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Rendering Imagination Visible™

GPU Cloud Computing Case Study City Planning using RealityServer® and GIS

SC10 | 17th November 2010

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Overview

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In the next 30 minutes we will talk about following:

- Brief company introductions
- Challenges of 3D GIS
- Case study
- RealityServer technology
- DiCE technology
- GPU Cloud computing
- Demo
- Conclusions

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Company Highlights:

- Delivering on Visual Computing
- Wholly owned subsidiary of NVIDIA
- Fundamental, patented technologies
- Academy Award® winning product
- 10+ million seats installed

AutoCAD · SolidWorks · CATIA · PTC · SOFTIMAGE|XSI · MAYA · 3ds Max · Bunkspeed Shot

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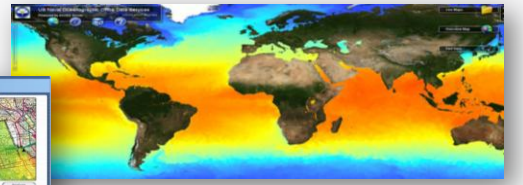
Company Highlights:

- Founded in 1969 by Jack and Laura Dangermond
- 2nd Largest Privately-Owned Software Company
- Over 300,000 Customers
- Over 4,500 Staff Worldwide
- Over 1 Million Users

GIS is used in many industries:

- **Environmental**
  - Monitoring and Modeling
- **Business**
  - Site Location, Delivery Systems
- **Industry**
  - Transportation, Communication, Mining, Pipelines, Healthcare
- **Government**
  - Local, State, Federal
- **Defense and Intelligence**
  - Homeland Security, Planning, Analysis
- **Education**
  - Research, Teaching Tool, Administration
- **Emergency Services**
  - Fire and Police

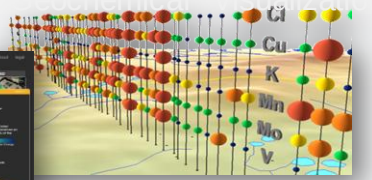
Sea Surface Temperature



Naval Oceanographic Office

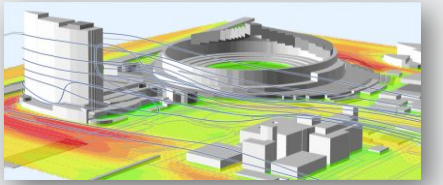
London

North Vancouver



Alaska

Wind Modeling



South Korea

Property Tax

Houston, TX

Challenges for 3D GIS Users

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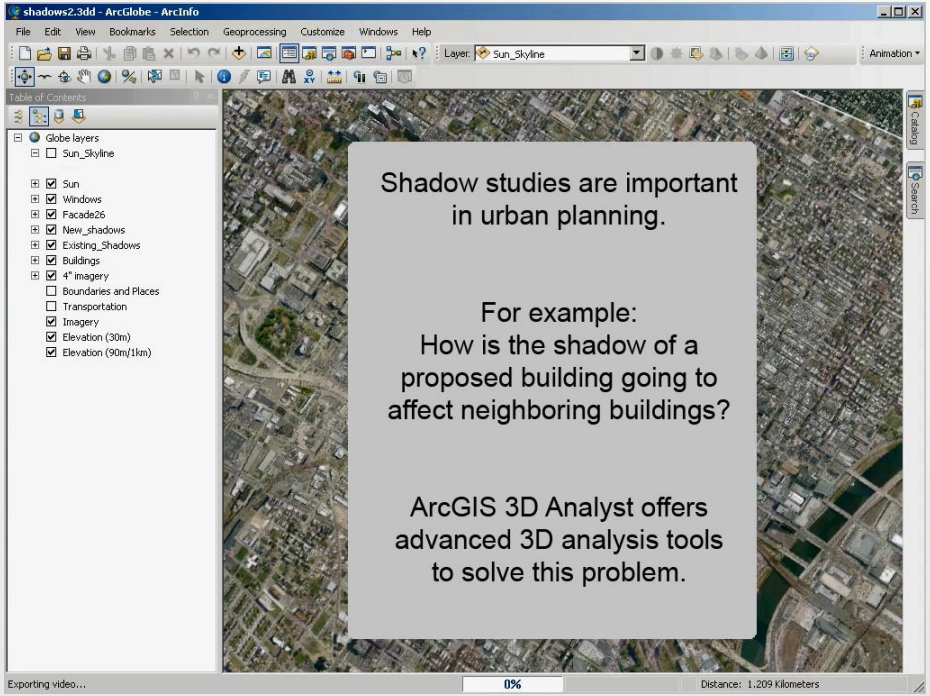
3D GIS exposes several challenges:

- Very large 3D datasets
- Client requirements for using 3D acceleration
- Limited quality of visual representations
- Collaborative analysis is complex
- Many fragmented datasets
- 3D analysis results difficult to understand and comprehend quickly



How RealityServer Helps

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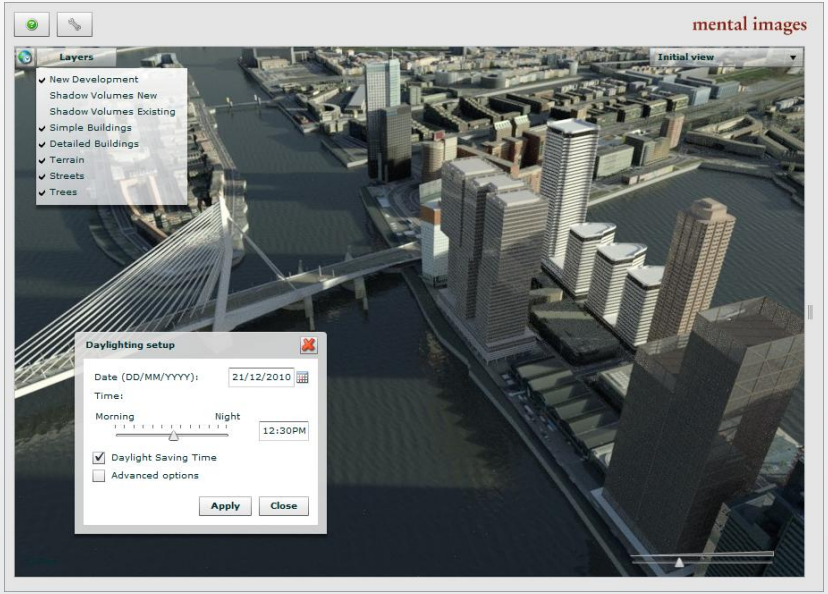
RealityServer provides key additional functions for GIS clients:

- Large scale Cloud based resources
- Light weight clients (browser, mobile)
- High quality photorealistic results
- Large scale server based collaboration
- Visual aggregation of multiple datasets
- Easy to understand results that can be immediately understood



Case Study: Problem

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A new development is being proposed on a wharf in Rotterdam. Planners have the following goals:

- Show that access to daylight will not be significantly impeded
- Show that reflections in building facades will not be visually distracting
- Overall appearance to be in keeping with the city and surrounding buildings
- Achieve buy in from residents, occupiers and planning authorities
- Communicate planning results widely and effectively to non-planners

Rotterdam Stock Photo

Case Study: Solution

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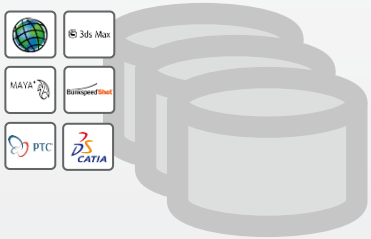
RealityServer enhances GIS information by providing visual results that anyone can understand and deploy them anywhere:

- Accurate visual analysis of daylight and effects of new buildings
- Physically correct portrayal of reflections and other complex lighting effects
- Results are visually accurate and can be shown entirely in context
- By showing real life simulated images more people can assess the results
- The 3D scene can be made available to anyone with a web browser to explore

© 2008 mental images | Rotterdam 3D City Visualization

Data



Databases, Cloud Data, Files

ODBC

.DAE
.OBJ
.DWF
.MI

Web services

Visual Computing

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NVIDIA

RealityServer

GPU Cloud Servers

REST
JSON-RPC
SOAP

HTTP
RTMP

JPEG
H.264

Results

Any Device with Network Access

The server based architecture of RealityServer give the following key advantages over traditional client-side technologies:

- Independence from Data Complexity
- Thin Clients
- Collaboration
- Data security
- Scalability
- Development Choice
- State of the art Rendering

DiCE™ Distributed Computing Environment

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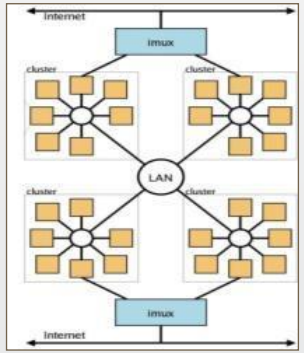
RealityServer is built on our proprietary DiCE technology.
It is ideally suited to Cloud based deployments:

- Master-less self-organizing cluster architecture
- Fault-tolerant in-memory distributed database
- Automated load balancing across resources (CPUs, GPUs)
- Dynamically add and remove computing resources
- Large scale clustering over GbE and 10GbE networks
- Multi-user by design
- Targeting very low latencies and large numbers of jobs
- Cloud specific clustering modes for Unicast only networks



GPU Cloud Computing

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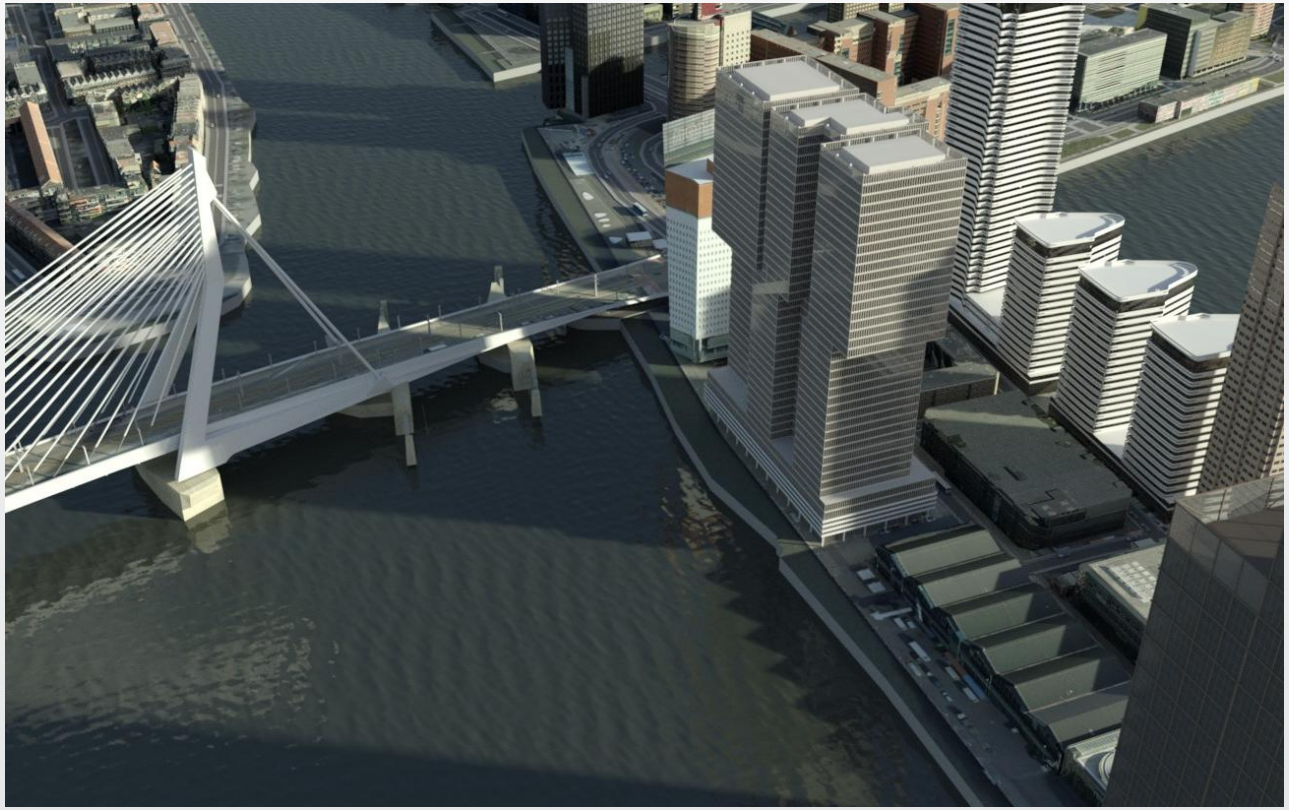
A significant trend is arising towards Cloud Computing for large scale deployments. RealityServer is ideal for Cloud Computing:

- Successfully deployed on:
  - **Amazon EC2**
  - **PEER 1**
  - **Penguin Computing**
- Web Services significantly ease communication with other Cloud resources or off-Cloud resources
- Straightforward way to scale with RealityServer resource requirements

Demo



amazon web services™

peer1

PENGUIN COMPUTING

NVIDIA

Conclusions

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RealityServer, 3D GIS and GPU Cloud Computing are converging:

- Photorealism has considerable benefits for 3D GIS applications and in making GIS data accessible for the masses
- GPU Cloud based systems enable wide distribution of large datasets to low powered devices, anywhere anytime
- RealityServer provides a central platform for building large scale collaborative GIS applications, exploiting high quality rendering
- Convergence of trends, Cloud, GPU acceleration and Photorealistic 3D enabling exciting new ways to collaborate

Questions

Related Talks

5:00-5:30 - GPU Cloud Computing 101: Getting Started
Dale Southard, NVIDIA

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