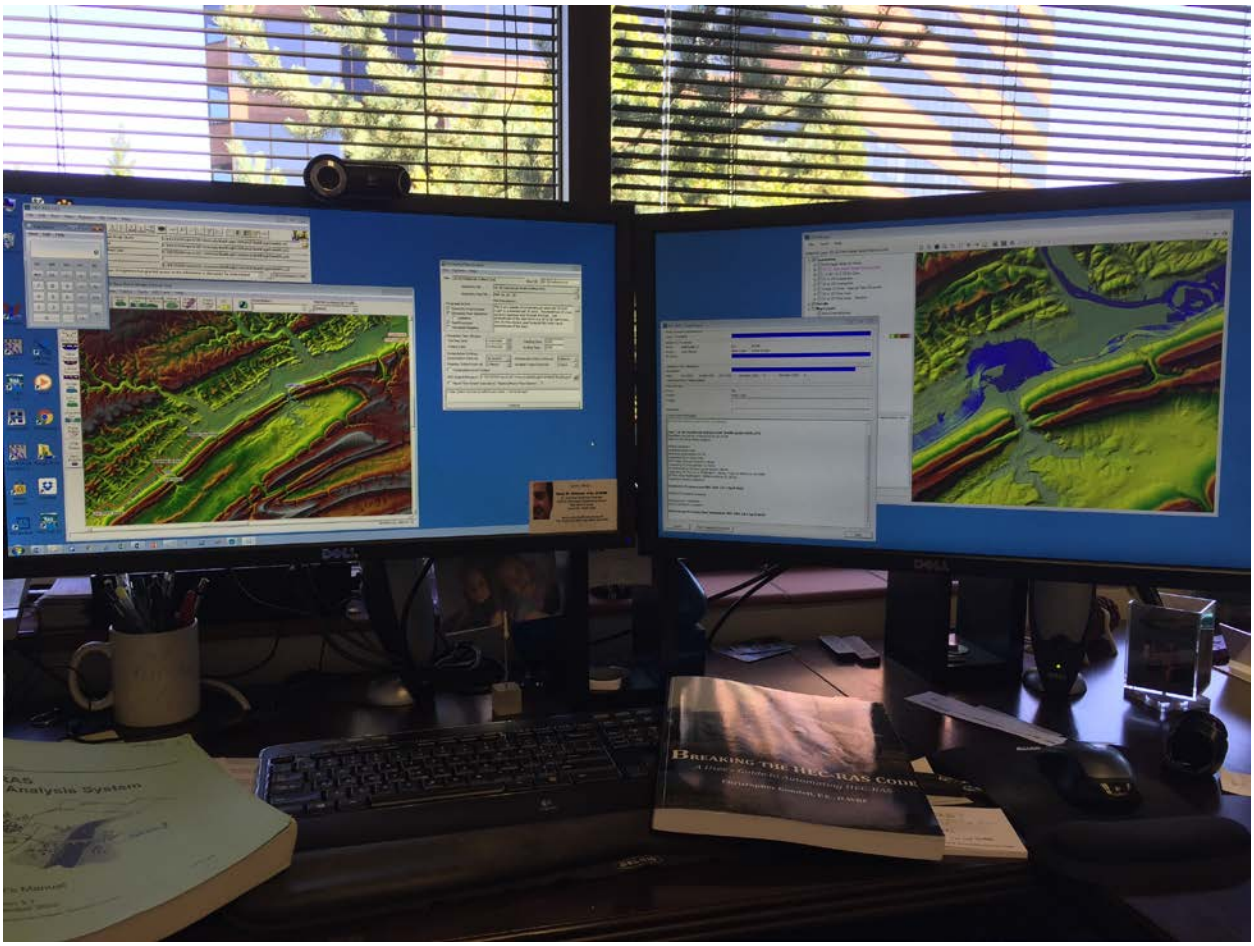
Optimize Your Computer for Fast HEC-RAS Simulations

Now that 2D is becoming widespread in the HEC-RAS community, a lot of modelers are wanting to know what kind of computer to get to maximize computation speed when running those large 2D datasets. This document is meant to provide you with some insight on how to configure a computer if you are targeting it to be used for HEC-RAS 1D/2D modeling.



Before moving into suggestions for 2D modeling, let me first state that currently in 1D modeling, multiple processing cores are NOT used. If you plan to only do 1D modeling, having extra cores will not help you with speed. In this case, the processor speed is everything. So get the fastest processor you can for 1D model (e.g. 3.4 Ghz or higher)

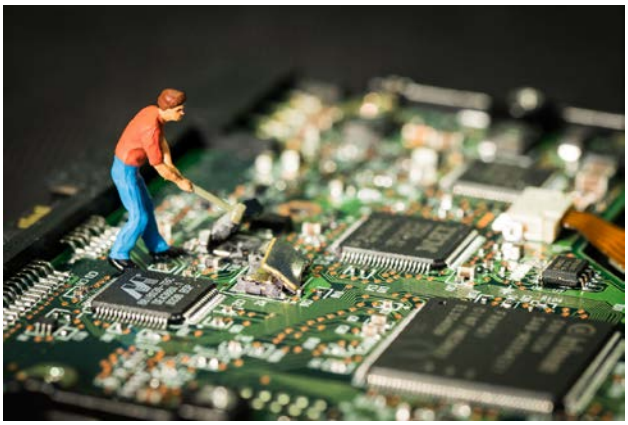
For the rest of this post, I'll assume you want to optimize your computer for 2D HEC-RAS modeling, since those are the models that typically will take longest to run.

More cores is not always better. In fact, it has been found that for smaller 2D areas (e.g. less than 10,000 cells or so), 8 cores may indeed run slower than 4 or 6 cores. The reason behind this is that there is a level of computing overhead used just to transfer data between cores. Fortunately, HEC-RAS has an option to change the number of cores you wish to use in the Computation Options and Tolerances window (from the unsteady flow analysis

window…Options…Calculation Options and Tolerances…2D Flow Options tab). For smaller datasets, I suggest experimenting with this to optimize computation speed. "All Available" may not necessarily be the fastest.

But for large numbers of cells, you're going to want as many cores as you can get your hands on. So for the number of Cores, get as many as you can, but not at the expense of processor speed. Make sure you get at least 3.2 to 3.4 Ghz or higher processors, no matter how many cores you get.

Processor speed is still paramount. Do NOT think you will have fast HEC-RAS model run times just because you have a computer with 16 cores or more. If all of your cores have slow processor speeds, you'll get some benefit out of the number of cores, but you will be disappointed in the overall speed for a wide range of model types (1D/2D) and sizes. So make sure even if you get a large number of cores, you are not doing so at the expense of fast processor clock speeds. As of the date of this article (August 2016) and the current version of HEC-RAS (5.0.3), 3.2 to 3.4 GHz or higher is a good clock speed for fast running models.



Your hard drive is important. Especially if you are producing a lot of output. Small detailed output intervals, small mapping output intervals, writing computation level output, etc. All of these settings affect how much and how often output is written to the hard drive during run time. Solid state hard drives (SSD) are typically going to be better than the traditional spinning hard drive (HDD).

RAM is important, but not as much as you might think. While RAM is definitely important, it is not as important for 2D modeling as number of cores and processor speed. You do want enough RAM to run your operating system and have your entire HEC-RAS model in memory, without the operating system having to swap things in and out of memory. That being said, if you plan to do multiple HEC-RAS models at the same time, or you have a habit of keeping lots of programs open and running in the background of your computer, you may want to get a computer with a lot of RAM. I would venture to guess that if you are buying a computer with a lot of cores with fast clock speeds, I'm guessing that computer will have enough RAM. But RAM

is cheap, so you might as well load up on it while you're building the HEC-RAS computer of your dreams.

Graphics card does not matter. While some of your other programs run best on a super-charged graphics card, HEC-RAS does not. For HEC-RAS modeling, don't waste your money on an expensive graphics card. However, you may seem so noticeable improvement in the snappiness of image rendering or particle tracing with a better graphics card. If money is no object, get a top-of-the-line graphics card, but this is one area you can sacrifice if you need to save some dough.

To sum up, my recommendation for building a computer to optimize 2D runs in HEC-RAS is as follows:

1. Get as many processing cores as you can (12 or more is recommended), but do not do so in expense of processor speed.
2. Make sure your computer has processors that are 3.2 to 3.4 Ghz or even higher (the faster the better). Do not get processors lower that 3.0 Ghz speed.
3. Get an SSD hard drive. They are way faster than a spinning drive.
4. Max out your RAM with at least 32 Gb if you plan on running very large data sets (lots of cells).

Pretty simple really. And by the way, 24-inch (or larger) dual monitors really helps with viewing all those HEC-RAS windows you have open.

Starting on page 4-11 in the HEC-RAS 2D Manual, there is an interesting discussion on the effect of number of processing cores in computations. I suggest giving it a quick read.