Automating Your Deployment

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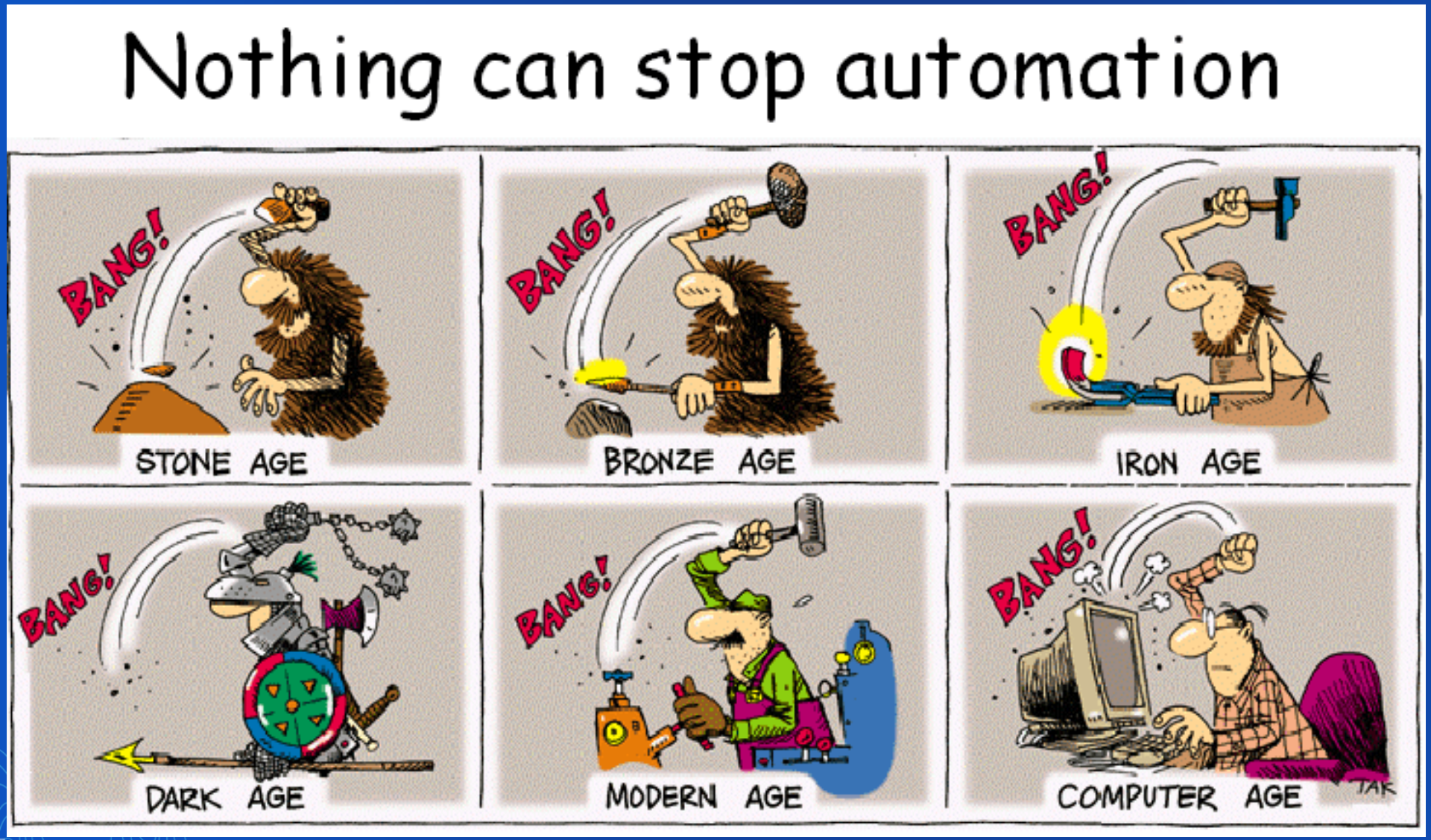
SEE
WHAT
OTHERS
CAN'T

Quick Survey

- Your role in your organization?
- Already using Esri provided automation?
- Which one?
- Are you using it on the cloud?

Age of Automation



https://www.runmode.com/automationhumor.html

Automation Tools

Deployment Automation

How you setup the software

ArcGIS Enterprise Builder

Amazon Web Services

Microsoft Azure

Chef

Powershell DSC

Workflow Automation

How you automate analytical and administrative tasks

ArcGIS API for Python

`webgisdr` Utility

...

and more

Deployment automation tools styles/experiences

Wizard

ArcGIS Enterprise Builder

Machine Images + Tooling

Amazon Web Services

Microsoft Azure

Script-based

Chef

Powershell DSC

Best fit environments for deployment automation tools

Cloud deployments

ArcGIS Enterprise Builder

Amazon Web Services

Microsoft Azure

Chef

Powershell DSC

Best fit environments for deployment automation tools

On-premises deployments

All-in-one, single machine deployments **only**

Any deployment scenario

ArcGIS Enterprise Builder

Amazon Web Services

Microsoft Azure

Chef

Powershell DSC

Tools that have deep dive sessions

Tools that have a deep dive session we will overview **quickly**

ArcGIS Enterprise Builder

Amazon Web Services

Microsoft Azure

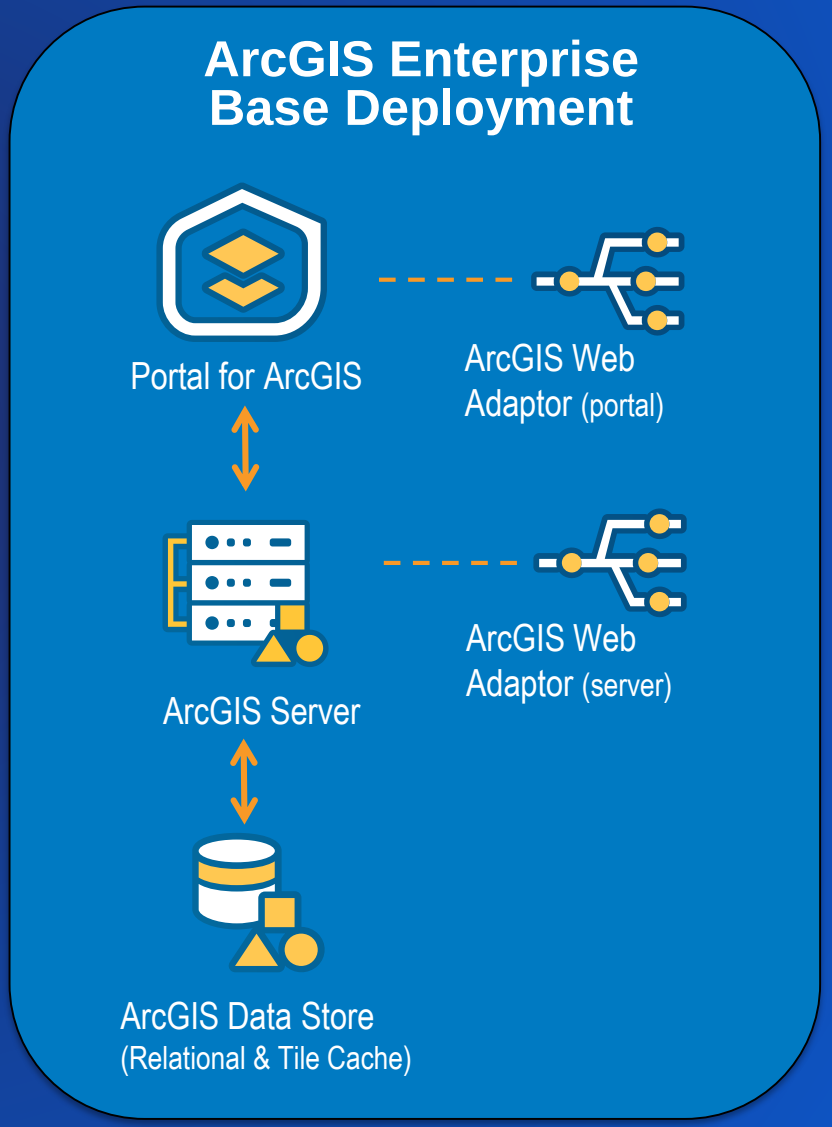
Chef

PowerShell DSC

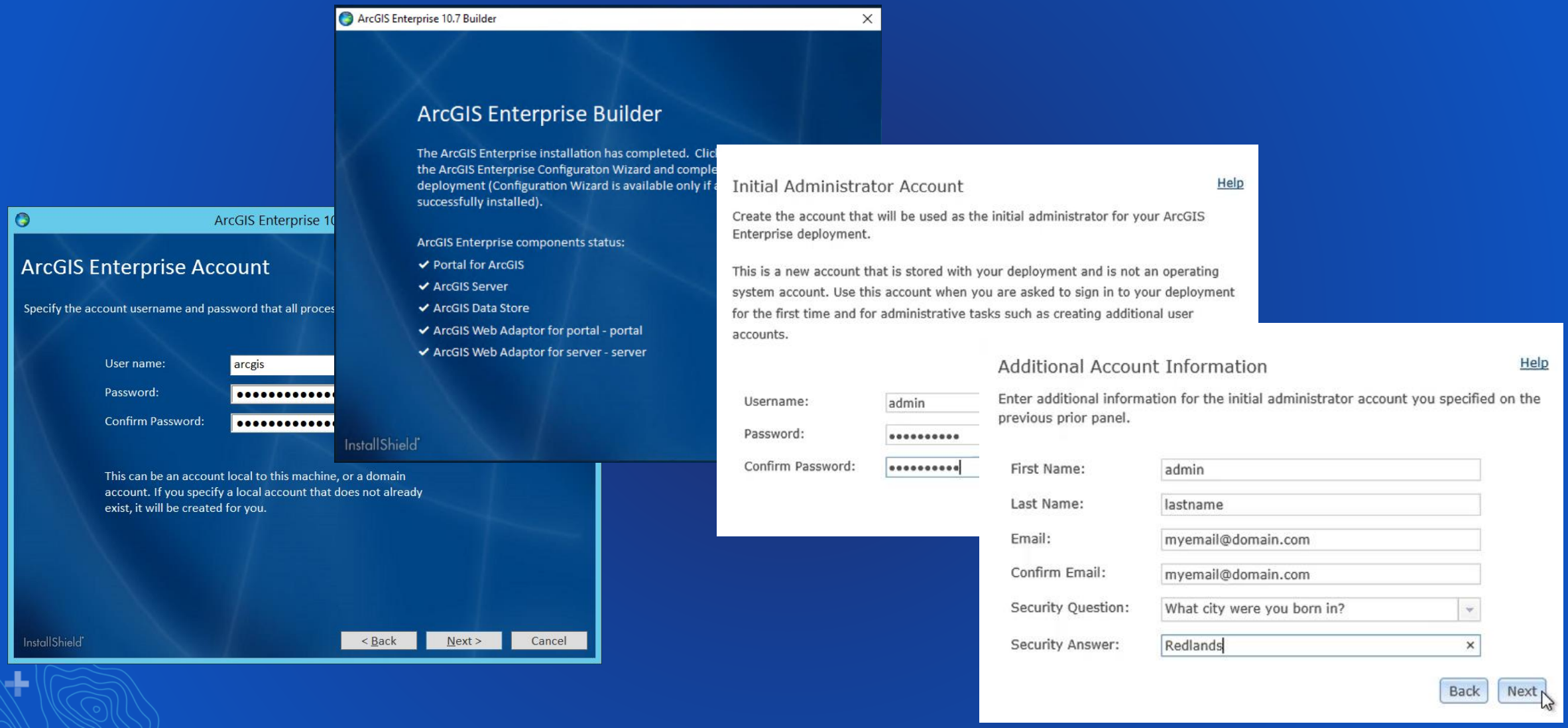
ArcGIS Enterprise Builder

ArcGIS Enterprise Builder – Single Machine Base Deployment

- **Minimum options**
  - **Install directory**
  - **RunAs account username/password (Windows only)**

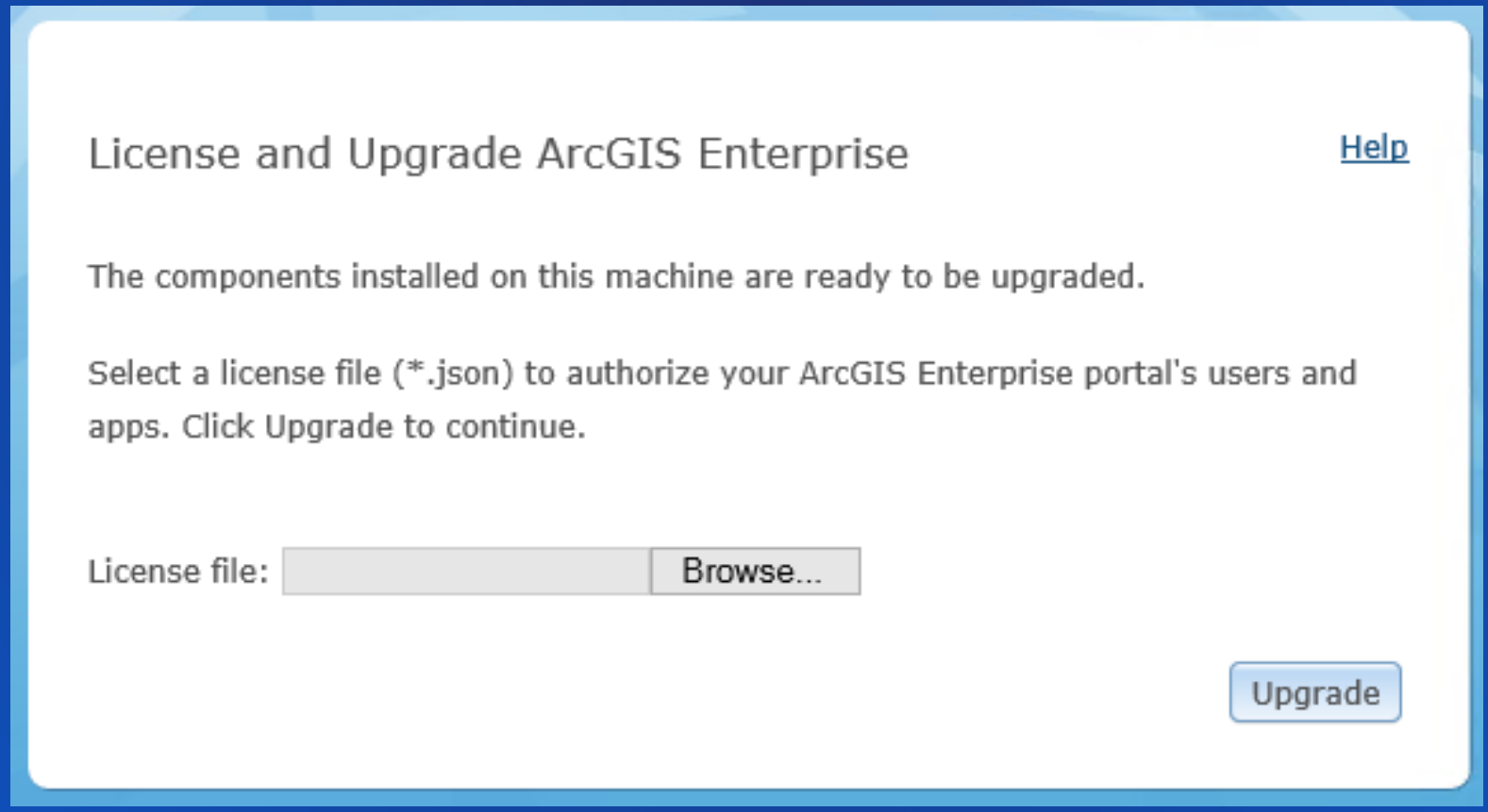


ArcGIS Enterprise Builder | UI for Installation and Configuration



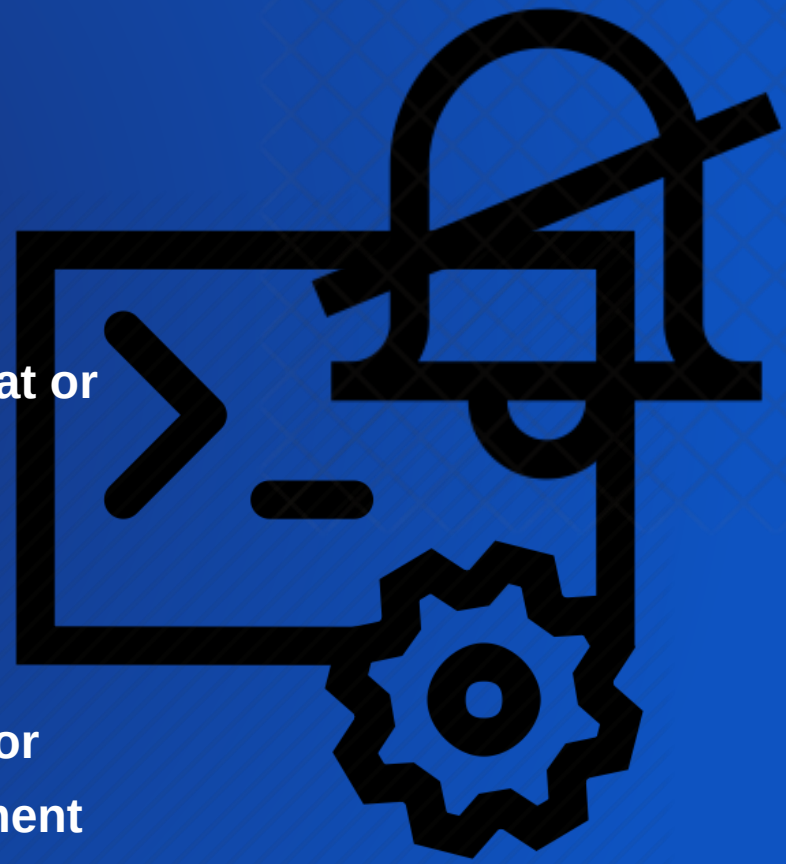
Upgrading an Enterprise Deployment

- One click experience that upgrades all components
- Upgrade only deployments previously deployed by Enterprise Builder



Command Line Utilities – Install, Configure and Upgrade Silently

- Install
  - <location of setup>/Builder.exe or
  - ./Setup
- Configure
  - <ArcGIS Server Install Dir>/tools/configurebasedeployment/configurebasedeployment.bat or
  - <location of utility>\configurebasedeployment
- Upgrade
  - <ArcGIS Server Install Dir>/tools/upgradebasedeployment/upgradebasedeployment.bat or
  - <ArcGIS Server installation directory>\tools\upgradebasedeployment



ArcGIS Enterprise Builder for Automation - Takeaways

- **Silent Option**
  - Schedule to execute install/Configure/Upgrade
  - Repeat on different machines
- **Limitations**
  - Single machine only
  - Standardizes the installation directories for all software components
  - Very limited options
- **More customizing:**
  - Powershell DSC or Chef

Deep Dive Session

Title:	Introduction to ArcGIS Enterprise and Building Your First Deployment
Date:	03/05/2019
Time:	2:30pm - 3:30pm
Presenter:	Jonathan Quinn

The Builder deep dive session has already passed
– watch the video later and/or **please bring questions to the Expo.**

ArcGIS Enterprise Automation on AWS

Getting Started

On-premise	AWS
Esri authorization files Domain_name for your application SSL Certificate for your domain Esri software setups Infrastructure - Machines/VMs/Networks - Web Servers and/or Load Balancer - File Server - Data storage/Database - ……	Esri authorization files Domain_name for your application SSL Certificate for your domain AWS Account

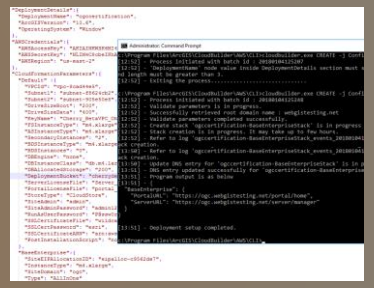
Deployment Tools for AWS

CHEF

Automation Tools

Public Esri AMIs

Esri CloudFormation



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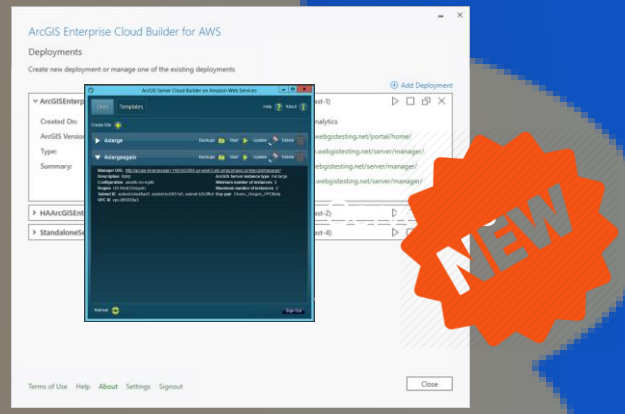


CB GUI

Power ⟷ Simplicity

Deployment Tools for AWS

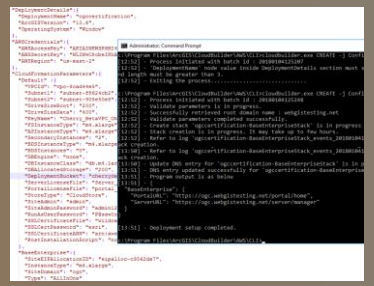
AWS Private Image: User's AMI + Esri ArcGIS Enterprise package

CHEF

Automation Tools

Public Esri AMIs

Esri CloudFormation



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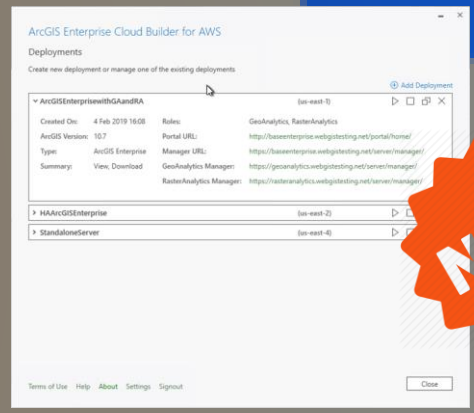


CB GUI

Power ⟷ Simplicity

Deep Dive Session

Title: ArcGIS Enterprise: Cloud Operations using Amazon Web Services

Date: 03/07/2019

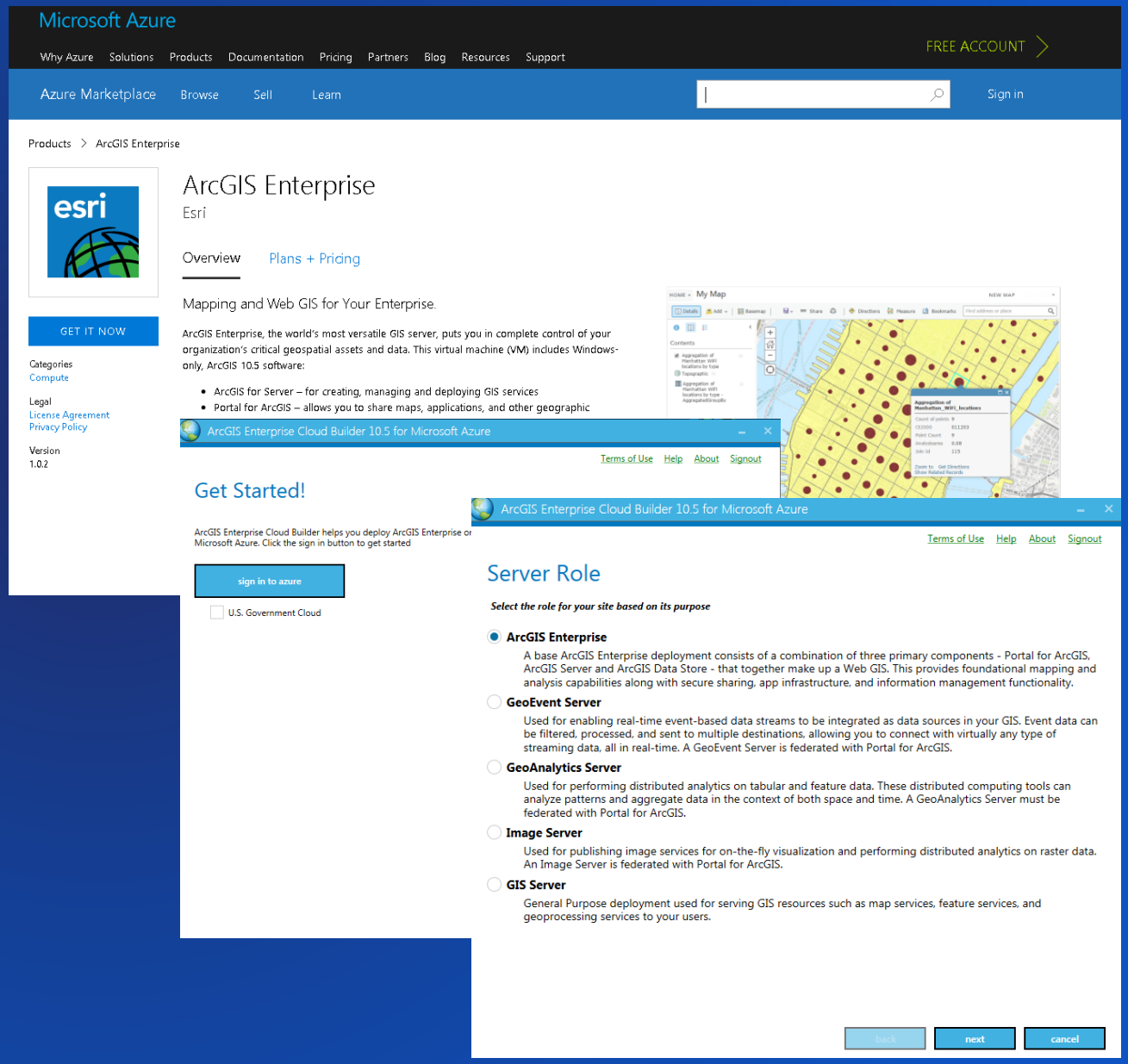
Time: 4:00pm - 5:00pm

Location: Catalina/Madera

ArcGIS Enterprise on Azure

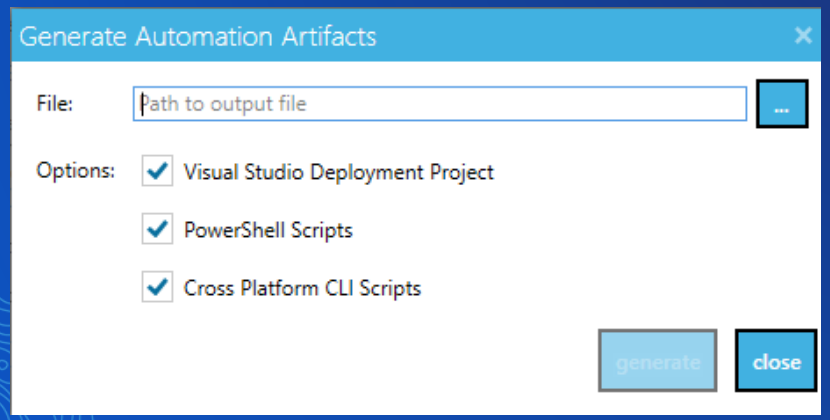
Deploying on Azure

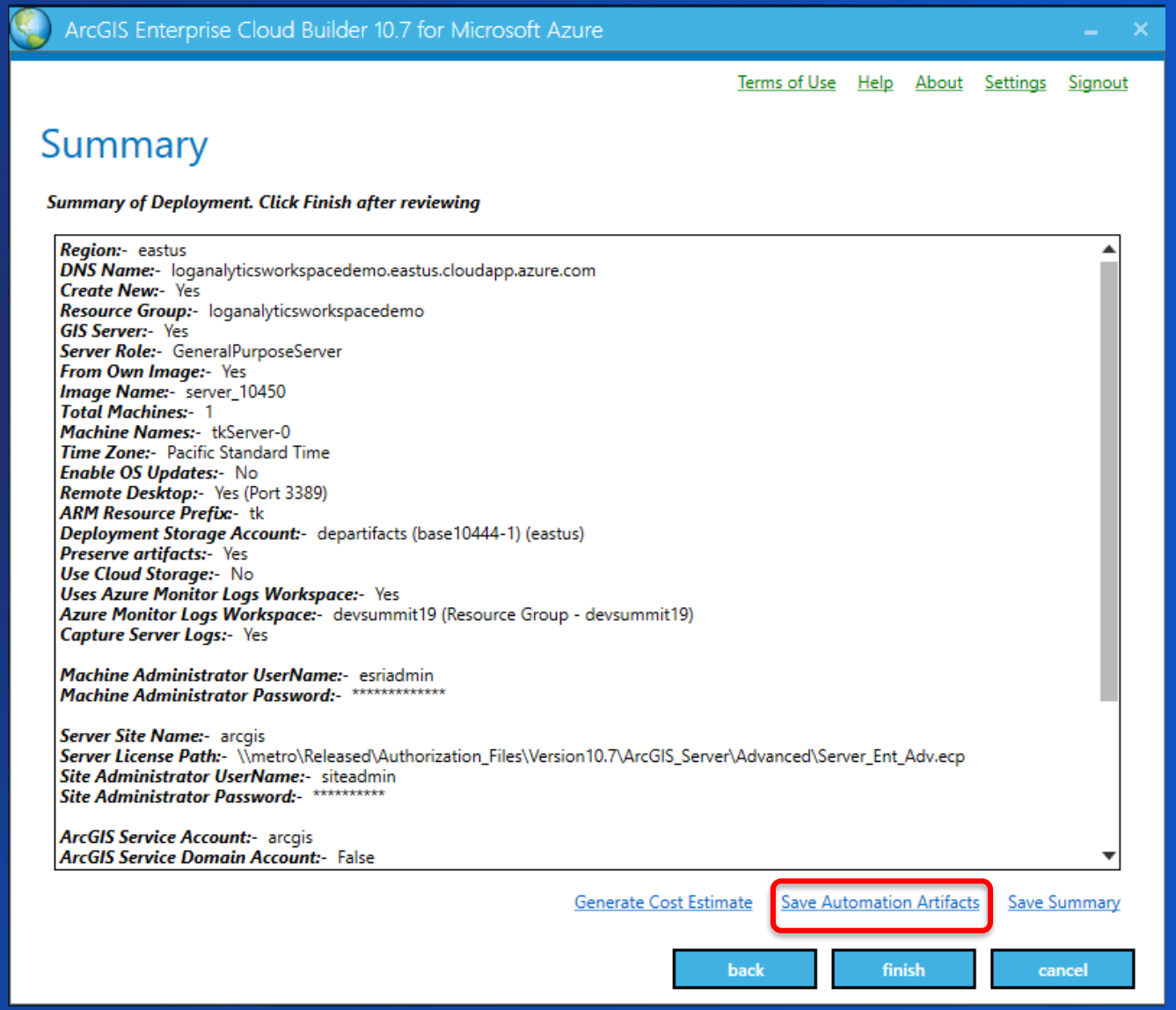
- Ready to use Virtual Machine Images
  - Public Azure (54 Regions)
  - U.S. Government Cloud (Fairfax)
- Easy to deploy and manage
  - Deployment Tools
    - Cloud Builder
    - Automation



Cloud Builder Overview

- Wizard driven deployment experience
- Base deployment + Distributed GIS
  - Single Machine/Tier
  - Multi Machine/Tiers
- Designer to generate automation artifacts





Deployment Options

Cloud Builder

Visual Studio

PowerShell

Command Line

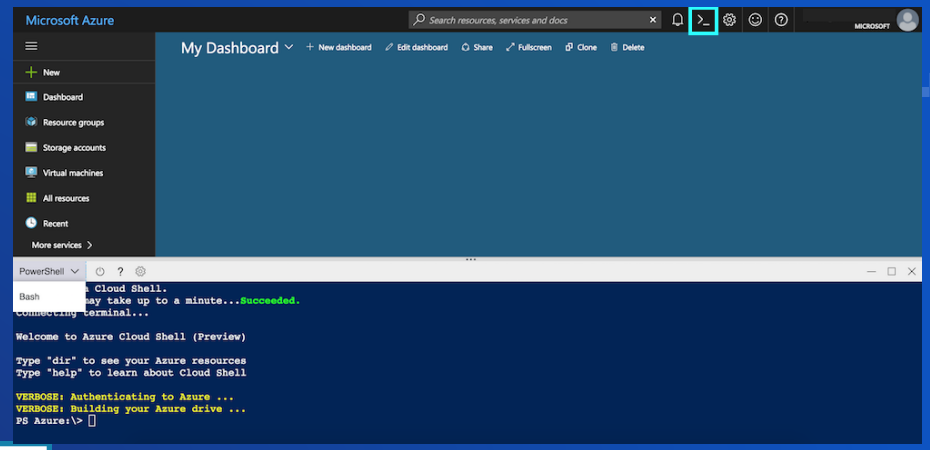
Windows

Mac

Linux

Integrate with …

Azure Cloud Shell



PowerShell DSC

Travis CI

Cloud Builder VS. Automation

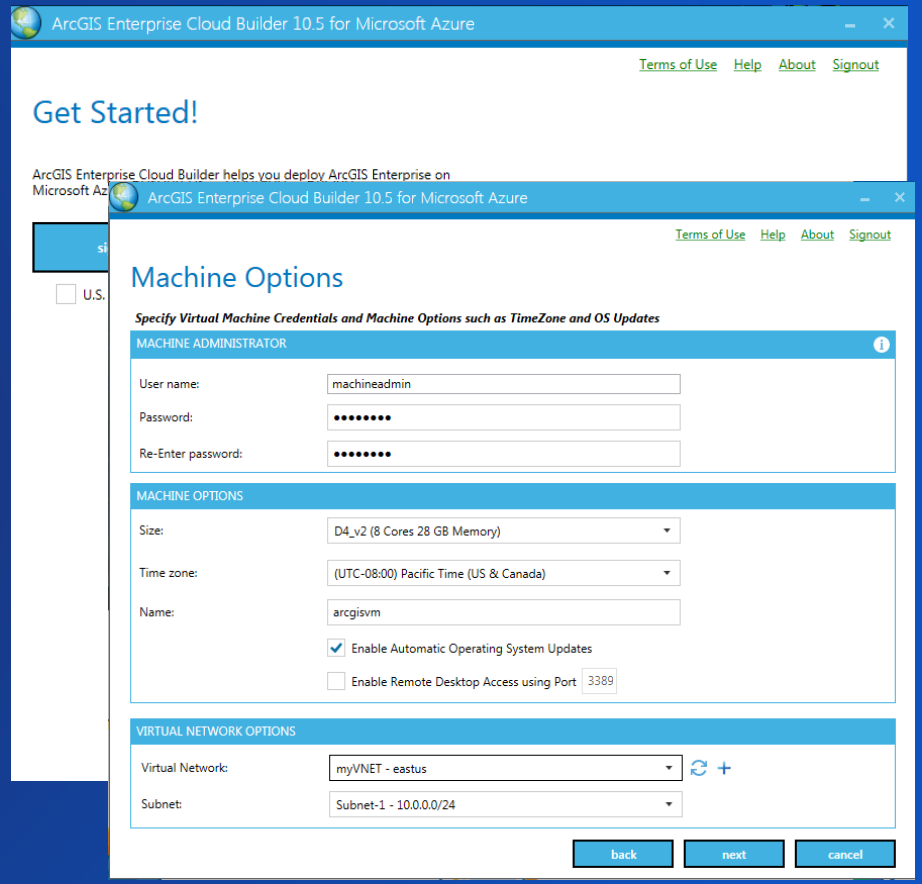
Visual Studio

BASH
THE BOURNE-AGAIN SHELL

PowerShell

Customize or Extend

Wizard Driven



Power ⟷ Simplicity

Deep Dive Session

ArcGIS Enterprise: Cloud Operations Using Microsoft Azure

Date: 03/07/2019

Time: 4:00pm - 5:00pm

Location: Pasadena/Sierra/Ventura

Microsoft Azure

Automation with PowerShell DSC

Use PowerShell DSC when …

- Microsoft Shop
  - Bias towards Microsoft Windows Tools
  - PowerShell DSC is built into Windows
- Windows Administrators love PowerShell
  - DSC is a natural fit
- Low Tech solution for push automation across multiple machines
  - No centralized server needed

PowerShell
DSC

PowerShell over the years

PowerShell Releases

What is PowerShell DSC (Desired State Configuration)

"Declarative platform used for configuration, deployment, and management of systems."

Automation Concepts

- Idempotent
- Declarative

```
New-SmbShare -Path '\\foo\share'
```

Not Idempotent

```
if(-not(Get-SmbShare -Name '\\foo\share'))
{
    New-SmbShare -Path '\\foo\share'
}
```

Add Checks to ensure idempotent

```
Import-Module ServerManager
#Check and install ASP.NET 4.5 feature
If (-not (Get-WindowsFeature "Web-Asp-Net45").Installed) {
    try {
        Add-WindowsFeature Web-Asp-Net45 -ErrorAction Stop
    }
    catch {
        Write-Error $_
    }
}
#Check and install Web Server Feature
If (-not (Get-WindowsFeature "Web-Server").Installed) {
    try {
        Add-WindowsFeature Web-Server -ErrorAction Stop
    }
    catch {
        Write-Error $_
    }
}
#Create a new website
Import-Module WebAdministration
New-WebSite -Name MyWebSite -Port 80 -HostHeader MyWebSite `
        -PhysicalPath "$env:systemdrive\inetpub\WWWROOT\MyWebSite"

#Start the website
Start-WebSite -Name MyWebSite
```

Imperative

```
Configuration WebSiteConfig
{
    Node MyWebServer
    {
        WindowsFeature IIS
        {
            Ensure = "Present"
            Name = "Web-Server"
        }
        WindowsFeature ASP
        {
            Ensure = "Present"
            Name = "Web-Asp-Net45"
        }
        Website MyWebSite
        {
            Ensure = "Present"
            Name = "MyWebSite"
            PhysicalPath = "C:\Inetpub"
            State = "Started"
            Protocol = @("http")
            BindingInfo = @("*:80:")
        }
    }
}
```

Declarative

PowerShell DSC

```
Configuration IISWebsite
{
        Node Server1, Server2
        {
            WindowsFeature IIS
            {
                    Ensure     = “Present”
                    Name       = “Web-Server”
            }

             WindowsFeature ASP
            {
                    Ensure     = “Present”
                    Name       = “Web-Asp-Net45”
            }
    }
}
```

```
Start-DscConfiguration 'server' -Verbose -Wait
```

Archive	Unpack .zip files
Environment	Manage env variables
File	Manage files, folders
Group	Manage local groups
Log	Write message to log
Package	Install/Uninstall .msi and setups
Registry	Manage registry keys & values
Script	Run PowerShell script blocks
Service	Manage Services
User	Manage local users
Windows Feature	Add/Remove Windows Features
Windows Process	Manage Processes

Built in DSC Resources

Wealth of DSC Resources

[PowerShell Gallery]

[DSC Resource Kit]

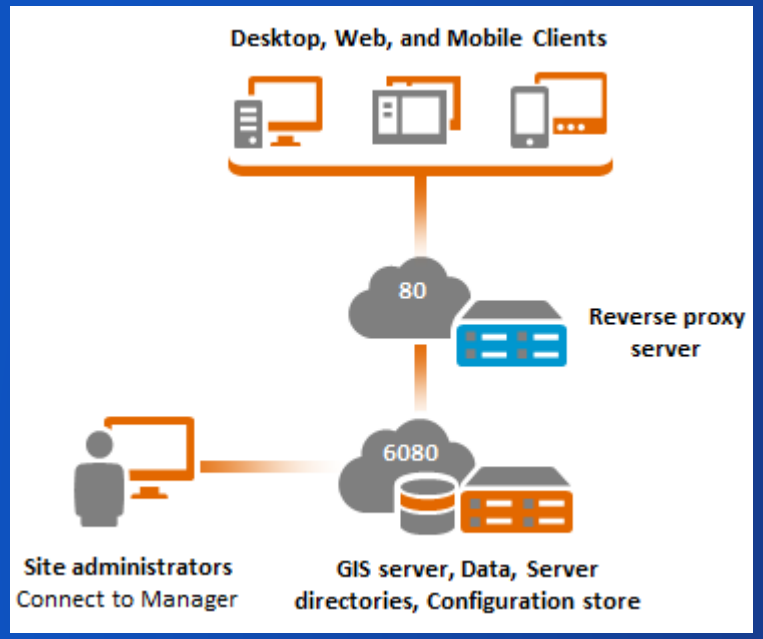
What about ArcGIS?

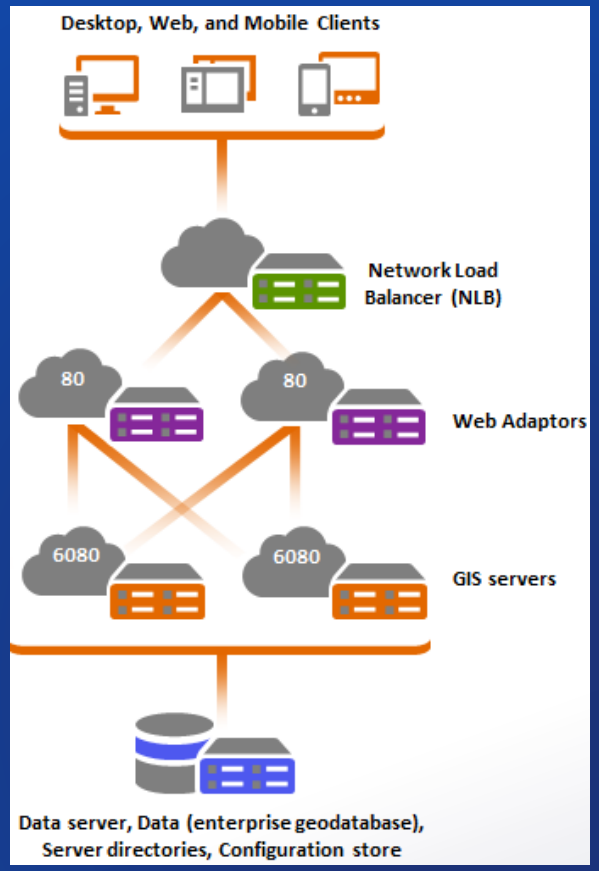
```
Configuration ArcGISServer
{
    Import-Module ArcGIS
    Node MyArcGISServer
    {
        ArcGIS MyArcGISSite
        {
            Ensure = "Present"
            ConfigStorePath = "C:\arcgis\server"
            SiteAdministrator = "..."
            State = "..."
        }
    }
}
```

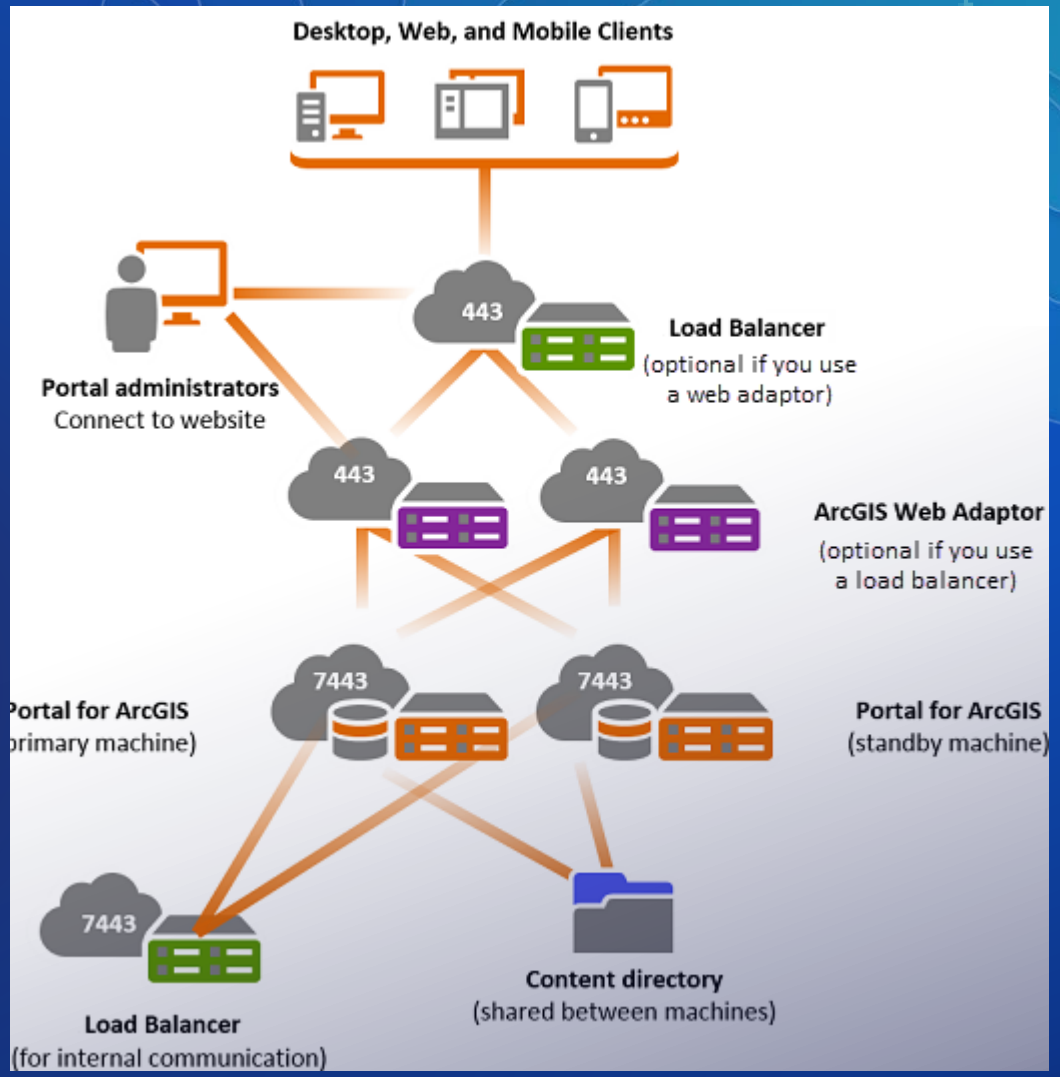
Wouldn’t this be great?

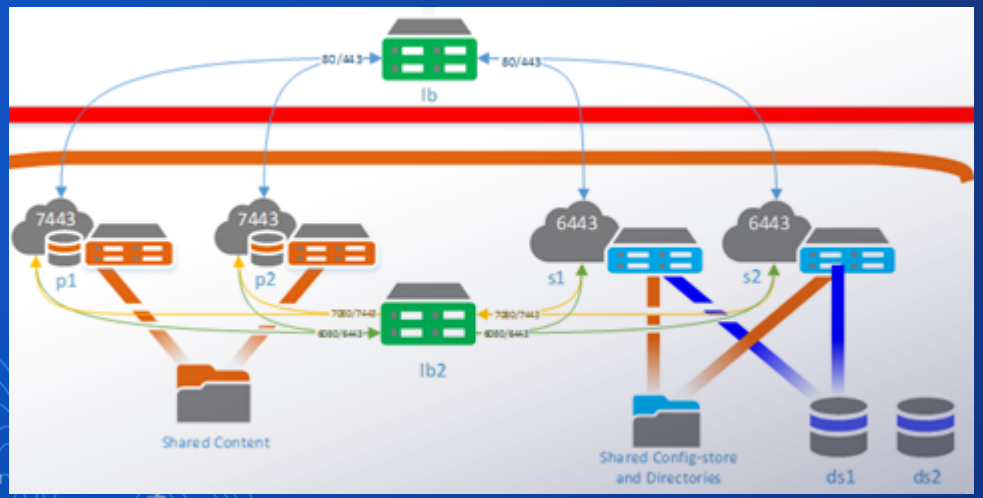
Not so Fast!

GIS Infrastructure









GIS Infrastructure needs vary

Discrete States

- Install Software
- License Software
- Configure Service Account
  - Create Windows Local/Domain User Account
  - Assign File System Privileges
  - Assign Windows Service to User
- Create Site
- Import SSL Certificates
- Register/Configure Databases or Data Stores
- Federate Site
- Stop/Start Server Services
  - Publish Services

ArcGIS DSC Resources

ArcGIS_Install	Manages the (un)installation of ArcGIS (Server) Software
ArcGIS_License	Licenses ArcGIS (Server) Software
ArcGIS_ServiceAccount	Configures the ‘Run As’ Service with appropriate (file system) privileges
ArcGIS_Server	Configures the ArcGIS Server Site
ArcGIS_Portal	Configures the Portal for ArcGIS
ArcGIS_DataStore	Configures the ArcGIS DataStore
ArcGIS_Server_TLS	Configures SSL on a Server Site
ArcGIS_Portal_TLS	Configures SSL on a Portal Site
ArcGIS_WebAdaptor	Configures Web Adaptor on IIS for Portal/Server
ArcGIS_EGDB	Enables/Registers an SQL Server flavor EGDB with Server
ArcGIS_GeoEvent	Configures GeoEvent Extension for Server
ArcGIS_Federation	Configures Federation between Server and Portal
ArcGIS_IIS_TLS	Configures SSL on IIS
…	…

Do I need to learn all these DSC Resources to use it?

No!

We want the getting started experience to be simple

Getting Started

Getting Started

- **Install ArcGIS PowerShell Module**

```
PS C:\> Install-Module arcgis
```

- **Edit (JSON) configuration file**
  - **Sample Configurations are**
  - **documented for common site topologies**

```
"ConfigData": {
    "Version": "10.5.1",
    "ServerContext": "server",
    "PortalContext": "portal",
    "ServerRole": "GeneralPurposeServer",
    "Credentials": {
        "PrimarySiteAdmin": {
            "UserName": "admin",
            "Email": "shgoel@esri.com",
            "Password": "changeit"
        },
        "ServiceAccount": {
            "Password": "Arc_123456_Gis",
            "UserName": "arcgis"
        }
    },
    "Server": {
        "LicenseFilePath": "\\\\metro\\ArcGIS_Automation\\Authorization_Files\\Version10.5\\Server_Ent_Adv_AllExt.prvc"
        "Installer": {
            "Path": "\\\\esri.com\\software\\Esri\\Released\\1051_Final\\ArcGIS_Server_Windows_1051_156124.exe",
            "InstallDir": "C:\\\\ArcGIS\\\\Server",
            "InstallDirPython": "C:\\\\Python27"
        },
        "ServerDirectoriesRootLocation": "C:\\\\arcgisserver\\directories",
        "ConfigStoreLocation": "C:\\\\arcgisserver\\config-store"
    },
    "Portal": {
        "LicenseFilePath": "\\\\metro\\ArcGIS_Automation\\Authorization_Files\\Version10.5\\portal_2000_1000.prvc",
```

- **Start Configuration**

```
PS C:\> Configure-ArcGIS pathToConfigFile
```

Automation using PowerShell DSC | System Requirements

- PowerShell 5.0 or Higher
  - Windows Management Framework 5.0 or Higher
    - Windows Server 2012 and higher

- Automation delivered via
  - PowerShell Gallery (best experience)
  - GitHub (Manual Install)

- Download Installers and Licenses from my ESRI (regular means)

Demo

PowerShell DSC

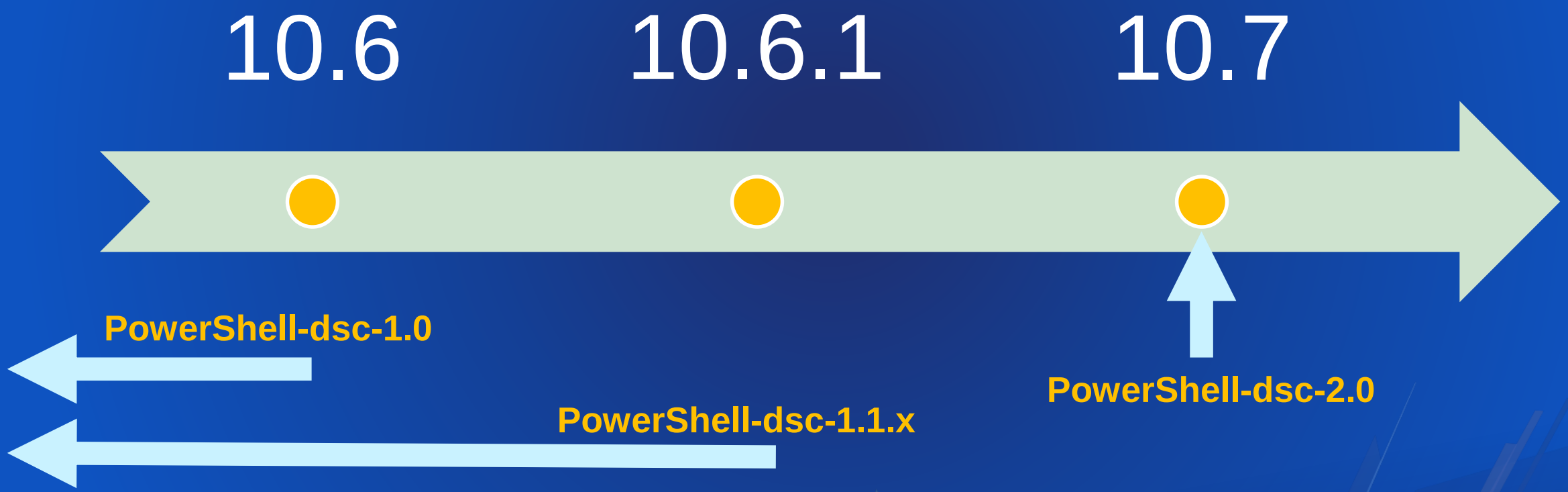
Automation using PowerShell DSC | Key Takeaways

- New Automation Option at 10.6
  - Analogous to Chef Automation
  - Targets an audience with a bias towards Microsoft Windows tooling
    - Windows Admins love PowerShell
    - DSC - Natural Fit
  - Easy Low Tech Solution for Push Model

- Delivered via
  - PowerShell Gallery https://www.powershellgallery.com/packages/ArcGIS/
  - Github https://github.com/Esri/arcgis-powershell-dsc

- Supports Single and Multi machine sites
  - Install, Uninstall and Upgrade workflows

ArcGIS PowerShell DSC releases vs. ArcGIS Enterprise releases



Resources for ArcGIS PowerShell DSC

esri.github.io/arcgis-powershell-dsc

Automation with Chef

What is Chef and what do we offer for it

- One of the most popular IT automation toolkit
- Install ready-to-use resources
- Define the configuration
- Deploy exact the way you want.
- No required programming skills
- ArcGIS Automation team offers a range of resources for you to use:

Cookbooks

A full set of files to install a software product, such as:

- ArcGIS Enterprise
- ArcGIS Desktop
- Insights for ArcGIS

Recipes

An individual JSON file in a cookbook for a specific task:

- Install ArcGIS Server
- Federate a server
- Apply an authorization file

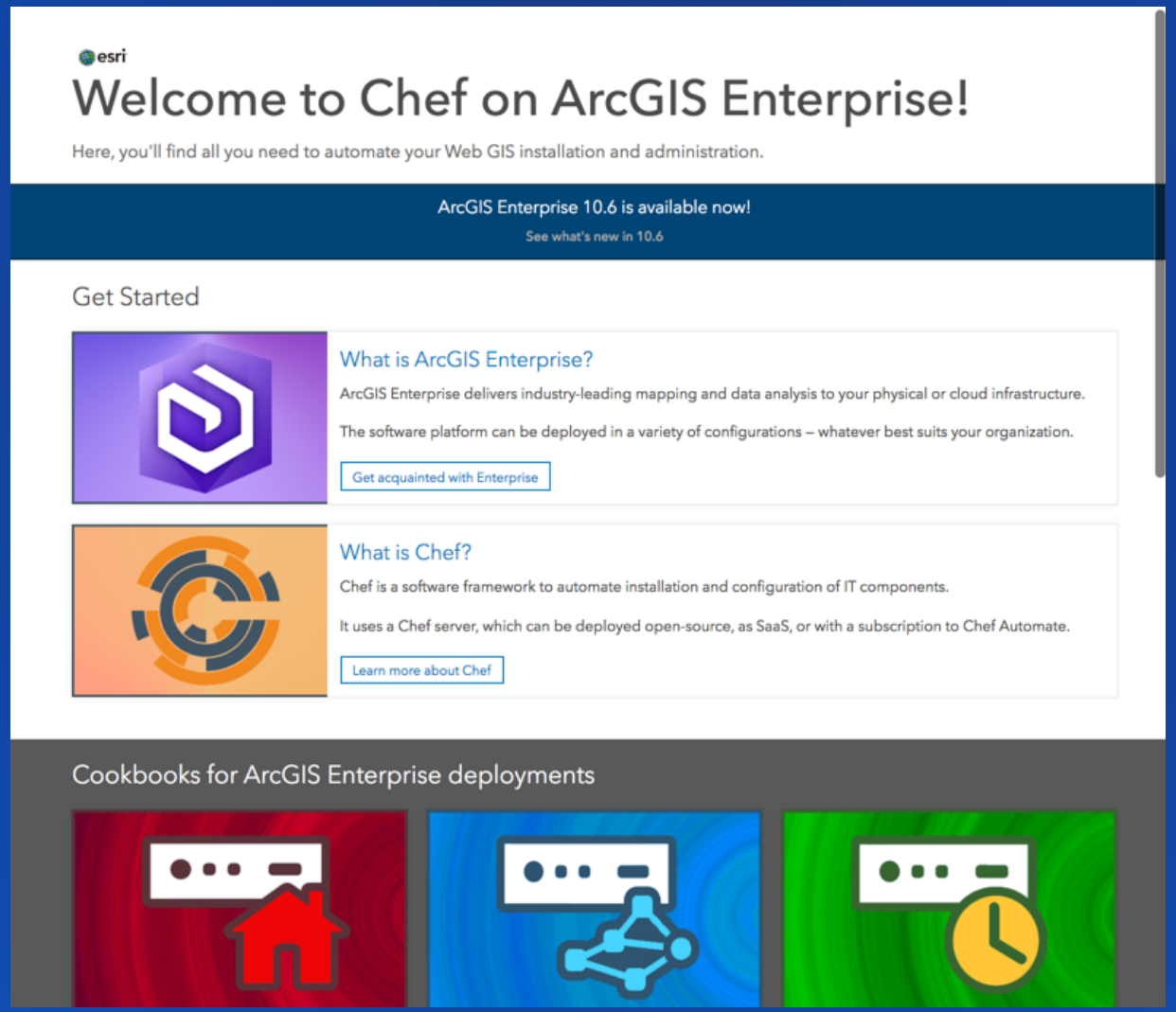
Roles

Our custom sets of recipes pulled to set up a machine:

- Base deployment
- ArcGIS Image Server
- ArcGIS (Big) Data Store

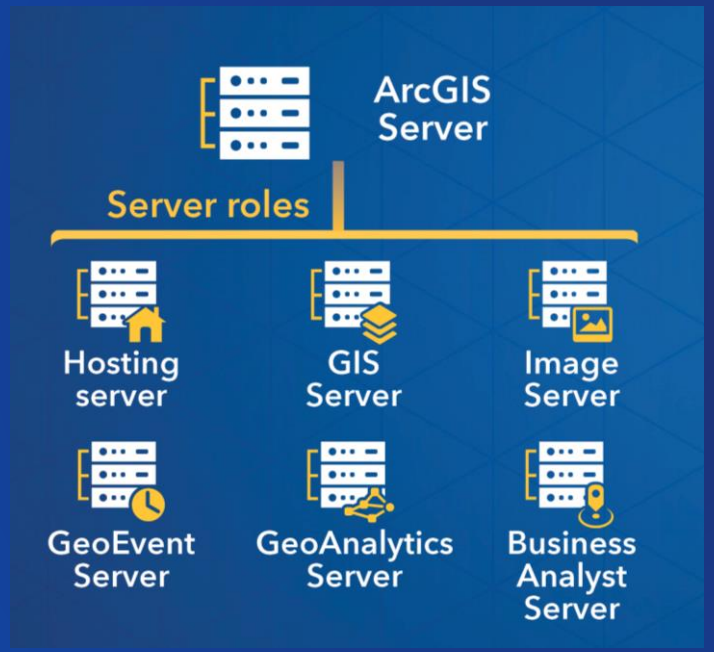
Getting Started

http://esri.github.io/arcgis-cookbook/

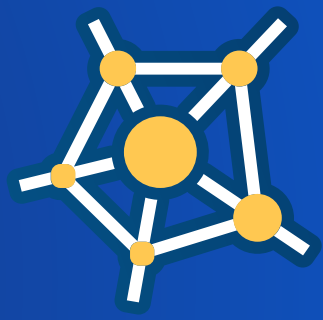


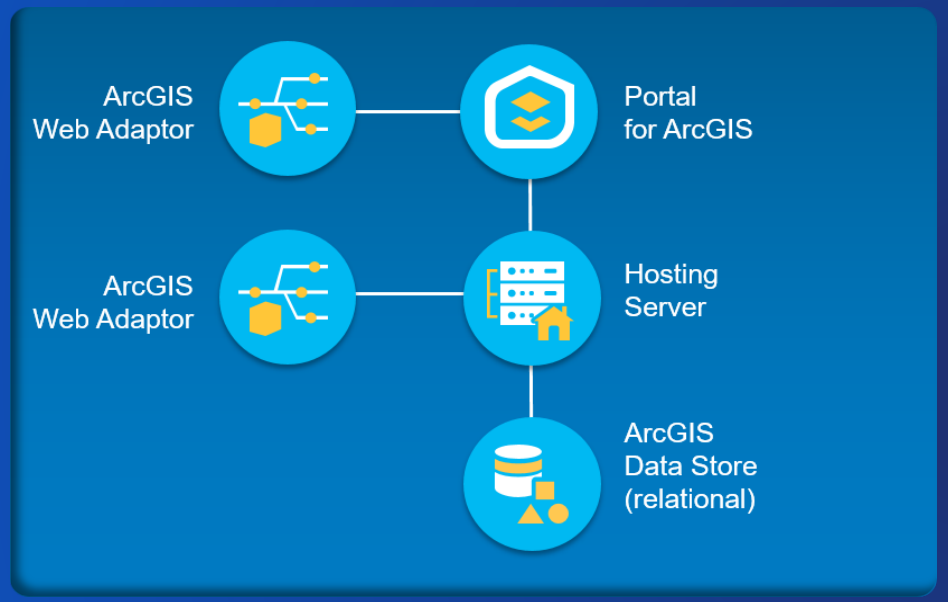
Plan your deployment

Base deployment, or extend with server roles?



One or many machines?





A Fresh ArcGIS Enterprise Install

Easy to Start

Install Chef Client and Download Cookbook

Edit Property json file

“chef-solo -j <properties>.json”

Idempotent

Demo

Chef – Single Machine Deployment

Upgrading an Existing Deployment

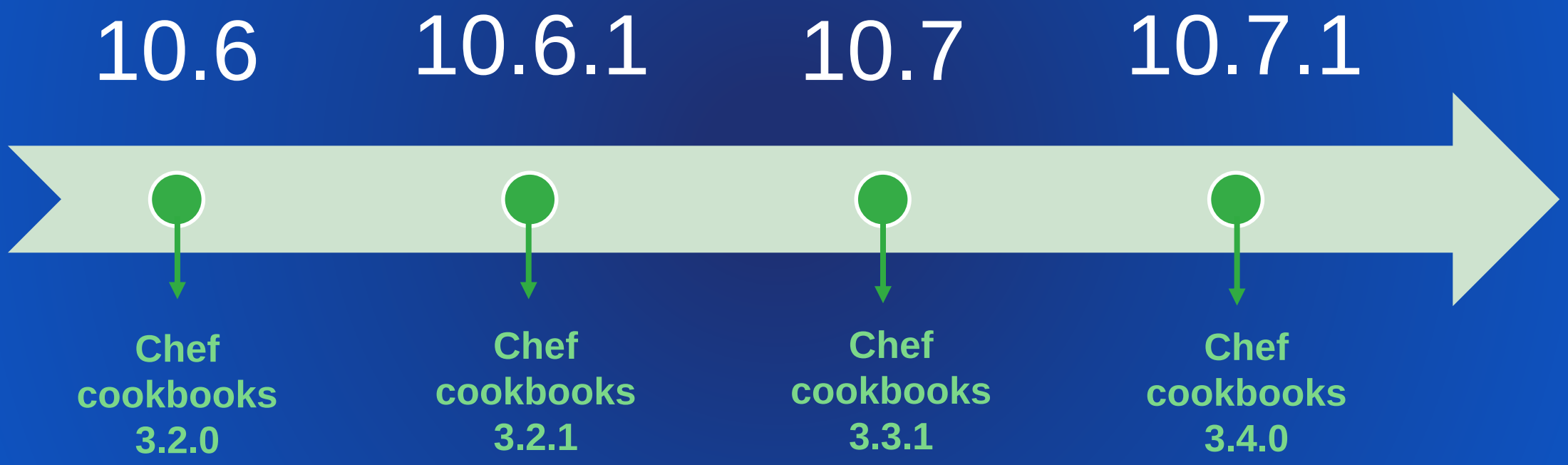
Upgrade

Download New Version of Cookbook

New Version #; New Setups; New License Files

“*chef-solo -j <properties>.json*”

Using Chef Puts You on an “Upgrade Track”



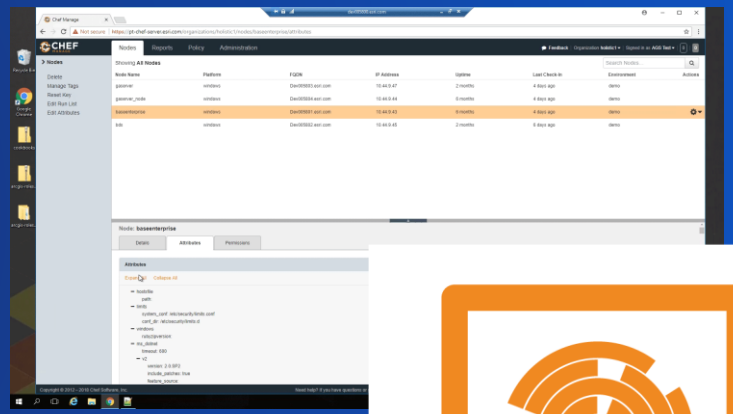
Demo

Chef – Upgrade

Expanding Chef for Multi-machine deployments

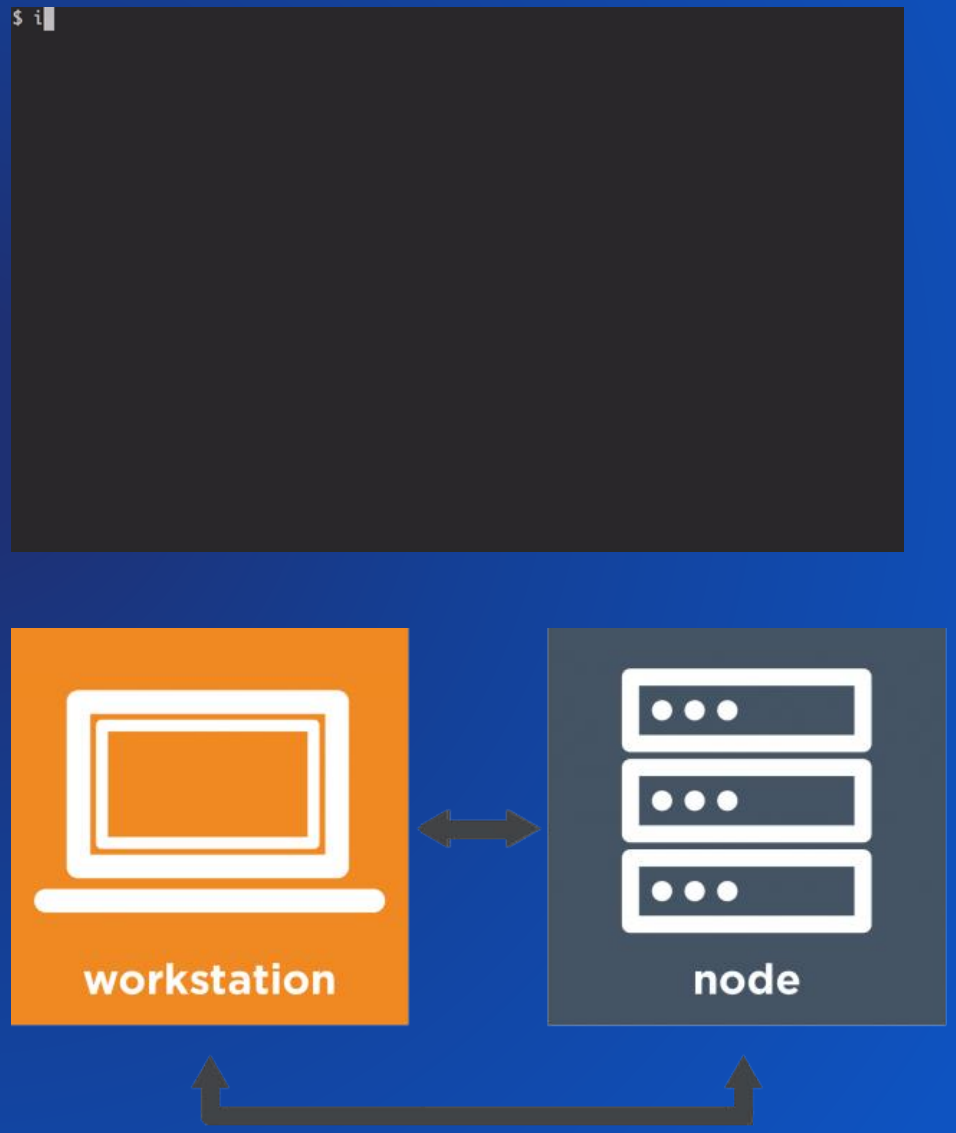
Expanding Chef for Multi-machine Deployment

- Chef-Server
  - Central repository of all your files
  - Three options for Chef Server
    - Open source on your own infrastructure
    - Subscribe to Hosted Chef Server (SaaS)
    - Subscribe to Chef Automate (full-stack software)
- Chef Client
  - Performs the work
  - Receives necessary files from Chef Server

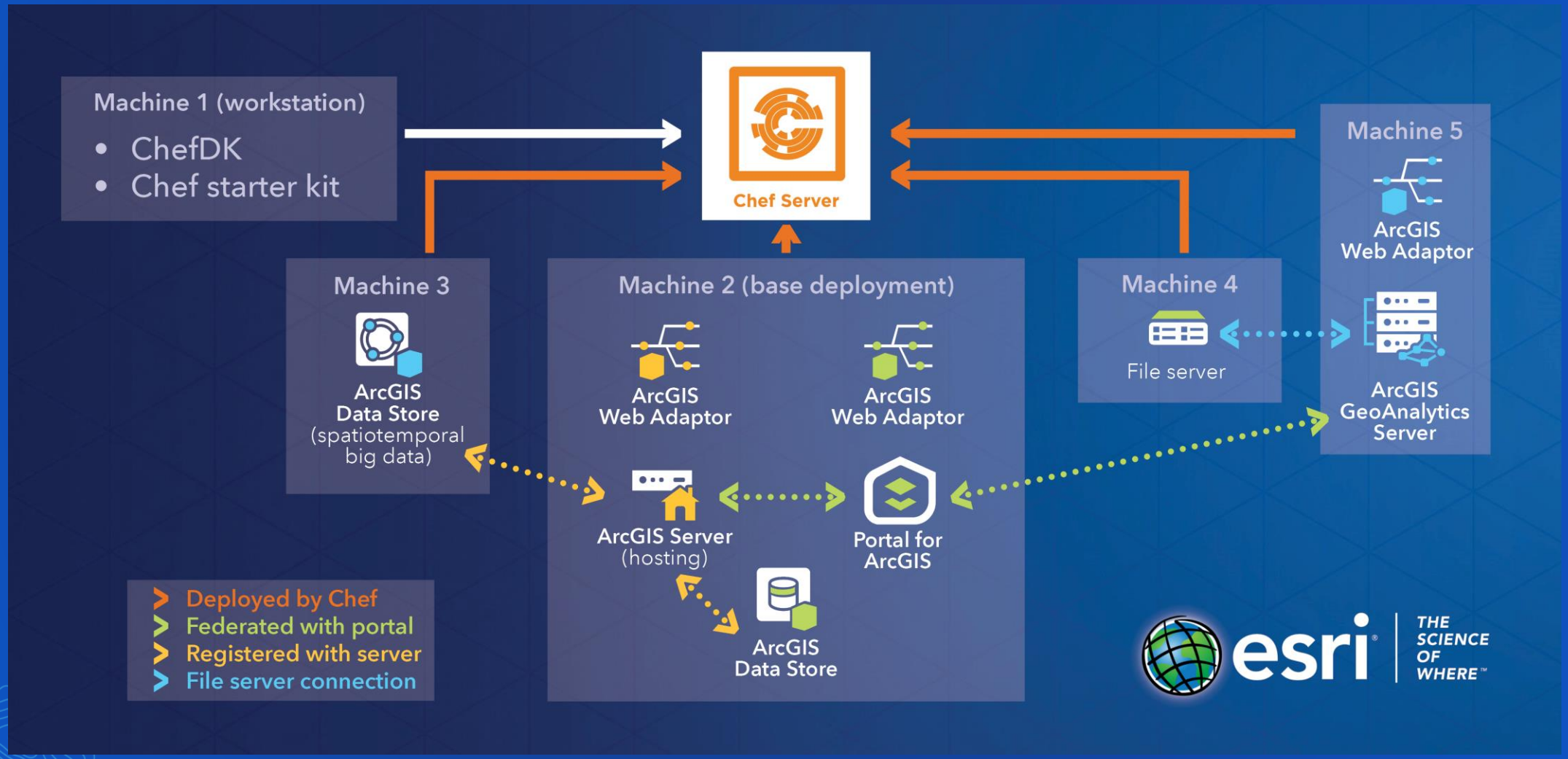


Expanding Chef for Multi-machine Deployment

- Chef-Run: Remote administration
  - SSH
  - WinRM
- OS Remote running Chef-solo
  - SSH
  - WinRM



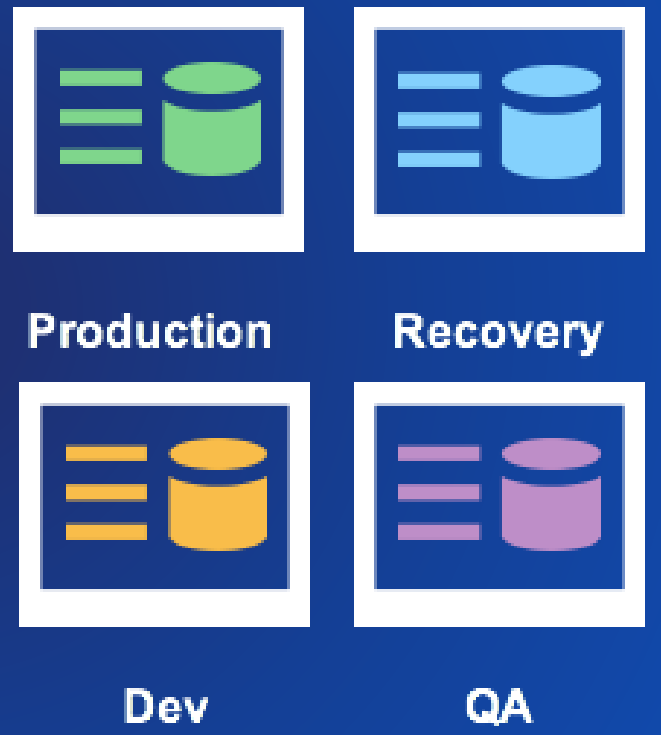
Using Chef – A Typical Multi-machine Deployment



Tips, Tricks & Key Points

Plan Ahead

- Need to plan
  - Design
  - Configuration
  - Testing
- Repeatable
  - Success in production environment
  - Less downtime in production
  - Faster recovery



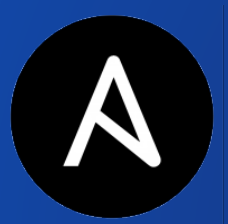
Consider Baking a Base Image

Install Chef; Cookbook

Have Some Processes Done.
e.g, Setups, System Requirements

Have some components baked in,
e.g. base map, security updates, etc

Work With



ArcGIS API for Python

webgisdr Utility

- Other software deployment automation tools
- GIS workflow automation tools
  - Python API for ArcGIS
  - WebGISDR tool
- Whole system infrastructure automation

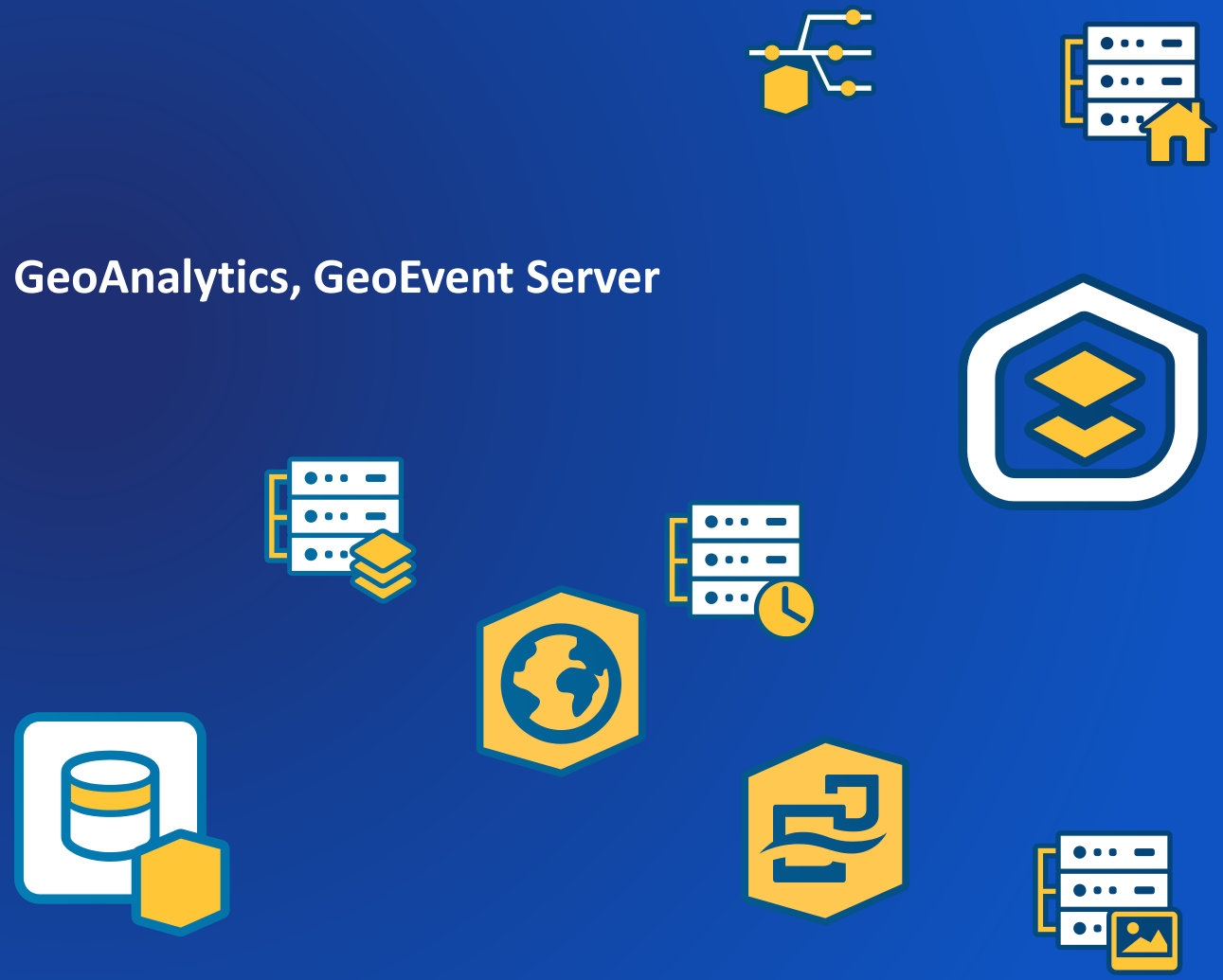
ArcGIS Software Repository

- A central location where all ArcGIS Software setups are stored
  - File share: local software repository
  - AWS S3 bucket

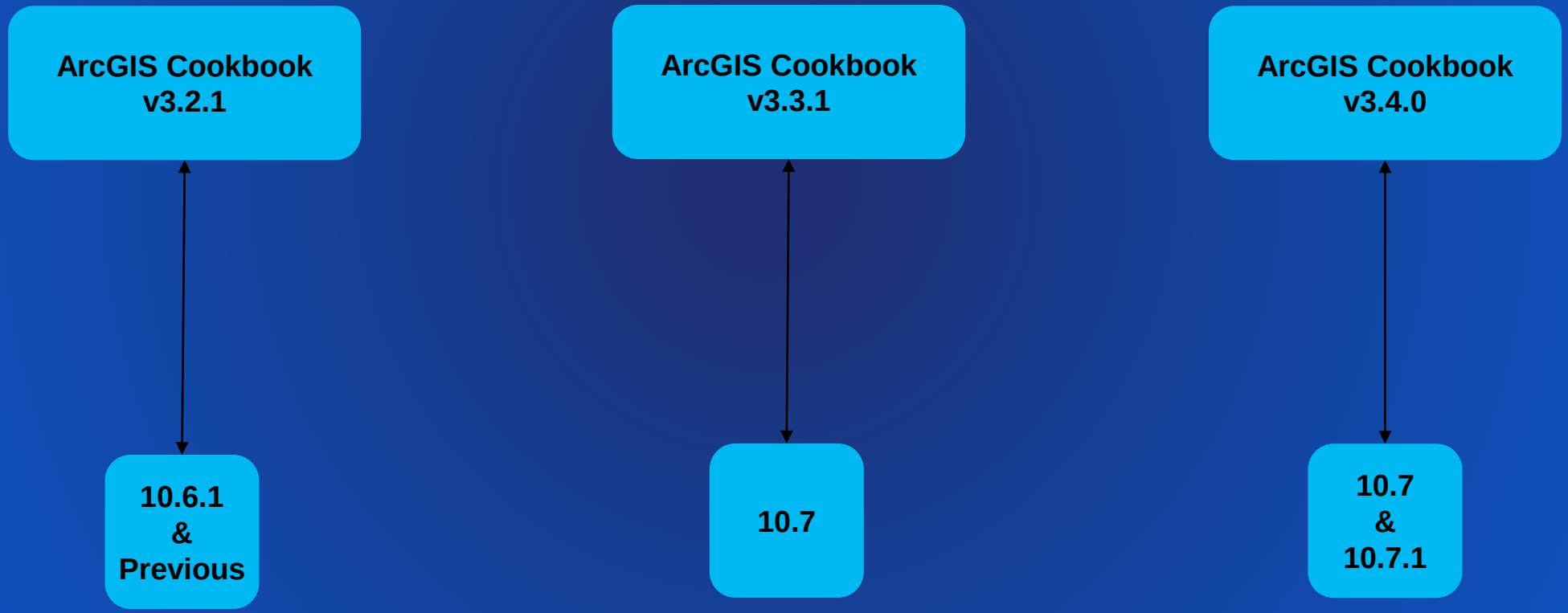
- At 10.7 and 10.7.1 all ArcGIS Cookbooks use this variable

ArcGIS Software

- ArcGIS Enterprise
  - Portal for ArcGIS
  - ArcGIS Server
    - Enabled Roles: Hosting, Image Server, GeoAnalytics, GeoEvent Server
  - ArcGIS Data Store
    - Relational, Tile Cache, Spatiotemporal
  - ArcGIS Web Adaptor
- And other Esri Software:
  - ArcGIS Pro
  - ArcGIS Insight
  - ArcGIS Desktop
  - ArcGIS License Manager



ArcGIS Cookbook releases vs. ArcGIS Enterprise releases



Other Tricks & Tips

- Disconnected Environment Considerations
  - Make sure you have proper Esri license files staged for use
  - Software setups in a common location for access
  - Having Chef Client installation staged for installation
- Set password in an environment variable
- “-l debug” for debug
- Attributes value of True or False, no “”. e.g. “configure_autostart”: true
- Support security configuration for ArcGIS Server.

Why use Chef?

- Easy
- Flexible
- Customizable
- Repeatable
- Forward-thinking

Resources for Chef + ArcGIS Enterprise

esri.github.io/arcgis-cookbook

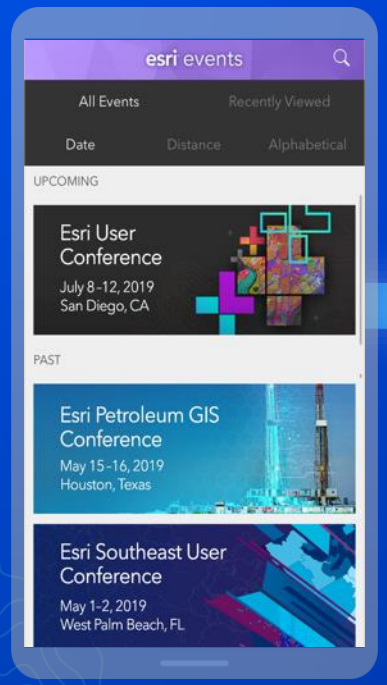
Summary

Best fit use case:

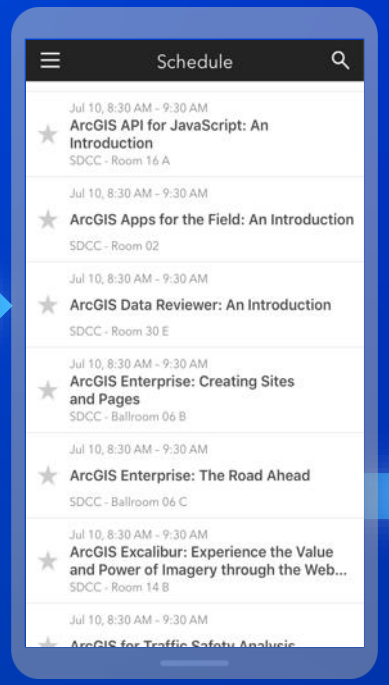
- ArcGIS Enterprise Builder = Single machine deployment all-in-one, very limited options
  - Base deployment only
- AWS = Deploying in Amazon cloud
  - Base deployment, server roles
- Azure = Deploying in Azure cloud
  - Base deployment, server roles
- Powershell DSC = All deployments, on premises or cloud, Windows, repeat deployments
  - -Base deployment, server roles, HA, DR
- Chef = All deployments, on-premises or cloud, Windows or Linux, repeat deployments
  - Base deployment, server roles, HA, DR

Please Share Your Feedback in the App

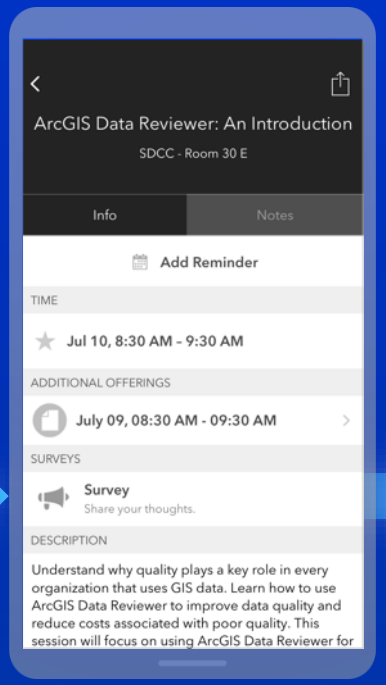
Download the Esri Events app and find your event



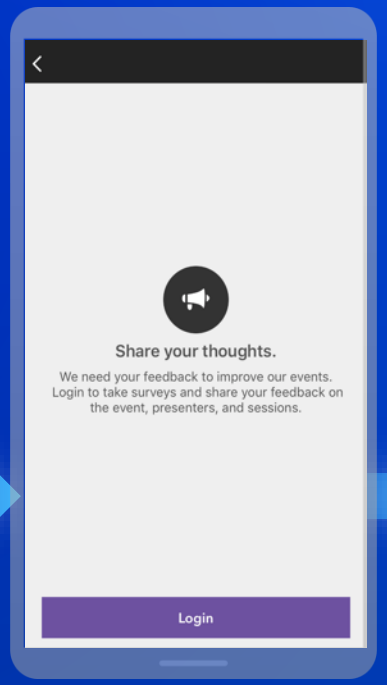
Select the session you attended



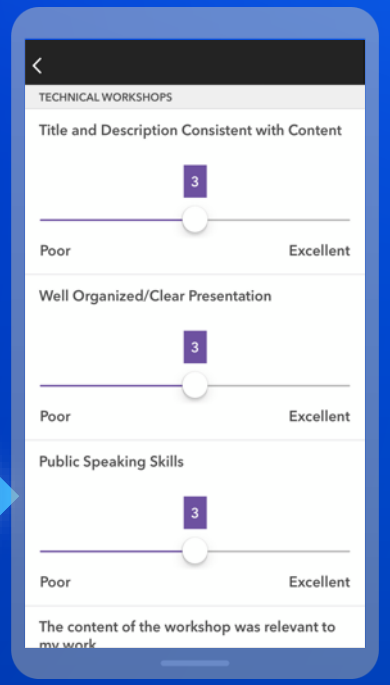
Scroll down to "Survey"



Log in to access the survey



Complete the survey and select "Submit"



Presentation Title

Presenter Names

SEE
WHAT
OTHERS
CAN'T

Section Header

Section Subhead

Demo Title

Presenter(s)