Optimizing Workstations for Product Development Applications

Technology in Practice, with HP and Robert Green

With all the attention being pad to BIM these days product development users sometimes get overlooked—yet they need to plan for new workstation purchases too. So the question becomes: When buying a new product development workstation what is the best configuration to maximize performance and get the most for your money?

Applications

The first thing to consider is what type of applications you'll be using along with your primary product development software. Will you be using visualization software like Auto-CAD® 3ds Max® to create high quality rendered images? Will you be analyzing your designs for stress compliance, digital manufacturing, mold/fluid dynamics or other simulation? Will you be supporting marketing by creating compelling images? The answers to these questions will make a big difference in the hardware you'll need in your workstation as we'll see shortly.

Processor

Your workstation's engine is its processor and you only have once chance to get it specified properly. Since product development software is "lightly threaded" – meaning they tend to run mainly on a single processor core – spend your money on the fastest clock speed processor with the most ample cache you can afford. Using this logic, a quad-core processor like the Intel® Xeon® E5-1620v3 (at 3.5 GHz with 10 MB cache) or Intel® Xeon® E3-1246v3 (at 3.5 GHz with 8 MB cache) are a great choices for many product development users. Of course in cases where the product development software is run concurrently with analysis and rendering software it can make sense to move to more than 4 cores but you'll still want the highest speed and cache size you can afford.

Note: Intel Xeon 12xx/16xx series processors support more cache than the slightly less expensive i7 or i5 processors as well as supporting much more reliable error correcting code (ECC) memory. The additional reliability and speed are worth the extra cost.

RAM

In order for your processor to do its best it needs enough memory (RAM) to process your product development application's functions as efficiently as possible. Here are a few quick rules of thumb to help you determine how much RAM is ideal:

- Start with 4GB + 1GB for each product development/analysis/rendering application
- Add 20x your maximum assembly size for each application
- Round up to next standard size

So an Inventor user working with 100 MB assemblies and no rendering could get by with 4 GB + 1 GB + (20 x 0.100 GB) = 7 GB then round up to 8GB.

But an Inventor user working with 250 MB assemblies running an ANSYS add-on plus 3ds Max would need 4 GB + 1 GB + 1 GB + 1 GB + (3 x 20 x 0.250 GB) = 22 GB then round up to 32.

The first case (at 8 GB) leaves almost no room for the user to utilize more applications or larger models while the second case (at 32 GB) does. Since your workstation will likely be in use for at least 3 years you should probably consider 16 GB as a minimum configuration at this time.

And no matter how much RAM you purchase make sure to specify the fastest speed ECC memory your processor can support.

Solid State Disks (SSDs)

Since product development software works with large models there is always a good bit of disk activity taking place. And it simply doesn't make sense to purchase the best processor and RAM you can afford only to have their performance hamstrung by a slow mechanical hard drive.

By equipping your workstation with a large enough SSD to contain your operating system, application software and the current models – and adding a conventional hard drive for extra storage - you'll reduce disk access and get

every last bit of performance from your processor, cache and RAM configuration. HP's new PCIe based Z Turbo Drives achieve over 1 TB/sec of throughput as compared to 480 MB/sec for more common SATA 3 based drives. With 256 GB HP Z Turbo drives at just $499 there's no reason not to upgrade to your product development workstation to achieve the best possible disk speed.

Figure 1 - HP's Z Turbo Drive outperforms a conventional SATA SSDs by a factor or 2x

Graphics

Of course all the inner workings of your workstation won't matter if you can't see the results on your monitor and that's where the graphics processor unit (GPU) comes in. With graphics options running the gamut from a few hundred to several thousand dollars, with or without application certification, picking the right GPU card can seem confusing.

A good way to pick the right GPU is to think about what you'll be doing as you design. Note your responses to the following questions:

1. Will you be designing smaller parts using only simple shaded views and very little 3D visualization?

2. Will you be designing larger parts/assemblies using shaded or semi-realistic visualization?

3. Will you use real time rotation, transparent assembly views or realistic visualization or image capture as you design?

4. Will you be creating photo realistic images using backgrounds, textures and realistic materials at high resolutions?

Of course the more you answer 'yes' to these questions the more graphics power you'll need and thus a more high end GPU. The good news is HP makes GPU selection simple by categorizing their certified graphics options (see Figure 2) in a way that aligns with questions 1 – 4. The options are (1) Professional 2D, (2) Entry 3D, (3) Mid-range 3D and (4) High-end 3D. Depending on the workstation's processor you can select from a variety of Autodesk certified graphics ranging from Intel® HD Pro P4600 on-board graphics to external GPU cards that are compatible with the available slots and power supply in the workstation chassis.
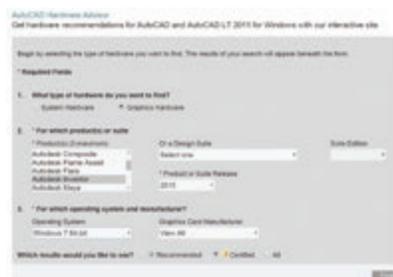

Figure 2 - HP's Z Turbo drive outperforma conventional SATA SSDs by a factor or 2x

Enjoy years of performance

Understanding your application software usage patterns allows you to specify processor, RAM, disk and graphics subsystems that give well harmonized performance without overspending. But as you specify your work-stations remember to allow for some future growth of model sizes and possible additional application usage so your workstation will meet your needs in future years as well.

About HP

HP helps you stay ahead of the curve with professional desktop and mobile workstations designed for large and complex datasets, dispersed teams, and tight deadlines. HP Z Workstations, built for Pros with Intel® Inside®, deliver the innovation, high performance, expandability, and extreme reliability you need to deliver your 3D CAD projects in less time. To learn how to configure a HP Z Workstation, visit the HP and Autodesk page at hp.com/go/autodesk. Start saving now!

About Robert Green

Robert Green provides CAD management consulting, programming, speaking, and training services for clients throughout the United States, Canada, and Europe. A mechanical engineer by training and alpha CAD user by choice, Robert is also well known for his insightful articles and book, Expert CAD Management: The Complete Guide. Reach Robert at rgreen@greenconsulting.com