each command launches a batch file that initiates a specific function. The change directory function looks like this:

```
C:\>dir and <enter>
```

This presents a list of available directories linked to the root directory -- for example, the C drive -- in the system. To change to a different directory, the following is performed, using the example of changing to a directory called *applications*:

```
C:\>cd applications\ and <enter>
```

This changes the directory to:

```
C:\applications\>
```

Now the system needs a command to execute something in the applications directory. To check on the status of the elements associated with a specific directory, the user enters the following at the command prompt:

```
C:\applications\>chkdsk and <enter>
```

The OS executes the chkdsk [utility](#) for the applications directory and presents a summary of the components in that directory, such as the number of files and subdirectories, and number of [bytes](#) in use and the number available.

KT1806 OS migration

About migrating Windows operating system to SSD / HDD

What is system migration? A system migration, just as the words imply, refers to the process of transferring current operating system to another storage device such as SSD (solid state drive) or HDD (hard disk drive). The process not only migrates Windows OS, but also installed apps, system updates, drivers, custom settings and wanted personal data on the system disk. If original system disk is of MBR format, both system reserved partition and C drive will be migrated; if it is a GPT disk, the OS migration will include system drive, EFI partition, MSR partition and other specified partitions. After system migration, the destination disk will be bootable, and it can be used to replace the original system disk immediately.

When do you want to migrating system to SSD or HDD? Here are some scenarios that you can simply migrate OS instead of reinstalling Windows from scratch:

To get faster and better performance: If you are not satisfied with the speed of current hard drive or the booting time, you can replace HDD with an SSD. After migrating OS to SSD from HDD, your computer will be much faster when booting up, reading or writing data.

To upgrade current disk to a larger one: As time passes, your system disk is full of data and running out of free space. There is not any free space available on the disk to transfer to C drive. In this case, you can replace current disk with a larger one.

To get a well-organized operating system: If you intend to add hard disk to computer and separate OS and personal data on different drives, you can simply move OS to a new disk without reinstalling everything; you may want to upgrade computer's build, but still want to use the old system, you can also try transferring Windows to new device without reinstalling OS and apps.

How to migrate Windows operating system to SSD or HDD? If you google similar questions, you can find the best solution is transferring OS to new disk with a free and reliable system migration tool.

Freeware to migrate Windows OS to SSD / HDD

DiskGenius Free Edition is recommended here to migrate Windows OS to new SSD or hard disk. With this free edition, you can simply select the destination disk which will be used as new system disk, and then click Start button to move OS. Once the process is done, the destination will be bootable, and your computer can boot from it directly.

Features related system migration:

Supports to migrate Windows OS to SSD or hard drive which is smaller than original system disk.

It is able to migrate all system-related partitions and other specified data partitions.

It allows users to set whether let computer boot from destination disk automatically after system is migrated.

It allows users to manually set boot entries for UEFI computers.

Supports BIOS / UEFI boot solutions as well as MBR / GPT disks.

Provides two ways of transferring OS: migrating system in Windows without affecting any running applications; transfer OS in WinPE environment. You can choose either way based on your preference.

How to migrate Windows operating system to SSD / HDD using DiskGenius Free Edition?

Preparations for system migration:

Uninstall software you won't use and delete unwanted files on original system disk, so that you can free up space and exclude data that you do not want to migrate to new disk.

Connect the SSD or hard drive which is going to hold the OS and make sure the disk can be detected by Windows properly. If the disk contains data, please backup important files in advance.

Install free system migration software – Disk Genius Free Edition. With this system cloning software, you can migrate Windows 10/8/7/Vista and Windows Server 2019/2016/2012/2008 operating system with ease.

KT1807 OS configurations

Operating system configurations

Each device can be defined to one or more operating systems. The hardware configuration contains this definition information, known as the operating system (OS) configuration. Note that you may define devices and their associated parameters to an OS configuration, even if they are not explicitly connected.

Typically, the OS configuration is associated with a processor or partition. Each processor can run different OS configurations at different times. There are two types of OS configuration: MVS and VM.

An MVS OS configuration can contain one or more EDTs. An Eligible Device Table or EDT is a list of esoteric device groups, plus the names of the generic device types which determine how devices are used (order of preference) within each esoteric. The EDT is identified by a two-digit ID; you must define at least one EDT for each MVS OS configuration.

An esoteric device group or esoteric is an installation-defined and named grouping of I/O devices under an EDT. An esoteric acts as a single "virtual device" which can be allocated without using a specific device number. Devices within an esoteric are usually from the same device group, but can be of different device types.

Every device type is associated with a generic device group or generic. A generic is an MVS-defined grouping of devices with similar characteristics, which determines how

devices are used in an esoteric device group. Each generic has a preference number which governs the order of allocation of devices to jobs within an esoteric. For example, if the esoteric contains the device types 3390, 3380 and 3350, and the generics associated with the device types have preference numbers 280, 290 and 300, respectively, then the preference numbers are used by the MVS allocation component to assign the devices in that order of preference.

Faster devices have lower preference numbers. You can change the preference number of a generic under an EDT (user-defined generic), but not under an OS configuration (system-defined generic).

You can mark one or more of the devices defined to an OS configuration to be your consoles. A console displays system-related information (for example, error messages) directly from MVS. For the MVS system, you can specify NIP consoles; for z/VM, you can specify primary and alternative VM consoles.

Internal Assessment Criteria and Weight

- IAC1801 An understanding of operating systems is demonstrated

(Weight 5%)

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