May 2012
Oracle Spatial User Conference
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Ronald Reagan Building and International Trade Center
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GIS
Software as a Service
for Business
using Oracle in the cloud
Program Agenda

• Benefits of Geospatial cloud computing.
• The Challenge: GIS as Software as a Service to multi-user Businesses with complex needs
• Technical approach – Oracle in the Cloud
• Experience of implementing this solution, Issues found & lessons learnt
• The result – eSpatial OnDemand GIS
SaaS Economics

• Reverses Traditional Cost / Risk Models

• The Supplier takes on the risk of application development, IT costs, and deployment

• The Customer pays only for use
Benefits of SaaS for GIS using Cloud Computing

- Lower Total Cost of Ownership
- Faster time to value
- Scales to your needs
- Reduces risk
- Enhanced data security and business continuity
- Always having the latest software release
Challenge: Provide GeoSpatial Analytics as SaaS to Businesses

- “Business Data Mapping”, not traditional GIS
  - Use is Data Analytics & Data Visualization – Spatial
  - Complex spatial analysis for untrained business users
- 100% Web Delivered, including rich functionality
- Need to be able to scale
- Need to be cost-effective
- Very large Spatial databases
- Need to be Multi-Tenant
Need to be Multi-Tenant
Multi-Tenancy is how successful SaaS is built

- Costs per customer are much lower:
  - Share Server, License & IT costs
  - Eliminate customer Set-up & deployment time & costs
- Need Multi-Tenancy to deliver the benefits of Cloud / SaaS
Why Multi-Tenancy?
Will change the GIS industry!

Old: Desktop → Server → Cloud-Hosted GIS
- Long, Costly, and Risky Enterprise GIS Projects
- Or very limited and inflexible web mapping

New: Multi-Tenant SaaS GIS in the Cloud
- Dramatically Lower costs – Initial and Ongoing
- Faster Time to Value
- Instantly available On Demand
- Flexibility to scale from smallest to largest groups
Why Oracle Spatial?

Advantages of Oracle for Cloud Deployment

- Provides all spatial functionality required
- Already available on Amazon Cloud
- Highly scalable spatial DB – For large numbers of customers X large volumes of data
- Exploits parallel load and query
- Seamless high availability HA and security support
- Performance is readily tuned for different scaling needs
Technical Approach - Overview

- Oracle Database with Spatial
- Deploy on Amazon EC2
- J2EE Web Application Server
- Multi-tenant Multi-user 100% Web software for Mapping and analyzing business data
  - eSpatial OnDemand GIS
Amazon Overview

• Elastic Cloud Computing (EC2)
• Variety of Instance Types (CPU cores, memory…)
• Pre-configured Amazon Machine Instances (AMI’s)
• Availability Zones…
• Elastic Block Storage – EBS
• Simple Storage Service (S3)
• Elastic IP addresses
• Load Balancing & Scaling, More…
Application Deployment Overview

EC2 Instance(s)
Web App Servers

OnDemandGIS
iSMART Server
App Server – Oracle or Apache Tomcat
O/S - Redhat Linux

EC2 Instance(s)
DB Servers

DBMS
Oracle 11gG SE
O/S - Redhat Linux

Backup – Amazon S3
Data Store – Amazon EBS

Amazon Elastic Cloud Computing (EC2)

Monitoring

AWS Console

Customer
Admin

Users
Oracle Deployment Overview on Amazon

- Dedicated Database Server(s) with separate Web Application Servers
- AMI - Oracle 11g DB & Redhat Fedora
- Database on an EBS volume
- ARCHIVELOG as normal – archive to a separate EBS volume
- RMAN Backup to separate EBS volume
- Copy backups to Amazon S3
- EE & RAC or SE-1 with Standby DB
- Backup from Standby DB
eSpatial’s Experience Implementing the Solution

- Have deployed eSpatial OnDemand GIS (early 2011)

- Using Oracle on Amazon

- 1000s of users. 10’ s – 100 trying it each day
Challenges, Issues, Lessons learnt

• Challenges overcome
  – No knowledge of or physical access to the servers & storage
  – Backup
  – Security
  – Manage load on database that each user can generate (complex spatial analyses)

• Issues to be aware of
  – AMI’s are not guaranteed to be permanent – cannot rely on their store
  – Amazon have a lot of $ meters…
  – You are responsible for securing your servers

• Lessons learnt
  – Restrict Access to AWS
  – Secure your AMI’s – no telnet
  – Need to monitor & respond
Recommendations, Tools

- Build your own AMIs
- Restrict access to AMI’s - ssh
- Use AWS Identity & Access Management (IAM)
- Automatically Monitor Application Health
- Have a 24x7 response in place
- Build a Cost model
- Monitor usage of Amazon services + user activity

Useful Tools:
- Oracle Enterprise Manager (“reduced” in SE1)
- AWS Management Console
- Amazon CloudWatch
- ElasticFox
- Nagios
The eSpatial Solution
eSpatial OnDemand GIS

Live on-line + Free Trial
Start Instantly On-line

NOT

Before you can start using GIS Server on Amazon EC2, follow these steps:

1. Get an Amazon Web Services (AWS) account.*
2. Contact Customer Service and provide your AWS account information.
3. We’ll provide you with ready-to-use GIS Server and enterprise database images in the Cloud.

OR

Talk to your local sales representative and discuss your options
Instant Access to the Application
Load your Data
Geographically analyze your Data
Do More
Rich set of functionality

- Style Maps
- Define Queries & Reports
- Add more users for your organization + control access
- Share – internally & externally
- Load business & GIS data
- + Compare data to demographic and other data from eSpatial
Some Customers
DEMONSTRATION

eSpatial OnDemand GIS
Where Next?
Continuing to grow the Service

Will Provide:

• Richer Analysis functionality
• Improved Ease of Use
• Access for Developers
• Vertical Applications
eSpatial’s Experience

eSpatial OnDemand GIS

• **Business Mapping is Not GIS**
  – New Users, New Uses, New Expectations
• **Want solution for a Task** – Not a General-purpose tool
• **Wide variety of Business Tasks**
  – Configure what’s provided BUT hide this from the user
  – Need rich set of functionality
• **Includes complex spatial analysis of business data**
• **Want it to be Easy** - Intuitive
• **Want it On Demand**
• **Want to Share it** with Everyone – High load peaks
Conclusion

• There is a demand for GIS as an On Demand service to organizations ranging from individuals to thousands of users, at low cost.

• The requirements for this are very different from traditional GIS, and are very challenging.

• Can deploy Oracle in the cloud on Amazon EC2 to achieve this.
Q&A
Thank You

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OVERVIEW

• Central database in the cloud for SaaS mapping service
• Multi-tenant SaaS Incorporates 1000s and growing number of multi-user accounts, each with sub-groups of users
• Supports Customers (Tenants), User-Groups, Users

CHALLENGES / OPPORTUNITIES

• Need scalability, security for multiple customers' data
• Customers can load disparate data sets
• Geo-code address data and also load GIS data
• Customers can define arbitrary spatial reports and queries
• Customers can define arbitrary maps

SOLUTIONS

• Oracle in the cloud on Amazon
• Oracle SaaS for ISVs licensing
• Oracle Database
  • Oracle Locator
  • Replica database

RESULTS

• Business Mapping SaaS based on Oracle in the cloud
• Large number of customers' data in central repository
• Disparate business and GIS datasets for each customer
• Standard GIS and other (such as demographic) datasets provided to all customers
• Provide Customers with ability to understand their activities in context of location
• Geo-code customer business data to allow for location-based analysis
• Customer ability to define maps, queries, and reports to analyze their data
Cloud Computing, Software as a Service (SaaS)

Cloud Computing

• Computing Infrastructure from the Internet – “the Cloud”
  – Generally virtual Servers
• Scale Dynamically – “On Demand Servers”

Software as a Service – SaaS

• Subscribe to an application for use On Demand
• The application is often run in the cloud