Operating System and Hardware Recommendations

by

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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
Sample Laptop - 15” screen ($)

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  - 2.5 - 3.5GHz
  - 6MB cache
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- 16GB RAM
- 256GB SSD + 1TB Hard Drive
- NVIDIA GTX 970M (3GB)
- Windows 7 x64
- **US$1800** (May 11, 2015)
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
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)
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

6/8/2015

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Sample Workstation ($)

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  - 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)
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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PLS-CADD
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Vegetation Management

1000+ Users in 100+ Countries
IEEE

1000+ Users in 100+ Countries
IEEE

Questions?

FAC 008/009
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Distribution
NERC Ratings

Line Optimization

PLS-POLE

Joint Use

Storm Hardening

Line Ratings

Drafting

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