

Generating High Fidelity 3D Environments from Imagery and LIDAR Data

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By
Matt Morris, Director of Product Development
Ian Carlson, Chief Engineer

Op3D JCTD Background

Problem: The warfighter does not have the ability to use 3D products to meet his mission needs within his time critical window. The process is too slow and cumbersome and must be improved to meet the speed at which mission execution requires 3D products.

Objective: To develop and transition capabilities to quickly discover, acquire, manage, generate, disseminate and accurately update 3D GEOINT data products from multiple collection systems to the warfighter



Combatant Command Sponsor: USSOCOM
Technical Manager: Army Geospatial Center (AGC)
Operational Manager: SOCOM J7T
Transition Manager: NGA

Overwatch's Op3D Objectives

- Reduce SOFPREP's CPED cycle for 3D products
 - Reduce time and labor required to generate 3D products from 2D and 3D sources
 - Utilize Assisted / Automated Feature Extraction software (Feature Analyst / LIDAR Analyst) to collect correlated data layers from imagery and LIDAR sources
 - Rapidly create 3D databases for training and mission rehearsal for special operations
- Transition technology and workflow enhancements to all DoD / Intel customers via a COTS package
 - FA / LA exist as extensions to ArcGIS
 - All capabilities are being added at no additional charge to existing license holders

FEATURE ANALYST™

Assisting Feature Extraction and Freeing GIS Analysts

- Reduce labor for maintaining geographic data
- Automatically collect features such as hydrology, buildings, roads, and trees
- Utilize spatial context as well as spectral and pattern information
- Create custom workflow models and apply them in a production-based environment



LIDAR ANALYST™

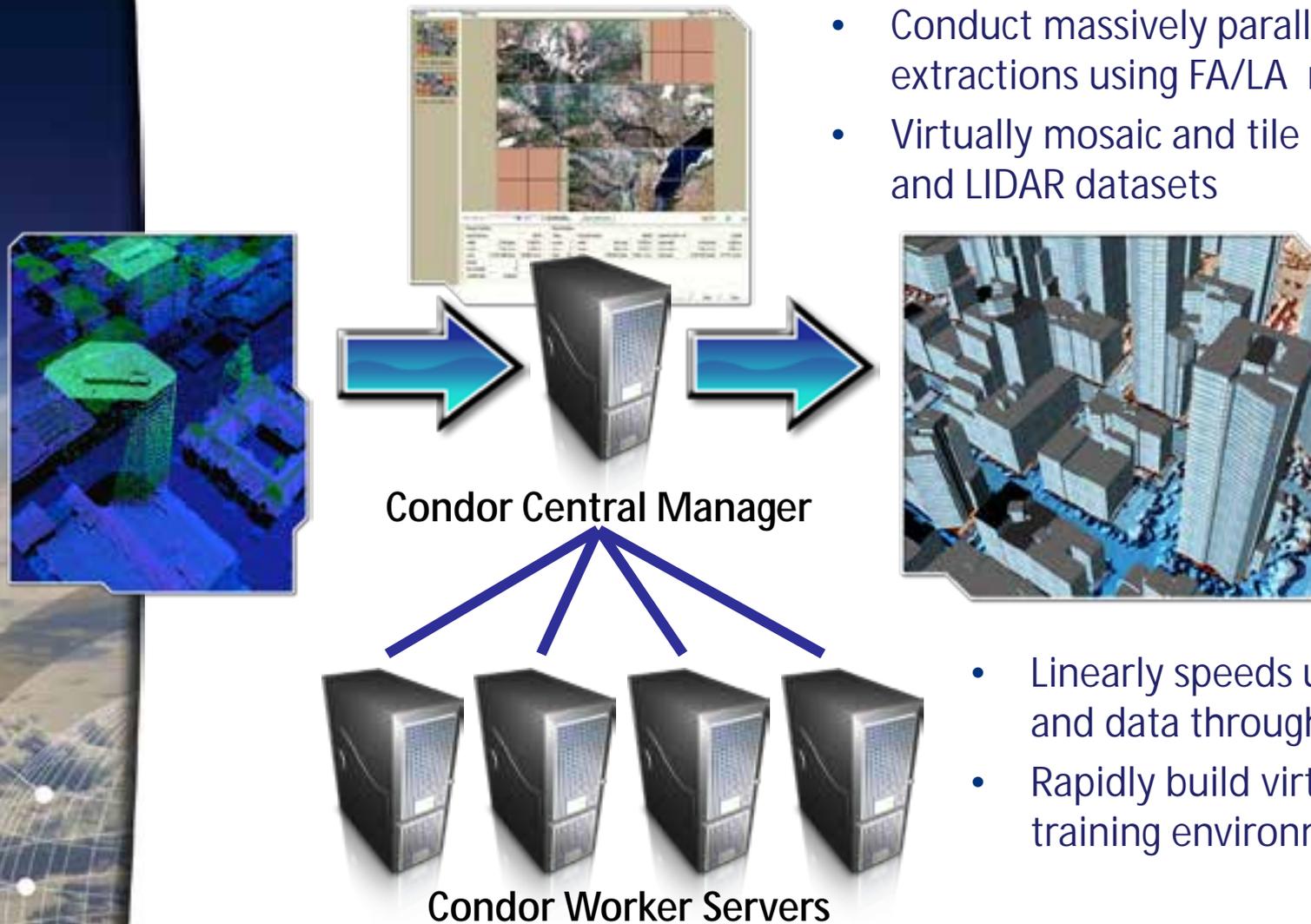
Rapidly Transform Raw LIDAR into Useful 3D Models

- Capture and exploit 3D data with precise sensor accuracy
- Process LIDAR data in any format
- Extract accurate bare earth
- Extract complex and multi-component 3D building shapes
- Extract individual trees or forests
- Generate and analyze elevation layers for landing zones, etc.



Op3D Distributed Processing System

- Conduct massively parallel extractions using FA/LA models
- Virtually mosaic and tile image and LIDAR datasets



- Linearly speeds up processing and data throughput
- Rapidly build virtual 3D training environments

Result of Op3D Enhancement

Process Step	Legacy Workflow	FA / LA Standalone	FA / LA Distributed Processing
Collect and Prepare Data	2 hrs	8 hrs	2 hrs
Extract Tree Features	192 hrs	168 hrs	68 hrs*
Extract Water Features	40 hrs	40 hrs	34 hrs*
Extract Bare Earth Terrain	N/A	7 hrs	25 min**

*A geo cell processed by SOFPREP on ~128 Nodes

**150 km² processed by Overwatch on ~16 Nodes

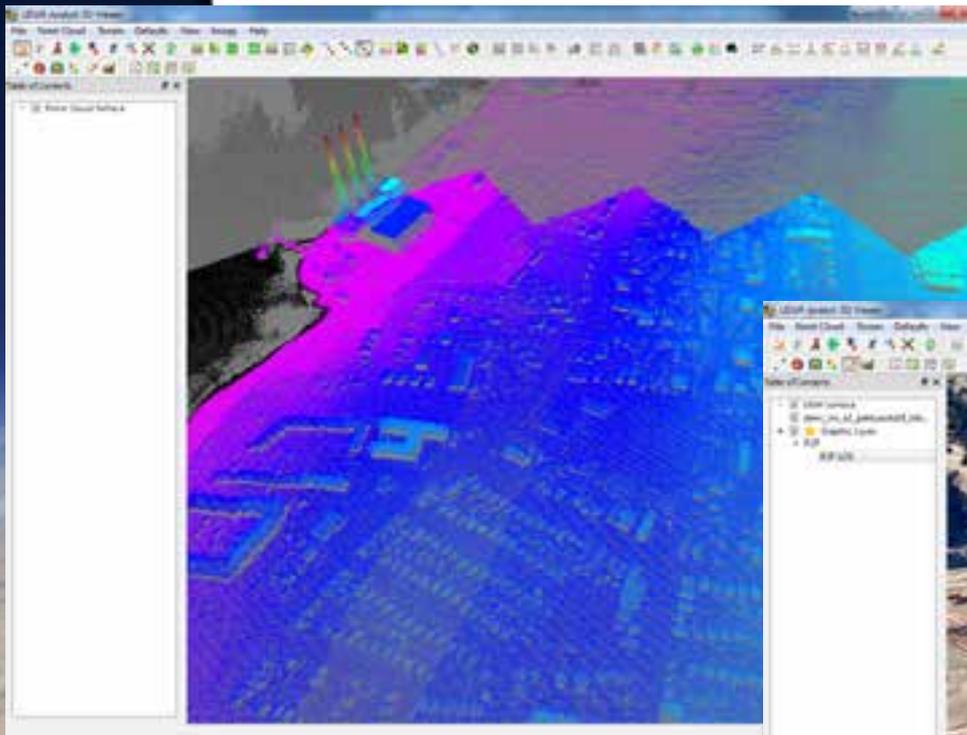
- SOFPREP estimated using FA with distributed processing on trees from imagery results in a **60+% time savings**
- Overwatch estimated using LA with distributed processing on terrain results in a **90% time savings**
- SOFPREP evaluating time savings for other features in hopes to further reduce time required to produce 3D GEOINT

Additional FA/LA Enhancements

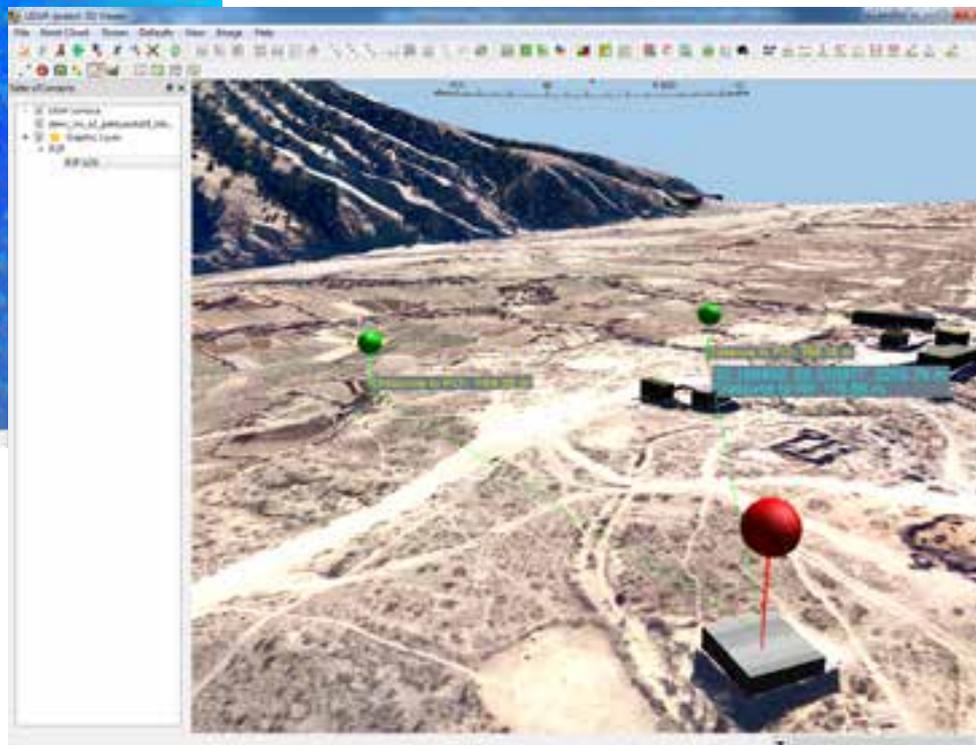
- LIDAR Analyst Multi-Preview Tool
 - Compare multiple feature extraction treatments
- LIDAR Analyst Mask-Based Workflow
- LIDAR Analyst Water Surface Correction
- 3D Viewer
 - Provides robust 3D visualization, analysis (TDAs, mensuration, etc.), and dissemination capabilities
 - Rapid QA/QC for LIDAR Analyst extractions in 3D
 - Load and manipulate point clouds in excess of a billion points using proprietary LOD system

All Op3D Enhancements are available in the current release (v5.1) of Feature Analyst and LIDAR Analyst

LIDAR Analyst 3D Visualization



- Capable of handling point clouds in excess of 1 BILLION points
- Tightly integrated within LIDAR Analyst and ArcGIS



- Allows users to create highly accurate and detailed 3D scenes using live data for mission planning and rehearsal

For more information or demos of the capabilities built for the Op3D Program please visit



Booth # N225 in the National Security Showcase