Accelerating Digital Preservation: Harnessing the Supek Supercomputer for High-Resolution Photogrammetry

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Methodology

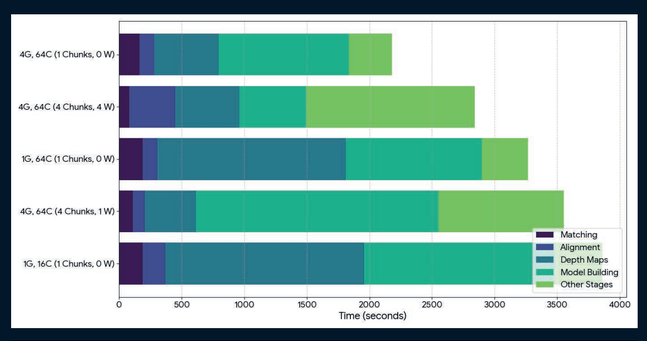
Photogrammetry is the non-invasive science of creating accurate 3D models, maps, and measurements from 2D overlapping photographs.

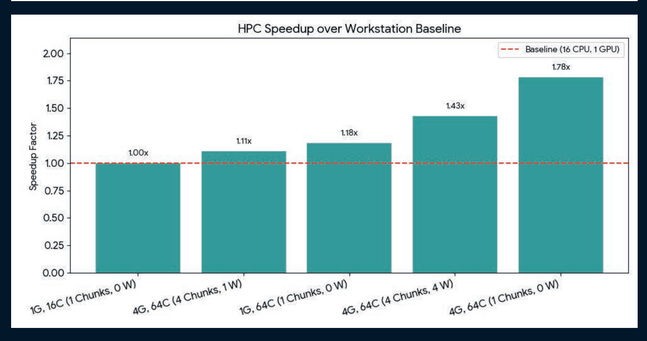
Software: Agisoft Metashape

Performance

Test performed on Supek using 1 node, 64 CPUs and 4 GPUs with scaling number of workers, chunks and GPUs per worker. The baseline model is 1 GPU and 16 CPUs.

1.8x Overall speedup | **3x** Speedup for mesh and 3D model generation





Challenges

Data Volume: Massive, high-fidelity dataset increase memory and storage demands.

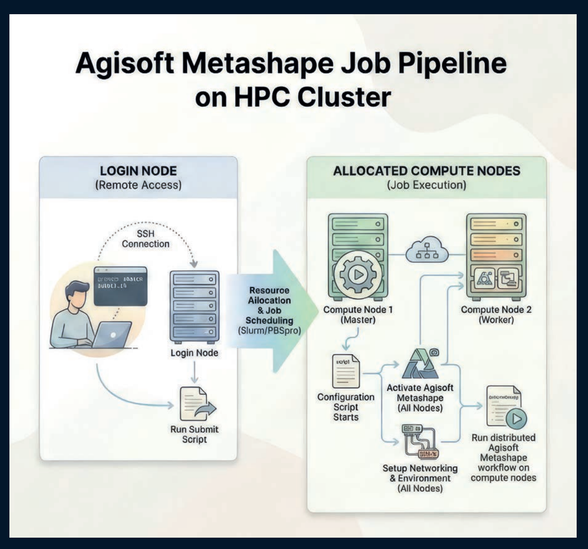
Computational intensity: High-resolution, high-details reconstruction require massive GPU computational power.

The GUI Barrier: Software designed for interactive use without native HPC integration prevents massive-scale processing on HPC systems.

Automated HPC Pipeline

Custom Architecture

- Cluster Workload Management: Custom Bash scripts integrate directly with SLURM and PBSPro schedulers.
- Automated Resource Handling: The system automatically setup Agisoft's network processing environment, binds CPUs/GPUs to workers, manages floating licenses, and cleans up the workspace upon completion.
- Configuration-Driven Execution: A primary orchestrator script (automation.py) reads a text config file to dynamically execute workflow steps and dataset chunking in network environment

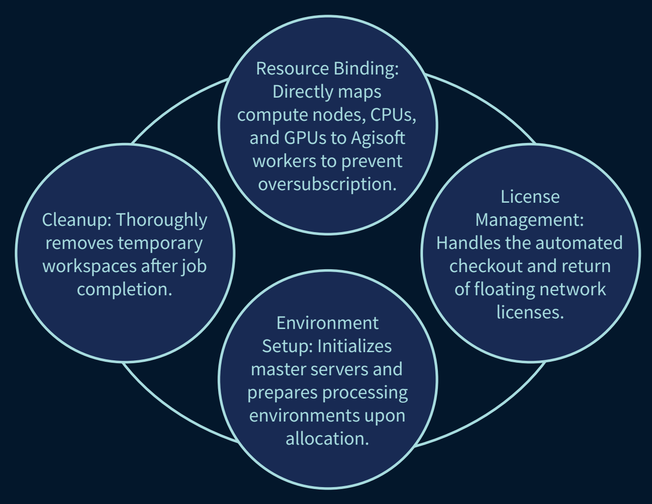


Adopting Metashape for HPC

The Orchestrator Script - The self-made automation.py script encapsulates the API to drive a configuration-based pipeline.

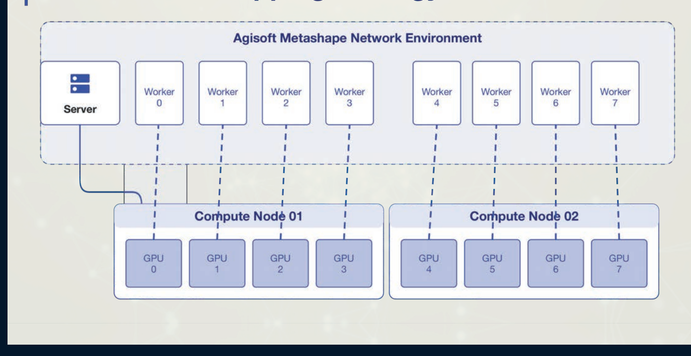
- Reads workflow steps & parameters
- Defines network variables
- Automates dataset chunking

Integrated HPC Solution - Complementary Bash scripts to bridge Metashape with cluster workload managers like SLURM and PBSPro.



Resource mapping

Worker/GPU mapping strategy



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