Using ArcGIS Server in the Amazon Cloud

Sterling Quinn
Andrew Stauffer
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Topics Covered

- Overview of Amazon EC2
- Working with Amazon EC2
- Scaling your configuration
- Case Study
- FAQs
Overview of Amazon EC2

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Conceptual Overview

• What is a Virtual Machine?
  - Using a single physical machine to host multiple concurrently running Operating Systems.
  - Physical machine is a shared resource

• What is Amazon EC2?
  - Amazon Elastic Compute Cloud
  - You run virtual machines on Amazon’s hardware within data centers located in different geographic regions.
Conceptual Overview

Your Server Room

Amazon EC2
Advantages of EC2

• Robust hardware and network infrastructure

• Elastic deployments

• Fast and inexpensive prototyping

• Easy short-term or emergency deployments

• Ease of setting up a public-facing site isolated from your own network
Key terms: EC2 instance and AMI

- **EC2 instance**
  - Virtual machine running on Amazon EC2
  - You pick the size and spec

- **Amazon Machine Image (AMI)**
  - Defines OS and software on your EC2 instance
ESRI-developed AMIs

- **ArcGIS Server AMI**
  - ArcGIS Server 10.0sp2 for Microsoft .NET Framework
  - ArcGIS Desktop
  - Any extension you can license
  - Windows Server 2008 64 Bit
  - 100 GB attached drive

- **Enterprise geodatabase AMI**
  - ArcSDE 10sp2
  - PostGRES SQL relational database
  - Windows Server 2008 64 Bit
How do I work with EC2?

- AWS Management Console
- Amazon EC2 API Tools
- Other Third Party Tools
Getting an instance running

1. Create instance

AWS Management Console
Demo: Create an instance

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Working with Instances

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How do I use my instance?

1. Create instance
2. Log into instance

AWS Management Console

Windows Remote Desktop
Configuring the instance

- Change the Operating System Administrator password
- License ArcGIS
- Add or remove EBS Volumes

No need to run the post install!
Moving your data

1. Create instance
2. Log into instance
3. Copy data to instance

Amazon EC2 Instance

AWS Management Console
Windows Remote Desktop
Moving your data

• Transferring data across the Internet
  - Can be slow
  - Can pose security concerns

• Various options outlined in help
  - Choice based on personal preference and your IT policies
Publishing services

1. Create instance
2. Log into instance
3. Copy data to instance
4. Publish services and apps
Map caching

- EC2 gives you temporary “boxes” for caching
- Probably faster to rebuild your cache on EC2 than to copy it
- Can test instance types relatively cheaply

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<th>Cost/hr</th>
<th>SOCs</th>
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</table>

Results of a test cache with approx. 75,000 tiles on different instance types
Preserving your configuration

1. Create instance
2. Log into instance
3. Copy data to instance
4. Publish services and apps
5. Save custom AMI
Demo: Setting up services
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Scaling your configuration

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Testing and scaling

- Testing is an iterative process
- Function -> Performance
- Scale up for QA testing of Staging and Production
Vertical and horizontal scaling

AMI

Instance

Vertical

Instance

Horizontal
Vertical scaling

- Change instance type
  - Can now be done “in place”

- Apply Elastic IP
  - Replacement instances can be mapped to same EIP
Horizontal scaling

On-premises architecture

Amazon EC2 architecture

Web server & SOM

Elastic Load Balancer

Web server
SOM
SOC
Setting up a load balancer

- Use AWS Management Console
- Add and remove instances with “point and click”
- Configure a health check
  - Bad instances auto-removed
Horizontal Scaling with EC2

Elastic Load Balancer

Instance 1

Instance 2

Identical EC2 instances

Custom AMI
Auto scaling

- Use Amazon APIs to add and remove instances from your site as needed
  - Works off triggers, such as CPU usage
  - Need a custom AMI created before doing this
Auto scaling with EC2

Elastic Load Balancer

Auto scaling rules

Custom AMI

Instance 1

Instance 2

Instance 3
Scripting basic actions

• Amazon API allows for automatic:
  - Stopping / Starting instances
  - Apply Elastic IP Address
  - Etc..

• This can save you money
  - Example: Stopping instances on weekends

• ArcGIS Server Blog Posts
  - Introduction to scripting with Amazon EC2
  - Tips and tricks for scripting ArcGIS Server on Amazon EC2
Demo: Scaling the system

Andrew Stauffer
Case Study: Japan Quake 2011

David McGuire
Japan Disaster – Case Study

Late on a Thursday night…
Initial Response

• Quickly deployed a New Media map
  - Hosted locally

• CNN links to the map
  - Local machine fails to handle load

• We need to scale quickly…
Which scaling was right for us?

AMI → Instance → Vertical
AMI → Instance → Horizontal
Staging Layout

Users

ArcGIS Server

ArcSDE Server
Final Layout

- Users
- Elastic Load Balancer
- ArcGIS Servers
- Elastic IP
- ArcSDE Server
Case Study

• Deployed app in a high capacity setup
  - Took only a couple hours
  - Initially 2 ArcGIS Servers and 1 SDE Server

• Al-Jazeera embeds map the following Monday
  - Increase to 6 ArcGIS Servers quickly to handle load
  - Double the size of the SDE Server
Common Amazon EC2 Questions

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How does the billing work?

- Two separate costs to consider:
  - Amazon EC2
  - Esri licensing

- Amazon EC2 is billed like a utility
  - Water, Gas, Electric...

- Reserved Instances can be cheaper in the long run

- AWS Calculators are available for creating monthly cost estimates
Will Amazon EC2 save me money?
Is Amazon EC2 secure?

• Amazon provides…
  - Secure physical facilities for data centers
  - Configurable firewall on each instance
  - Secure management console with optional multifactor authentication
  - Secure instances with key pair required for obtaining passwords

• You’re responsible for…
  - Setting up ArcGIS Server security
  - Keeping the admin passwords safe
  - Configuring the security groups correctly
The Road Ahead…

• What’s coming in 10.1
  - Ubuntu AMIs
  - New architecture of the 10.1 ArcGIS Server
  - Esri-provided app for building a site
Questions...

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