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May 2011
Oracle Spatial User Conference

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Ronald Reagan Building and International Trade Center
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Using Oracle Spatial

for

Cloud-Based Point Cloud Data Management

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Point Cloud Overview

Data Collection

- Methods: LiDAR, Sonar, and GPR
- Styles: Aerial, Static, Mobile, and Bathymetric

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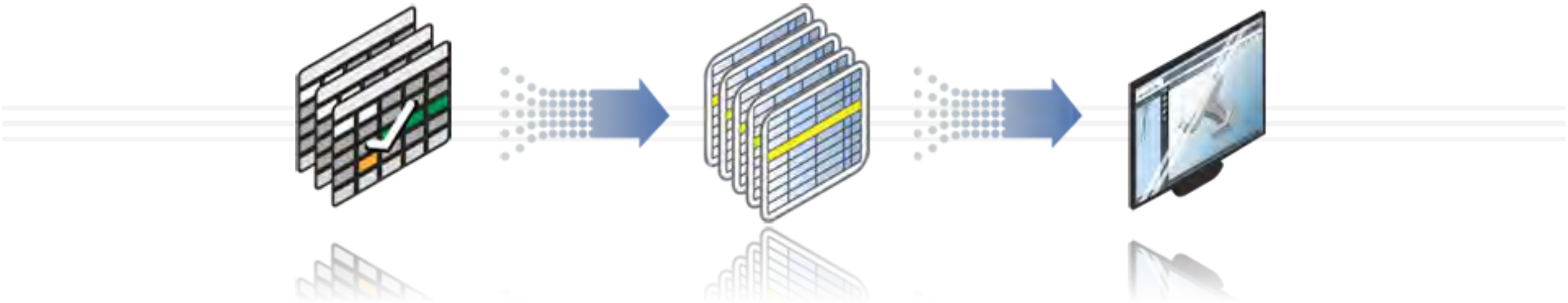
Point Cloud Positives

- Quickly acquire “as-built” (existing) conditions for a project
- Point cloud used in 3D modeling and geospatial software



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Point Cloud Negatives

- Typical point cloud data files (LAS, XYZ, POD, PTS) are multiple gigabytes in size
- Transfer and distribution cause significant delays

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Positives from Negatives

- Oracle 11g Spatial and Amazon EC2 Cloud
  - Efficient, secure storage and delivery to designers and construction contractors

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Enter TrueViz PULSE™

- Combines extensive 3-D design expertise with unique tools and workflows
- Acquires, optimizes, extracts and leverages LiDAR point cloud data
- Utilizes point cloud data from design through construction

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Enter TrueViz PULSE™ Data Manager

- Point cloud data management system
- Users quickly locate and extract specific areas of interest, including cross sections and polygons
- Oracle 11g database
- Amazon EC2 Linux instance
- Silverlight mapping interface

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Oracle Spatial in the cloud

- 11gR2 database on Oracle Enterprise Linux
  - DB created on Amazon EC2 instance
  - Setup using image provided by Oracle
  - RMAN configured for S3 data file backup
- EBS volumes attached to server as storage devices
  - Raw devices used as data files for Tablespace(s)
  - On-demand storage as new LiDAR data is collected

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Oracle Spatial SDO_PC

- Point Clouds stored using SDO_PC package
  - Loaded into database using LibLAS las2oci
  - Points converted directly from .las files to SDO_PC blocks
  - Significant reduction in load time

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Oracle Spatial SDO_PC

- User-defined areas extracted using SDO_PC_PKG.CLIP_PC
  - Blocks are inserted into queuing table
  - Points extracted using SDO_PC_PKG.TO_GEOMETRY
  - LiDAR attributes stored on point dimensions 4-11
- Points are written to a variety of formats
  - .las, .pod, .txt
- Filtering by classification
  - Ground, vegetation, water, buildings, etc.

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Client Access to Point Clouds

- Web access through WCF services, ODP.NET
  - Bing Maps Silverlight application displays all point cloud collect locations
  - Admin interface manages and monitors cloud storage through EC2 .NET API
  - Points extracted and streamed to a variety of clients, such as MicroStation, iPad, and Android

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D E M O N S T R A T I O N

TRUEVIZ™ PULSE DATA MANAGER

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Leveraging Oracle Spatial

HNTB next steps…

- Oracle MapViewer and GeoRaster
- Rasterize point cloud data to display densities *(currently mapping minimum bounding rectangles)*

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Conclusion

- Increased use of LiDAR has led to significant data storage and delivery challenges
- HNTB was forced to look beyond traditional storage methods
- Oracle's SDO_PC package used in the Amazon cloud provides us with the combination of speed, scaling and flexibility we need to leverage LiDAR

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