

# WHAT'S THE DIFFERENCE BETWEEN HIBERNATE AND SLEEP? SHOULD YOU USE EITHER?

First, let's look at what happens to your computer when you don't use sleep or hibernate.

When you shut down or power down your computer, a number of things happen.

- Any running programs are told that the system is shutting down. They may or may not warn you about any open files you have, after which the program exits and is removed from RAM.
- Any software services that are part of Windows itself are also told of the impending shutdown, so they can perform any necessary cleanup, writing anything that needs to be preserved to the hard disk for the next time the machine is turned on.
- The software drivers associated with the hardware in or attached to your machine are also told of the impending shutdown, so they can do the same thing, in addition to turning off the hardware they control (or perhaps resetting it to a safe state, if needed, before power is removed).
- Finally, any last-minute information is written to disk, and the system instructs the hardware to turn off the power, at which point everything in RAM is erased.

When the power is turned back on to restart the computer, a similar sequence happens in reverse from the shutdown process.

- The boot process causes Windows itself to be read from the hard disk and placed into RAM, where it can control your machine.
- The drivers associated with your hardware are loaded from disk into RAM and initialized. They typically initialize the hardware that they control.
- The services associated with the various Windows features and functions are loaded from disk into RAM and run, each initializing itself to whatever state is required to perform its task.
- Finally, the applications you have configured to run automatically are loaded from disk into RAM and run. Once again, each initializes itself into some known state in preparation for whatever task it's intended to perform.

Even though this is an oversimplification, you can readily see that shutting down and starting up are complex processes that take time.

Sleep and hibernate are two different approaches to optimizing the shutdown and startup process.

### **HIBERNATE: WRITE RAM TO DISK**

One of the common threads in the startup and shutdown processes outlined earlier is that each process — be it an application, a service, or a hardware driver — needs to initialize itself on start up or clean itself up on shutdown. Frequently, this is nothing more than collecting and maintaining information in the computer's memory or RAM.

The hibernate process is relatively simple, at least in concept. Rather than having all the software shut down and then later re-initialize itself, hibernate attempts to preserve that state in a way that takes less effort.

- Applications, services, and drivers are notified that hibernation has been requested.
- *The contents of RAM are written to disk.* All the loaded and running programs are included in the exact state they happen to be in, including any data they've initialized and maintained.
- The system instructs the hardware to turn off the power, at which point everything in RAM is erased.

When you resume from a hibernation state, the process is reversed.

- The system's boot process reads the image that was saved on to the hard drive when the machine was placed in hibernation.
- The applications, services, and drivers — all already loaded into RAM — are notified that the system has resumed in case they need to perform any initialization. (Again, hardware drivers are typically the most impacted.)

That's it. Your system is back up and running. It's usually quicker than a full shutdown and restart because all the software doesn't have to be individually loaded and initialized from scratch.

### **SLEEP: KEEP RAM IN RAM (AT A COST)**

Sleep takes things one step further by not bothering to write RAM to disk. The process is even simpler.

- Applications, services, and drivers are notified that a sleep is happening. Most do nothing about it at all, though once again, drivers may elect to put their hardware into a low-power state.
- The system instructs the hardware to turn off the power — *mostly*. A small amount of power is left on to keep RAM from losing its contents.

As you can see, sleep causes very little activity, and can therefore happen very quickly.

Resuming from sleep is similarly straightforward: the power is turned on and the software still in RAM resumes operating.

The “cost” of sleep, however, is that unlike hibernation — which truly and completely powers down your device — sleep uses a small amount of power to keep RAM from losing its contents. Particularly if your computer is battery-powered, this means that eventually a sleeping computer will run out of power and needs to do something about it. Typically, it wakes up long enough to put itself into hibernation.

### **WHICH IS BETTER?**

Hibernate and sleep are neither better nor worse than the another. They're different and are intended for different purposes.

Sleep is great if you just need to close your laptop for a while but expect to be back at it before any significant battery drain has occurred. Hibernate is great as an alternative to shutting down most of the time, though sometimes only the real thing will do.

The “better” one is whichever works well for you, on your machine and in your situation. (Note that not all computers have hibernate as an option.)

### **PROBLEMS WITH SLEEP AND HIBERNATE**

Both sleep and hibernate have a long history of not quite working. Particularly in years past, it wasn't uncommon for a machine not to resume properly or for something to be “not quite right”.

A true shutdown and restart always resolved the issue.

The problem mostly stems from all the device drivers that deal with the hardware on your machine. They each need to be aware of sleep and/or hibernate, and either state could impact the hardware's performance. The answer is different for different hardware, and quite possibly different for the state the hardware happens to be in at the moment you put a machine into sleep or hibernate. The fact that device drivers come from a variety of sources doesn't help.

Many drivers got it wrong. While most now get it right, they can still be fragile when it comes to both sleep and hibernate. If something's "not quite right" after resuming or waking up, a restart might be in order.

### **YOU STILL WANT TO RESTART PERIODICALLY**

Any issues caused by sleep and hibernate aside, you still want to shutdown and restart your machine from time to time.

As much as Microsoft might desire otherwise, instability accumulates over time. Especially for a computer that's being used for many different things, with many different programs coming and going, or even just a poorly written program that's left running all the time, sometimes you just need to reboot to start afresh.

Even though you might get to a point where hibernate and sleep are viable, it's an opportune time to consider avoiding both options anyway and performing a "real" shutdown instead.

That's what many experts do. Rarely do they sleep or hibernate their computers, including their laptops. Years of misbehavior have convinced them to avoid both sleep and hibernation, and even though they're more stable than ever, many experienced users just feel better with a complete shutdown and clean restart.

Since your monitor (screen) consumes most of the power, whether you are on a desktop or a laptop, you may wish to place your unit in a power-saving mode by turning off your monitor after a brief period (say 10 minutes) of non-active use. Your computer will return to active-duty quickly just by tapping a key or moving the mouse.