

WELCOME!

LIVE with ROBERT GREEN:

Select the Right Processor & RAM for CAD, Analysis & Visualization Workflows



Robert Green

CAD Management Expert
Cadalyst Contributing Editor

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TODAY'S PRESENTATION

Which processor best meets your needs?

How many cores do you really need?

How are cores and speed related?



How much RAM do you need?

How does RAM affect processor performance?

How do you get the best bang for your buck?

CPU's



WHAT IS A CENTRAL PROCESSING UNIT (CPU)?

- ▶▶ The CPU is the contains the cores, cache, and interface circuitry required to run your workstation.
- ▶▶ The CPU manages all computer tasks other than specialized graphics tasks such as gaming or virtual reality.
- ▶▶ A CPU is comprised of multiple cores running at a base frequency with a maximum Turbo frequency.
- ▶▶ In CAD workstations, the CPU is typically an Intel® Core™ i7 or Intel® Xeon™ processor.



A CPU IS NOT A GPU

- ▶▶ The graphics processing unit (GPU) is typically a standalone, add-in board from NVIDIA or AMD (aka, “graphics card”) but in some cases is integrated in the CPU/processor.
- ▶▶ The GPU manages graphics-specific tasks for 3D visualization, rendering, virtual reality, etc., used by CAD or analysis applications.
- ▶▶ Software that utilizes the GPU will tell you which type/model of GPU it is certified to run on.

Today’s webinar will focus on CPUs. We’ll cover GPUs in a future presentation. Stay tuned!



OPTIMAL CPU PERFORMANCE RELIES ON AN OPTIMAL COMBINATION OF CORE SPEED & CORE COUNT

- ▶ Paradoxically, more cores on a processor usually means slower base core speed. In other words, fewer cores can give faster base core speed.
- ▶ Turbo boosted speed dictates the speed of the single-fastest core supporting the primary application — a very significant parameter in CAD applications.
- ▶ The faster the turbo-boosted frequency, the faster the primary application runs.
- ▶ And: The fewer the cores, the lower the cost.

The trick is finding the right balance.

PROCESSORS: SPEED vs CORES

Processor Family	Intel® Xeon® W processor
Processors	<ul style="list-style-type: none">Intel® Xeon® W2195 (3.3 GHz base frequency, up to 4.5 GHz with Intel® Turbo Boost Technology, 13.75 MB cache, 10 cores)Intel® Xeon® W2145 (3.7 GHz base frequency, up to 4.5 GHz with Intel® Turbo Boost Technology, 11 MB cache, 8 cores)Intel® Xeon® W2133 (3.6 GHz base frequency, up to 3.9 GHz with Intel® Turbo Boost Technology, 8.25 MB cache, 6 cores)Intel® Xeon® W2125 (4 GHz base frequency, up to 4.5 GHz with Intel® Turbo Boost Technology, 8.25 MB cache, 4 cores)Intel® Xeon® W2135 (3.7 GHz base frequency, up to 4.5 GHz with Intel® Turbo Boost Technology, 8.25 MB cache, 6 cores)Intel® Xeon® W2123 (3.6 GHz base frequency, up to 3.9 GHz with Intel® Turbo Boost Technology, 8.25 MB cache, 4 cores)Intel® Xeon® W2104 (3.2 GHz, 8.25 MB cache, 4 cores)Intel® Xeon® W2102 (2.9 GHz, 8.25 MB cache, 4 cores)



WHY IS CORE COUNT IMPORTANT?

- ▶▶ Cores support your software and allow it to work fast.
- ▶▶ Too few cores can cause a logjam that impedes software performance as the operating system swaps work on and off the disk to juggle core load.
 - ▶▶ But too many cores can reduce processor speed in some cases and increases cost in almost all cases.

Right-sizing core count maximizes bang for your buck.

HOW TO OPTIMIZE CORE COUNT



DETERMINE CORE COUNT BASED ON YOUR SOFTWARE USE

▶▶ By understanding how your software utilizes cores and how much software you run at the same time (“concurrency”), you can determine your core requirements.

Core requirements will then dictate processor selection.

DIFFERENT SOFTWARE USES CORES DIFFERENTLY

AutoCAD: Lightly threaded, runs mostly on single core.

BIM/Mechanical: Medium threaded, can run some processes on more than one core.

Internet Browsers/MS Office: Lightly threaded, run mostly on single core.

Simulation/Analysis: Can run on multiple cores.

Rendering/Video Production: Can run on multiple cores.

SOFTWARE CONCURRENCY

Which software do you run at the same time?

AutoCAD + MS Office

BIM/Mechanical CAD + MS Office

BIM/MCAD + MS Office + Analysis

Everything + Rendering/Video Production

**Rapid development environments tend to have high concurrency.
As more concurrent processes stack up, more cores are required.**

GENERAL CORE RECOMMENDATIONS

SOFTWARE RUNNING CONCURRENTLY	CORES
AutoCAD + MS Office	4
BIM/MCAD + MS Office	4-6
BIM/MCAD + MS Office + Analysis	8
Everything + Rendering/Video	8+

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PRO TIP: DON'T OVERBUY CORES

You'll just spend more money on cores your software can't take advantage of and you may get slower speeds.

It's OK to buy two extra cores to stave off obsolescence if you can afford it, but don't sacrifice speed to do so.

RAM



SUPPORT YOUR CORES WITH RAM

- ▶▶ RAM is random-access memory and it moves data on/off processor cores to support software applications.
- ▶▶ Cores can only do their job optimally if they have adequate amounts of properly installed RAM.

**Processors/cores dictate RAM configuration.
Let's see how.**



RAM IS CRITICAL FOR OPTIMAL CPU PERFORMANCE

- ▶▶ Newer processors often support more memory (RAM) slots. More slots means more RAM on board.
- ▶▶ More memory slots means more data transport channels to the cores — that is, more memory channels feed the cores faster/better.

Therefore, more memory slots generally equates to better workstation (and software) performance.

MEMORY SLOTS

HP WORKSTATION SPECIFICATIONS	HP Z4 G4	HP Z6 G4
Maximum memory	256 GB DDR4-2666 ECC SDRAM*	384 GB DDR4-2666 ECC SDRAM*
Memory slots	8 DIMM**	12 DIMM**

*Transfer rates up to 2666 MT/s.

* SDRAM (Synchronous Dynamic RAM) is another commonly used term for RAM.

** Dual Inline Memory Module (DIMM) packaging is a standard term for slot mounted RAM modules.

GENERAL RAM RECOMMENDATIONS

SOFTWARE RUNNING CONCURRENTLY	RAM
AutoCAD + MS Office	12–16 GB
BIM/MCAD + MS Office	16–24 GB
BIM/MCAD + MS Office + Analysis	32–48 GB
Everything + Rendering/Video	48+ GB



MEMORY CONFIGURATION BEST PRACTICES

- ▶▶ Buy the fastest memory your processor supports.
 - ▶▶ Fill all slots.
- ▶▶ Fill slots with RAM modules of the same size.
 - ▶▶ When in doubt, round up.

Memory is cheap; don't scrimp!

FINAL **THOUGHTS**

- ▶▶ The programs you use and your workflow dictate core count.
- ▶▶ Keep core count in check to improve processor speed and reduce cost.
 - ▶▶ Cores determine processor selection.
- ▶▶ Right-size your processor to maximize bang for your buck
 - ▶▶ Support your processor with adequate RAM.
- ▶▶ Enjoy!

Q & A

▶▶ Submit a question using the Questions panel in your GoToWebinar interface.

Panelist: Robert Green
Moderator: Nancy Johnson

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