



Is there such a thing as too much memory?

When the various processing units of your computer are performing their respective calculations, they need somewhere to store the information they're working with in the short term. This is a task for which a hard disk drive is unsuitable – as it is far too slow. Instead, we use RAM – or Random Access Memory. This is where all the data your computer is working with at any given time – from your operating system to your browser to the games you enjoy – is processed while it's being used.

Running out of memory is bad news for performance, as we'll see. And obviously, the more memory we have available, the less likely we are to run out of it. But is there a flipside to this arrangement? Is there a point where lots of memory becomes a bad thing? Is RAM, over a certain level, redundant? Let's examine the question in closer detail.

How much memory am I using?

You can look at your current RAM consumptions using Windows' Task Manager or Resource Monitor applications. In order to test your current system, perhaps to assess your PC's capability in running a demanding game or other program, you can access the Windows [resource monitor](#), and click on the 'memory' tab. You'll be presented with a list of processes, along with a graphic or chart indicating how much of your memory is in use. If you're using more than 80% of your available memory, then you might run into difficulty.

What if we don't have enough memory?

When your computer first boots, it loads a number of essential programs from the hard drive to the RAM. These include the kernel, display drivers and your operating system. Once you've booted, you might then load your browser, some applications, and then finally your game of choice.

When you don't have enough RAM to hold all of the programs you're running, your computer will begin to swap the ones you aren't using into a space on your hard drive called the [page file](#). Then, when you tab out of your game to check something in your browser, your computer will swap the two programs around, loading your game into the page file and your browser into RAM.

Since your hard drive (even if it's an SSD) is slower than your memory, this will cause your performance to fall off a cliff. It's therefore essential that we have enough RAM to do all of the things we'd like to do.

But is there any advantage of having *more* RAM than we need? As it happens, yes: when an application is closed, it's removed from RAM. Or is it? If your computer has a large RAM capacity, it might instead keep the unused data in the RAM, and simply mark it as inactive. This means that when it's called upon again, it'll be able to load far more quickly. However if you have no intention of using that particular program again during the session, you have functions within the RAM which simply aren't required.

Software limitations

If you're running a thirty-two bit version of your operating system, then you won't be able to access more than 4GB of memory. This is because such an operating system can only use thirty-two-bit



addresses – meaning that a maximum of 4,294,967,296 possible addresses can be referred to – and many of these are consumed by video RAM and other components. Serious gamers, then, should have already made the switch to a 64-bit operating system.

Other considerations

Thus far we've only discussed the quantity of RAM we have available. But there are other factors at play, here. Not all RAM is created equally – some is clocked at a higher speed than others. By opting for 16GB of faster RAM (eg 2133MHz), we might achieve better performance than if we were using 32GB of slower RAM (eg 1333MHz). However you do need to check what memory speeds your motherboard will support.

Furthermore, RAM is designed to work in multiple channels, which allows for faster speeds. A single 16GB stick of RAM will thus produce far inferior performance to two 8GB sticks placed in a dual channel arrangement. In some motherboards, you might find triple or even quad-channel setups, allowing us to achieve even greater speeds.

When shopping for RAM, we need to also be sure that it will physically fit into our motherboard. Different RAM technologies are incompatible with one another, and so manufacturers build sticks to ensure that we can't mistakenly put the wrong stick of RAM into the wrong motherboard.

If you take a look at a given stick of modern RAM, you'll notice that there is a small notch around a third of the way along the stick. This notch is placed slightly differently depending on the technology format. This means that it's impossible to place a DDR4 stick into a DDR3 motherboard. When shopping for RAM (or indeed, for a motherboard), it's essential to consider this.

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