Deploying ArcGIS Server in the Cloud - A Business Perspective

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Agenda

- Cloud Deployment Patterns
- Example Business Cases For Cloud GIS
- Cost Effective Cloud Deployment in Amazon
- Cloud Deployment On premise
- Conclusion & Summary
The Cloud is a Deployment Option

What part of IT is core to your mission critical workflows?

...is GIS part of it?

ArcGIS has evolved to a cloud platform
Deployed How You Want

Aligning with the Maturity Of Your Organization

On Premises

Cloud

Hybrid

Complimenting Existing Desktops & Servers
Patterns and Alignment

Data Management
- Collect, Organize, & Exchange Data

Planning & Analysis
- Transform Data Into Actionable Information

Field Mobility
- Get Information Into and Out of the Field

Visualization
- Disseminate Information Where and When it is Needed

Constituent Engagement
- Get Feedback and Make Informed Decisions

A Complete Integrated System

ArcGIS Aligns Value with Business
Elasticity:
”...the tendency of a body to return to its original shape after it has been stretched or compressed...”

Capacity on Demand; ‘Cloud Bursting’ is a solution to over-provisioning. It rapidly migrates workloads from an overstretched resources to a cloud service on demand

Source: wordnetweb.princeton.edu, and Andy Hendrickson
Elasticity

- Can adjust for peaks and troughs in demand for...

**Data Management**

- High Availability w/ ArcGIS Server + EGDB
- High Availability w/ ArcGIS Server + EGDB using updates

- Enhanced & Dynamic Processing -- Batch Data Processing, Large Scale *Analysis*

- Cache cooking / Cache deployment in S3 or ArcGIS Online

- Geocoding
Elasticity

- **Visualization & Mobile enablement**
  - Grow out capacity as needed
  - Expand capabilities in near real time
  - One Server Access w/ ArcGIS Server
  - High Availability w/ ArcGIS Server

Operational Awareness

Constituent Engagement

Mobile
ArcGIS deployment On-Premise

User

ArcGIS Desktop
ArcGIS Server
Portal for ArcGIS
Data Management deployment to Cloud

On-Premise User

Public Or Private

ArcGIS Desktop

ArcGIS Server

editing

ArcGIS Online
Hybrid Deployment with Redundancy

On-Premise
Data Management
& Analysis

ArcGIS Server
ArcGIS Desktop
ArcGIS Server

Public
Or
Private

ArcGIS Server 1
ArcGIS Server 2
ArcGIS Server 3
ArcGIS Server n

Visualization
In Cloud

ArcGIS Online

editing
Deployment with redundancy

On-Premise User

ArcGIS Desktop
ArcGIS Server

Public Or Private

ArcGIS Server 1
ArcGIS Server 2
ArcGIS Server 3
ArcGIS Server n

ArcGIS Online
Publication & Visualization
In Cloud

Data Management
Data Publication & Analysis
In Cloud
Hybrid Deployment with Redundancy

On-Premise
Data Management & Analysis

ArcGIS Desktop
ArcGIS Server
editing

ArcGIS Server
2-way replication
active
active

Public Or Private

ArcGIS Server 1
ArcGIS Server 2
ArcGIS Server 3
ArcGIS Server n

ArcGIS Online

Publication & Visualization In Cloud

Data Publication In Cloud
Hybrid Deployment with Redundancy

On-Premise Data Management & Analysis

ArcGIS Desktop
ArcGIS Server
editing

Public
Or
Private

ArcGIS Server
passive

ArcGIS Server
active
1-way replication

ArcGIS Server 1
ArcGIS Server 2
ArcGIS Server 3
ArcGIS Server n

ArcGIS Online

Publication & Visualization In Cloud

Data Publication In Cloud
Deployment with Redundancy & Test

On-Premise Data Management & Analysis

ArcGIS Desktop

ArcGIS Server

ArcGIS Server editing

ArcGIS Server 1

ArcGIS Server 2

ArcGIS Server 3

ArcGIS Server n

Portal for ArcGIS

Publication & Visualization On-Premise

Data Publication On-Premise

2-way replication
Time to Market:

Erase the limit to creativity with the ability to quickly respond to business needs
Increase Time to Market

- Rapid provisioning of ArcGIS Server = less time to spin up servers and capacity
- Easy to set up and administer
- Extremely fast release of web maps
- Non constraining for innovation
- Lowering Cost
- Simplicity
- Scalability
Risk Aversion:

Growing the GIS into the Enterprise as your Business demands more should not be limited due to cost ceilings and a limit to your ability to test.
Limit Risk

- What is it appropriate for?
- Performance & Scalability
- The Cloud may not be reliable enough - you need to evaluate - SLA
- Is the the cloud secure enough?
- Ideal Effective Utilization
- Real Utilization of owned equipment vs. rented
- Compliance (e.g. green computing)
Budget:

Growing the GIS into your Business Enterprise requires unique budgetary planning
Budgetary

- Limit capital expenditures
- Flexible (expense) budgets can be used
- Reduced operational cost
  - No heavy lifting
  - Time to market effect
Cloud Computing Categories

ArcGIS Leverages Each One

- **Infrastructure As A Service (IAAS)**
  - Web Services API (eg: Amazon)

- **Platform As A Service (PAAS)**
  - Framework API (eg: Azure, Google App Engine, ArcGIS Online)

- **Software As A Service (SAAS)**
  - Web Browser (eg: YouTube, SalesForce, ArcGIS Online)
Cost Effective Cloud Deployment in Amazon
Aspects of Cost

- Procurement costs
- Maintenance and Management costs
- Time
The cost of Time

- Time to Market
- Labor time
Important Concepts

Instance Types

- **Standard Large**
  - 7.5 GB of memory, 4 EC2 Compute Units
  - (2 virtual cores with 2 EC2 Compute Units each)

- **High CPU Extra Large**
  - 7 GB of memory, 20 EC2 Compute Units
  - (8 virtual cores with 2.5 EC2 Compute Units each)

- **High Memory Quadruple Extra Large**
  - 68.4 GB of memory, 26 EC2 Compute Units
  - (8 virtual cores with 3.25 EC2 Compute Units each)
Important Concepts

Amazon Machine Image

Instance

AMI
Important Concepts

Storage

• Simple Storage Service (S3)

• Elastic Block Storage (EBS)
Regions & Availability Zones

Different prices per Region

- Four regions
  - East Coast
  - West Coast
  - Europe (Ireland)
  - APAC (Singapore)
  - APAC (Japan)

- Different zones = Different data centers
Esri provided AMIs

- ArcGIS 10 sp2
- Available in all regions

**ArcGIS Server 10 AMI**
- Windows 2008 64 bit
- ArcGIS Server GIS Services
- Microsoft SQL Server Express (ArcSDE enabled)
- ArcGIS Desktop
- 100Gb of storage (optional)

**Enterprise Geodatabase 10 AMI**
- Windows 2008 64 bit
- PostgreSQL 8.3.0 (ArcSDE enabled)
- 100Gb of storage (optional)
Calculating cost in Amazon

- **Machine cost**
  - Instance size and type
  - Storage
  - Bandwidth

- **Other costs**
  - Extra storage: S3, CloudFront
  - Elastic Load Balancer, Elastic ip, Route 53
  - Monitoring: CloudWatch
Security Concepts and Costs

- Security Group
- Virtual Private Cloud

On Premise

VPN
Data Management deployment in Amazon EC2

On-Premise User

Amazon EC2

ArcGIS Desktop

ArcGIS Server

editing
Cost items

- **ArcGIS Server Machine**
  - Instance Size
  - EBS Volume Size
  - Data Transfer
  - eip

- **Geodatabase Server**
  - Instance Size
  - EBS Volume Size
  - Eip

- **Cost Considerations**
Demo
Simple Monthly Calculator
Hybrid Deployment with Redundancy

On-Premise
Data Management & Analysis

ArcGIS Server
ArcGIS Desktop
editing

Amazon EC2
ArcGIS Server 1
ArcGIS Server 2
ArcGIS Server 3
ArcGIS Server n

Visualization
In Cloud
Cost items

• ArcGIS Server 1
  - Instance Size
  - EBS Volume Size
  - Data Transfer
  - eip

• ArcGIS Server n
  - Instance Size
  - EBS Volume Size
  - Data Transfer
  - eip

• Cost Considerations
<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
<th>Hours</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amazon EC2 running Windows</strong></td>
<td>$0.476 per Large Instance-hour (or partial hour)</td>
<td>1,476 Hrs.</td>
<td>701.94</td>
</tr>
<tr>
<td></td>
<td>$0.96 per Extra-Large Windows Instance (m1.xlarge)</td>
<td>1 Hr</td>
<td>0.96</td>
</tr>
<tr>
<td><strong>Amazon CloudWatch</strong></td>
<td>$0.00 per alarm-month - First 10 alarms</td>
<td>0.495 Alarms</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Elastic IP Addresses</strong></td>
<td>$0.01 per non-attached Elastic IP address per complete hour</td>
<td>184 Hrs.</td>
<td>1.84</td>
</tr>
<tr>
<td><strong>Amazon EC2 EBS</strong></td>
<td>$0.10 per GB-month of provisioned storage</td>
<td>456.472 GB-Mo</td>
<td>45.65</td>
</tr>
<tr>
<td></td>
<td>$0.10 per 1 million I/O requests</td>
<td>12,516,462 I/Os</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>$0.15 per GB-Month of snapshot data stored</td>
<td>45.571 GB-Mo</td>
<td>6.84</td>
</tr>
<tr>
<td></td>
<td>$0.01 per 10,000 gets (when loading a snapshot)</td>
<td>75,160 Requests</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>$0.01 per 1,000 puts (when saving a snapshot)</td>
<td>0 Requests</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Elastic Load Balancing</strong></td>
<td>$0.008 per GB Data Processed by the LoadBalancer</td>
<td>0.000007 GB</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>$0.025 per LoadBalancer-hour (or partial hour)</td>
<td>184 Hrs.</td>
<td>4.60</td>
</tr>
<tr>
<td><strong>Asia Pacific (Singapore) Region</strong></td>
<td><strong>Amazon EC2 running Windows</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$0.48 per Large Windows Instance (m1.large) instance-hour (or partial hour)</td>
<td>184 Hrs.</td>
<td>88.32</td>
</tr>
<tr>
<td></td>
<td><strong>Amazon EC2 EBS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$0.11 per GB-month of provisioned storage</td>
<td>2,084.599 GB-Mo</td>
<td>229.31</td>
</tr>
<tr>
<td></td>
<td>$0.11 per 1 million I/O requests</td>
<td>2,534,649 I/Os</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>$0.15 per GB-Month of snapshot data stored</td>
<td>2.617 GB-Mo</td>
<td>0.39</td>
</tr>
</tbody>
</table>

**Totals** - 1,081.45
### Amazon Bill

**Complete Cost**

<table>
<thead>
<tr>
<th>Service</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon Elastic Compute Cloud</td>
<td>$1,081.45</td>
</tr>
<tr>
<td>Amazon Simple Storage Service</td>
<td>$1.83</td>
</tr>
<tr>
<td>AWS Data Transfer (excluding Amazon CloudFront)</td>
<td>$0.06</td>
</tr>
</tbody>
</table>

**Bill Summary**

- Usage charges and monthly recurring fees during this billing cycle†: $1,083.34
- One-time fees during this billing cycle: $0.00
- Taxes: $0.00
- Total new charges this billing cycle: $1,083.34
- Current estimated unpaid balance to be charged for this billing cycle: $1,083.34

† Applies only to items with a recurring cost. This includes charges for services that are billed at the same rate each month. Other charges such as one-time fees or taxes may apply separately.
Cost Savings Best Practices

- Only Use what you need, when you need it
- Put AMIs to use
- Elasticity is your friend
- Use Amazon Features
- Automate wisely
Cloud Deployment On Premise - VCE

- Cisco/ Vmware/ EMC²
- Vblock
- Running in your DataCenter
  - ArcGIS Server on Vblock
    - Custom Templates
    - Support different architectures
References

- **Amazon Web site**
  - Calculator
  - Keep an eye on prices and new services

- **Blogs**
  - How to best save costs and use the cloud

- **VCE Web Site**
  - Whitepaper

ESRI Can Help You Start Today

- ArcGIS Server for Amazon EC2 (AMIs)
- Cloud Bundle
- Cloud hosting package
- Jumpstart package
- Custom Services
- Architecture assistance

For more information contact your account executive
Summary

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