



**Esri International User Conference | San Diego, CA**  
**Technical Workshops | July 12, 2011**

# **Using ArcGIS Server in the Amazon Cloud**

Sterling Quinn

Andrew Stauffer

David McGuire

# Topics Covered

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

# Overview of Amazon EC2

Sterling Quinn



# Conceptual Overview

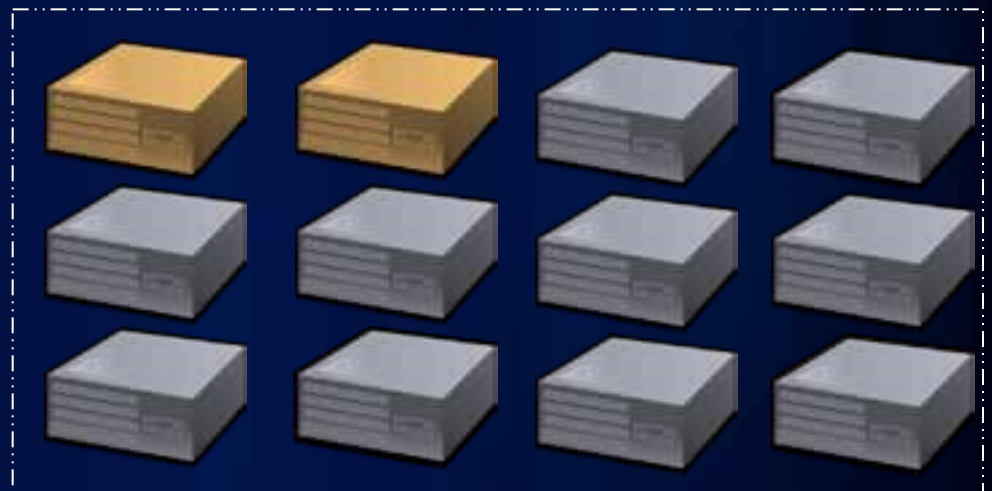
- **What is a Virtual Machine?**
  - Using a single physical machine to host multiple concurrently running Operating Systems.
  - Physical machine is a shared resource
- **What is Amazon EC2?**
  - Amazon Elastic Compute Cloud
  - You run virtual machines on Amazon's hardware within data centers located 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

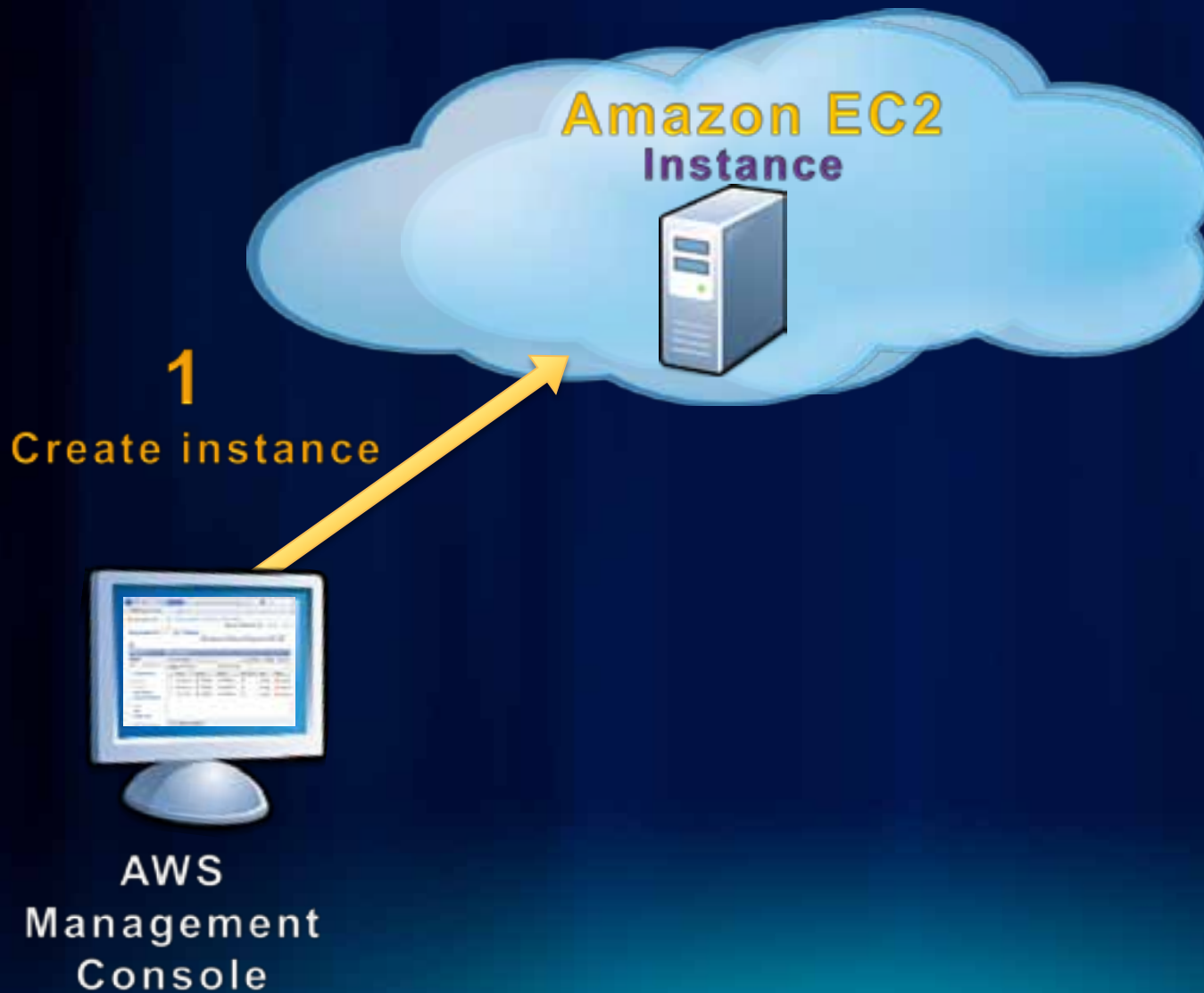
- **ArcGIS Server AMI**
  - ArcGIS Server 10.0sp2 for Microsoft .NET Framework
  - ArcGIS Desktop
  - Any extension you can license
  - Windows Server 2008 64 Bit
  - 100 GB attached drive
- **Enterprise geodatabase AMI**
  - ArcSDE 10sp2
  - PostGRES SQL relational database
  - Windows Server 2008 64 Bit



## How do I work with EC2?

- **AWS Management Console**
- **Amazon EC2 API Tools**
- **Other Third Party Tools**

# Getting an instance running



# Demo: Create an instance

Sterling Quinn



# Working with Instances

Sterling Quinn



# How do I use my instance?



## 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

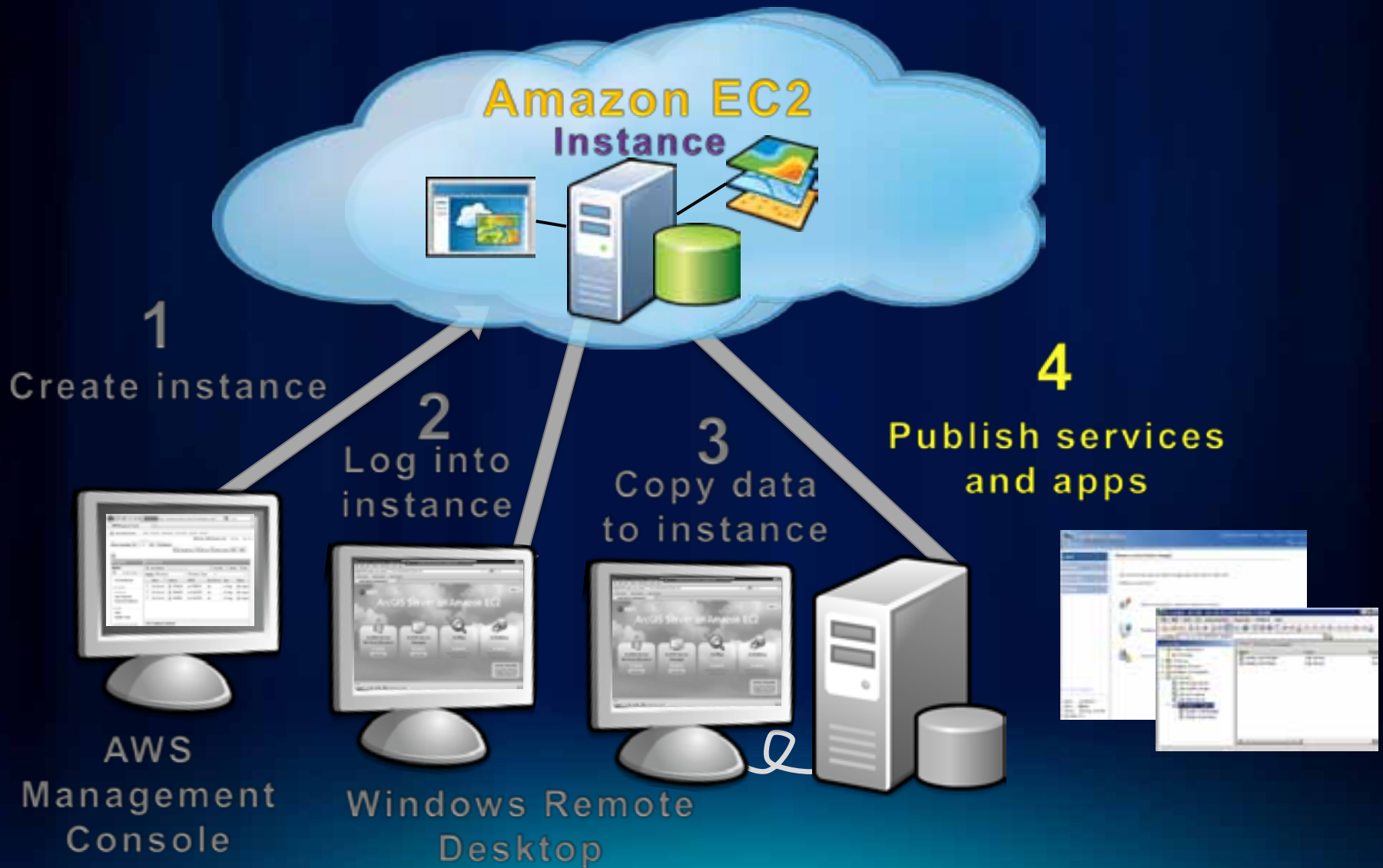


# Moving your data

- **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



# Map caching

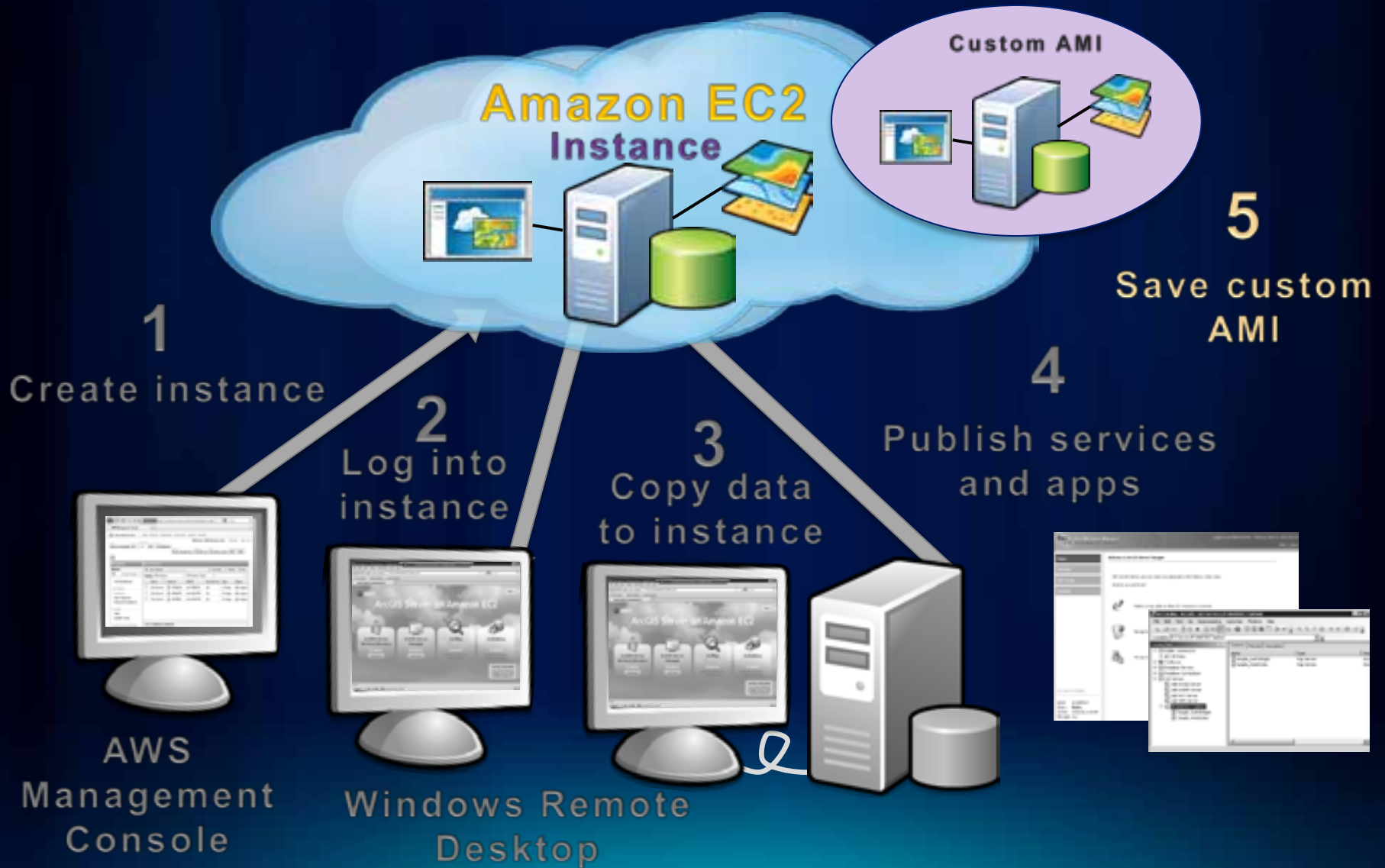
- EC2 gives you temporary “boxes” for caching
- Probably faster to rebuild your cache on EC2 than to copy it
- Can test instance types relatively cheaply



EC2 Configuration	CPU	RAM	Cost/hr	SOCs	Bld time	Tiles/sec	“Cost”
m1.large-1	2	7.5	\$0.48	2	39:02	32	\$ 0.31
m1.xlarge	4	15	\$0.96	5	12:40	99	\$ 0.20
m2.2xlarge	4	34.2	\$1.24	5	9:37	131	\$ 0.20
m2.4xlarge	8	68.4	\$2.48	10	7:24	170	\$ 0.31
c1.xlarge	8	7	\$1.16	10	10:17	123	\$ 0.20

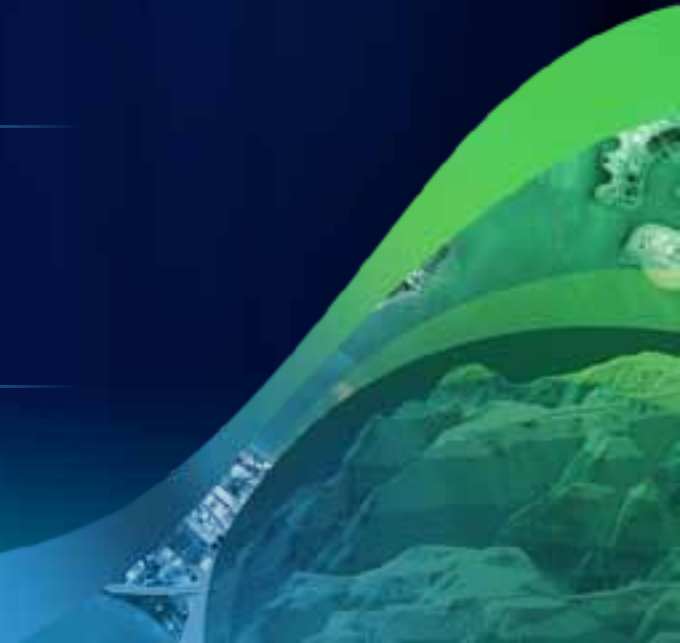
*Results of a test cache with approx. 75,000 tiles on different instance types*

# Preserving your configuration



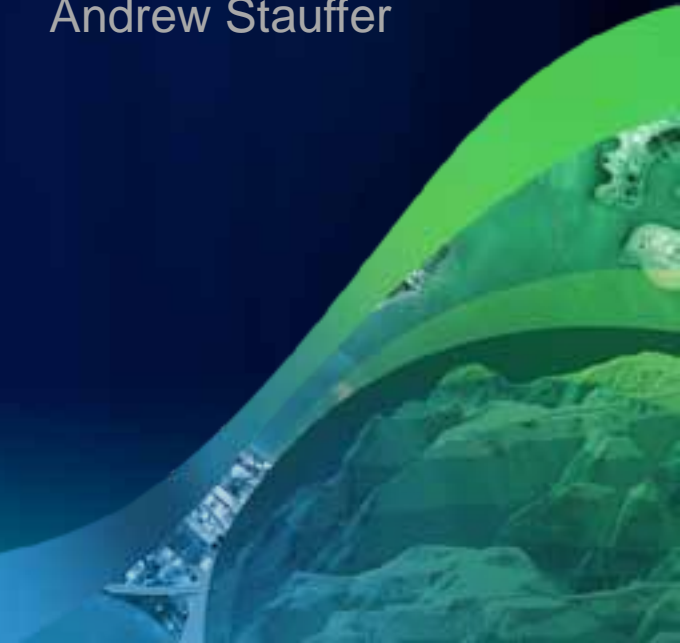
# Demo: Setting up services

Sterling Quinn



# Scaling your configuration

Andrew Stauffer



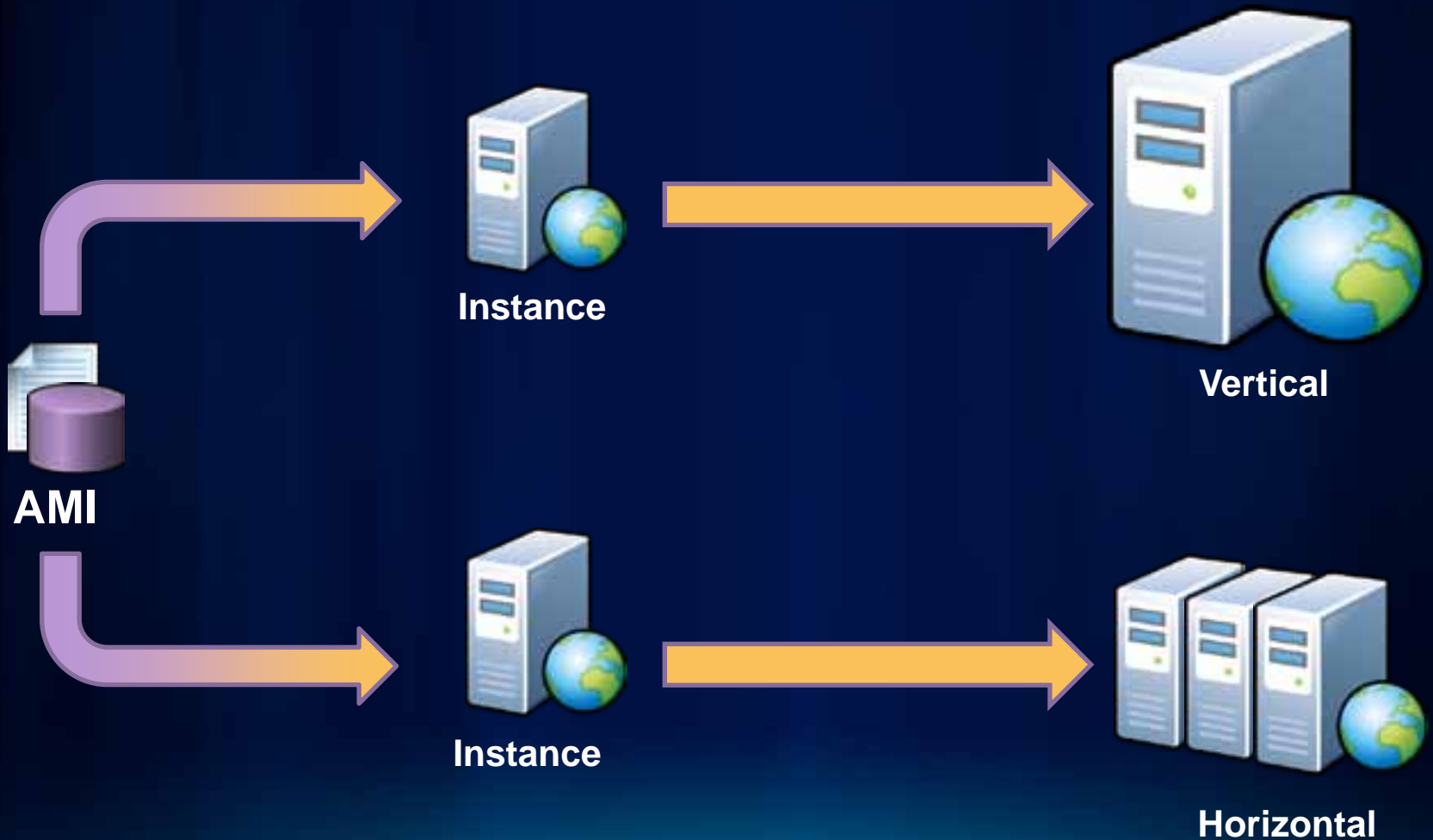
# Testing and scaling

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





# Vertical and horizontal scaling



# Vertical scaling

- **Change instance type**
  - Can now be done “in place”
- **Apply Elastic IP**
  - Replacement instances can be mapped to same EIP





# Horizontal scaling

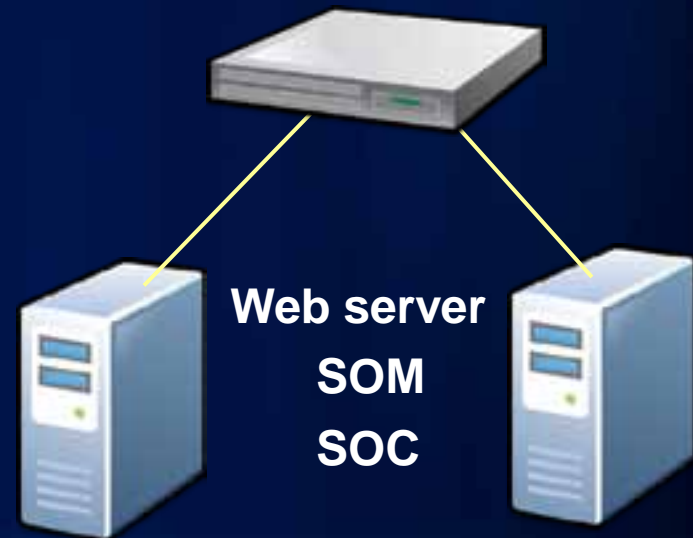
## On-premises architecture

Web server & SOM



## Amazon EC2 architecture

Elastic Load Balancer

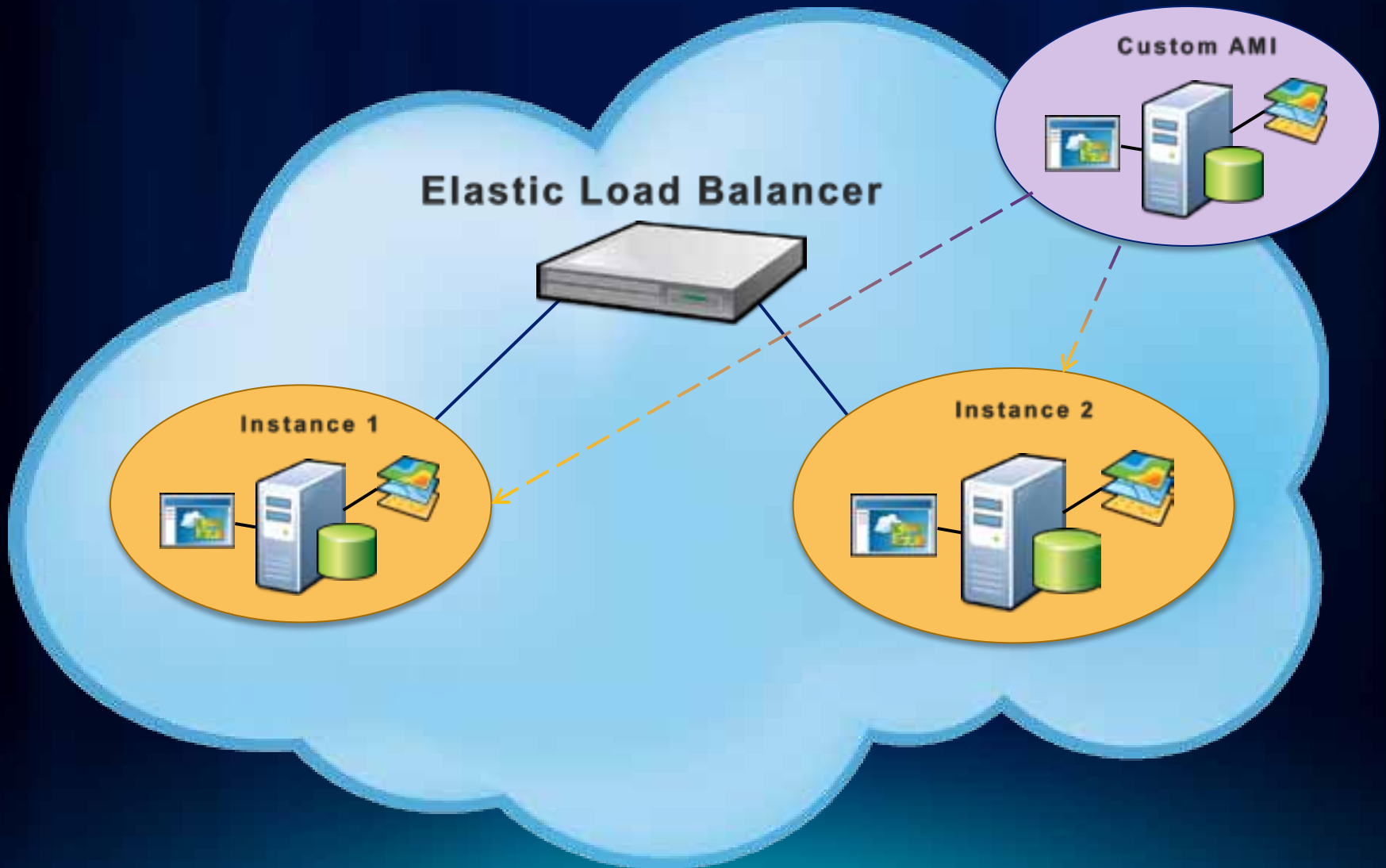


## Setting up a load balancer

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

# Horizontal Scaling with EC2

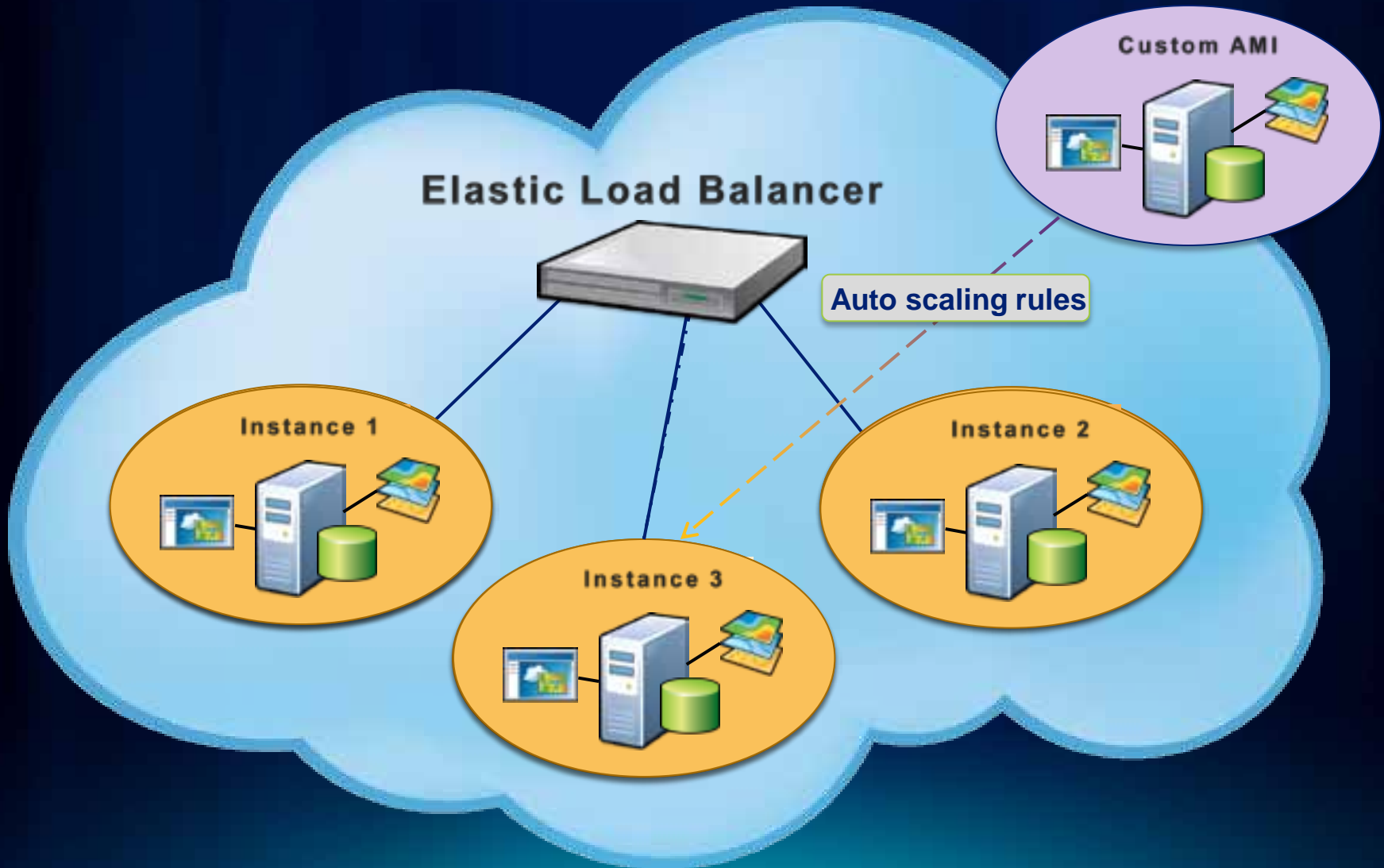
Identical EC2 instances



# 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



# 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](#)

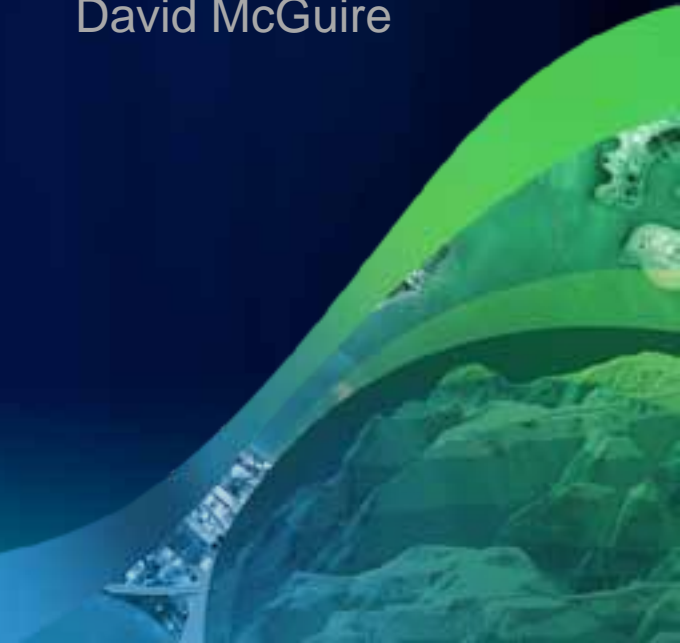
# Demo: Scaling the system

Andrew Stauffer



# Case Study: Japan Quake 2011

David McGuire





# Japan Disaster – Case Study

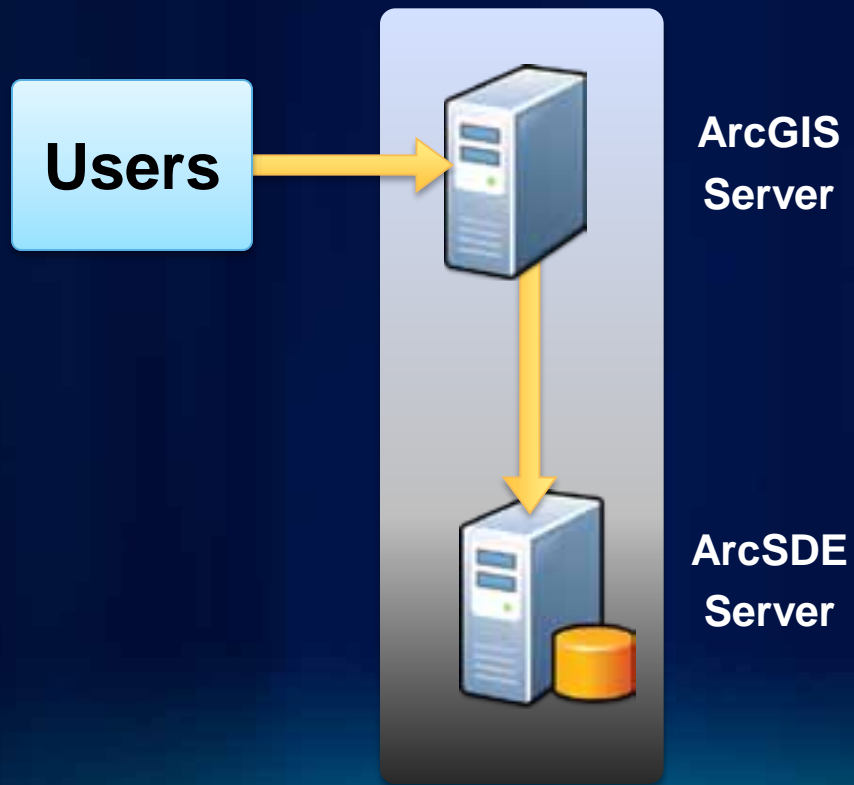
Late on a Thursday night...



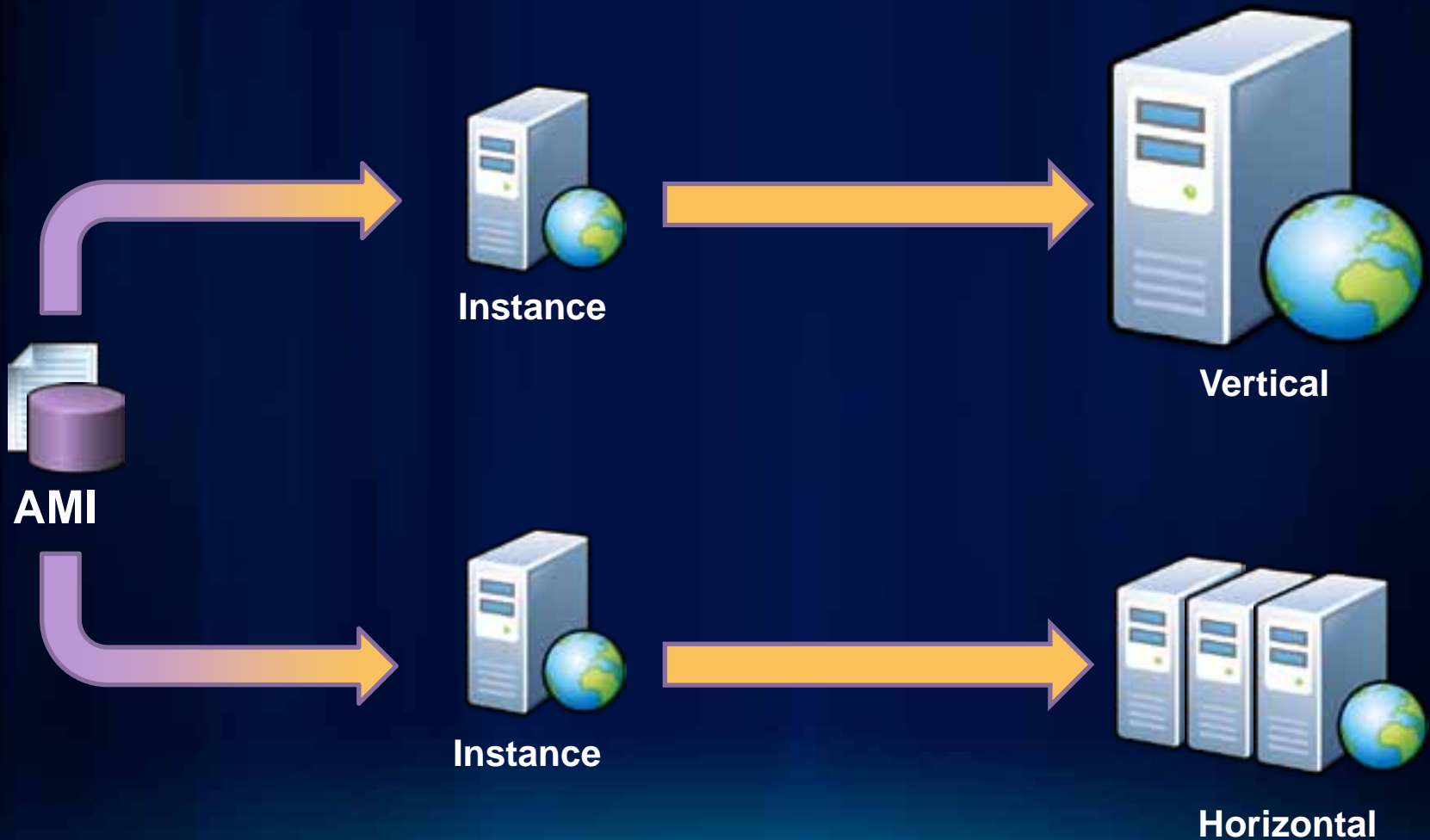
# Initial Response

- **Quickly deployed a New Media map**
  - Hosted locally
- **CNN links to the map**
  - Local machine fails to handle load
- **We need to scale quickly...**

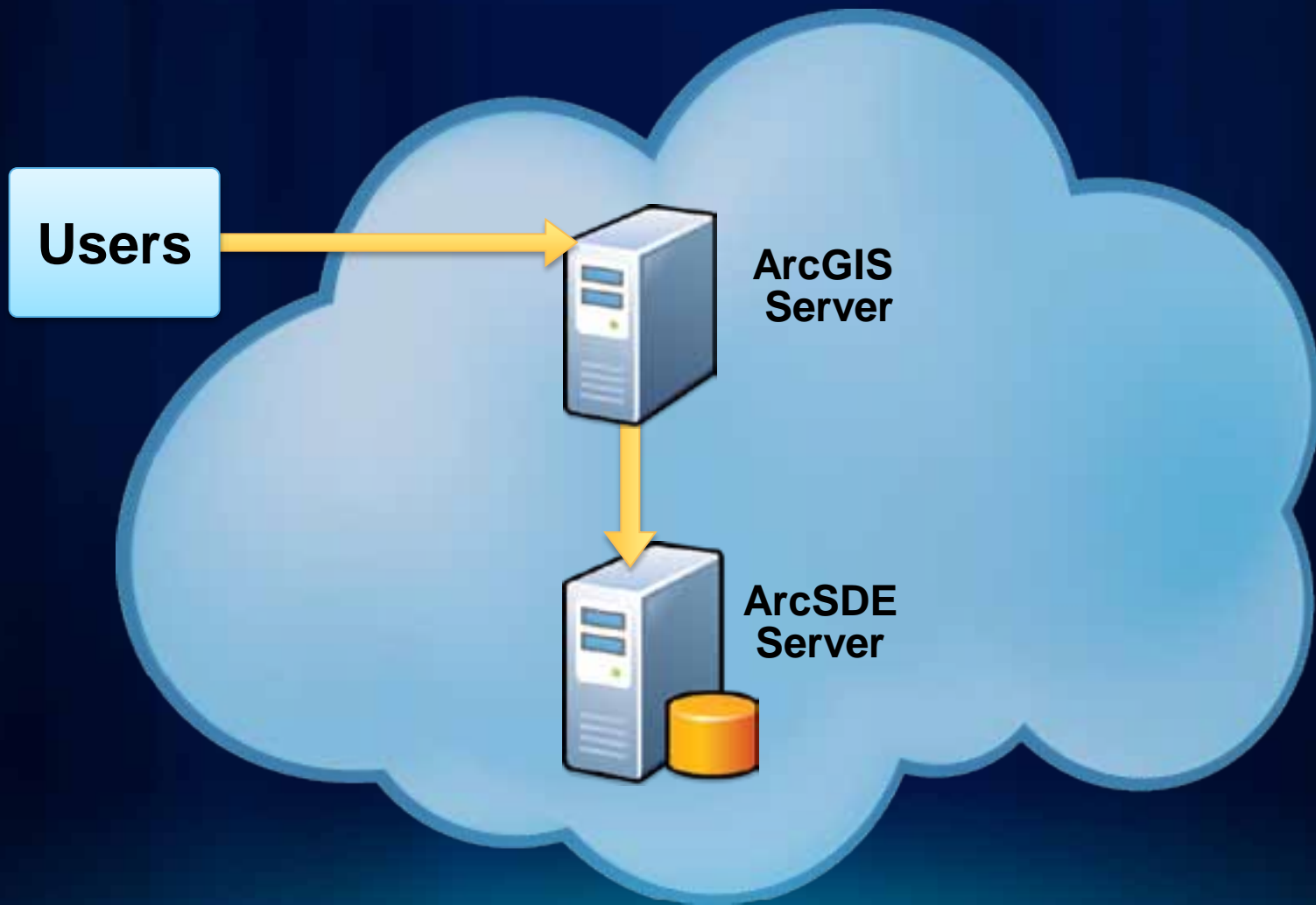
# Local Layout



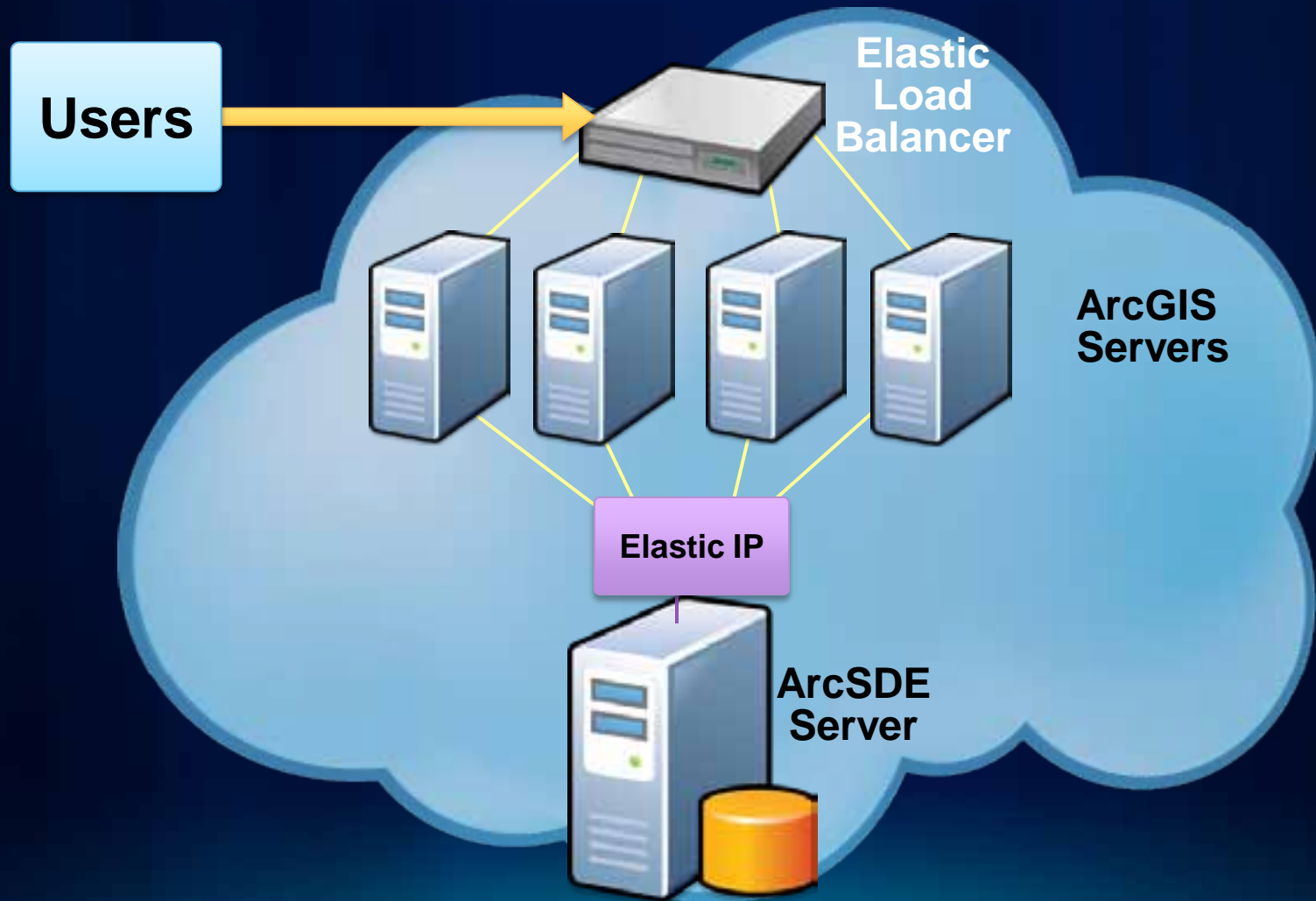
# Which scaling was right for us?



# Staging Layout



## Final Layout



## 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

Sterling Quinn





# 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...

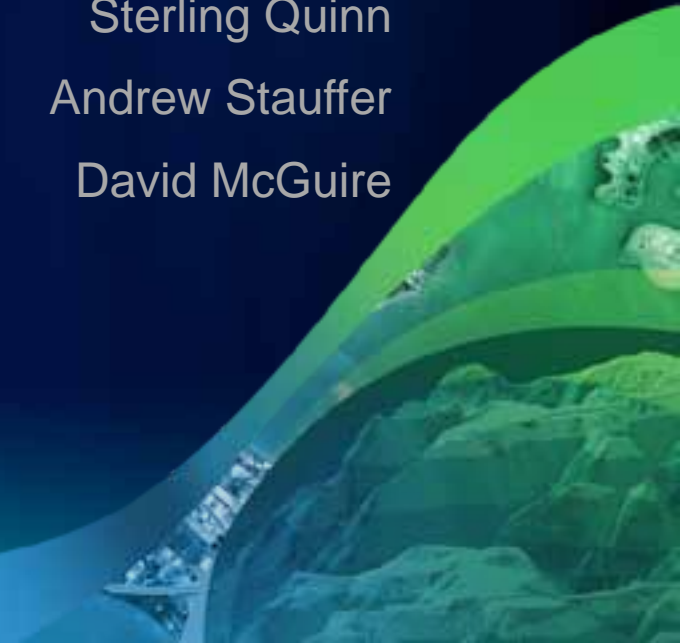
- **What's coming in 10.1**
  - **Ubuntu AMIs**
  - **New architecture of the 10.1 ArcGIS Server**
  - **Esri-provided app for building a site**

# Questions...

Sterling Quinn

Andrew Stauffer

David McGuire





esri