2015 PLS-CADD Advanced Training and User Group

Operating System and Hardware Recommendations

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Introduction

- Update from my 2013 talk

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

Supported Operating Systems

- *Windows XP (not supported, but worked last time I checked)*
- Windows Vista (32 + x64)
- Windows 7 (32 + x64)
- Windows 8 (32 + x64)
- Windows 10 (32 + x64) *July 29th release date*
- 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
    - Tools don't support it
    - Can't take advantage of new features while support it (some UI, advanced features …)
    - Security risk
    - ~15% of clients still on it
- ~~Windows Vista (32 + x64)~~
  - Obsolete, no advantage over Win7

Recommended OS Continued

- ~~Windows 8 (32 + x64)~~
  - No benefit to PLS software. Bizarre, clunky UI that requires retraining.
  - Windows 10 changes the UI again. 8 is a dead end.
- **Windows 7 x64**
  - Fast, stable, mature, familiar UI
  - Want x64 for LiDAR, images, family design in TOWER, general stability and security
- **Windows 10 x64**
  - Different UI, but not bizarre
  - Works well with keyboard and mouse
  - PLS software “Just works”

Hardware Recommendations

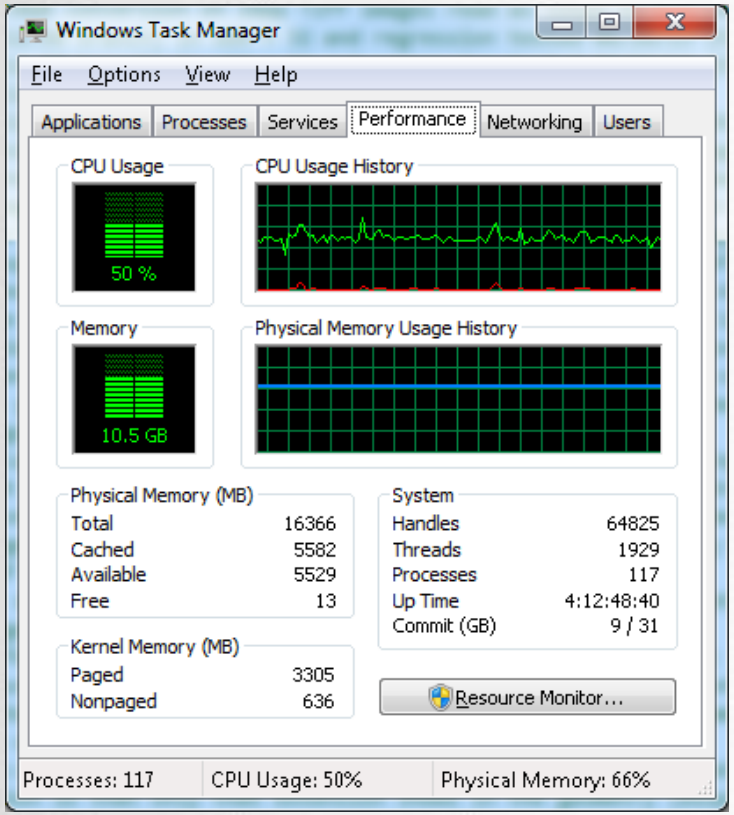
- PLS-CADD vs. PLS-POLE / TOWER
  - PLS-CADD: RAM most important
  - PLS-POLE/TOWER: # cores most important
    - Analysis time proportional to (Load cases) / (# cores)
- For all applications
  - SSD if files stored local
  - Gigabit to server if files stored remote
    - Use *Compress XYZ and TIN files* 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
- 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
  - Hyper-threading (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**



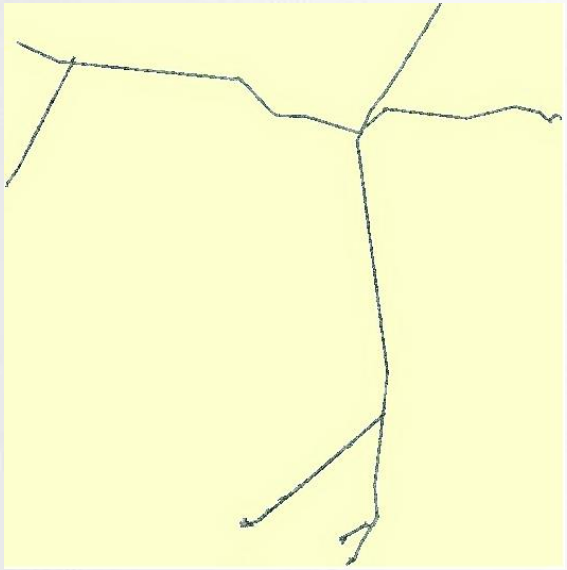
Hardware Limits/Details Continued

- 96 GB of RAM used to load ~1 Billion XYZ points
- Our code is unusually demanding and can reveal hardware and driver faults
  - Overheating processor
  - 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
- Family and Framing Managers
- 500+ Load cases
  - Really?

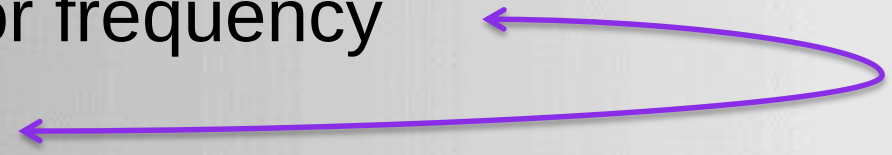


Miscellany

- Intel processors dominate
- Integrated GPS
  - PLS-CADD works with on Win 7 and newer
  - Must be natively supported by Windows
- 3Dconnexion Mouse supported
  - 6 degrees of freedom
- Touch screens supported
  - For tablet use Surface Pro

Budgeting Priorities

- Priority when budgeting
  - RAM (RAM speed matters)
  - Processor frequency
  - # cores
  - SSD



Swap for TOWER vs. PLS-CADD

Sample Laptop - 15” screen

- Core i7-4710HQ Processor
  - 2.5 - 3.5GHz
  - 6MB cache
  - 4 cores (8 with Hyper-threading)
- 16GB RAM
- 256GB SSD + 1TB Hard Drive
- NVIDIA GTX 970M (3GB)
- Windows 7 x64

Dell Alienware 15

Sample Laptop - 15” screen ($)

- Core i7-4710HQ Processor
  - 2.5 - 3.5GHz
  - 6MB cache
  - 4 cores (8 with Hyper-threading)
- 16GB RAM
- 256GB SSD + 1TB Hard Drive
- NVIDIA GTX 970M (3GB)
- Windows 7 x64
- US$1800 (May 11, 2015)

Dell Alienware 15

Sample Desktop

- Core i7-4790 Processor
  - 3.6-4.0GHz
  - 8MB cache
  - 4 cores (8 with Hyper-threading)
- 16GB RAM
- 250GB SSD
- NVIDIA Quadro K420 (1GB)
- Windows 7 x64

XI Computer MTower LE

Sample Desktop ($)

- Core i7-4790 Processor
  - 3.6-4.0GHz
  - 8MB cache
  - 4 cores (8 with Hyper-threading)
- 16GB RAM
- 250GB SSD
- NVIDIA Quadro K420 (1GB)
- Windows 7 x64
- US$1185 (May 11, 2015)

Dell XPS 8700

Sample Workstation

- i7-4960X (for PLS-CADD) / i7-5960X (for TOWER)
  - 4.4 / 4.0GHz (Water cooled and overclocked)
  - 15 / 20MB cache
  - 6 / 8 cores (12 / 16 with Hyper-threading)
- 64GB RAM
- 250GB SSD
- NVIDIA K420 (1GB)
- Windows 7 x64

XI Computer MTower

Sample Workstation ($)

- i7-4960X (for PLS-CADD) / i7-5960X (for TOWER)
  - 4.4 / 4.0GHz (Water cooled and overclocked)
  - 15 / 20MB cache
  - 6 / 8 cores (12 / 16 with Hyper-threading)
- 64GB RAM
- 250GB SSD
- NVIDIA K420 (1GB)
- Windows 7 x64
- US$3850 (May 11, 2015)

XI Computer MTower

Conclusion

- Windows 7 or 10 x64 is the way to go
  - Failing that, any 64 bit system
- PLS-CADD
  - Buy RAM. Fast RAM and lots of it.
- PLS-POLE + TOWER
  - Buy cores. Many cores.
- SSD = happiness

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