Challenges

- Shrinking Budgets
- Specialist Network and Infrastructure Staff Required
- Long Lead Times to Set up New Infrastructure
- Flexibility
- Resilience
- Keeping Software up to Date
Infrastructure as a Service – (IaaS)

- Outsourced computing infrastructure
Shared Responsibility Model

<table>
<thead>
<tr>
<th>Category</th>
<th>On-Premises</th>
<th>Esri Images &amp; Cloud Builder</th>
<th>Esri Managed Cloud Services</th>
<th>ArcGIS Online</th>
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<tr>
<td>Application</td>
<td>Customer Managed</td>
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</tbody>
</table>
Which Cloud Provider to use?
ESRI Specialized tooling available

- Why is this important?
  - Enables consistent repeatable deployments
  - Creates a record of deployed configuration
ESRI Specialized tooling available

- AWS CloudFormation
- ArcGIS Enterprise Cloud Builder for Amazon Web Services
- ArcGIS Enterprise Cloud Builder for Microsoft Azure
A dog is for life, not just for Christmas®

DogsTrust
Cloud Architectures – Single-machine deployment

- Machine 1: Configured with AWS Auto Recovery
  - IIS or Tomcat
    - ArcGIS Web Adaptor Portal
    - ArcGIS Web Adaptor Server
  - Portal for ArcGIS WebContext:FL + ELB:portal
  - Hosting Server
    - ArcGIS Server
  - Registered
    - ArcGIS Data Store
Resilience & Disaster Recovery

Use Cloud Capabilities to provide resilience, i.e.:

- Multi-region hosting and backups
- Auto-Scaling & Healing
- AWS Route 53 & Azure Traffic Manager
- Multi-region Managed Databases (i.e. RDS)
- Proven Templates & APIs

• Infrastructure as code
Understanding cost

• AWS Simple Monthly Calculator

• Azure Pricing Calculator
Setting up the Networking

- ESRI release their own Enterprise templates

VPC for ArcGIS Enterprise

Create an AWS VPC to deploy ArcGIS Enterprise

This template will deploy an AWS VPC that you can setup your ArcGIS Enterprise deployments in it. It will create a VPC with two public subnets.

To deploy this template, follow these steps:

- Run the template.
  - Click Launch Stack for this template. There are a number of properties in the Parameters object that you can set:
    - AZ: Select two availability zones that you want the VPC subnets to be in. The VPC subnet will be created in these zones.
    - CIDR: For VPC CIDR. The default is 10.0.0.0/16.
    - Subnet1CIDR: CIDR block of VPC subnet 1. The default is 10.0.0.0/24.
    - Subnet2CIDR: CIDR block of VPC subnet 2. The default is 10.0.0.0/24.
  - Output of the stack creation.

After the stack is created successfully, in the Output tab, you'll get: "VPCId", "Subnet1", and "Subnet2". These output values can be used as input in other templates for VPC information.

<table>
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<tr>
<th>Template Name</th>
<th>Description</th>
<th>View</th>
<th>Launch</th>
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<tbody>
<tr>
<td>Create an Amazon VPC</td>
<td>Create an Amazon VPC with two subnets that ArcGIS Enterprise can be deployed in. (ReadMe)</td>
<td>View</td>
<td>LAUNCH STACK</td>
</tr>
</tbody>
</table>
VPC parameters

**Stack name**: ESRDер546m5
Stack name can be changed

**Parameters**
- **AZs**: Select two available:
  - eu-west-1a
  - eu-west-1b
- **IAM role - option**: Choose the same IAM role as used in the Key pair

**Permissions**
- **CloudWatch alarm - option**: Amazon SNS topic ARN
  - Specify an SNS topic
  - Create new SNS

**Notifications**
- **Monitoring time**
  - **Disabled**
  - **Enabled**
- **Timeout**
  - **10 Minutes**

**Stack policy**
- **Rollback on failure**
  - **Disabled**
  - **Enabled**
- **Termination protection**
  - **Disabled**
  - **Enabled**

**Key pair**
- **Resource**
  - **CloudWatch alarm - option**

**Estimate cost**

**Launch stack**

**Quick-create link**

**Launch stack**

**View**

**Launch**

**Create stack**
Setting up ArcGIS Enterprise

Cloud Formation

Deploy base ArcGIS Enterprise

A base ArcGIS Enterprise deployment includes Portal for ArcGIS, a GIS Server to be used as the portal’s hosting server, and a relational and a tile cache data store created through ArcGIS Data Store and registered with the portal’s hosting server.

These templates create a base ArcGIS Enterprise deployment. You also have the option to include a spatiotemporal big data store with your base deployment when you use the following templates.

<table>
<thead>
<tr>
<th>Template Name</th>
<th>Description</th>
<th>Platform</th>
<th>View</th>
<th>Launch</th>
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<tr>
<td>Single-machine deployment</td>
<td>Create a base ArcGIS Enterprise deployment on a single machine. This is the minimal all-in-one configuration, where all the components are installed on a single instance. ReadMe</td>
<td>Windows 2019</td>
<td>View</td>
<td>LAUNCH STACK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ubuntu LTS 18.04</td>
<td>View</td>
<td>LAUNCH STACK</td>
</tr>
</tbody>
</table>

• Cloud Builder

ArcGIS Enterprise

Cloud Builder for AWS
Single-machine deployment parameters

Amazon EC2 Configuration
- InstanceType: r5.xlarge
- BDSInstanceType: Spatio-temporal Big Data Store EC2 Instance type
- Instance: r5.xlarge
- Number of spatio-temporal Big Data Store EC2 Instances: 0
- DriveSizeRoot: 100

Specify ten
A template is a multi-template

Template soon
Selecting a temp
Amazon

Amazon S3 URL: https://s3.an

ArcGIS Enterprise Configuration
- DeploymentBucket: MyBucket1
- ServerLicenseFile: Server.pnc
- PortalLicenseFile: portal.pac

StoreType
ArcGIS Server config store and Portal for ArcGIS content store type
- Filesystem
Managing Cost in the cloud

- AWS Cost Explorer
- Azure Cost Management

- Scheduled stop/start
  - Scripted scheduled tasks
  - 3rd Party Tools

- Regular backups / rotate daily keep 7 etc

- Reserved Instances (can save upto 75%)
  - Save upto 75% compared to EC2 OnDemand hourly rates
  - Price calculated on 3 factors:
    - Instance Attributes, Term – 1 year / 3 year, Payment Options
Upgrade at 10.7: Automated

- AWS Cloud Formation update stack by providing
  - Portal license (.json)
  - Server 10.7 license
- Run update cloudformation with the template provided by Esri
Security Best Practices

• KMS Keys (Key Management Service)
  - Volume Encryption
• IAM (Identity and Access Management)
  - Enforce the principle of least privilege
• Security Group rules
  - Port restrictions
  - IP whitelists
• Penetration testing
  - ArcGIS portalScan & serverScan – python scripts
  - Fix any issues and build into a standard pattern
Scaling and Performance Optimization Options

- Add More Resources (storage)
- Change Instance Types i.e. Memory Optimised Instances (Higher RAM)
- Use paging files
- Use Auto-Scale to spread server load
Monitoring

• Why monitor?
  - Spot performance issues
  - View trends
  - Act rather than React!

• Levels of Monitoring
  - Endpoint
  - Infrastructure – CPU / Memory / Disk
  - Application – AGS Enterprise / AGS Server / Database
Monitoring Tools

- Amazon CloudWatch
- Azure Monitor
- Datadog
- AppDynamics
- ArcGIS Monitor
- New Relic
- SolarWinds
- LogicMonitor
How happy is Juliet?

- Do more with her limited budget
- Limit need for specialist infrastructure and network skills
- Flexibility to scale up (or down) and try new things
- Cost effective resilience
- Easily support her ArcGIS Enterprise users.
Esri Distributors and Partners can offer Managed Cloud Services
Any Questions
Please Take Our Survey on the App

Download the Esri Events app and find your event

Select the session you attended

Scroll down to find the feedback section

Complete answers and select “Submit”
Additional slide 1 – useful links

- ESRI CloudFormation Templates 10.7.1

- ArcGIS Enterprise Cloud Builder for Amazon Web Services

- ArcGIS Enterprise Cloud Builder for Microsoft Azure

- Amazon AWS
  - https://aws.amazon.com/
  - https://aws.amazon.com/ec2/instance-types/

- Microsoft Azure
  - https://azure.microsoft.com/en-gb/
Additional slide 2 – useful links

- AWS to Azure Services Comparison
  - https://docs.microsoft.com/en-us/azure/architecture/aws-professional/services

- AWS Simple Monthly Calculator

- Azure Pricing Calculator

- portalScan.py

- serverScan.py
Additional slide 3 – useful links

- ArcGIS Enterprise: Cloud Operations using Amazon Web Services – Palm Springs DevSummit (March 2019)

- Cloud Operations using Microsoft Azure – Palm Springs DevSummit (March 2019)

- Managed Cloud Services