



Welcome

Esri Mid-Atlantic
User Conference



Using ArcGIS for Server in the Amazon Cloud

Bonnie Stayer

Session Outline

- **AWS Overview**
- **ArcGIS in AWS**
- **Cloud Builder**
- **Maintenance**
- **Benefits**
- **Security**

AWS Overview

Utility Computing

**ON DEMAND
UNIFORM
PAY AS YOU GO
AVAILABLE**




**ON DEMAND
UNIFORM
PAY AS YOU GO
AVAILABLE**




Amazon Web Services

Compute


 **EC2**
Virtual Servers in the Cloud

Storage & Content Delivery

 **S3**
Scalable Storage in the Cloud

 **Storage Gateway**
Integrates On-Premises IT Environments with Cloud Storage


 **Glacier**
Archive Storage in the Cloud


 **CloudFront**
Global Content Delivery Network

Database

 **RDS**
Managed Relational Database Service

 **DynamoDB**
Predictable and Scalable NoSQL Data Store

 **ElastiCache**
In-Memory Cache

 **Redshift**
Managed Petabyte-Scale Data Warehouse Service

Networking


 **VPC**
Isolated Cloud Resources


 **Direct Connect**
Dedicated Network Connection to AWS

 **Route 53**
Scalable DNS and Domain Name Registration


Administration & Security


 **Directory Service**
Managed Directories in the Cloud

 **Identity & Access Management**
Access Control and Key Management

 **Trusted Advisor**
AWS Cloud Optimization Expert

 **CloudTrail**
User Activity and Change Tracking

 **Config** PREVIEW
Resource Configurations and Inventory

 **CloudWatch**
Resource and Application Monitoring

Deployment & Management

 **Elastic Beanstalk**
AWS Application Container

 **OpsWorks**
DevOps Application Management Service

 **CloudFormation**
Templated AWS Resource Creation

 **CodeDeploy**
Automated Deployments


Analytics


 **EMR**
Managed Hadoop Framework


 **Kinesis**
Real-time Processing of Streaming Big Data


 **Data Pipeline**
Orchestration for Data-Driven Workflows

Application Services


 **SQS**
Message Queue Service

 **SWF**
Workflow Service for Coordinating Application Components


 **AppStream**
Low Latency Application Streaming


 **Elastic Transcoder**
Easy-to-use Scalable Media Transcoding

 **SES**
Email Sending Service

 **CloudSearch**
Managed Search Service


Mobile Services


 **Cognito**
User Identity and App Data Synchronization

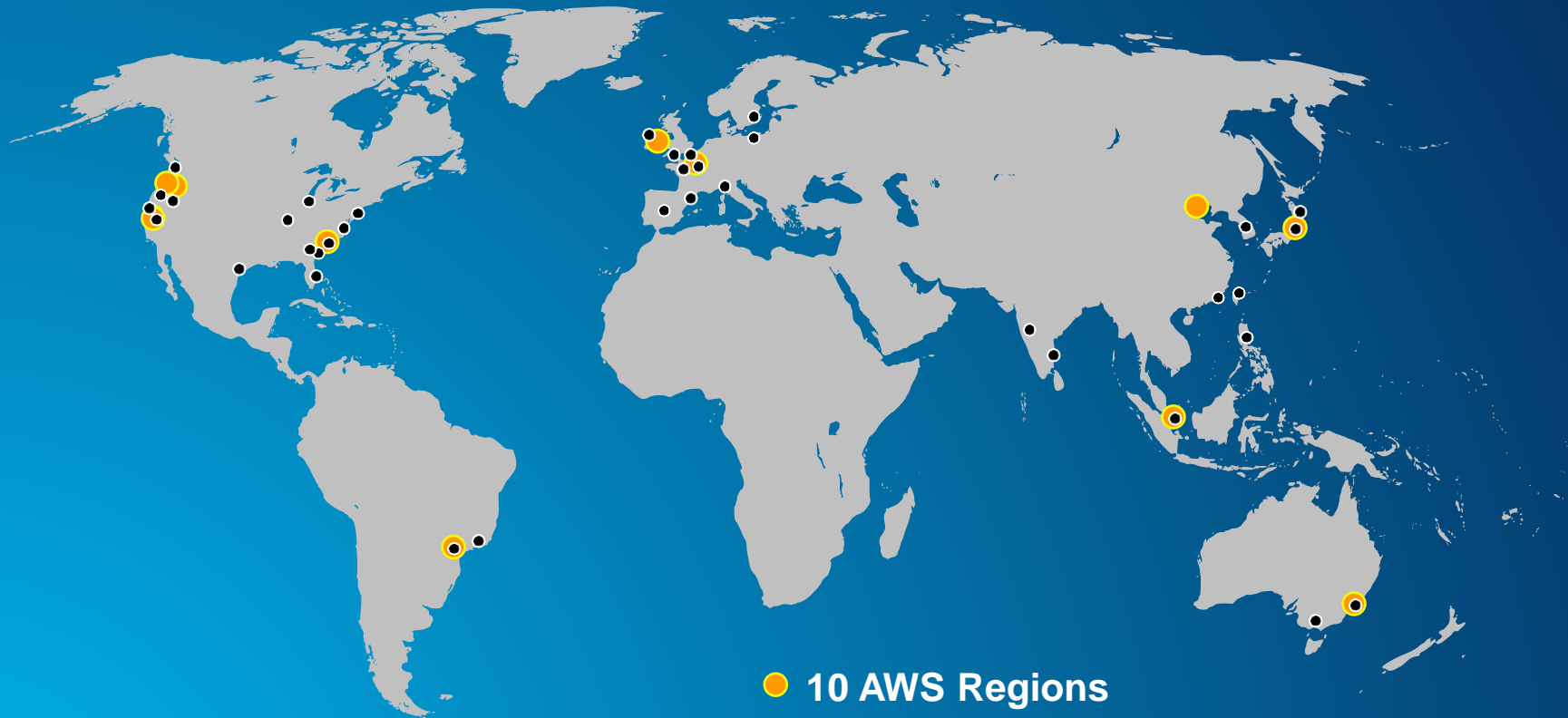
 **Mobile Analytics**
Understand App Usage Data at Scale

 **SNS**
Push Notification Service

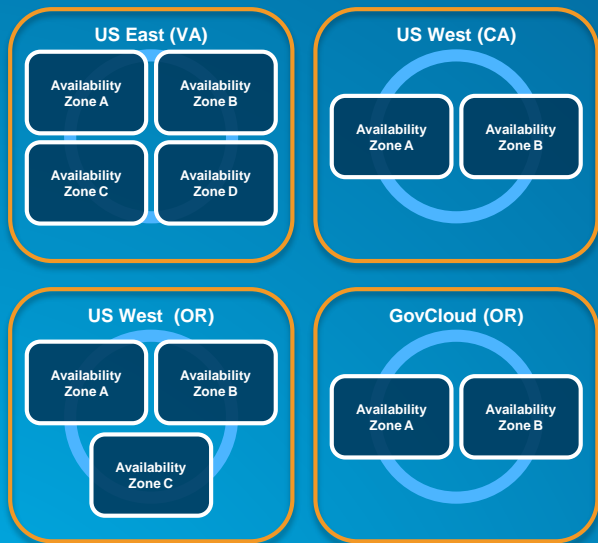
Enterprise Applications

 **WorkSpaces**
Desktops in the Cloud

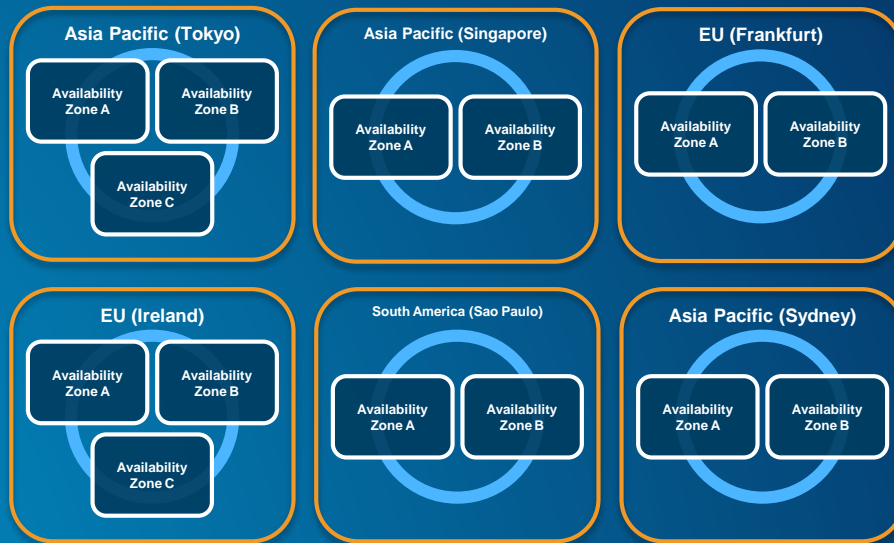
 **Zocalo**
Secure Enterprise Storage and Sharing Service



US Regions



Global Regions



Note: Conceptual drawing only. The number of Availability Zones may vary.



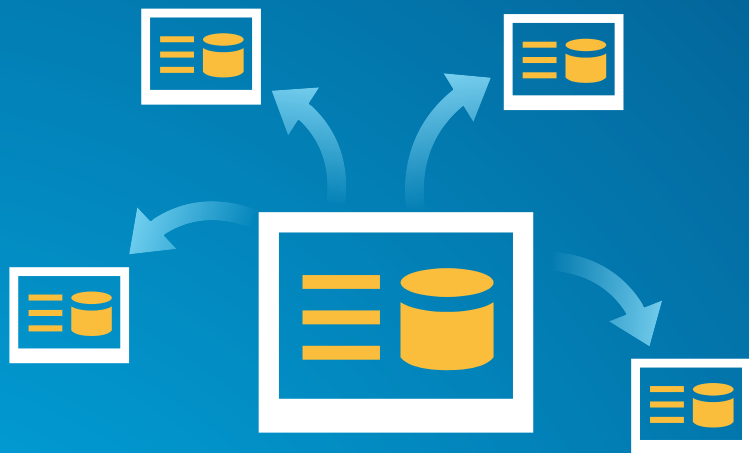
**Virtual machines (instance types)
optimized for:**

- General purpose
- Compute
- GPU
- Memory
- Storage

Elastic Block Storage (EBS)

- Storage volumes can be attached to EC2 instances
- Can be detached and preserved separately





**Amazon
Machine
Image (AMI)**

Preconfigured with:

- Operating system
- Architecture (32-bit or 64-bit)
- Storage
- Applications (i.e. ArcGIS)

Services Edit

Amazon Web Services

Compute & Networking

- Direct Connect**
Dedicated Network Connection to AWS
- EC2**
Virtual Servers in the Cloud
- Elastic MapReduce**
Managed Hadoop Framework
- Route 53**
Scalable Domain Name System
- VPC**
Isolated Cloud Resources

Storage & Content Delivery

- CloudFront**
Global Content Delivery Network
- Glacier**
Archive Storage in the Cloud
- S3**
Scalable Storage in the Cloud
- Storage Gateway**
Integrates On-Premises IT Environments with Cloud Storage

Database

- DynamoDB**
Predictable and Scalable NoSQL Data Store
- ElastiCache**
In-Memory Cache
- RDS**
Managed Relational Database Service
- Redshift** **NEW**
Managed Petabyte-Scale Data Warehouse Service

Deployment & Management

- CloudFormation**
Templated AWS Resource Creation
- CloudWatch**
Resource and Application Monitoring
- Data Pipeline**
Orchestration for Data-Driven Workflows
- Elastic Beanstalk**
AWS Application Container
- IAM**
Secure AWS Access Control
- OpsWorks** **NEW**
DevOps Application Management Service

App Services

- CloudSearch**
Managed Search Service
- Elastic Transcoder** **NEW**
Easy-to-use Scalable Media Transcoding
- SES**
Email Sending Service
- SNS**
Push Notification Service
- SQS**
Message Queue Service
- SWF**
Workflow Service for Coordinating Application Components

AWS Management Console

Demo

ArcGIS in AWS





**Ubuntu with
PostgreSQL**



**Windows Server
with SQL Server**



**Windows Server
with SQL Express**



Esri AMI



Services



Web Application



Custom AMI

Amazon EC2

Region

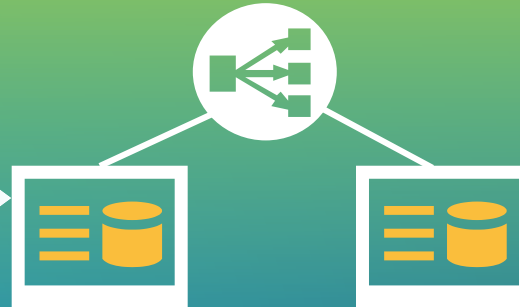
Availability Zone

Virtual Private Cloud

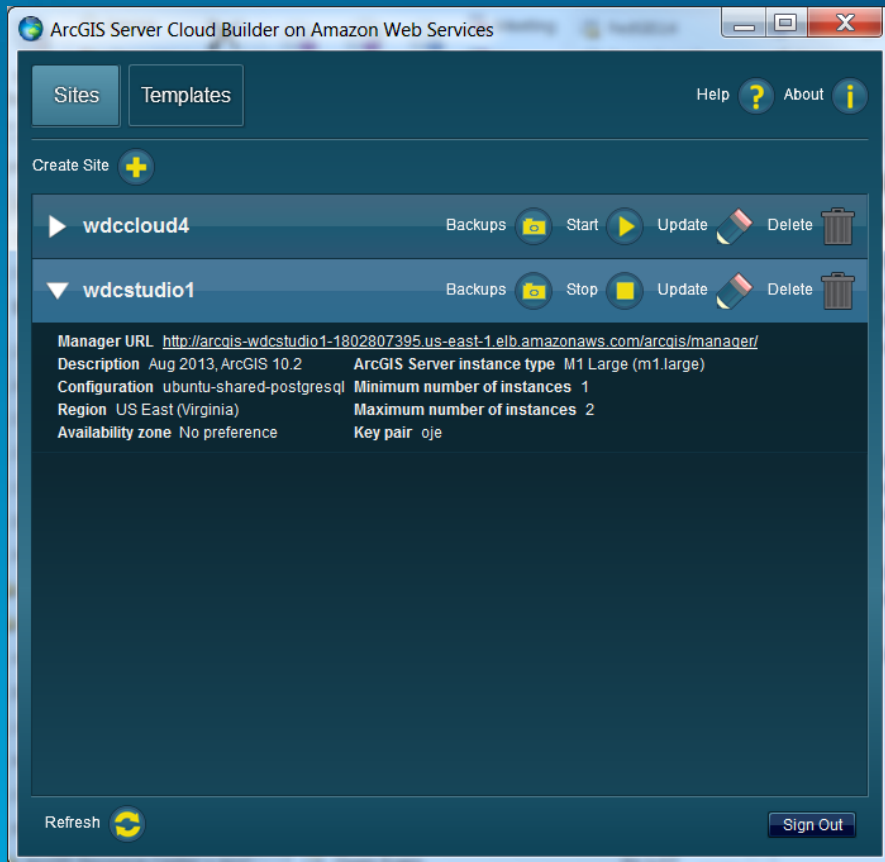
ArcGIS for Server Site

Cloud
Builder

AMIs

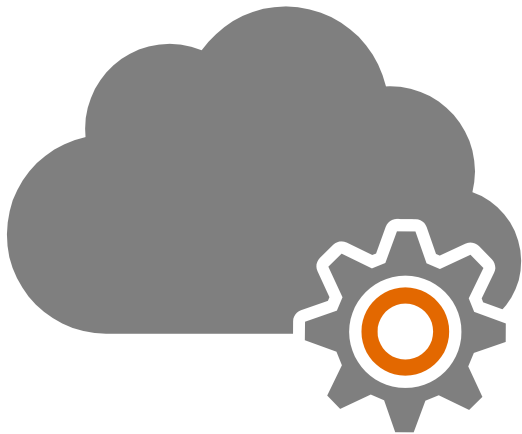


Cloud Builder



- Create new sites
- Create custom sites
- Manage sites
- Make backups

- **Applies the Server license file**
- **Optionally set up a database in a separate instance**
- **Creates the PSA account**
- **Creates an elastic load balancer and puts all the server instances under it**
- **Sets up a common configuration store, server directories, etc. for all instances**
- **Provides auto-scaling options**



Cloud Builder

Demo

1. Initial setup

- a. Sign up for an Amazon Account
- b. Send AWS account # to service@esri.com
- c. Get Cloud Builder (<http://my.esri.com>)

1. **Initial setup**
2. **Deploy site using Cloud Builder**

1. **Initial setup**
2. **Deploy site using Cloud Builder**
3. **Publish Services**
 - a. **Copy/replicate data to server (optional)**
 - b. **Publish services**

1. **Initial setup**
2. **Deploy site using Cloud Builder**
3. **Publish Services**
4. **Create web maps/apps**

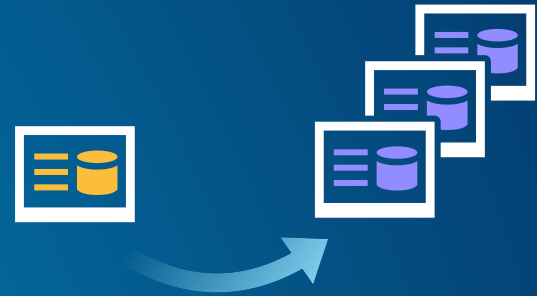
Maintenance

- **Templates**

- Customized ArcGIS Server site
- Store, share, and import

- **Backup**

- ArcGIS Server Backup and Restore Utility
- Cloud Builder Backup
- Cloud Builder Template
 - Launch multiple sites with the same architecture



Deciding how to back up your AWS-based ArcGIS Server site

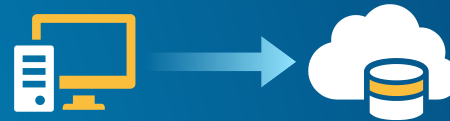
- **Storage Options**

- EBS Volume
- S3
- EC2 Instance



- **Data Loading Options**

- Publishing from ArcGIS for Desktop
- RDP
- S3 Client Utilities
- FTP/HTTP Server
- AWS Export/Import



- CloudWatch

- Monitor EC2 & other AWS resources
- Store logs
- Set alarms
- Graphs and stats

The screenshot displays the AWS CloudWatch console interface. At the top right, a 'Create Alarm' modal is open, showing a progress indicator with '1. Select Metric' and '2. Define Alarm'. Below this, there is a 'Browse Metrics' button and a search bar. The main content area shows a 'Metric Summary' dashboard. On the left, a sidebar lists navigation options: Dashboard, Alarms (with 1 ALARM and 13 INSUFFICIENT status indicators), Billing, Logs, and Metrics (with a 'Selected Metrics' section listing EBS, EC2, and ELB). The 'Metric Summary' section includes a description of CloudWatch metrics, a 'Browse Metrics' button, and an 'Alarm Summary' section stating 'You have 1 alarm in ALARM and 13 alarms in INSUFFICIENT DATA state in US region. See top 16 alarms.' Below the summary are three line graphs showing CPU utilization for different instances over time (7/14 03:00 to 05:00). The first graph shows low utilization (below 20%), the second shows high utilization (above 80%), and the third is partially visible. A callout box on the right provides details for 'EC2 Metrics: 188', including 'Per-Instance Metrics: 150', 'By Auto Scaling Group: 10', 'By Image (AMI) Id: 14', 'Aggregated by Instance Type: 7', and 'Across All Instances: 7'.

Benefits

- **Can help you optimize...**

- **Setup Time**
- **Scalability**
- **Cost**



- **Machine cost**

- Instance size and type
- Storage
- Bandwidth

- **Other costs**

- Extra storage: S3, CloudFront
- Elastic Load Balancer, Elastic IP, Route 53
- Monitoring: CloudWatch



- **Running Servers (includes OS licensing):**

- On Demand – hourly rate
- Reserved Instance – upfront charge, reduced hourly rate



- **Storing Data (per month):**

- Transfer in to AWS: free
- Transfer out from AWS: sliding scale (1 GB free, then \$0.12/GB max)
- EBS Storage: \$0.10 / GB of volume size



- 1 Windows Large Instance
- On-Demand Pricing (per hour, no upfront)
- US East (Northern VA)

24 x 365

x \$0.266/hr

\$2330.16/yr

- Reserved Instance Pricing
- Heavy Utilization (always on)

$$\begin{aligned} & \$602 + \\ & 24 \times 365 \\ & \underline{\times \$0.106/\text{hr}} \\ & \$1530.56/\text{yr} \end{aligned}$$

- Add a server for a week
- On-Demand Pricing (per hour, no upfront)
- US East (Northern VA)

$$24 \times 7$$
$$\times \underline{\$0.266/\text{hr}}$$

\$44.69/wk

Security

Customer

Customer Data

Platform, Applications, Identity & Access Management

Operating System, Network & Firewall Configuration

Client-side Data Encryption &
Data Integrity Authentication

Server-side Encryption
(File System and/or Data)

Network Traffic Protection
(Encryption/Integrity/Identity)

- Customers implement their own set of controls
- Multiple customers with FISMA Low and Moderate ATOs

Amazon

Foundation Services

Compute

Storage

Database

Networking

AWS Global
Infrastructure

Availability Zones

Regions

Edge Locations

- SAS-70 Type II
- ISO 27001/ 2 Certification
- Payment Card Industry (PCI)
- Data Security Standard (DSS)
- NIST Compliant Controls
- DoD Compliant Controls
- FedRAMP Compliant Controls
- HIPAA Compliant

Dedicated Instances

Single Tenant Physical Nodes

Run your virtualized operating systems and apps in a “single tenant per physical node” model within the AWS infrastructure

Security Groups

Instance firewalls

Firewall control on instances via Security Groups

CLIs and APIs

Instantly audit your entire AWS infrastructure from scriptable APIs – generate an on-demand IT inventory enabled by programmatic nature of AWS

VPC

Subnet control

Create low level networking constraints for resource access, such as public and private subnets, internet gateways and NATs

Bastion hosts

Only allow access for management of production resources from a bastion host.
Turn off when not needed

Direct Connect & VPN

Private connections to VPC

Secured access to resources in AWS over software or hardware VPN and dedicated network links



GovCloud

- Available to U.S. federal, state, and local government clients, contractors, and educational institutions
- ITAR-compliant
- Supports CUI workloads
- More expensive
- Esri AMIs

Resources

- **Amazon EC2** - http://aws.amazon.com/ec2/?nc2=h_l3_c/
- **ArcGIS for Server on AWS Help** - http://resources.arcgis.com/en/help/main/10.2/#/Quick_start_guide/00rq0000002p000000/
- **Cloud Builder** - http://resources.arcgis.com/en/help/main/10.2/#/A_quick_tour_of_Cloud_Builder/00rq0000005z000000/



Understanding our world.