WHAT HAPPENS WHEN YOU SHUT DOWN YOUR PC?

The shutdown process is overall formal, and for a reason. Windows has several checks in place before programs are closed and users are logged out. It is only after ensuring that everything is properly closed that the OS begins to halt and shut itself down.

The following is what happens when you initiate shut down of your computer:

User check takes place

The first thing that happens is that Windows does a user check to find out whether other users are logged into the computer, or another account is used on the same PC. If it sees this, the operating system alerts you by asking and confirming whether you want to actually shut down.

You may be familiar with this check that takes place, most notably when you have other programs running or have unsaved documents. It is here you can click on No to cancel the operation.

Programs are closed

After confirming that you really want to shut down your PC, Windows begins the process by shutting down any programs, windows, or processes that you are running. The OS compiles a list and sends a shutdown signal to every program that is open. In case a program contains unsaved data, it usually prompts you to save the data to continue before it can exit. And when a program can't be stopped, Windows prompts you to end it by force.

You still have the option of clicking on No to cancel the operation here, if you have changed your mind or initiated the shutdown process by mistake.

Users are logged out

After programs and processes that belong to you have been stopped, Windows now gets down to the business of ending your session. This is straightforward enough — the operating system simply logs you out to end your session.

Windows is halted

Now comes the big deal. If things go according to plan, Windows now gets ready to halt itself. This part is where the operating system shuts down, bit by bit, as all active services are closed. Windows basically needs to make sure that all associated programs, services, and processes are all safely ended, and your next restart does not create issues or problems.

Shutdown signal is sent

After Windows is done with itself, and safely halted operations, it then sends a signal to the power management hardware of your computer to turn off the power. That is, if you have such hardware in place. Otherwise, you are presented with a message that it is now safe to turn off your PC, like the good old days of the 90s.

Dirty Bit

One mystery that had gone unresolved for the longest of time is what is called the Dirty Bit. This is a feature that controls the shutdown and boot process on computers that Microsoft did not reveal until recently.

Basically, this is just a 1 hex value that is hidden somewhere on the hard drive, which Windows checks to determine if a volume may have corrupted files due to your PC being reset while files were still open. It also comes in play when you unplug a USB flash drive in the middle of copying a file.

What actually happens is that the Dirty Bit is set on your system early in the boot process. In a controlled shutdown, sleep, or hibernate process, this bit is cleared. But in a sudden or uncontrolled shutdown like during a crash or when you manually power off, the Dirty Bit is left on and not flushed.

The Dirty Bit is what asks Windows to check your disk for consistency before the OS is loaded.

If the Dirty Bit is found upon the next reboot, it induces the disk diagnostic tools built into Windows. You can, obviously, skip disk checking by pressing any key during the loading process, but the prompt will come back again the next time you restart your computer. This will keep on happening until you let the drive to be scanned, or specifically ask Windows to stop checking that specific drive.

A look at the options

Microsoft, understanding that powering down your computer is not always what a user needs to do, designed several shutdown options in the operating system to provide more convenient options for Windows users depending on their needs.

Imagine having to shut down and power back on just to log in using a different account!

Available options include Shut Down, Restart (or Reboot), Hibernate, Log Off, Switch User, and Lock Computer. You may also get a few other choices, depending on if you have updates pending to be deployed on your system. In those cases, Windows will give you the choice of install updates and restart, for example.

So, what exactly does each do and when is it best to use them?

Power on
To power on a system means to simply press the power button on your computer, and let the system come up to a login prompt. If you enter your user name and password here, you have gone one step further and actually logged on to your system.

Log in
Also known as log on, this is when you enter your username and password after your computer has booted up. After that instance, you can simply log off or log in and out by switching to another account without shutting down your computer.

Log off
To log off a system means that the user that is currently logged on has ended their session, but that left the computer running for someone else to use. Log out comes in really handy in cases where you want to prevent other users from accessing your private documents, saved passwords, files and other data.

Plus, it is also faster than a full restart, making this generally a better choice for PCs that are shared between multiple users in a work or home environment.

Switch account
It's easy to get this option confused with log on or off. But switch account takes your entire Windows session and sets it aside, then returns you to the login screen. This allows you, or someone else, to sign in with another account.

Once you want to sign back in to your original account, you can simply switch back in and get back to your previous environment.

Lock computer
Locking your computer is a great way to protect your programs and data for when you are about to step away from your PC. This option does not close any applications or documents that you may have open and working on. It merely prohibits others from using your machine in your absence.

Shut down
This is the process of powering down or powering off your system. That is, once the shutdown process is complete, the machine becomes inactive, and will not come back up again until someone takes further action like pressing the power button to turn it on again.

Shutting down our computer instructs Windows to close all running programs, log all users out, and then completely shut off your machine. Once Windows shuts down properly after saving all the necessary data to the drive, the hard drive stops

spinning or the SSD is powered off, with a signal sent indicating that your system data has been saved to the physical disk. Your computer is then turned off.

Some PCs still use a trickle of power even in this state, mostly to monitor the power button.

Restart
Rebooting or restarting is when Windows turns your machine off and back on again quickly. The OS basically safely saves your data, turns off the computer for a moment and then turns it back on again.

This makes restarts best for when your PC is running unusually slow or if a program has locked up your system. A reboot is also performed as a troubleshooting step and can fix many an unexpected problem. It may also be required after a new program is installed, or when Windows deploys an update or new versions of itself.

Sleep
Putting your computer to sleep does not shut down the computer, but puts it in a state that uses very little power. This is a neat option for when you want to conserve power, yet need to get back to your desktop quickly.

Not all desktop computer, laptops or tablets have this option, and the same goes for hibernate below.

Hibernate
And finally, the hibernate option. This works in a similar way, except it turns off the machine. What makes this really useful is that it remembers what you were doing. So, when you return back to work, you can pick up where you left off.