

2013 PLS-CADD Advanced Training and User Group

Operating System and Hardware Recommendations

by

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Introduction

- Operating Systems
- Hardware
- Q/A as time permits

Supported Operating Systems

- Windows XP (32 + x64)
- Windows Vista (32 + x64)
- Windows 7 (32 + x64)
- Windows 8 (32 + x64)
- Windows Server versions
 - Not supported for interactive execution
 - File serving OK

Recommended Operating Systems

~~• Windows XP (32 + x64)~~

- MS EOL April 8, 2014
- PLS EOL June 8, 2014
 - Microsoft won't support us developing for it
 - Can't take advantage of new features while support it (some UI, advanced features ...)
 - Security risk

~~• Windows Vista (32 + x64)~~

- Obsolete, no advantage over Win7

Recommended OS Continued

- Windows 8 and 8.1 (32 + x64)
 - No benefit (or harm) to PLS software. Bizarre, clunky UI that requires retraining.
 - It is a “Work in progress”
 - Windows 8.1 didn’t change this much
- **Windows 7 x64**
 - Clear winner: fast, stable, mature, familiar UI
 - Majority of development done on it.
 - Want x64 for LiDAR, images, family design in TOWER, general stability

Hardware Recommendations

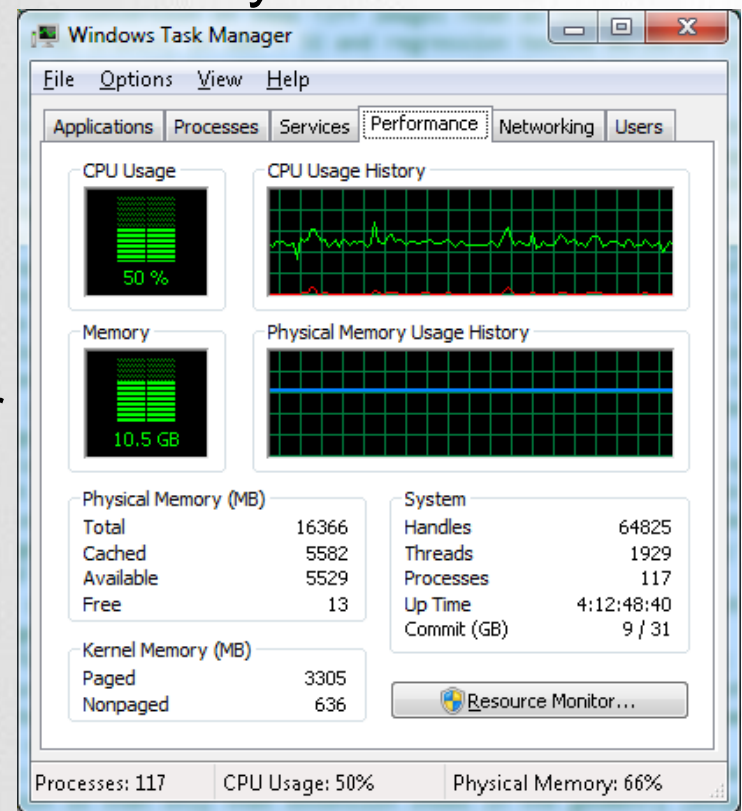
- PLS-CADD vs. PLS-POLE / TOWER
 - PLS-CADD: RAM most important (then frequency)
 - PLS-POLE/TOWER: # cores most important
 - Analysis time proportional to (Load cases) / (# cores)
- Common
 - SSD if files stored local
 - Gigabit to server if files stored remote
 - Use *Compress XYZ and TIN files* setting in PLS-CADD
 - Multiple monitors help productivity
 - Do not need best/fastest GPU – spend the money on RAM and cores instead

Why no GPGPU?

- Performance numbers are peak for single precision. We use double precision typically a factor of 10 slower on GPU.
- Problems not parallelizable enough
- Memory bandwidth limiting, not FP
- OS support missing (XP)
- Do not always guarantee IEEE 754 floating point semantics
 - Our results matter!

Hardware Limits/Details

- Tested on 32 cores: OK
 - Only required change to Intel library
- Not all cores are equal
 - Hyperthreading (HT)
 - Makes 1 core look like 2
 - Useless for FP bound apps
 - Half of cores Task Manager reports for Intel processors are HT
 - **50% is full utilization**

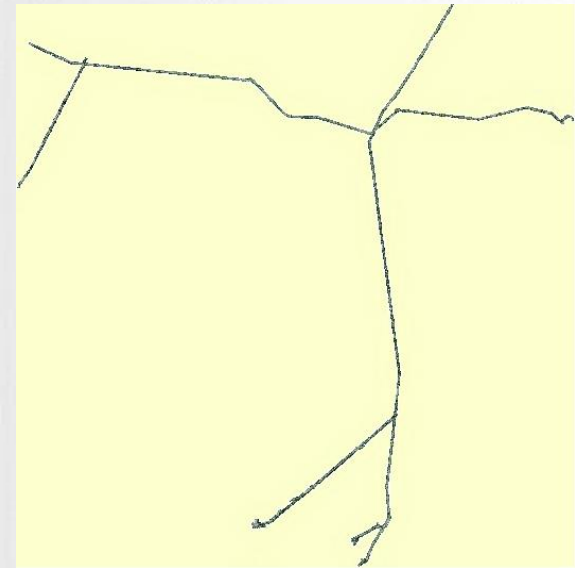


Hardware Limits/Details Continued

- 96 GB of RAM used to load ~1 Billion XYZ points
- Our code is unusually demanding and can reveal hardware and driver faults. Some hardware problems exposed only by running our software:
 - Overheating processor (faulty fan)
 - Improperly cooled RAM
 - Network driver bug

What pushes the limits?

- LiDAR point counts – ever growing
 - Multiple lasers
 - Higher frequency data collection
- 1TB image
 - No compilations!
 - Prefer 10-100 images to 1000+ or just one big image
- 500+ Load cases
 - Really?



Miscellany

- Intel processors ascendant
- 3Dconnexion Mouse supported
 - 6 degrees of freedom
- Priority when budgeting
 - RAM (RAM speed matters)
 - Processor frequency
 - # cores
 - SSD



Swap for TOWER vs. PLS-CADD

Sample Laptop - 14" screen

- Core i7-4800MQ Processor
 - 2.7 - 3.7GHz
 - 6MB cache
 - 4 cores (8 with Hyper-threading)
- 16GB RAM
- 80GB SSD + 1TB Hard Drive
- NVIDIA GTX 765M (2GB)
- Windows 7 x64
- **US\$2099** (March 7, 2014)

Dell Alienware 14

Sample Desktop

- Core i7-4770 Processor
 - 3.4 - 3.9GHz
 - 8MB cache
 - 4 cores (8 with Hyper-threading)
- 24GB RAM
- 256 GB SSD + 2TB Hard Drive
- AMD R9 270 (2GB)
- Windows 7 x64
- **US\$1799** (March 7, 2014)

Dell XPS 8700

Sample Workstation (Capacity)

- If project requires > 32 GB of RAM, buy this
- 2x E5-2637 v2 Processors
 - 3.5 - 3.8GHz (Note: frequency more important than core count)
 - 15MB cache
 - 4 cores (8 with Hyper-threading) EACH = 8 / 16 cores total!
- 64GB RAM (Upgrade to 128GB for \$2000 more)
- 256GB SSD
- AMD V3900 (1GB)
- Windows 7 x64
- **US\$6856** (July 12, 2013)

HP Z820

Sample Workstation (Speed)

- **Fastest possible computer for our software**
 - If project fits in 32GB of RAM
- Core i7-4960X Processor
 - 3.9 - 4.3GHz (factory overclocked, liquid cooled)
 - 15MB cache
 - 6 cores (12 with Hyper-threading)
- 32GB RAM
- 256 GB SSD
- AMD R9 270 (2GB)
- Windows 7 x64
- **US\$3249** (March 7, 2014)

This is the standard configuration for our support and development teams.

Dell Alienware Aurora-R4

Conclusion

- Windows 7 x64 is the way to go
 - Failing that, any 64 bit system
- PLS-CADD
 - Buy RAM. Fast RAM and lots of it. Then get the highest frequency processor.
- PLS-POLE + TOWER
 - Buy cores. Many cores.
- SSD = happiness

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