

# Azure Linux Migration Workshop

Analyzing, Migrating, Deploying & Modernizing Linux  
workloads in Microsoft Azure

New York, NY – December 5 / 2017

Program Leads:  
Stuart Kirk & Sean Mikha

# STUART KIRK

Microsoft Global Black Belt – Open Source Linux Infrastructure  
Home: Ann Arbor, Michigan, originally from Canada

- Engaging with Microsoft clients in North America to architect and migrate open source workloads hosted on Microsoft Azure.
- Entirety of career in Open Source: Dell, Cisco, Red Hat
- Joined Microsoft in June 2016
- MCSA: Linux on Azure, MCSD: Azure Solutions Architect
- RHCA, RHCE, RHCSA, RHCDS, RHCVA
  
- Twitter: @StuartAtMSFT
- LinkedIn: <https://www.linkedin.com/in/stuartkirk>



# Agenda

<b>Begin</b>	<b>End</b>	<b>Description</b>	<b>Format</b>	
8:30 AM	9:00 AM	Registration/Snacks		
9:00 AM	9:45 AM	Overview of Program / Why are we here?	PowerPoint	
9:45 AM	10:30 AM	Challenge 1	Hands-On / Hackathon	
10:30 AM	10:45 AM	Break		
10:45 AM	11:30 AM	Challenge 2	Hands-On / Hackathon	
11:30 AM	12:00 PM	Overview of Cloud Migration Tools	PowerPoint	
12:00 PM	12:30 PM	Challenge 3	Hands-On / Hackathon	
12:30 PM	1:15 PM	Working Lunch		
1:15 PM	1:45 PM	Overview of Cloud Analysis Tools	PowerPoint	
1:45 PM	3:00 PM	Challenge 4	Hands-On / Hackathon	
3:00 PM	3:15 PM	Break		
3:15 PM	3:45 PM	Overview of Modernization Opportunities / Next Steps	PowerPoint	
3:45 PM	4:45 PM	Optional Challenges	Hands-On / Hackathon	Optional Challenges
4:45 PM	5:00 PM	Overflow / Q&A		

# GitHub

<https://github.com/stuartatmicrosoft/Azure-Linux-Migration-Workshop>

- Agenda
- Registration Links
- Cities
- Challenges
- Presentations
- Provisioning Scripts
- Thank you to our valued partners!

# Let's Get Started!

- Please provide your corporate e-mail address to the instructor. The instructor will register you for Challenge 4 and you will receive the required credentials from StratoZone to access their system
- Visit the URL written on the whiteboard to obtain your lab environment
- Access to the lab environment is using noVNC which provides an HTML5 interface incase rdesktop/tigervnc is blocked on your laptop
- Most work will be done using the CentOS 7.4 Gnome Desktop provided
- Copy + Paste in and out of noVNC is not possible, however you may open Firefox in the noVNC desktop to Copy + Paste

# Let's Get Started!

**SAVE THE INFO PROVIDED WHEN YOU REACH THIS SCREEN!**

- ✓ Your On Demand Lab is ready (2 hour(s), 57 minute(s) remaining)

Here are your credentials to login to [Microsoft Azure](#) and access the On Demand Lab

Username : odl\_user\_5057@gbbossteamoutlook.onmicrosoft.com

Password : fkme84SHY\*Qb

**Name**

password

**Value**

Microsoft

vncServerURL

<http://liftshift-vmip-7bktmalbtg3rs.eastus.cloudapp.azure.com:6080>

Service Principal Details:

**Name**

Application Id

**Value**

faea1e6f-eef4-4e5d-b808-75341aabe5e7

Application Display Name

[https://odl\\_user\\_sp\\_5057](https://odl_user_sp_5057)

Application Secret Key

tvip06TWG\*iD

Subscription Id

b23accae-e655-44e6-a08d-85fb5f1bb854

Tenant Id

12c5db39-b62e-4301-b848-09acda2692a5

Tenant Domain Name

gbbossteamoutlook.onmicrosoft.com

Lab Guide : <https://github.com/stuartatmicrosoft/Azure-Linux-Migration-Workshop>

[DELETE ON DEMAND LAB](#)



# Microsoft & Open Source

# Inner Sourcing



In 2014, Microsoft CEO Satya Nadella directed all Microsoft engineers to "open source internally" - anyone at the company can see anyone else's code and use it as needed.

This vision is now a day-to-day reality for Microsoft engineers.

# Microsoft + Open Source: Empowering Customers

## Our Products

SQL Server ❤️ Linux

SQL Server on Linux



HD Insight managed service on Linux



Acquisition

Windows Subsystem for Linux

```
C:\Users\markhill> bash  
root@localhost: #
```

Run Linux on Windows natively

## Our Partnerships



Partnership



Partnership



Jenkins project on Azure



Microsoft joins Eclipse Foundation



Partnership with the Linux Foundation for Linux on Azure certification

## Our Offerings

### Azure Marketplace



44% / 1 in 3

60% of all images in Azure Marketplace are based on Linux/OSS

44% of VMs on Azure overall run Linux, and more than half of all new VMs run Linux

## Our Employees



**Ross Gardler**

President Apache SW Foundation



**Brendan Burns**

Co-Founder of Kubernetes

**600 Million+**

Lines of open source code

[Microsoft Open Source Hub](#)

# Azure is an open cloud



# Why Linux on Azure

- ✓ Our customers want it!
  - ✓ Roughly 1 out of 3 VMs run Linux & OSS
  - ✓ Enterprise grade cloud leadership
  - ✓ Only true hybrid cloud
- Our goal is to be the most complete and *open* cloud
- 

# Linux images in the Azure Marketplace



## Azure Endorsed Linux Distributions

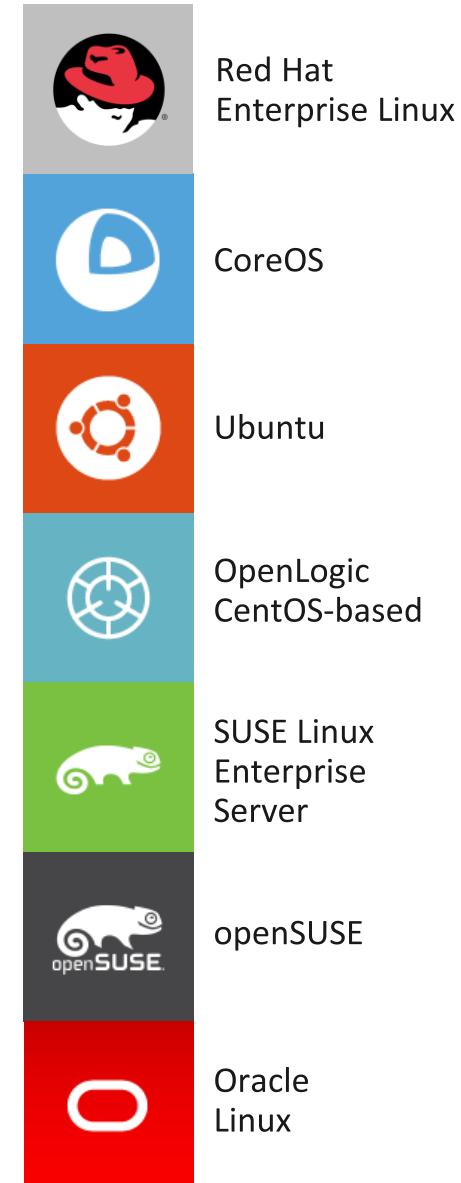
Published, maintained and supported by partners, curated & tested by Microsoft  
Most endorsed distros maintain repos in each Azure region for fast updating

## Standard Images

- Customers** can contact Linux vendor/partner for Linux support
- Azure-related platform issues supported by Microsoft
- Limited support for Linux issues -- from Microsoft

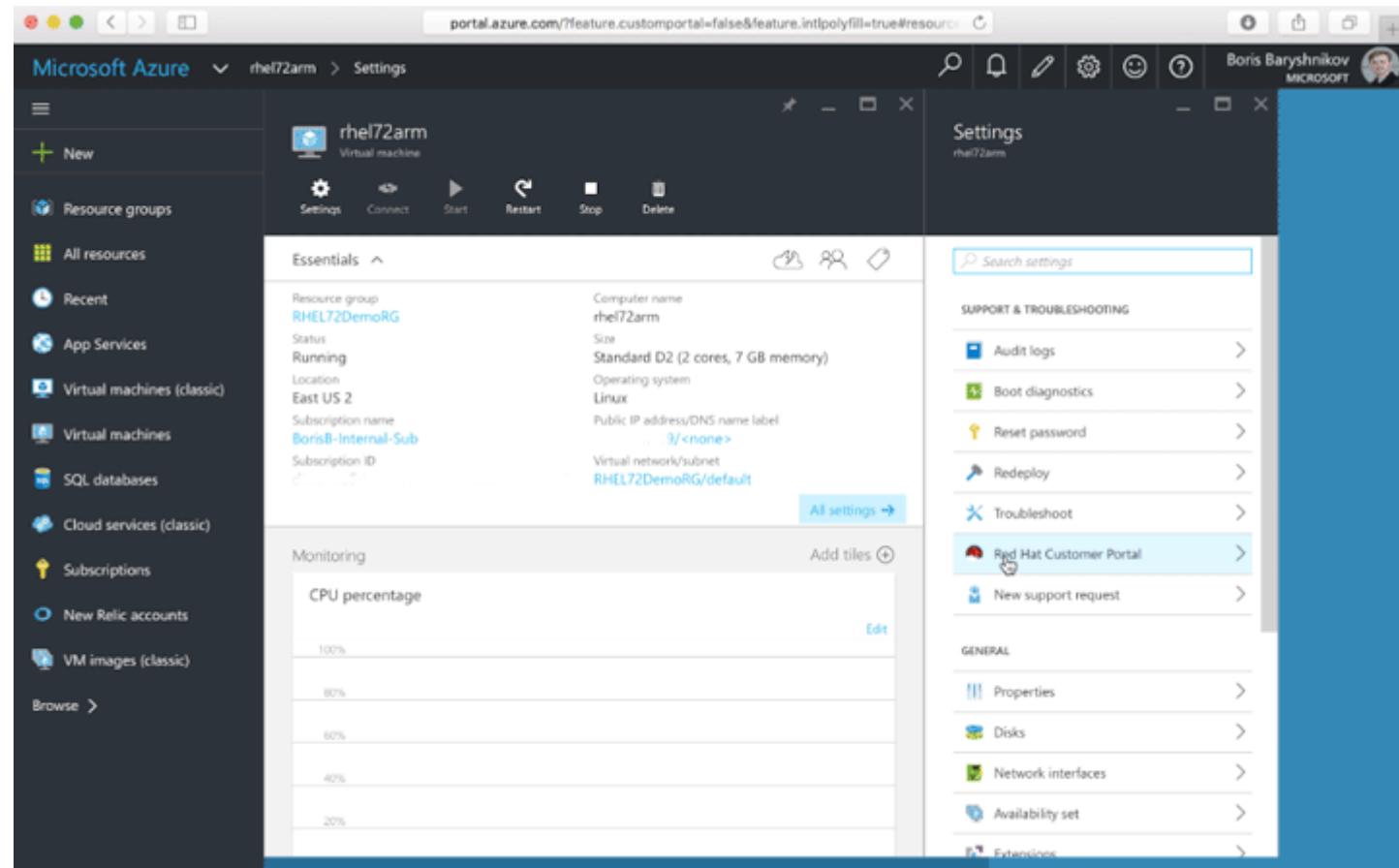
## Premium Images

- Microsoft engages** the Linux vendor/partner on behalf of the customer for support
- Includes updates, patches, and support through 24x7 web, email, chat and phone
- Available for Red Hat Enterprise Linux and SUSE Linux Enterprise Server



# Accessing the Red Hat Customer Portal from Azure

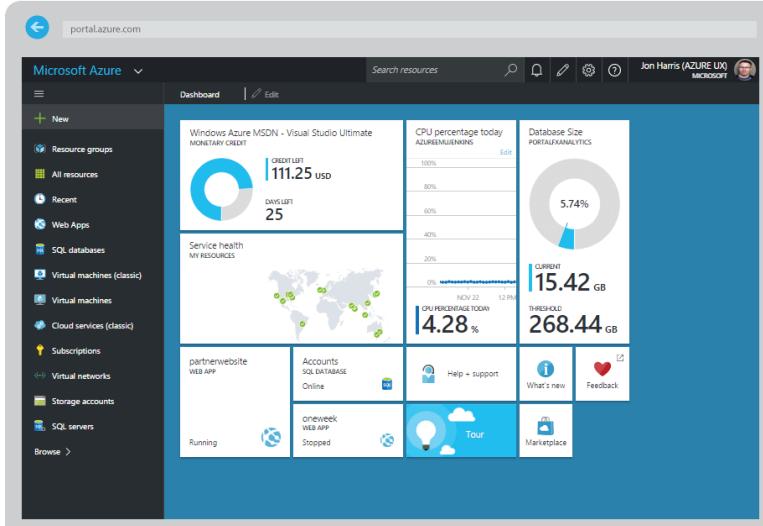
- With Azure “Pay As You Go” licensing, you can connect your subscription to Red Hat to access all Red Hat premium content and support.
- Customers with existing Red Hat subscriptions may also seamlessly extend those to Azure using Red Hat Cloud Access



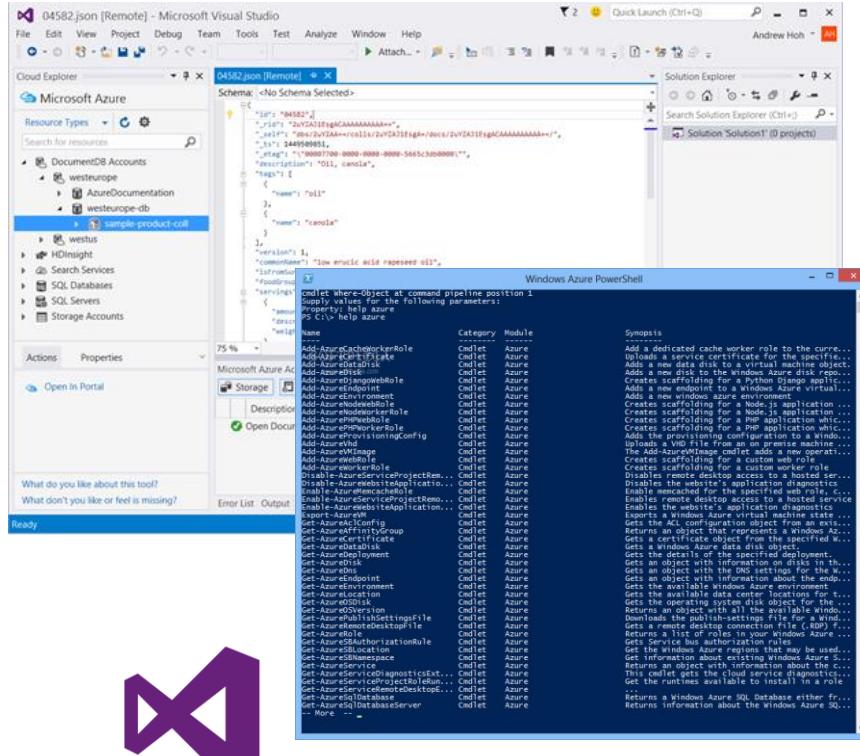
<https://azure.microsoft.com/en-us/blog/red-hat-customer-portal-from-azure/>  
<https://www.redhat.com/en/technologies/cloud-computing/cloud-access>

# CLI, Portal, PowerShell, Visual Studio

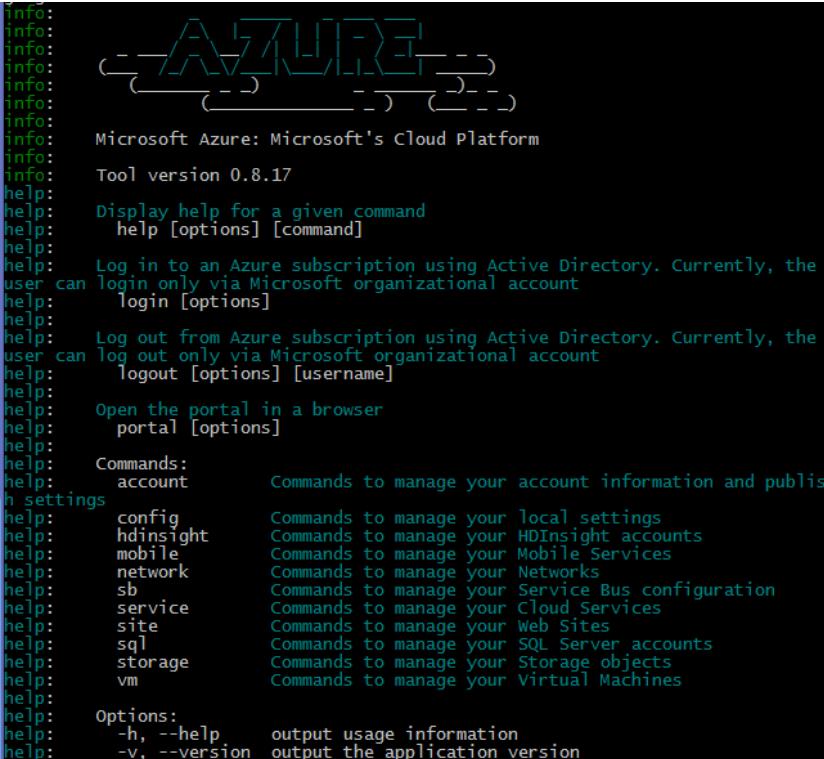
## Multiple ways to interact with Azure for any enterprise!



The screenshot shows the Microsoft Azure portal dashboard. It features a top navigation bar with 'portal.azure.com' and user information. Below is a summary card for 'Windows Azure MSDN - Visual Studio Ultimate' with a credit balance of '111.25 usd'. It displays 'CPU percentage today' at 4.28% and 'Database Size' for 'PORTALMANALYTICS' at 5.74%. A world map shows 'Service health' across various regions. Below the summary are cards for 'partnerwebsite' (WEB APP, Running), 'Accounts' (SQL DATABASE, Online), and 'oneweek' (WEB APP, Stopped). Buttons for 'Help + support', 'What's new', and 'Feedback' are also present.



The screenshot shows Microsoft Visual Studio with an open project named '04582.json [Remote]'. The Azure Explorer sidebar is visible, showing a tree structure for 'Resource Types' under 'Microsoft Azure', including 'DocumentDB Accounts', 'westeurope', 'AzureDocumentation', and 'westeurope-db'. The main code editor window contains JSON configuration for a database. A separate 'Windows Azure PowerShell' window is open, showing command suggestions for 'cloud service Object at command pipeline position 1'. Examples include 'Add-AzureDataDisk', 'Add-AzureEndpoint', and 'Add-AzureMobileService'. The PowerShell window has tabs for 'Actions' and 'Properties'.



The screenshot shows the Azure CLI interface. At the top, it says 'Microsoft Azure: Microsoft's Cloud Platform' and 'Tool version 0.8.17'. Below is a large block of text containing the 'help' command output. It includes sections for 'Commands', 'Commands to manage your account information and publish', 'Commands to manage your local settings', 'Commands to manage your HDInsight accounts', 'Commands to manage your Mobile Services', 'Commands to manage your Networks', 'Commands to manage your Service Bus configuration', 'Commands to manage your Cloud Services', 'Commands to manage your Web Sites', 'Commands to manage your SQL Server accounts', 'Commands to manage your Storage objects', and 'Commands to manage your Virtual Machines'. It also lists 'Options' for '-h, --help' and '-v, --version'.

<http://portal.azure.com>



Visual Studio®

Linux Azure CLI Interface  
<http://aka.ms/azure-cli-2>

# Challenges 1 & 2

Introduction to & Provisioning  
in the Azure Linux CLI

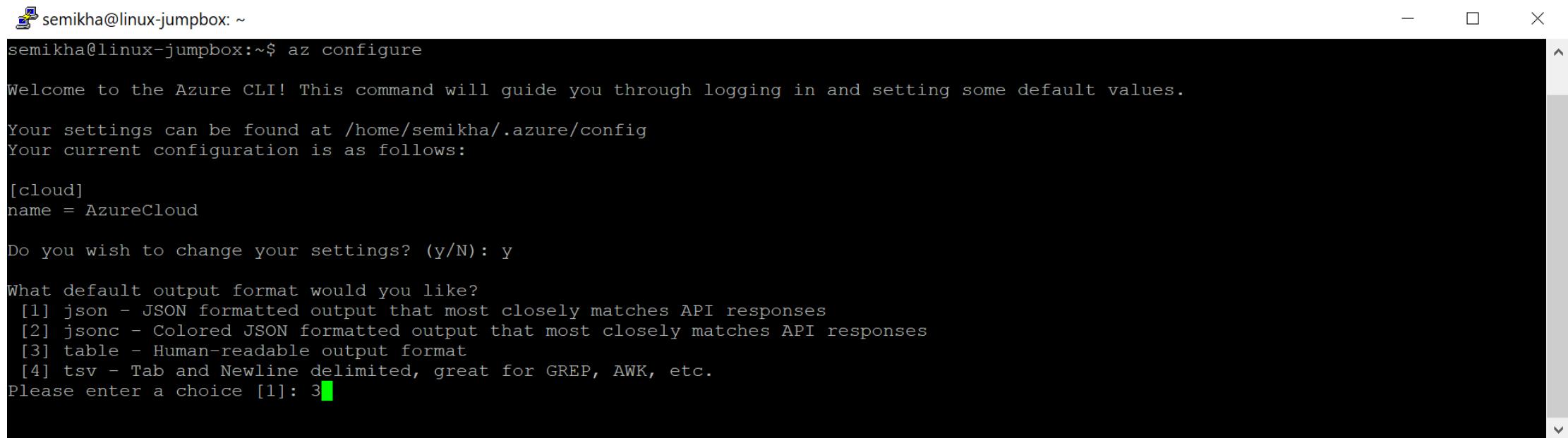
# Getting Started with the Azure Linux CLI

- Available on Mac, Linux and Windows
- Cloud Shell also available at <http://portal.azure.com>
- Installation instructions <http://aka.ms/azure-cli-2>
- If you are new to the Azure Linux CLI, a guide is provided:  
<https://docs.microsoft.com/en-us/cli/azure/get-started-with-azure-cli?view=azure-cli-latest>
- Once installed, you may use the Azure Linux CLI to log in to your subscription. All commands are entered via the "az" command:

```
semikha@linux-jumpbox:~$ az login
To sign in, use a web browser to open the page https://aka.ms/devicelogin and enter the code BXZD72NSB to authenticate.
```

# Getting Started with the Azure Linux CLI

- To change the output format of the Azure Linux CLI, run the command **"az configure"**
- The default output format is JSON



semikha@linux-jumpbox: ~

```
semikha@linux-jumpbox:~$ az configure

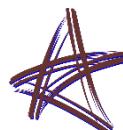
Welcome to the Azure CLI! This command will guide you through logging in and setting some default values.

Your settings can be found at /home/semikha/.azure/config
Your current configuration is as follows:

[cloud]
name = AzureCloud

Do you wish to change your settings? (y/N): y

What default output format would you like?
[1] json - JSON formatted output that most closely matches API responses
[2] jsonc - Colored JSON formatted output that most closely matches API responses
[3] table - Human-readable output format
[4] tsv - Tab and Newline delimited, great for GREP, AWK, etc.
Please enter a choice [1]: 3
```



Pro Tip: You can modify the output results to any command with the --output or --out operator added to any common Azure CLI command (e.g. > az vm list --output json )

# Getting Started with the Azure Linux CLI

- To find a list of available options, use the command: “**az help**”
- The default output format is JSON

```
sean@acs-k8s-jumpbox-sm:~$ az help

For version info, use 'az --version'

Group
  az

Subgroups:
  account      : Manage subscriptions.
  acr          : Manage Azure Container Registries.
  acs          : Manage Azure Container Services.
  ad           : Synchronize on-premises directories and manage Azure Active Directory
                  resources.
  appservice    : Manage your App Service plans.
  batch         : Manage Azure Batch.
  billing       : Manage Azure Billing.
  cdn          : Manage Azure Content Delivery Networks (CDN).
```



Pro Tip: You can see syntax for a popular command with > az [command] ... (the ellipses will force an error which results in syntax being returned)

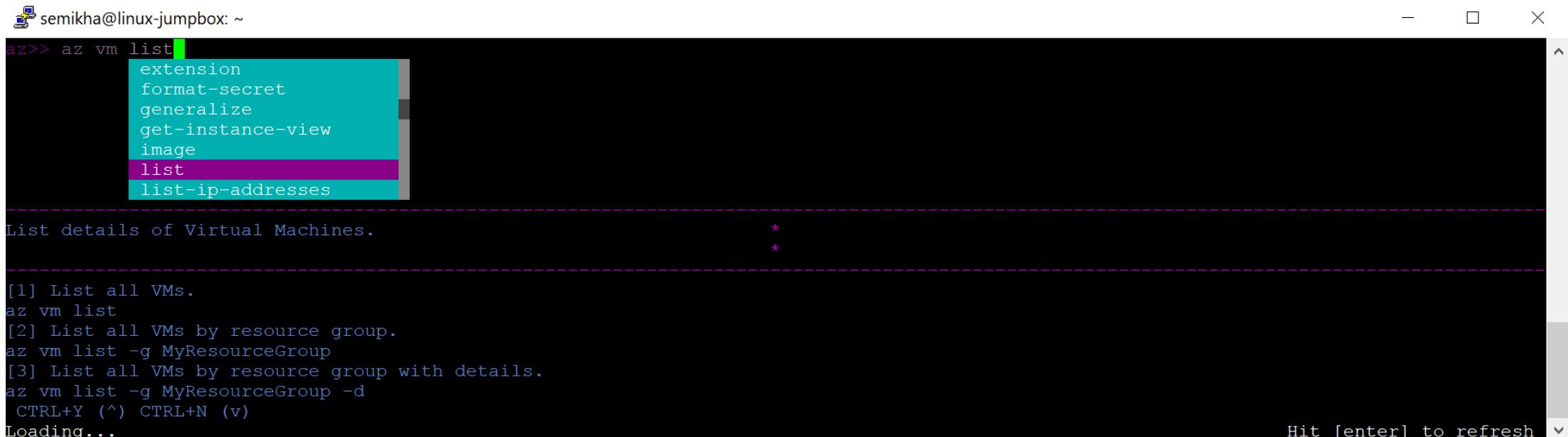
# Getting Started with the Azure Linux CLI

- A service principal is a service account that is created and attached to a specific subscription and is intended for integration purposes
- Designed to allow control to extend to the resource-group level
- To create a service principal: "**az ad sp create-for-rbac --name="my-service-principal" --role="Contributor" --scopes="/subscriptions/<INSERT SUBSCRIPTION ID HERE>"**

```
sean@Azure:~$ az ad sp create-for-rbac --name 'service-principal-name1' --password 'P@ssword1'
Retrying role assignment creation: 1/36
{
  "appId": "76f4841f-5c0f-4259-be50-ccdf523c71bc",
  "displayName": "service-principal-name1",
  "name": "http://service-principal-name1",
  "password": "P@ssword1",
  "tenant": "72f988bf-86f1-41af-91ab-2d7cd011db47"
}
```

# Getting Started with the Azure Linux CLI

- The CLI can help you build the commands you need to run against your azure subscription
- Interactive mode provides a TUI to assist in building commands
- To create a service principal: “**az interactive**”



A screenshot of a terminal window titled "semikha@linux-jumpbox: ~". The user has typed "az vm list" and is using the Tab key to cycle through command suggestions. The suggestions include "extension", "format-secret", "generalize", "get-instance-view", "image", "list", and "list-ip-addresses". Below the suggestions, a list of options is displayed:

```
az>> az vm list
      extension
      format-secret
      generalize
      get-instance-view
      image
      list
      list-ip-addresses

List details of Virtual Machines.

[1] List all VMs.
az vm list
[2] List all VMs by resource group.
az vm list -g MyResourceGroup
[3] List all VMs by resource group with details.
az vm list -g MyResourceGroup -d
  CTRL+Y (^)  CTRL+N (v)
Loading...
Hit [enter] to refresh
```

# Getting Started with the Azure Linux CLI

- You may query the CLI for the command you require, similar to a "man -k" / "apropos"
- Query the CLI as follows: "**az find --search-query 'image'**"

```
semikha@linux-jumpbox: ~
semikha@linux-jumpbox:~$ az find --search-query 'image'
`az vm image list`
    List the VM/VMSS images available in the Azure Marketplace.

`az vm image show`
    Get the details for a VM image available in the Azure Marketplace.

`az image create`
    Create a custom Virtual Machine Image from managed disks or
    snapshots.

`az vm image list-offers`
    List the VM image offers available in the Azure Marketplace.

`az vm image list-publishers`
    List the VM image publishers available in the Azure Marketplace.

`az image show`
    Gets an image.
```

# Getting Started with the Azure Linux CLI

- The Azure CLI can also be used to create/destroy virtual machines
- To create a VM: “**az vm create --name myVM --resource-group MyRG --image UbuntuLTS**”

```
sean@acs-k8s-jumpbox-sm:~$ az vm create --name MyVM --resource-group MyRG --image UbuntuLTS --generate-ssh-keys
ResourceGroup      PowerState    PublicIpAddress   PrivateIpAddress   MacAddress       Location
-----  -----  -----  -----  -----  -----
MyRG          VM running    52.173.73.131     10.0.0.4        00-0D-3A-90-68-2E centralus
sean@acs-k8s-jumpbox-sm:~$ 
```

- At least these three parameters are required to create a virtual machine, however many more are often used

# Getting Started with the Azure Linux CLI

- Azure has a massive number of options for Linux virtual machines
- To query the available options use: “**az vm image list --offer CentOS --publisher OpenLogic --all**”

```
sean@acs-k8s-jumpbox-sm:~$ az vm image list --offer cent --publisher open --sku 6.9 --all
Offer    Publisher      Sku   Urn                                Version
-----  -----      -----  -----
Centos   OpenLogic      6.9   OpenLogic:CentOS:6.9:6.9.20170405  6.9.20170405
Centos   OpenLogic      6.9   OpenLogic:CentOS:6.9:6.9.20170421  6.9.20170421
Centos   OpenLogic      6.9   OpenLogic:CentOS:6.9:6.9.20170517  6.9.20170517
Centos   OpenLogic      6.9   OpenLogic:CentOS:6.9:6.9.20170612  6.9.20170612
Centos   OpenLogic      6.9   OpenLogic:CentOS:6.9:6.9.20170707  6.9.20170707
```

- Do not forget to use the “--all” command or the output may be incomplete

# Challenge 3

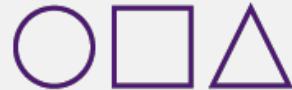
Live Migrate your Linux  
Workloads to Microsoft Azure

# CloudEndure Live Migration

## CloudEndure Key Technology Pillars



OS-based continuous block-level replication



Replicate any applications from physical / virtual / cloud-based machines



Minimal footprint replication staging area



Designed for busy databases without impacting performance



No disruption or reboot of source machine(s)

## CloudEndure Live Migration benefits



Reduce human labor and complexity

- ✓ No need for special skills around OS/Apps/DBs
- ✓ Cut project timelines
- ✓ No DB-level tools required
- ✓ Wide variety of supported OS's



Shorten cutover window / downtime

- ✓ Data is always in real-time sync
- ✓ Cutover windows of minutes



Non-disruptive easy testability

- ✓ No impact on source application
- ✓ No impact on replication
- ✓ Easily test in network isolation



Project management dashboard

- ✓ Track progress
- ✓ Identify project risks
- ✓ Integration with Migration Hub



Migration automation and optimization

- ✓ Run migration & cutover jobs in parallel
- ✓ Leverage Documented APIs
- ✓ Integrated Post-Script support



Predictable and no-risk cutover

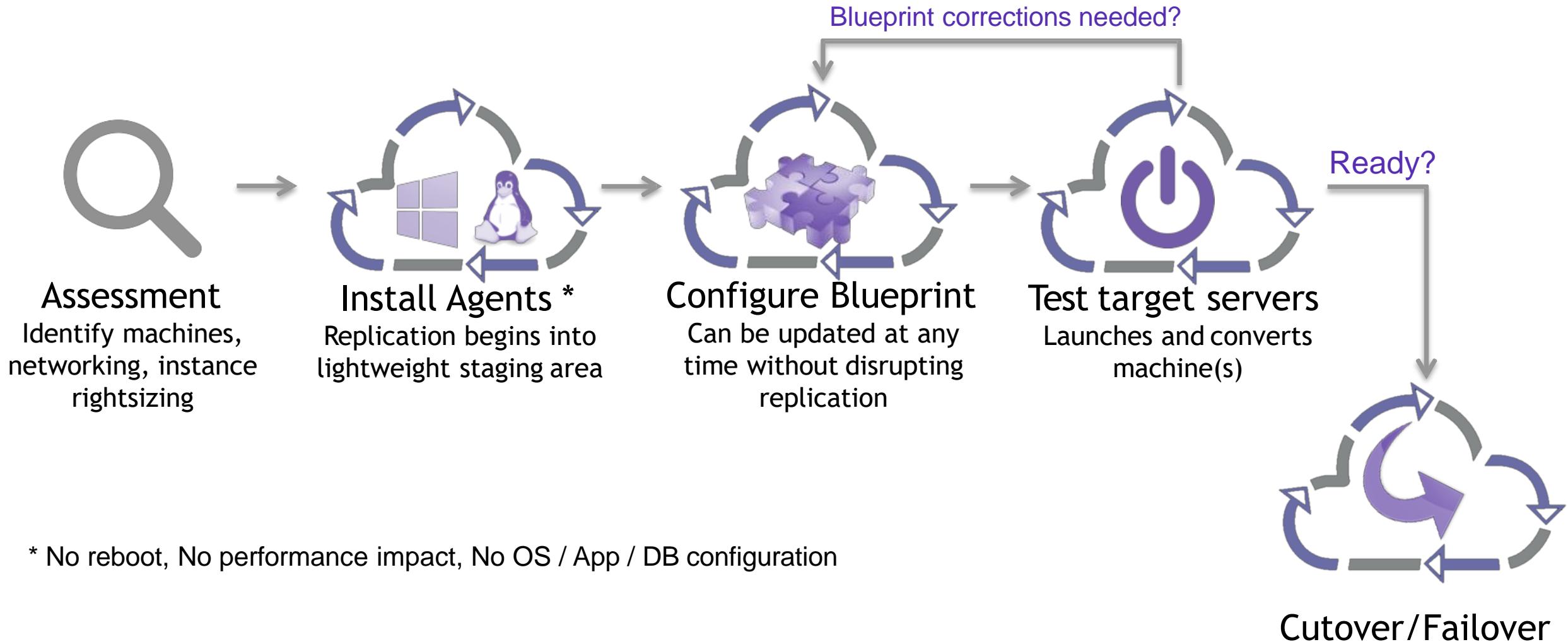
- ✓ Test for 100% confidence
- ✓ No surprises during cutover



# CloudEndure benefits - summary

- Replicate from physical or virtual machines (any hypervisor)
- Replicate from other clouds (such as AWS, Google, Rackspace etc.)
- Support for wide variety of OS types and flavors, both Windows and Linux
- Supports any application and DB (such as Oracle, SQL servers, SAP, SharePoint etc.)
- Simple to deploy (agent only, no appliances or storage required in source location)
- Continuous block-level replication
- Simple orchestration (launch target machines at scale via API and post-script automation)
- Lightweight and non-disruptive agent (no reboot or performance impact)
- Supports simple fail-back

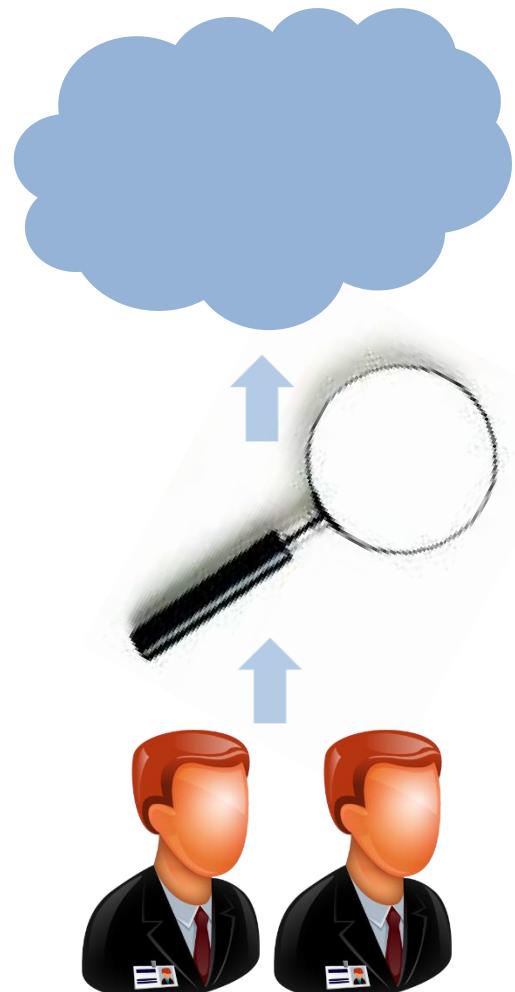
# Replication workflow with CloudEndure



# Challenge 4

Analyze, size, and estimate  
the cost of your enterprise in  
Microsoft Azure

# Technical Deliverables....

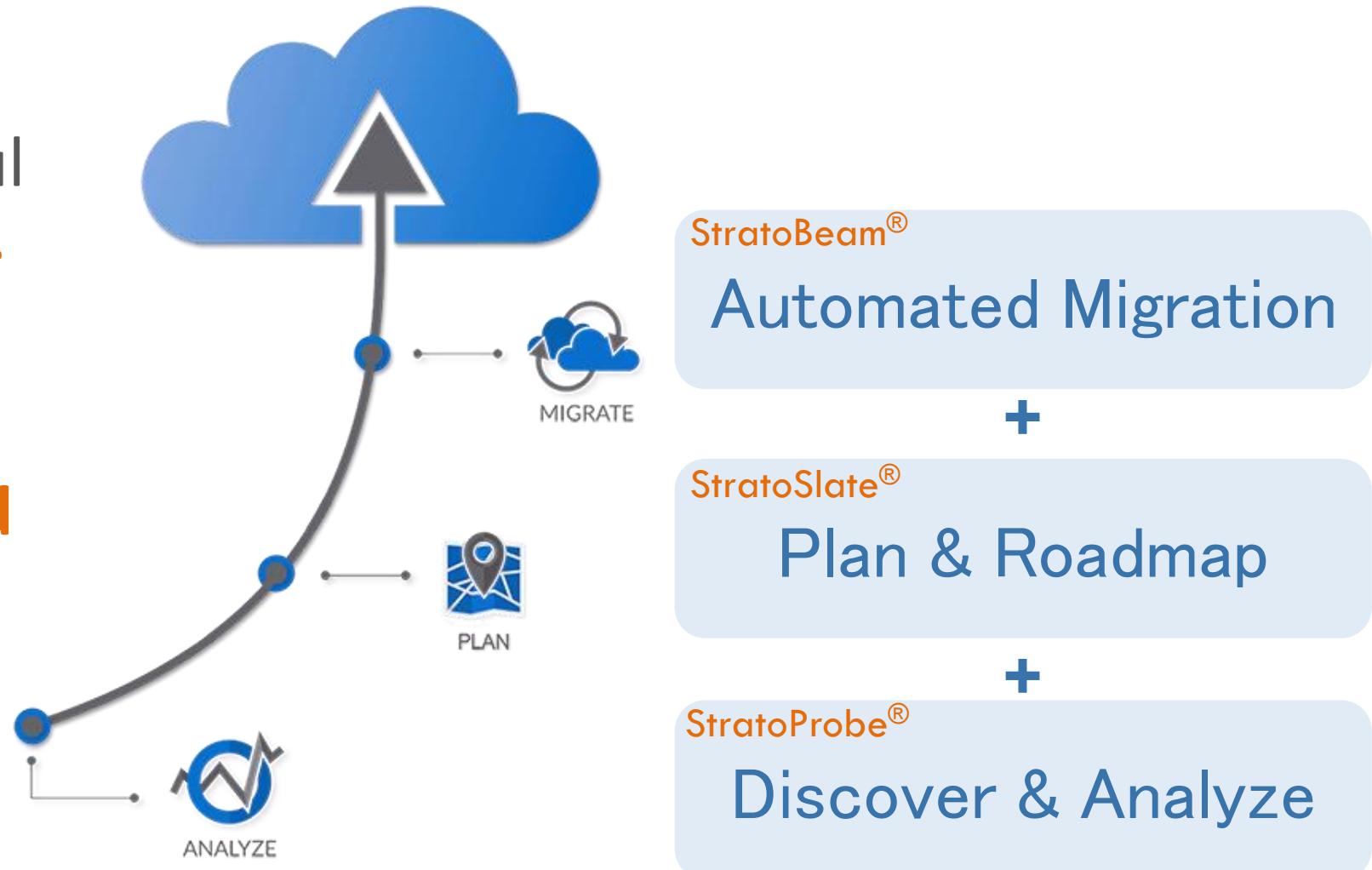


Enterprise IT

- Inventory Analysis
- Requirements Definition
- Cloud-fit Analysis
- Dependency Mapping
- Application Mapping
- Financial Modeling
- Migration Automation

# The StratoZone Solution

The most powerful end-to-end **cloud-enablement** platform for **accelerating cloud consumption**.



# Our Cloud Planning Approach



**Understand  
Your  
Environment  
and Needs**



**Plan Your  
Requirements  
and Create  
Your  
Roadmap**



**Identify Cost  
Savings and  
Best-Fit  
Products**



**Create Your  
Migration Plan  
and Migrate  
Assets**

**Fast and actionable results through automation!**

# Industry-leading, cognitive dependency & app mapping

**Actions**

- Back To Dependency Groups
- Add Workloads to Group
- Add Workloads to Application
- View Installed Apps
- View Running Processes
- View Running Services

**Grouping**

- ▲ Unknown Servers
- Group Unknown Servers

▼ Function

**Exclusion Filters** clear

- ▼ Ports
- ▼ Protocol
- ▼ App
- ▼ Asset

**Workload Dependency**

Group Name: Boston [edit group name](#)

Customer : Demo Corp

Action	Asset	Function	Dependencies (Known/Unknown)
<a href="#"></a> <a href="#"></a> <a href="#"></a>	192.168.5.75 / localhost.localdomain	Unknown Application / Development Server	23 (0 / 23)
<a href="#"></a> <a href="#"></a> <a href="#"></a>	192.168.15.131 / STZ-WEBSVC01	IIS Web Server / Web Server	13 (2 / 11)

# Multi-scenario savings and ROI comparisons

## StratoMatch Comparison

**Customer : ACME, Inc**

Build Group	Assets	Configuration Summary		
▲ All Assets <i>Build Group</i>	25	Total vCPUs: 41	Total Storage: 3.4 TB	Total Memory: 155.4 GB
		Machines with Partial Run Time(less than 730 hours per month): 0		
 PRIVATE DATA CENTER	 Microsoft Azure	 Microsoft Azure 10% discount applied		 Azure Stack
<b>Private Data Center</b>	<b>Rackspace</b>	<b>Microsoft Azure</b>	<b>Dell EMC</b>	
Hosting Region: North America	Hosting Region: East US 2	Hosting Region: East US 2		Hosting Region: TP Public Cloud
<u>Monthly Price</u>	<u>Monthly Price</u>	<u>Monthly Price</u>		<u>Monthly Price</u>
Infrastructure Cost: \$11,573.82	Infrastructure Cost: \$2,829.02	Infrastructure Cost: \$2,314.29		Infrastructure Cost: \$9,961.02
Other Costs: \$0.00	Other Costs: \$0.00	Other Costs: \$0.00		Other Costs: \$0.00
Total Cost: \$11,573.82	Total Cost: \$2,829.02	Total Cost: \$2,314.29		Total Cost: \$9,961.02
<b>Savings</b>	<b>\$8,744.80 (75.56%)</b>	<b>\$9,259.53 (80.00%)</b>		<b>\$1,612.80 (13.93%)</b>

<p>▼ Chicago Collector</p>	1	Total vCPUs: 4	Total Storage: 1.3 TB	Total Memory: 7.9 GB
Machines with Partial Run Time(less than 730 hours per month): 0				

# Challenge 5

Overview of Optional  
Challenges

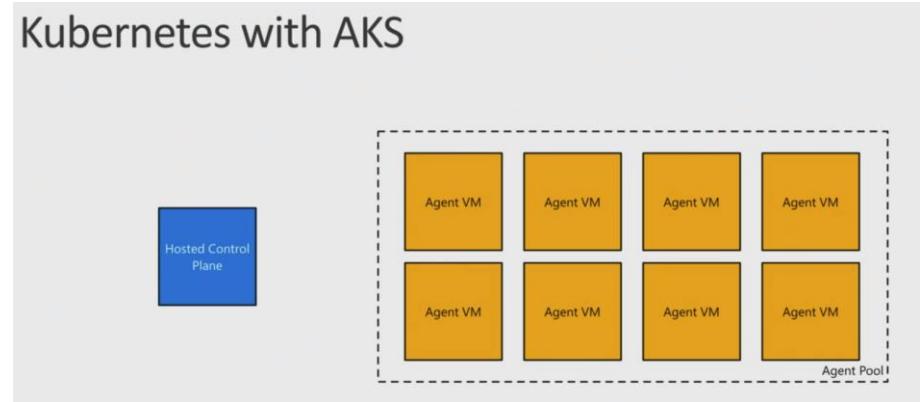
# Challenge 5a

Introduction to Azure Container Service (AKS)

# Introduction to AKS

- Container hosting solution optimized for Azure
- Azure-hosted control plane
- Only pay for resource consumption
- Automated upgrades, self-healing, easy scaling
- Ease Kubernetes management with open source upstream portability

Kubernetes with AKS



Announcing the preview of AKS,  
managed Kubernetes

[Learn more >](#)



Azure



# Introduction to AKS

- Fully managed Kubernetes control plane:
- No VMs to operate; No patching required
- Provisioned in under 2 minutes
- SLA-available service (99.95%)
- Transparently scales with cluster size:
- 1, 50, 100, 250, 500, etc.
- Upstream Kubernetes
- Free (no charge for control plane)

# Introduction to AKS

- Automated Kubernetes upgrades
- Self-healing Control Plane
- etcd SSD backed, automated, H/A, backup/restore
- Customized networking (Azure VNETs, CNI)
- Cluster scaling
- TLS everywhere. Backed by Azure KeyVault
- RBAC and Azure AD integrated
- Hybrid Clusters (future)

# Challenge 5b

Integrating Ansible CLI to Microsoft Azure

# Integrate Ansible to Azure

Examining an Ansible Playbook utilizing an Azure Module

```
- hosts: localhost
  connection: local
  gather_facts: no
  tasks:
    - name: Create Azure Deploy
      azure_rm_deployment:
        state: present      (Set to absent if you want to remove)
        location: eastus2    (Specify your Azure Data Center)
```

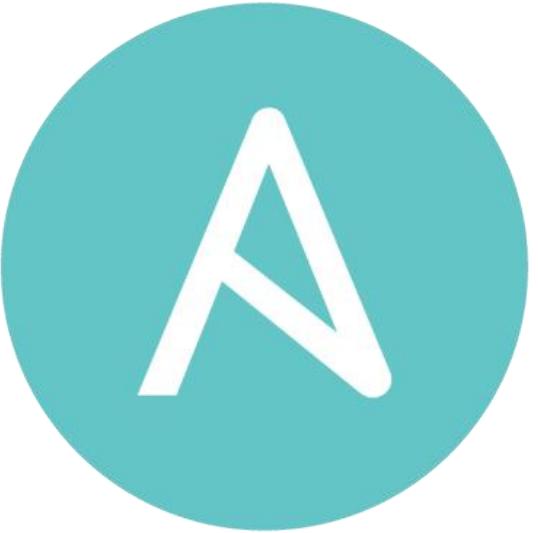
# Integrate Ansible to Azure

```
resource_group_name: AnsibleTestCentOSRG (Specify RG)
parameters:
    adminUsername:
        value: ansibleadmin
    sshKeyData:
        value: "<Your SSH Public Key>"
    template_link:
'https://raw.githubusercontent.com/stuartatmicrosoft/ansible-
playbook-repo/master/centos7-prem.json'
    register: azure
```

# Integrate Ansible to Azure

Installing Required Python Modules & Azure SDK

- `yum -y install ansible`
- `useradd ansible`
- `pip install --upgrade pip`
- `pip install ansible[azure]`
- `su - ansible`
- `mkdir $HOME/.azure`



# Integrate Ansible to Azure

Configuration File Overview:

- `tee $HOME/.azure/credentials <<EOF`
- `[default]`
- `subscription_id=`
- `tenant=`
- `client_id=`
- `secret=`
- `EOF`



# Integrate Ansible to Azure

Create Service Principal for Ansible to connect to Microsoft Azure:

**az account show --expanded-view**

EnvironmentName	SubscriptionId	SubscriptionName	TenantId	UserName
AzureCloud	jw96fa2f-9yfw-f2a2-h2bv-e7dj3lc9sh4e	Microsoft Azure Internal Consumption	37ek9s02-f73w-n3fd-83hg-i83ys8zbbw41	stkirk@microsoft.com

Obtain value for “SubscriptionId” and “TenantId”

**az ad sp create-for-rbac --name=”<name-of-sp>” --role=“Contributor”--scopes=/subscriptions/<SubscriptionId>”**

AppId	DisplayName	Name	Password	Tenant
j3te9dh4-7ey3-jfje-83ue-fj4irnb49d83	stkirk-summit-2017	http://stkirk-summit-2017	fj3janf2-je3q-n3o2-022i-j4ne3jdkwi33	37ek9s02-f73w-n3fd-83hg-i83ys8zbbw41

Make note of both “AppId” and “Password”



# Integrate Ansible to Azure

Step by Step Overview:

- **ansible-playbook centos-azure-create.yml**



# Integrate Ansible to Azure

Deploy and Test an IaaS Virtual Machine:

- `vi /etc/ansible/hosts`
- `ansible -m ping all`
- `ansible-playbook helloworld.yml`
- `az account list --output table`
- `az group list`
- `az vm list -g AnsibleTestCentOSRG -d`

# Integrate Ansible to Azure

Population of ~ansible/.azure/credentials file:

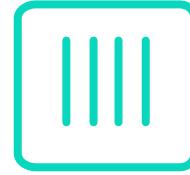
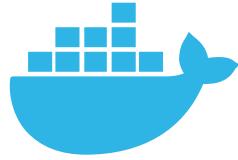
- "subscription\_id" | az account list --output table
- "tenant" | az account show -s <subscription>
- "client\_id" | az ad sp create-for-rbac (AppId)
- "secret" | az ad sp create-for-rbac (Password)

## Challenge 5c

Containerize an application with Docker

# About Docker, Inc.

Docker is the company driving the container movement



**21.0M**

Docker Hosts

**24B**

Container downloads

**77K%**

Growth in Docker job listings

- Company driving the container movement and industry standards
- Container platform for both developers and IT pros
- Customers Include:



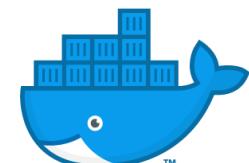
NORTHERN  
TRUST



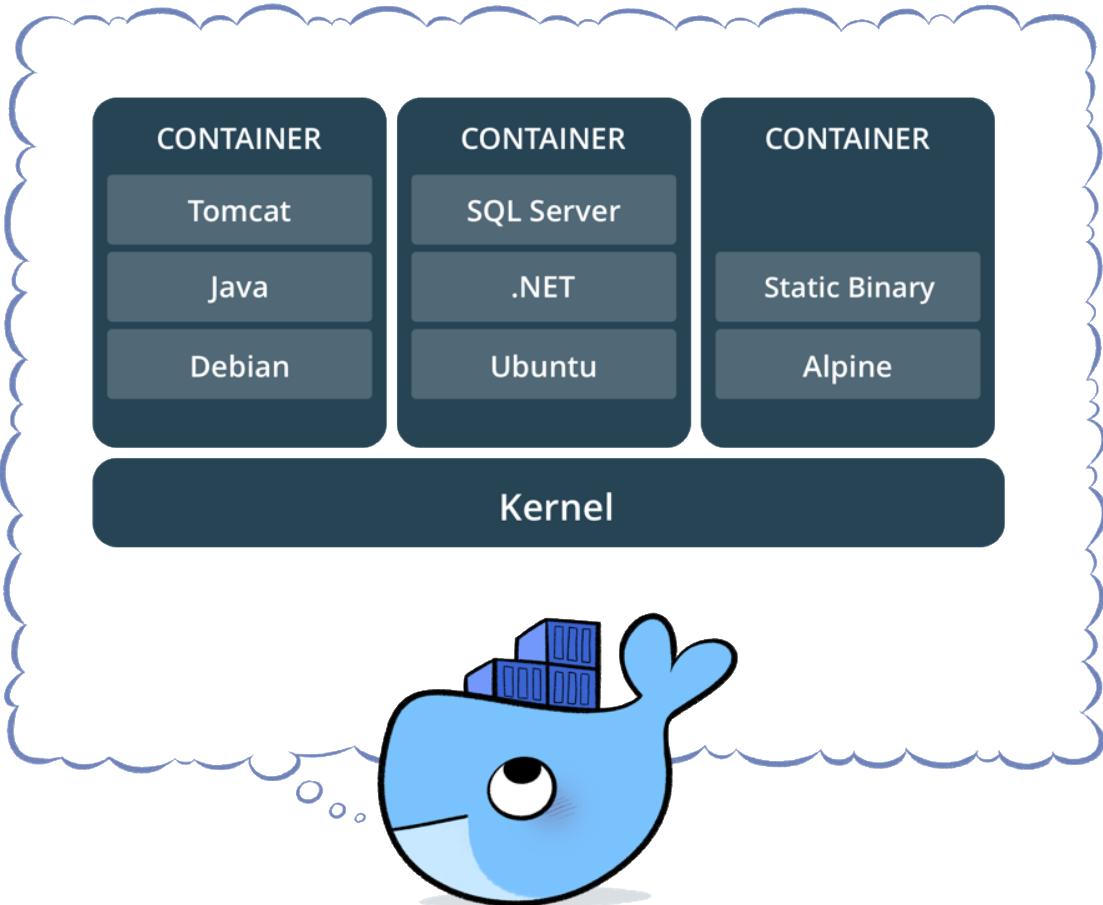
LIBERTY MUTUAL.  
INSURANCE



INDIANA UNIVERSITY



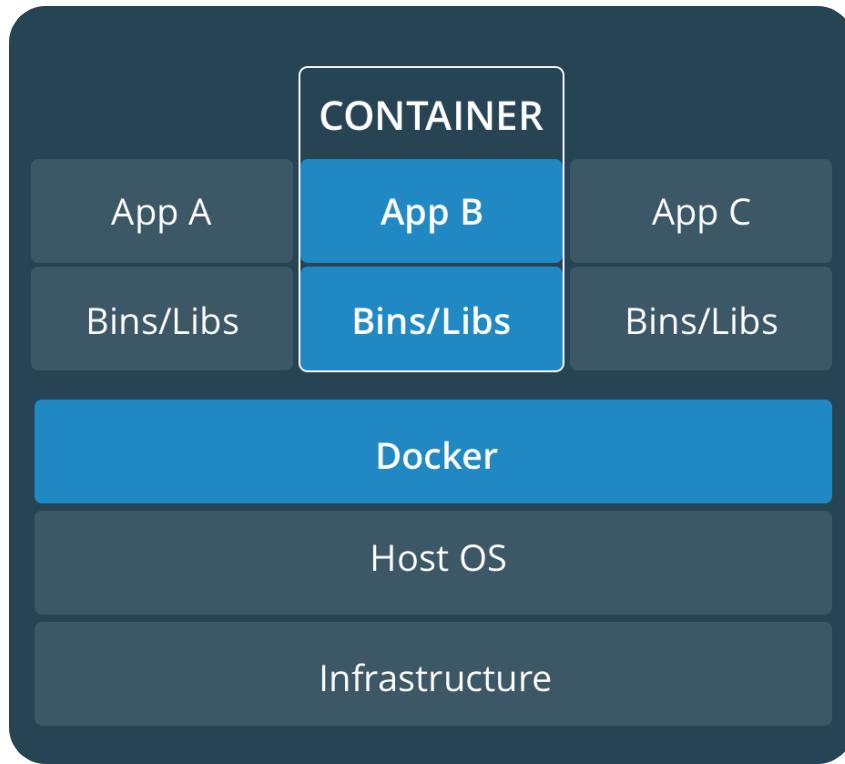
# What is a Docker container?



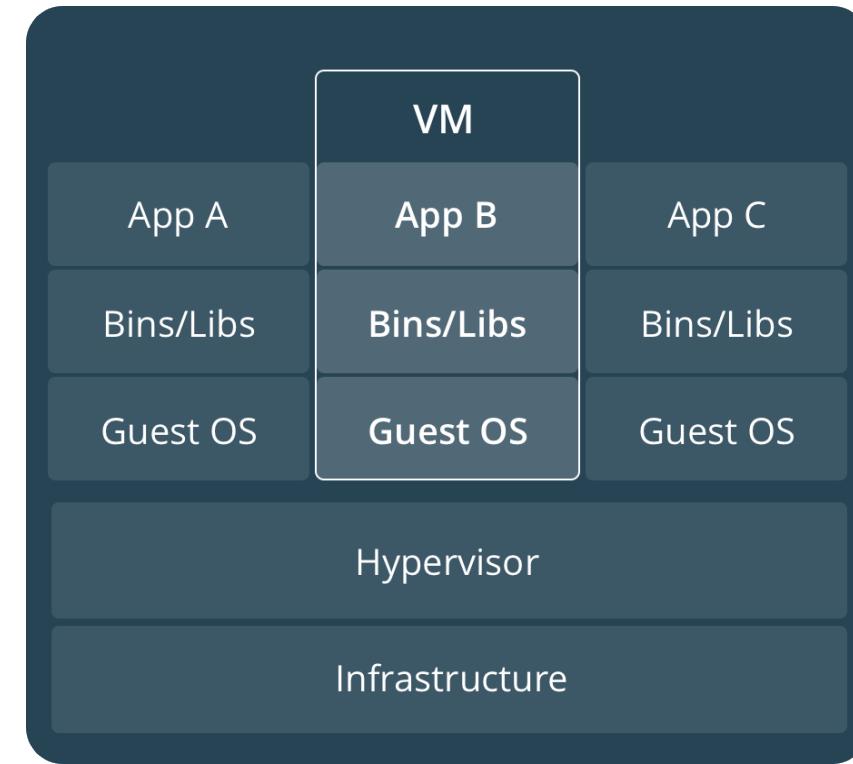
- Containers are application level tools
- Package software and dependencies into an isolated process
- Share the underlying OS kernel
- Available for Linux and Windows



# Comparing Containers and VMs



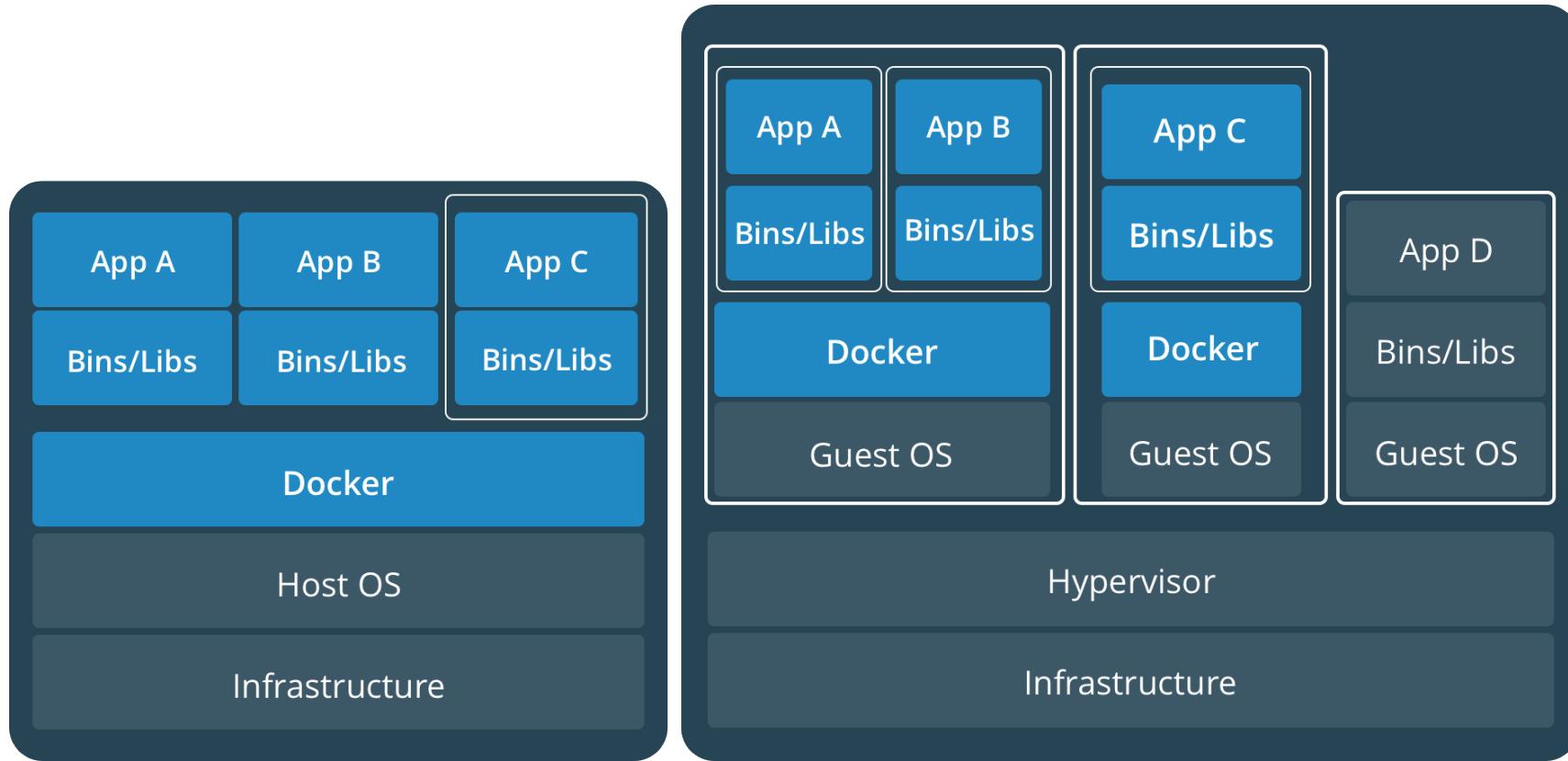
Containers are an app level  
construct



VMs are an infrastructure level  
construct to turn one machine into  
many servers



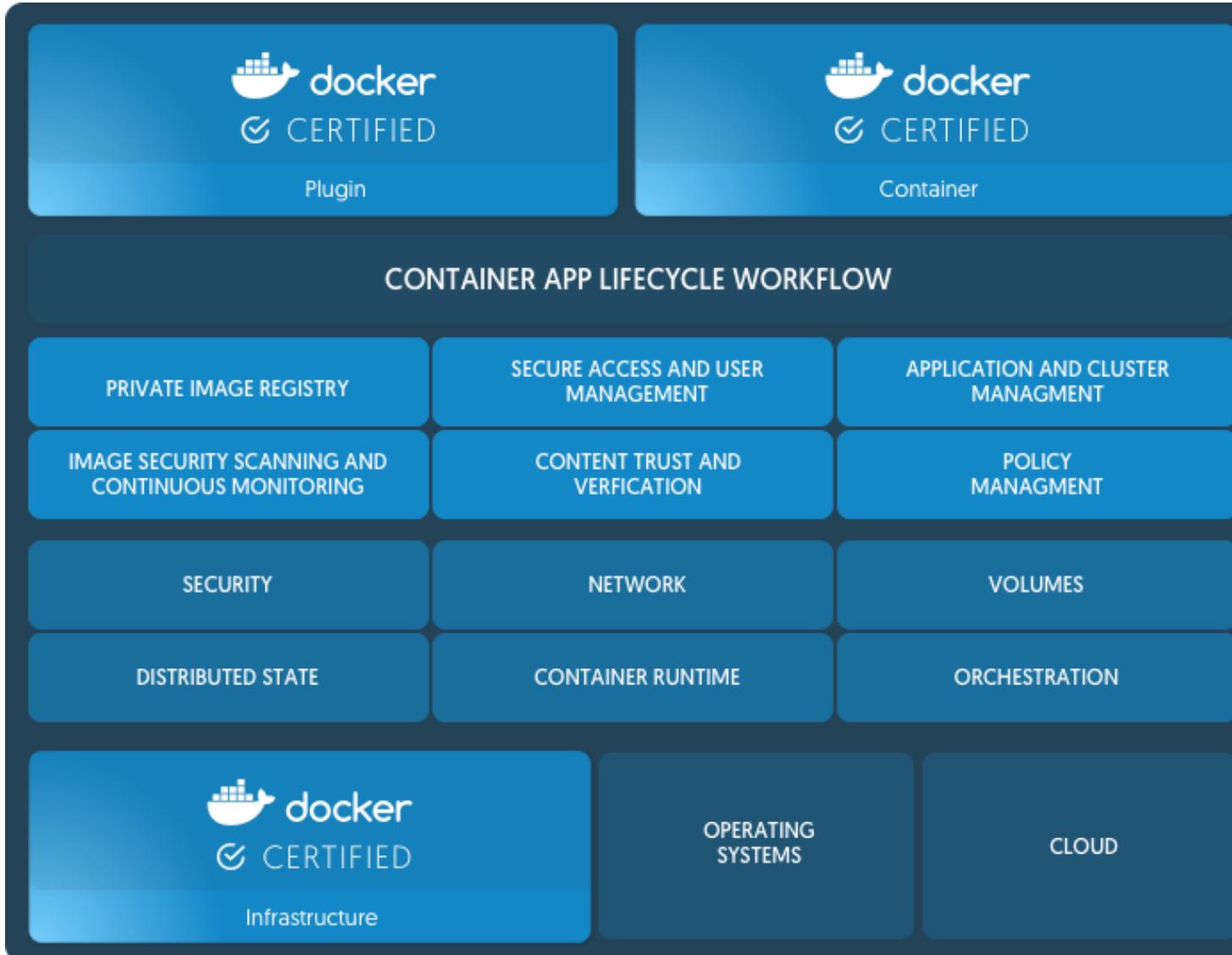
# Containers and VMs together



Containers and VMs together provide a tremendous amount of flexibility for IT to optimally deploy and manage apps.



# Docker Enterprise Edition: Container management and security platform



CERTIFIED PLUGINS FOR NETWORKING  
AND STORAGE

CERTIFIED CONTAINERS FOR ISV APPS

SECURE SOFTWARE SUPPLY CHAIN

INTEGRATED CONTAINER LIFECYCLE  
MANAGEMENT

MULTI-ARCHITECTURE OPERATIONS:  
WINDOWS, LINUX, MAINFRAME

CONTAINER RUNTIME

CERTIFIED INFRASTRUCTURE –  
OS AND CLOUD



# Modernize Traditional Apps [MTA] with Docker Enterprise Edition to simplify and accelerate cloud migration

Get immediate savings without disruption



## Portability

Hybrid  
Cloud-Ready



## Agility

2x Faster



## Security

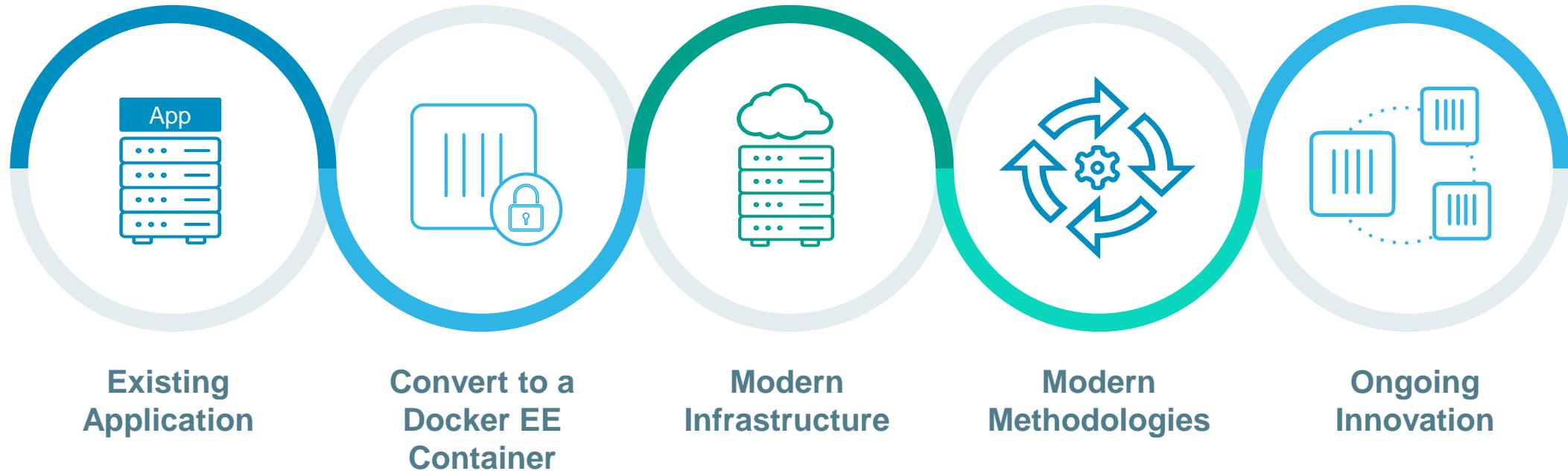
Isolation  
& Integrity



Reducing total costs by **50%**

# Modernization Traditional Apps [MTA] with Docker Enterprise Edition

Repackage apps and migrate to Azure in less than 5 days without recoding



We are here to help! Learn more about our program  
[www.docker.com/MTA](http://www.docker.com/MTA)



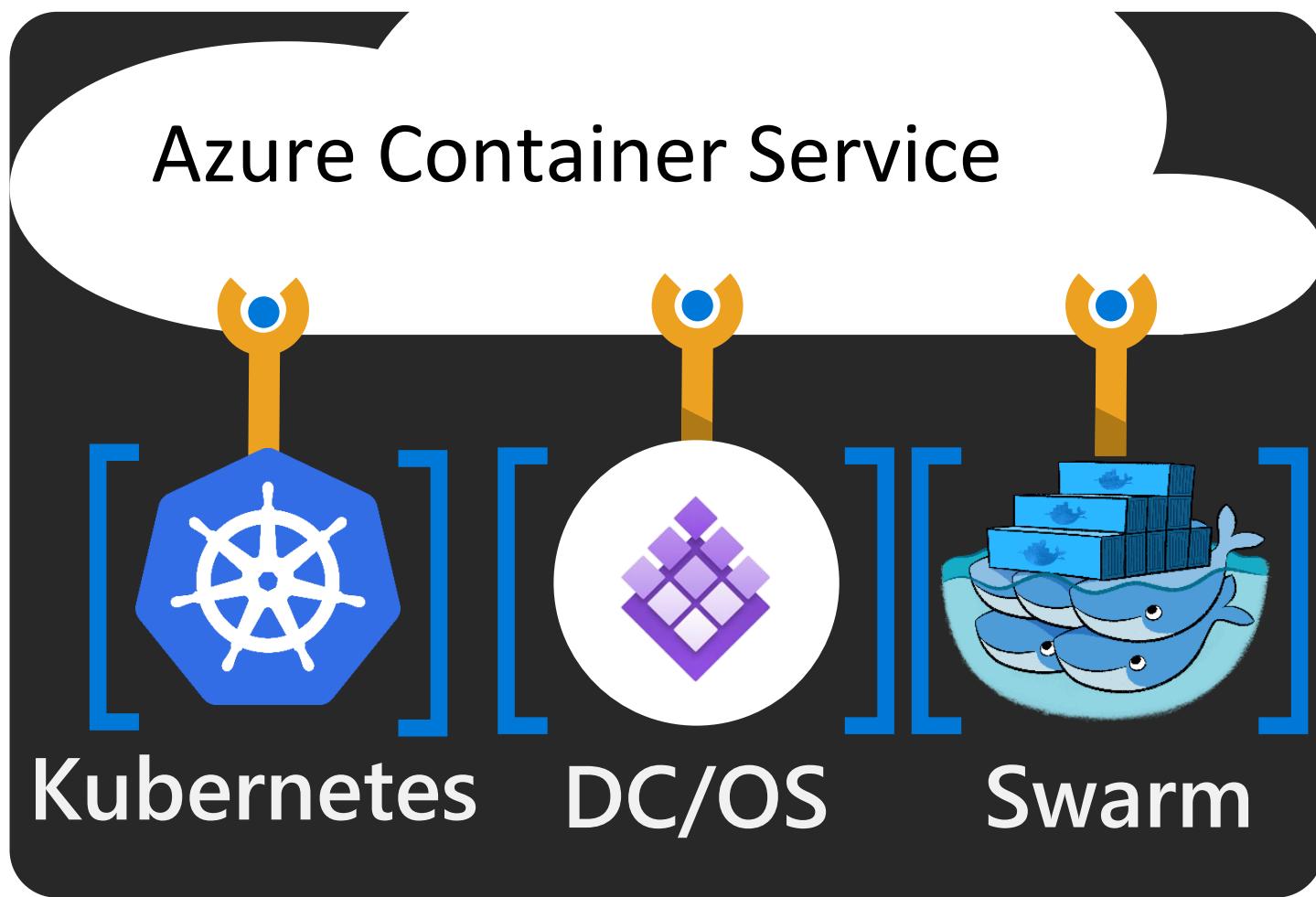
# Challenge 5d

Introduction to Azure Container Service (ACS)

# Introduction to ACS

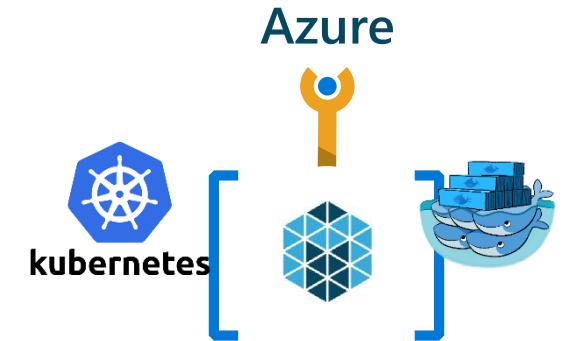
"Deploy and manage containers using the tools you choose"

- Standard Tooling and API support
- Streamlined provisioning of Mesosphere DC/OS, Docker Swarm and Kubernetes



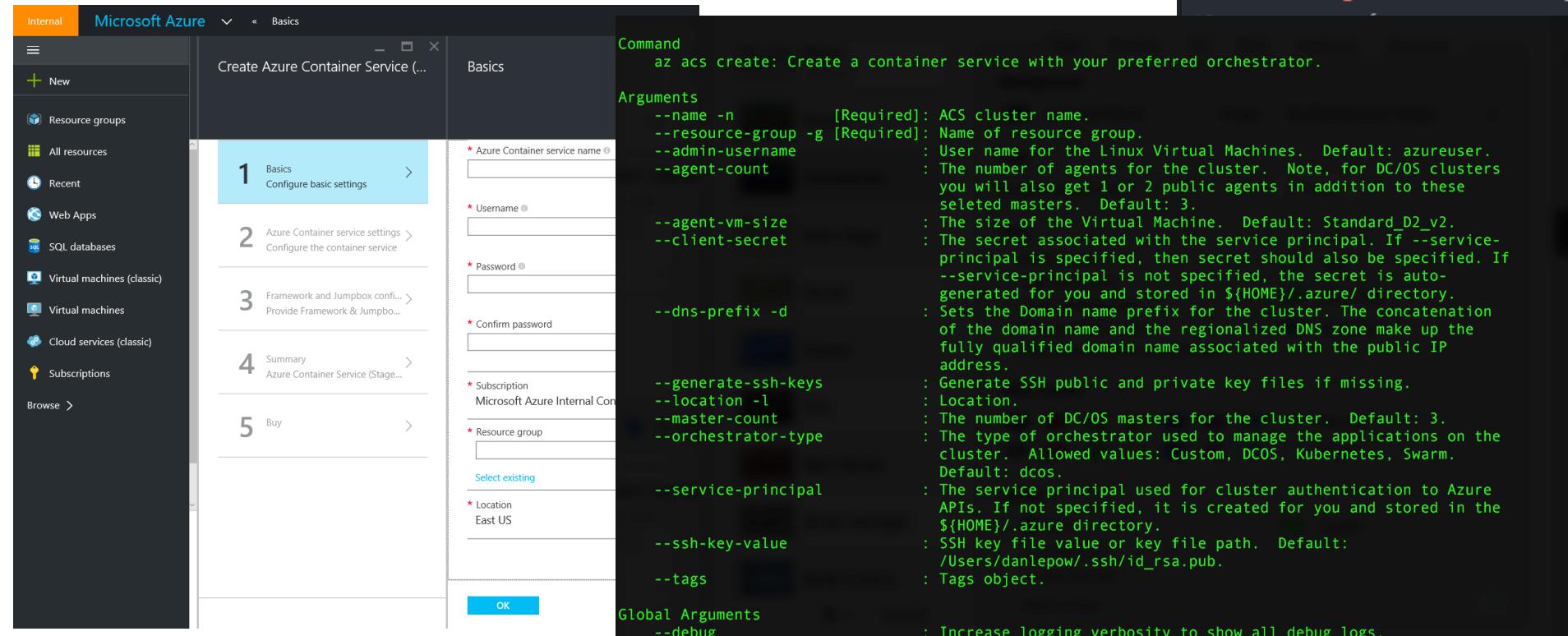
# Introduction to ACS

- Managed delivery of optimized container hosting solution
- Manage container applications using popular open source tooling
- Scale & orchestrate using Mesosphere DC/OS, Swarm, or Kubernetes
- Migrate container workloads to and from Azure
- Full support from Microsoft / Docker / Mesosphere
- Leverage Azure Platform capabilities
  - Azure Resource Manager
  - VM Scale Sets
  - Networking
  - Security



# Introduction to ACS

- Deploy using the Portal, CLI, or ARM



```
1  {
2      "apiVersion": "2015-11-01-preview",
3      "type": "Microsoft.ContainerService/containerServices",
4      "name": "MyContainerService",
5      "location": "[resourceGroup().location]",
6      "properties": {
7          "orchestratorProfile": { "type": "mesos" },
8          "masterProfile": {
9              "count": "3",
10             "dnsPrefix": "containerservicemgmt"
11         },
12         "agentPoolProfile": [
13             {
14                 "count": "2",
15                 "vmSize": "Standard_D2_v2",
16                 "osType": "Linux",
17                 "osDiskSizeGB": 30,
18                 "osDiskCaching": "None",
19                 "osDiskName": "osdisk",
20                 "osType": "Linux",
21                 "osDiskType": "Managed",
22                 "osDiskCreateOption": "FromImage",
23                 "osDiskUri": "https://containe
24             }
25         ],
26         "privateEndpointConnections": [
27             {
28                 "name": "privateEndpointConnection1",
29                 "privateLinkServiceId": "https://privat
30             }
31         ],
32         "agentPoolType": "VirtualMachineScaleSets"
33     }
34 }
```

privateCluster",  
dard\_A1",

ontainerserviceapp"

inerservicejb"

zureuser",

assword1234\$",

": {

keys": [ {"keyData": "AAAAAB3NzaC1yc2E

# ACS-Engine Overview

- Generates ARM templates for Azure Container Service clusters
- Go based tool can be run in Docker or natively on Windows, OS X, Linux
- Cluster defined by a JSON cluster definition file
- Output is an ARM template for deploying ACS into Azure
- Deploy via Azure CLI or PowerShell
- Some of the customization options:
  - Choice of DC/OS, Kubernetes, or Swarm orchestrators
  - Docker cluster sizes of 1200
  - Custom VNET
- Multiple agent pools where each agent pool can specify:
  - standard or premium VM Sizes
  - node count
  - Virtual Machine Scale Sets or Availability Sets
  - Storage Account Disks or Managed Disks (under private preview)

# SURVEY

Please complete our 10-question survey:

<https://aka.ms/linuxsurvey>

