

2017 PLS-CADD Advanced Training and User Group

# Operating System and Hardware Recommendations

by

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# Introduction

- Update from my 2015 talk
- Operating Systems
- Hardware
- Q/A as time permits

# Supported Operating Systems

- Windows Vista (32 + x64)
- Windows 7 (32 + x64)
- Windows 8 (32 + x64)
- Windows 10 (32 + x64)
- Windows Server versions
  - Not supported for interactive execution
  - File serving OK

# Not Recommended Operating Systems

- ~~Windows XP (32 + x64)~~
  - Current software won't run on it
- ~~Windows Vista (32 + x64)~~
  - Obsolete, no advantage over Windows 7 or 10
- ~~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.

# Recommended Operating Systems

- **Windows 7 x64**
  - Fast, stable, mature, familiar UI
- **Windows 10 x64**
  - Different UI, but not bizarre
  - Works well with keyboard and mouse
  - PLS software “Just works”

## For both

Want x64 for LiDAR, images, family design in TOWER, general stability and security

# Hardware Recommendations

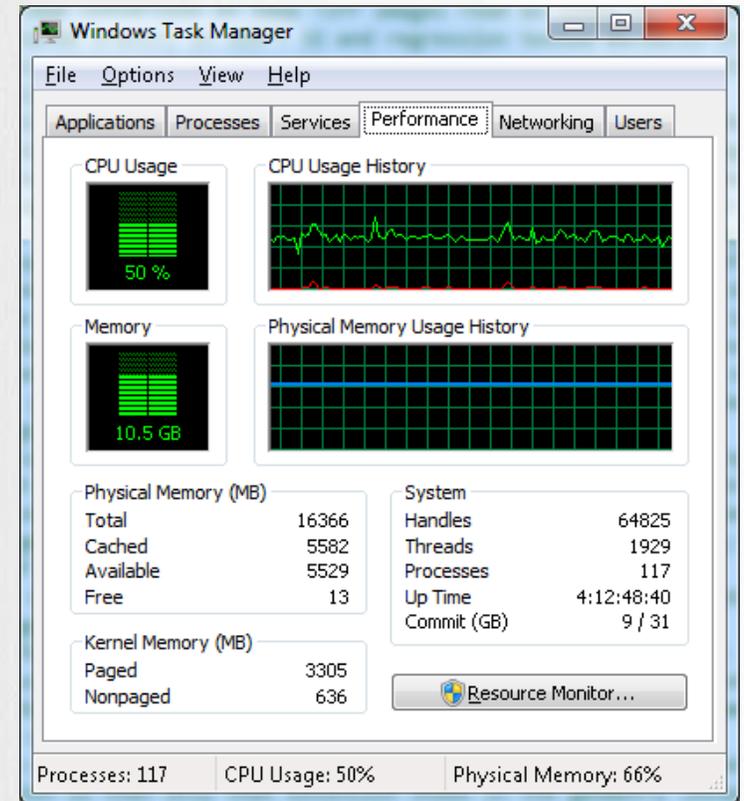
- PLS-CADD vs. PLS-POLE / TOWER
  - PLS-CADD: RAM most important
  - PLS-POLE/TOWER: # cores most important
    - Analysis time proportional to (Load cases) / (# cores)
- For all applications
  - SSD if files stored local (preferably a PCIe NVMe SSD)
  - Gigabit to server if files stored remote
    - Use *Compress XYZ and TIN files* setting in PLS-CADD
  - Multiple monitors boost 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!

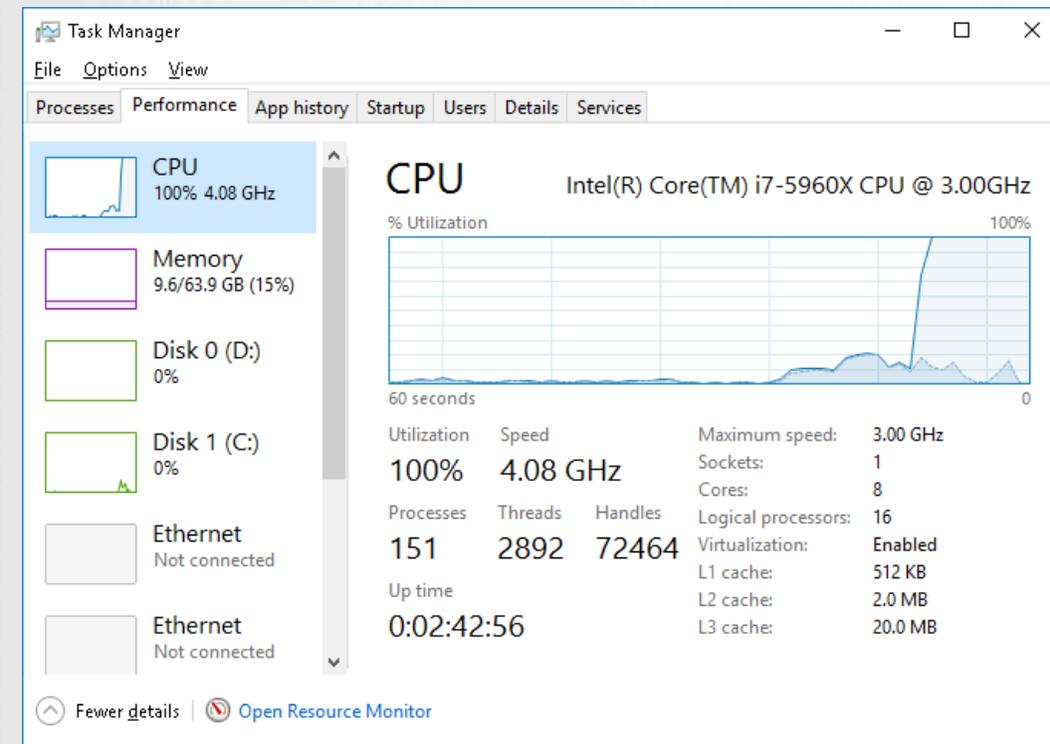
# Hardware Limits/Details (Version $\leq$ 14.40)

- Tested on 32 cores: OK
  - Only required change to an 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 most processors are HT
    - **50% is full utilization**



# Hardware Limits/Details (Version > 14.40)

- Tested on 32 cores: OK
  - Only required change to an Intel library
- Hyper-threading (HT)
  - Makes 1 core look like 2
  - Half of cores Task Manager reports for most processors are HT
  - **No longer useless!**
  - **Versions > 14.40 will use HT cores for a 0-30% improvement in performance**

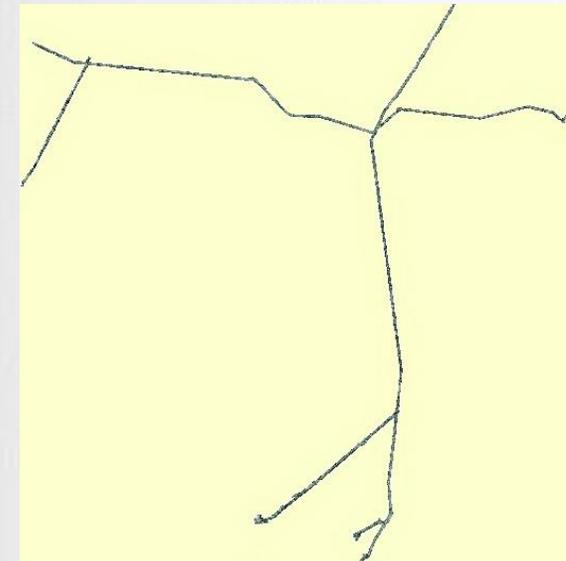


# Hardware Limits/Details Continued

- 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
  - Ethernet card 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?

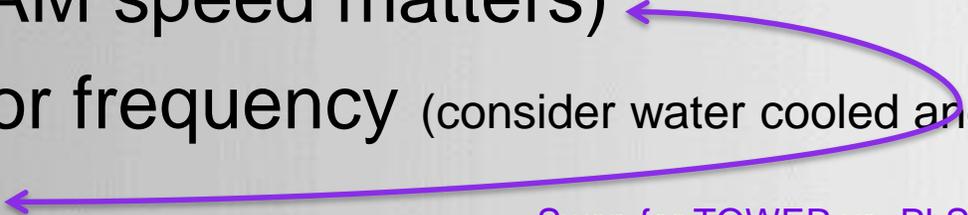


# Miscellany

- Intel processors dominate, but AMD Ryzen looms...
- Integrated GPS
  - PLS-CADD works with on Win 7 and newer
  - GPS receiver 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 (consider water cooled and over clocked)
    - # cores
    - SSD
- 
- Swap for TOWER vs. PLS-CADD

# Sample Laptop - 15" screen

- Core i7-7700HQ Processor
  - 2.8 - 3.8 GHz
  - 6 MB cache
  - 4 cores (8 with Hyper-threading)
- 16 GB RAM
- 512 GB PCIe NVMe drive (4x faster than a standard SSD)
- NVIDIA GTX 1050 (4 GB)
- Windows 10 x64

Dell XPS 15

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- 16 GB RAM
- 512 GB PCIe NVMe drive (4x faster than a standard SSD)
- NVIDIA GTX 1050 (4 GB)
- Windows 10 x64
- **US\$1749** (May 19, 2017)

Dell XPS 15

# Sample Desktop

- Core i7-7700 Processor
  - 3.6 - 4.2 GHz
  - 8 MB cache
  - 4 cores (8 with Hyper-threading)
- 16 GB RAM
- 256 GB PCIe NVMe drive (4x faster than a standard SSD)
- AMD Radeon RX 560
- Windows 10 x64

Dell Aurora R6

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  - 4 cores (8 with Hyper-threading)
- 16 GB RAM
- 256 GB PCIe NVMe drive (4x faster than a standard SSD)
- AMD Radeon RX 560 (4 GB)
- Windows 10 x64
- **US\$1219** (May 19, 2017)

Dell Aurora R6

# Sample Workstation

- PLS-CADD

- i7-7700K
- 5.0 GHz \*
- 8 MB cache
- 4 cores (8 with HT)

- 64 GB RAM

- 500 GB PCIe NVMe drive (4x faster than a standard SSD)

- NVIDIA P400 (2 GB)

- Windows 10 x64

XI Computer MTower

## TOWER

Xeon E5-1660v3

3.9 GHz\*      \* = (Water cooled and overclocked)

20 MB cache

8 cores (16 with HT)

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- 4 cores (8 with HT)

- 64 GB RAM

- 500 GB PCIe NVMe drive (4x faster than a standard SSD)

- NVIDIA P400 (2 GB)

- Windows 10 x64

- **US\$2686** (May 19, 2017)

XI Computer MTower

## TOWER

Xeon E5-1660v3

3.9 GHz\*      \* = (Water cooled and overclocked)

20 MB cache

8 cores (16 with HT)

# 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 is good.**
  - PCIe NVMe M.2 SSD is great!

Advanced Sag & Tension IEC FAC 008/009  
NESC Materials Management LiDAR Modeling  
Structural Analysis **PLS-CADD**® CSA  
Pole Analysis CENELEC Distribution  
Transmission NERC Ratings  
Project Estimating Line Optimization  
FAC 003 ASCE Joint Use PLS-POLE  
Vegetation Management  
1000+ Users in 100+ Countries Storm Hardening  
IEEE Line Ratings  
**TOWER** Drafting

## Questions?

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# Next up: Brandon "Groot" Grillon



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