





Esri International User Conference | San Diego, CA
Technical Workshops | Tue, Jul 12

Deploying ArcGIS Server in the Cloud - A Business Perspective

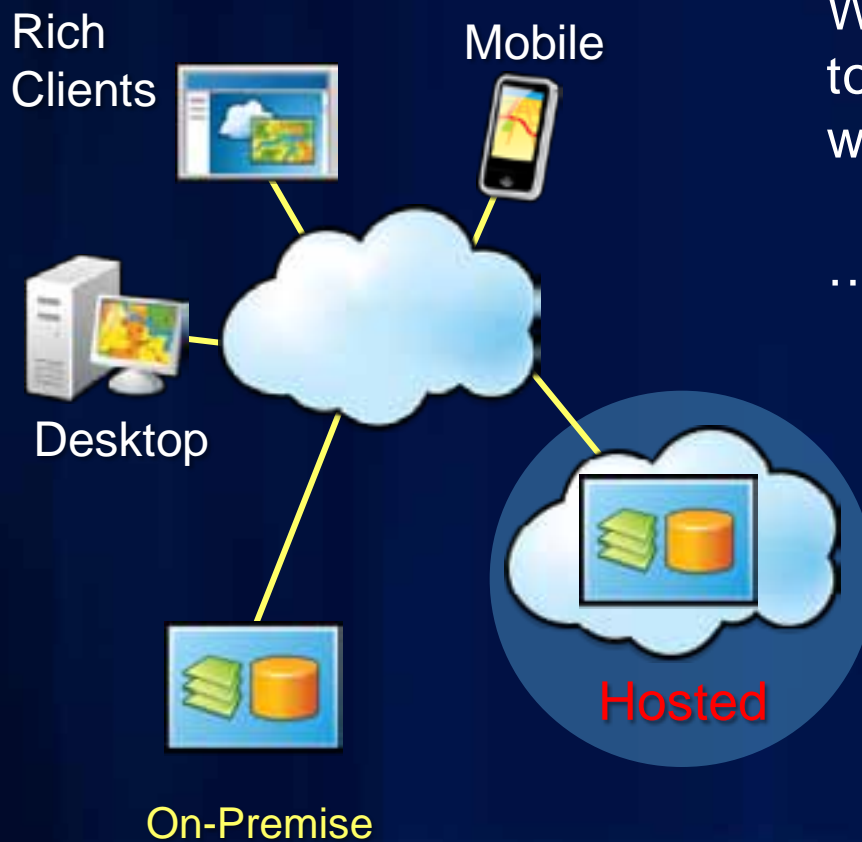
Andrew Hendrickson

Marwa Mabrouk

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

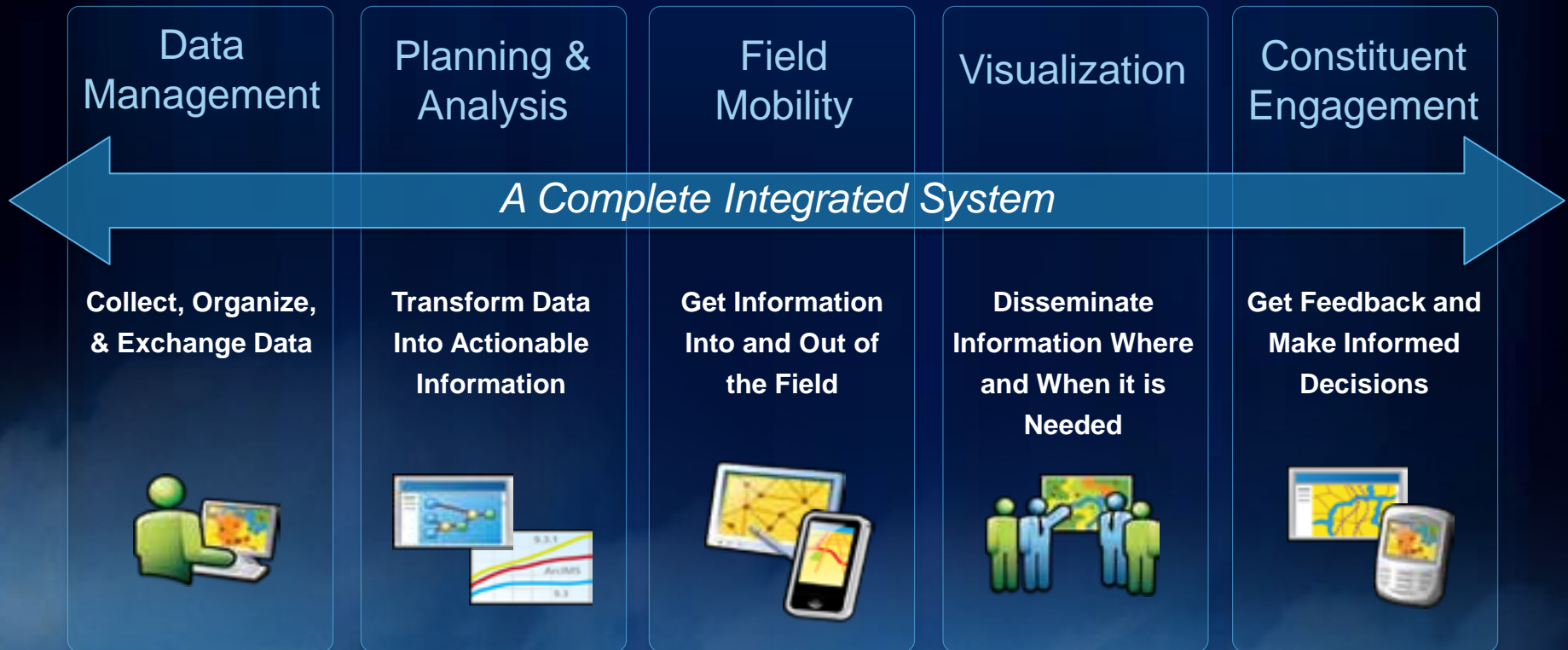


Hybrid



Complimenting Existing Desktops & Servers

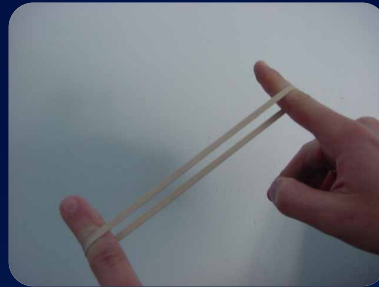
Patterns and Alignment



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

Elasticity

- Can adjust for peaks and troughs in demand for...
- *Data Management*



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*



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



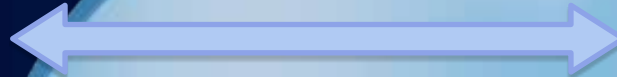
ArcGIS Desktop



ArcGIS Server



ArcGIS Online



Hybrid Deployment with Redundancy

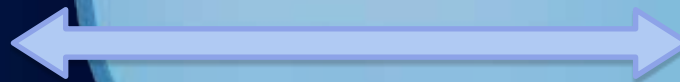
*On-Premise
Data Management
& Analysis*



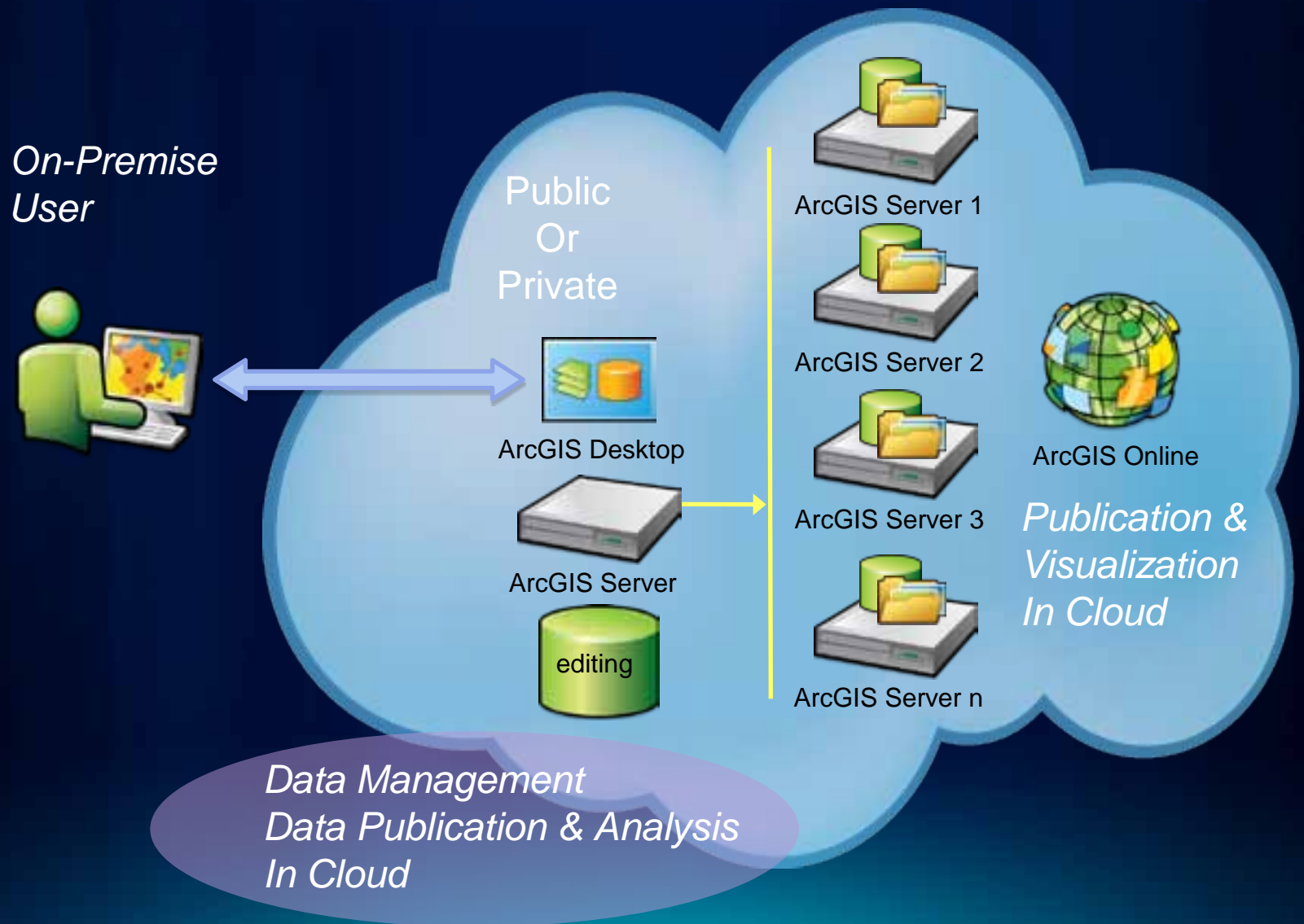
Public
Or
Private



*Visualization
In Cloud*



Deployment with redundancy

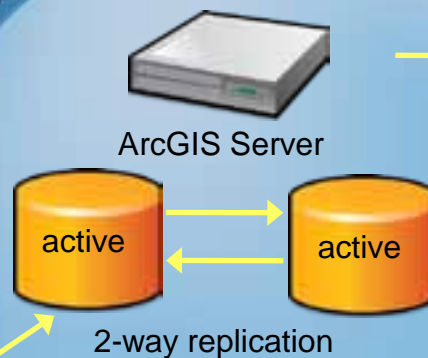


Hybrid Deployment with Redundancy

*On-Premise
Data Management
& Analysis*



Public
Or
Private



ArcGIS Server 1

ArcGIS Server 2

ArcGIS Server 3

ArcGIS Server n



ArcGIS Online

*Publication &
Visualization
In Cloud*

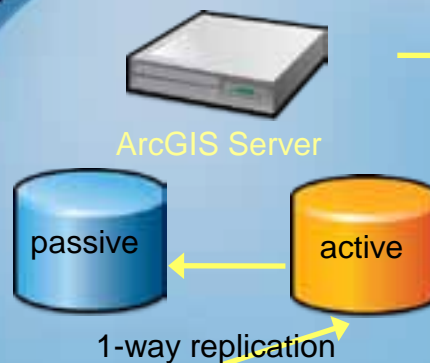
*Data Publication
In Cloud*

Hybrid Deployment with Redundancy

*On-Premise
Data Management
& Analysis*



Public
Or
Private



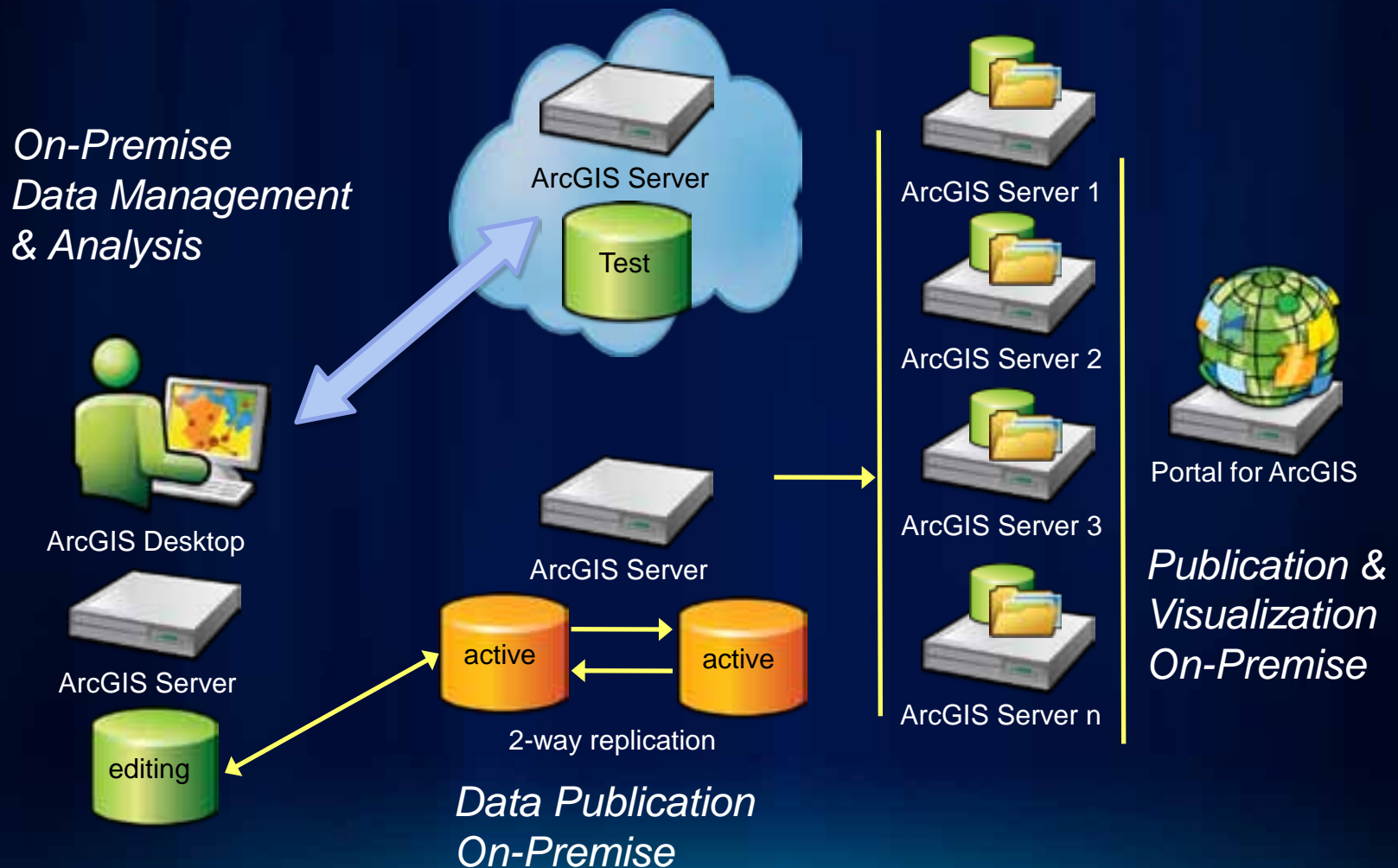
*Data Publication
In Cloud*



ArcGIS Online

*Publication &
Visualization
In Cloud*

Deployment with Redundancy & Test



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

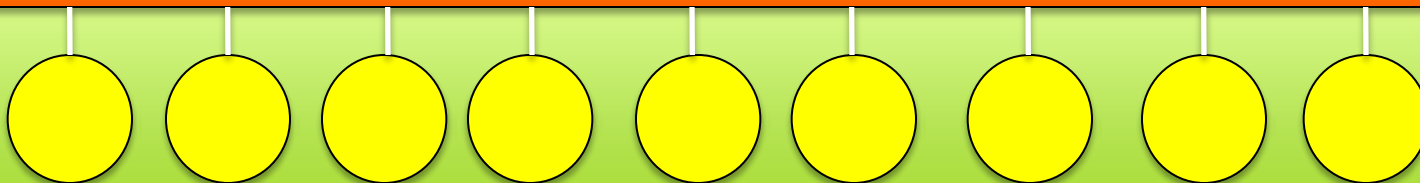
Software
As A
Service
(SAAS)

Web Browser (eg: YouTube, Salesforce, ArcGIS Online)



Platform
As A
Service
(PAAS)

Framework API (eg: Azure, Google App Engine, ArcGIS Online)

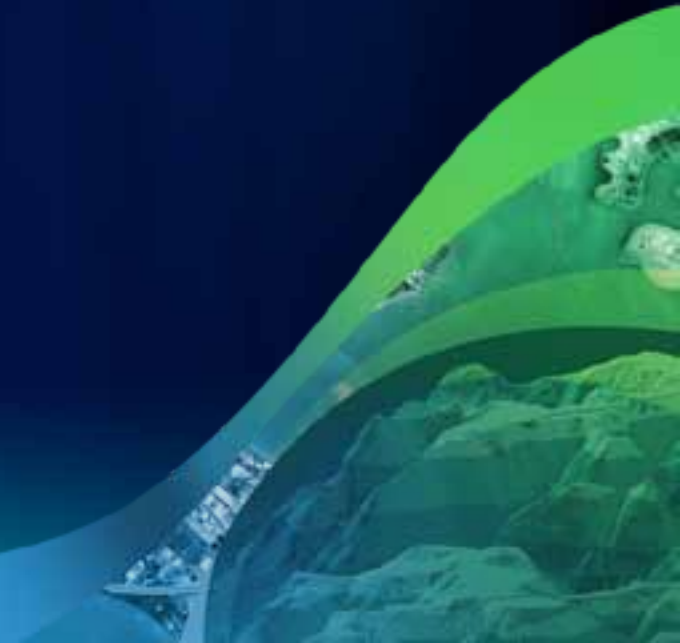


Infrastructure
As A
Service
(IAAS)

Web Services API (eg: Amazon)



Cost Effective Cloud Deployment in Amazon

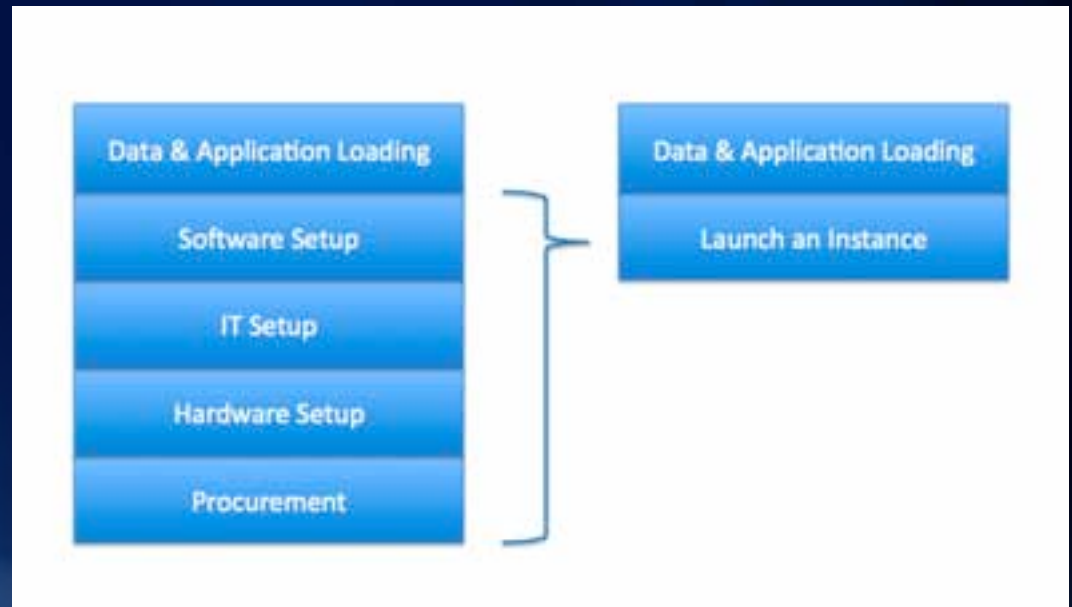


Aspects of Cost

- **Procurement costs**
- **Maintenance and Management costs**
- **Time**

The cost of Time

- Time to Market
- Labor time



Important Concepts

Instance Types

Standard
Large



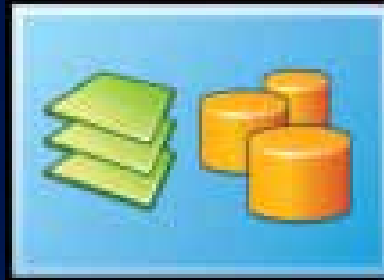
7.5 GB of memory,
4 EC2
Compute
Units
(2 virtual
cores with
2 EC2
Compute
Units each)

High CPU
Extra Large



7 GB of memory,
20 EC2 Compute
Units
(8 virtual cores
with 2.5 EC2
Compute Units
each)

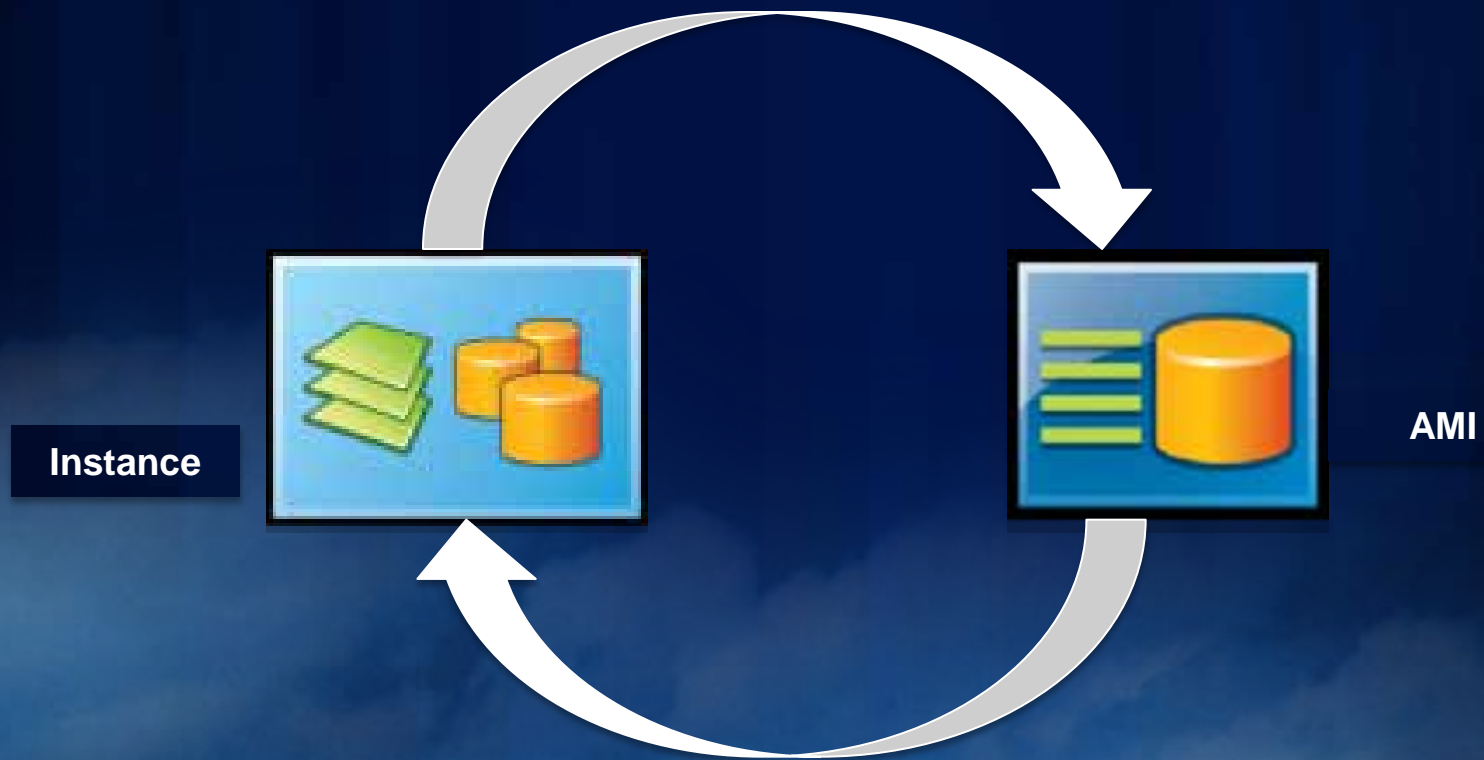
High Memory
Quadruple Extra Large



68.4 GB of memory,
26 EC2 Compute Units
(8 virtual cores with 3.25
EC2 Compute Units each)

Important Concepts

Amazon Machine Image



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



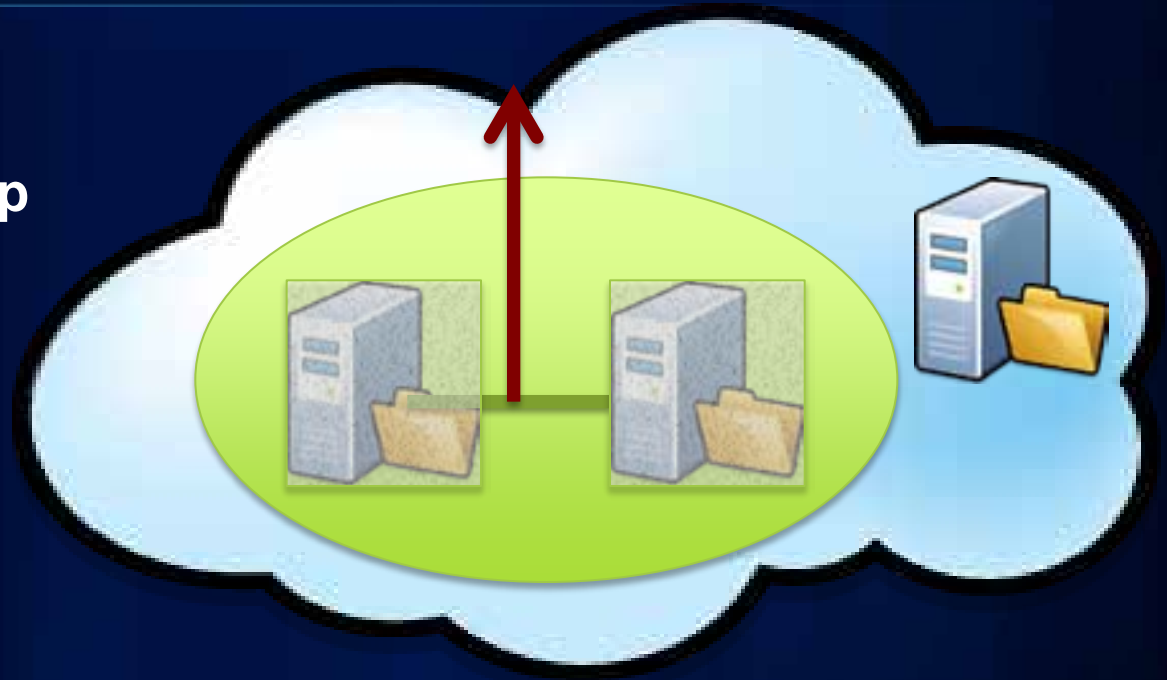
- **Other costs**

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

Security

Concepts and Costs

- Security Group



- Virtual Private Cloud



Data Management deployment in Amazon EC2

*On-Premise
User*



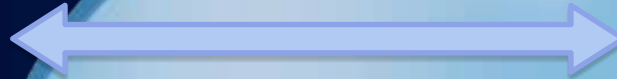
Amazon EC2



ArcGIS Desktop



ArcGIS Server



Cost items

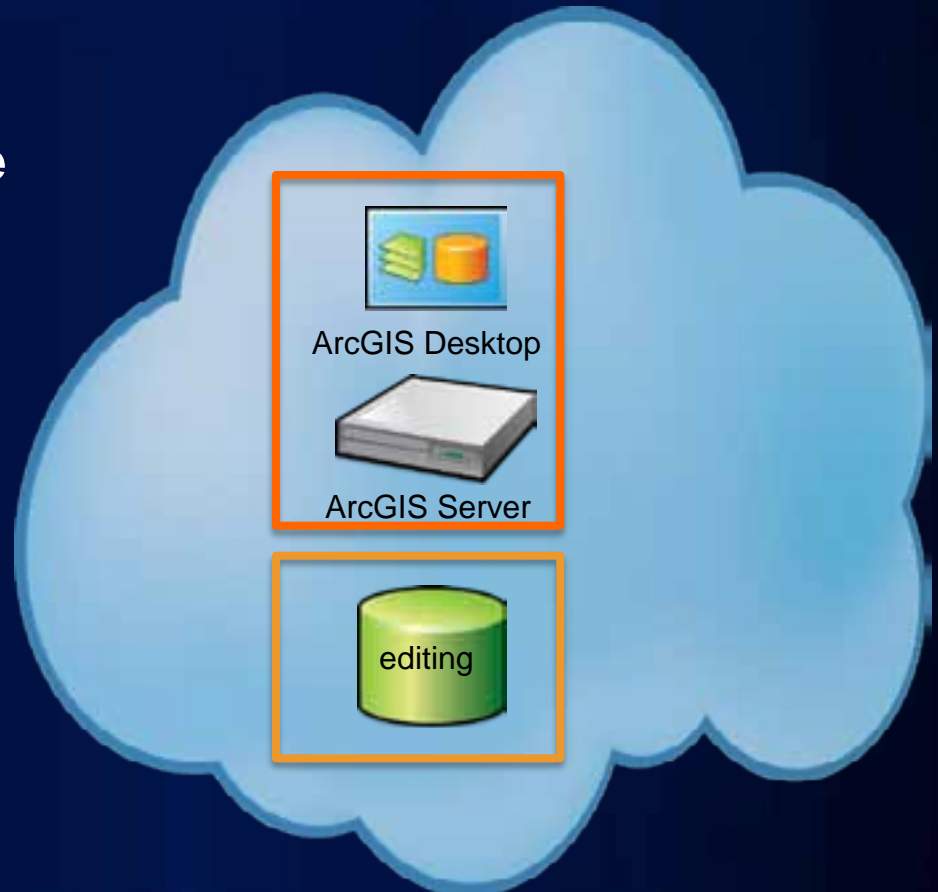
- **ArcGIS Server Machine**

- Instance Size
- EBS Volume Size
- Data Transfer
- eip

- **Geodatabase Server**

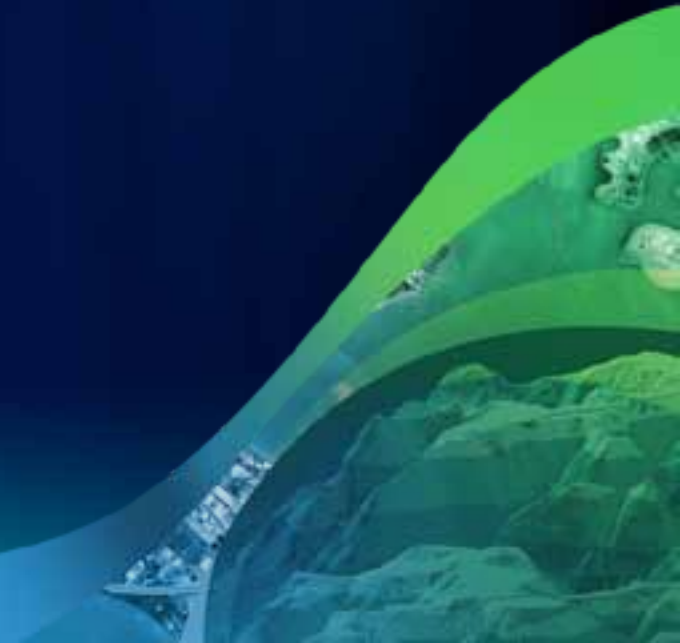
- Instance Size
- EBS Volume Size
- Eip

- **Cost Considerations**



Demo

Simple Monthly Calculator



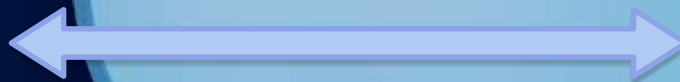
Hybrid Deployment with Redundancy

*On-Premise
Data Management
& Analysis*



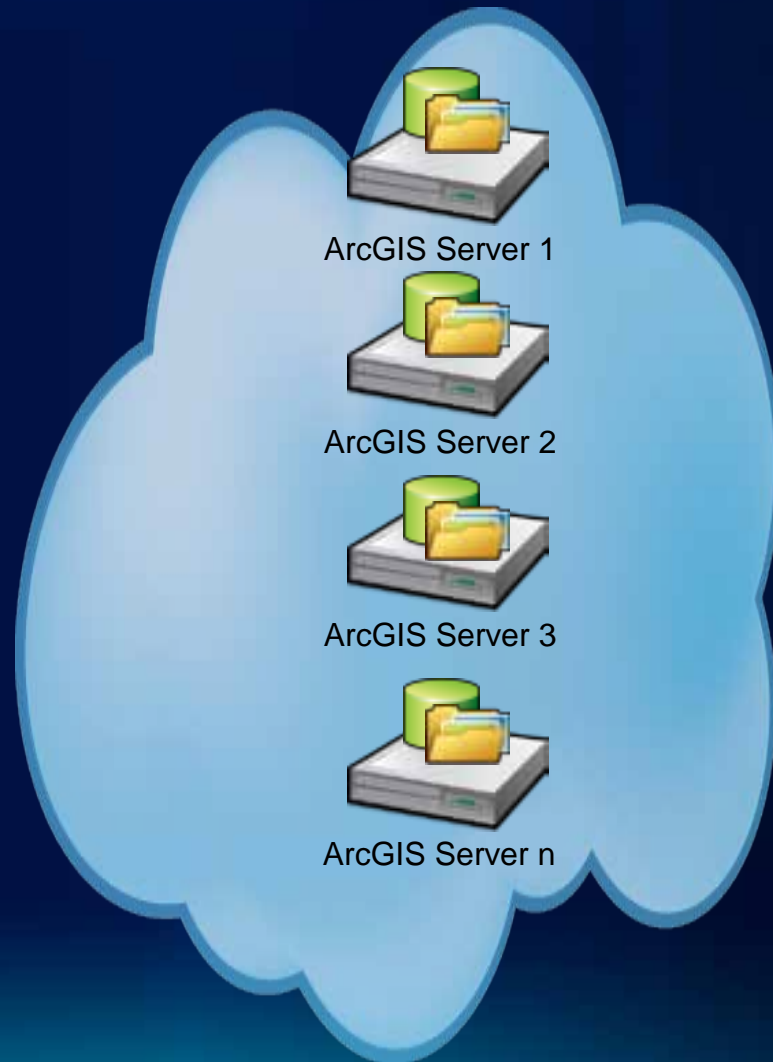
Amazon EC2

*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**



Amazon Bill

Cost Breakdown

			Totals
Amazon Elastic Compute Cloud			
View Paid AMI Activity			
US East (Northern Virginia) Region			
Amazon EC2 running Windows			
\$0.476 per Large Instance-hour (or partial hour) consumed (blended price)*	1,476 Hrs		701.94
\$0.96 per Extra-Large Windows Instance (m1.xlarge) instance-hour (or partial hour)	1 Hr		0.96
Amazon CloudWatch			
\$0.00 per alarm-month - first 10 alarms	0.495 Alarms		0.00
Elastic IP Addresses			
\$0.01 per non-attached Elastic IP address per complete hour	184 Hrs		1.84
Amazon EC2 EBS			
\$0.10 per GB-month of provisioned storage	456,472 GB-Mo		45.65
\$0.10 per 1 million I/O requests	12,516,462 IOs		1.25
\$0.15 per GB-Month of snapshot data stored	45,571 GB-Mo		6.84
\$0.01 per 10,000 gets (when loading a snapshot)	75,160 Requests		0.08
\$0.01 per 1,000 puts (when saving a snapshot)	3 Requests		0.00
Elastic Load Balancing			
\$0.008 per GB Data Processed by the LoadBalancer	0.000007 GB		0.00
\$0.025 per LoadBalancer-hour (or partial hour)	184 Hrs		4.60
			763.15
Asia Pacific (Singapore) Region			
Amazon EC2 running Windows			
\$0.48 per Large Windows Instance (m1.large) instance-hour (or partial hour)	184 Hrs		88.32
Amazon EC2 EBS			
\$0.11 per GB-month of provisioned storage	2,084,599 GB-Mo		229.31
\$0.11 per 1 million I/O requests	2,534,649 IOs		0.28
\$0.15 per GB-Month of snapshot data stored	2,617 GB-Mo		0.39
			318.30
Download Usage Report			1,081.45

Amazon Bill

Complete Cost

This Month's Activity as of July 8, 2011

The billing cycle for this report is July 1 - July 31, 2011. The AWS service usage charges on this page currently show activity through approximately 07/08/2011 19:59 GMT.

Expand All Services Collapse All Services		Printer Friendly Version
		Totals
+ Amazon Elastic Compute Cloud	View Paid AMI Activity	
	Download Usage Report »	1,081.45
+ Amazon Simple Storage Service		
	Download Usage Report »	1.83
+ AWS Data Transfer (excluding Amazon CloudFront)		
		0.06
Bill Summary		
Usage charges and monthly recurring fees during this billing cycle†		\$1,083.34
(More Info)		
One-time fees during this billing cycle		\$0.00
(More Info)		
Taxes		\$0.00
Estimated Taxes		
Total new charges this billing cycle		\$1,083.34
No payments received to date.		
Current estimated unpaid balance to be charged for this billing cycle		\$1,083.34

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

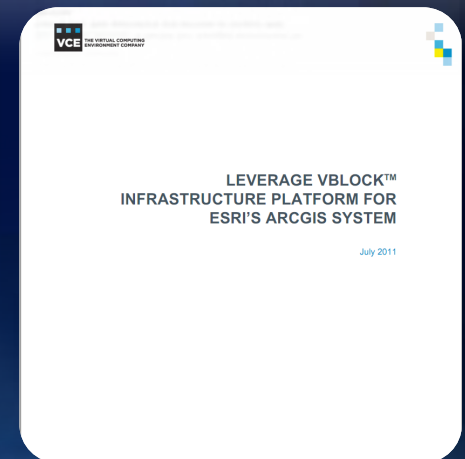
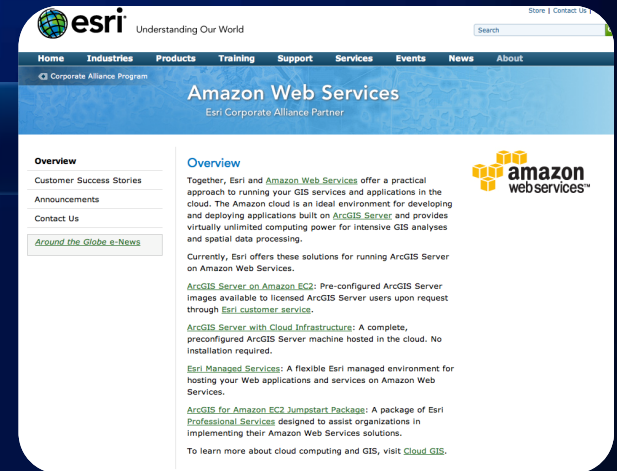
Cloud Deployment On Premise - VCE

- 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

(<http://www.vce.com/pdf/solutions/vce-esri-arcgis-white-paper.pdf>)



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

- **Cloud Deployment Patterns**
- **Example Business Cases For Cloud GIS**
- **Cost Effective Cloud Deployment in Amazon**
- **Cloud Deployment On premise**
- **Conclusion & Summary**

Q&A

