Red Hat & Microsoft “OpenShift on Azure (OSA)”

Deep dive session

Michalis Kargakis, Senior Software Engineer
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Agenda

• Overview
• User Experience
• Architecture
• Integration
• Teams
• Support
• Timeline
• References
Overview
Overview

• Easily deploy fully managed, scalable OpenShift clusters on Azure

• First OpenShift service offering in the public cloud

• Jointly managed and supported by Microsoft and Red Hat
Overview

• Run within customer’s Azure subscription, with joint SLA

• Red Hat is responsible for the majority of the operational workload

• Architecture is highly opinionated to avoid pitfall of excessive configurables

• Compliant with SOC, ISO, PCI DSS, and HIPAA
User Experience
User Experience

0. Log into the Azure Portal

1. **Create** OpenShift clusters into your Azure subscription

*Note: the Portal is still a work in progress*
OpenShift on Azure

OpenShift on Azure (OSA) manages your hosted OpenShift environment, making it quick and easy to deploy and manage containerized applications without container orchestration expertise. It also eliminates the burden of ongoing operations and maintenance by provisioning, upgrading, and scaling resources on demand, without taking your applications offline. Learn more about OpenShift on Azure.

PROJECT DETAILS
Select a subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

- Subscription: RH OSA Engineering
- Resource group: lucky

CLUSTER DETAILS
- OpenShift cluster name: lucky-eu-west
- Region: UK West
- OpenShift version: 3.11.3
- DNS name prefix: lucky

SCALE
The number and size of compute nodes in your cluster. Master and infrastructure nodes are sized automatically based on the size and count of compute nodes selected. For production workloads, at least 3 nodes are recommended for resiliency. For development or test workloads, only one node is required. You will not be able to change the node size after cluster creation, but you will be able to change...
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- Create new

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OpenShift on Azure

Create OpenShift cluster

Networking

You can choose between two networking options: “Basic” or “Advanced”.

- “Basic” networking creates a new VNet for your cluster using default values.
- “Advanced” networking allows clusters to use a new VNet with customizable addresses.

Learn more about networking in OpenShift on Azure

Network configuration

- Basic
- Advanced

Configure Virtual Networks

- Virtual network
- Cluster subnet
- Kubernetes service address range
- Kubernetes DNS service IP address
- Docker Bridge address

(new) lucky-vnet

(new) default (10.240.0.0/16)

10.0.0.15

10.0.0.10

172.17.0.1/16
OpenShift clusters

Add
Edit columns

NAME

lucky-us-east

Create OpenShift cluster

Basics  Authentication  Networking  Monitoring  Tags  Review + create

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Learn more about networking in OpenShift on Azure

Network configuration

Advanced

Configure virtual networks

- Virtual network: (new) lucky-vnet
- Cluster subnet: (new) default (10.240.0.0/16)
- Kubernetes service address range: 10.0.0.0/16
- Kubernetes DNS service IP address: 10.0.0.10
- Docker Bridge address: 172.17.0.1/16
User Experience

2. View your newly created cluster info
## OpenShift clusters

**Subscriptions:** RH OSA Engineering

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>RESOURCE GROUP</th>
<th>LOCATION</th>
<th>SUBSCRIPTION</th>
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<tbody>
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<td>lucky</td>
<td>East US</td>
<td>RH OSA Engineering</td>
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OpenShift on Azure
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- Resource group: lucky
- Status: Succeeded
- Location: East US
- Subscription: RH OSA Engineering
- Subscription ID: 225e02bc-43d0-43d1-a01a-17e58
- API server address: lucky-us-east-eastus.cloudapp.azure.com/api
- Total cores: 20
- Total memory: 80
- HTTP application routing domain: 695e547eb0f4d0a8891-eastus.aksapp.io

Monitor containers
- Get health and performance insights
- Go to Azure Monitor insights

View logs
- Search and analyze logs using ad-hoc queries
- Go to Azure Monitor logs

View OpenShift console
- Connect to the OpenShift web console
- Learn more
OpenShift on Azure
User Experience

3. Need more capacity? Scale up!
SCALE

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OpenShift on Azure

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 - Master node size
   - 3x Standard D4s v3
     - 4 vcpus, 16 GB memory

 - Infrastructure node size
   - 3x Standard D4s v3
     - 4 vcpus, 32 GB memory

 - Compute node size
   - Standard D4s v3
     - 4 vcpus, 16 GB memory

 - Compute node count
   - 3
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- *Compute node size: Standard D4s v3
  - 4 vcpus, 16 GB memory

- *Compute node count: 3
User Experience

$ az openshift create -g myResourceGroup -n myCluster
- Running ..

$ az openshift list -o table

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>ResourceGroup</th>
<th>OpenShiftVersion</th>
<th>ProvisioningState</th>
</tr>
</thead>
<tbody>
<tr>
<td>myCluster</td>
<td>eastus</td>
<td>myResourceGroup</td>
<td>3.11.3</td>
<td>Succeeded</td>
</tr>
</tbody>
</table>

$ az openshift show -g myResourceGroup -n myCluster
[{..., "fqdn": "myCluster.eastus.cloudapp.azure.com", ...}]
User Experience

$ az openshift scale -c 20 -g myResourceGroup -n myCluster
- Running ..

$ az openshift upgrade -g myResourceGroup -n myCluster
- Running ..
Demo

Pray to the demo gods and create a cluster...
Architecture
Flow of a request

User
- Create application object and service principal
- Request OSA cluster

Microsoft
- External validation
- Enrich internal
- Persist OSA resource

Red Hat
- Convert to internal
- Validate internal
Flow of a request

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- Deploy ARM
- DNS Zone and CNAME
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OpenShift on Azure
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Profit
Flow of a request

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Profit
OpenShift on Azure Architecture

- **DNS**: Public/Internet Accessible
- **Master Load Balancer**
- **Router Load Balancer**
- **OpenShift SDN**
- **Application Nodes (xN)**: App 1, App 2
- **Infrastructure Nodes (x3)**: Router, Registry
- **Master Nodes (x3)**: Docker and Local, ETCD Storage

Storage:
- **Docker and Local**
- **ETCD Storage**
- **Registry Storage (Blob)**
- **App Storage**

Cloud Services:
- **Azure DNS**
- **Public IP Address**
- **Azure Load Balancers**
- **Azure Virtual Network**
- **Network Security Groups**
- **Azure Virtual Machines Scale Sets**
- **Azure Active Directory User Authentication**
- **Azure Storage**:
  - Azure Managed Disk Premium SSDs (VMs)
  - Azure Blob Storage (Registry)
  - Azure Managed Disk Premium SSDs (Apps)

**Resource Group**
Integration
Integration

- Azure DNS
  - External DNS
- Azure Load Balancer
  - Ingress Traffic
- AAD
  - User Authentication
- Metrics
  - Prometheus w/ Grafana
- Azure VM ScaleSets
- Azure Storage
  - etcd, registry, and user application storage
- External Services
  - Azure Service Broker
Default DNS for App Routing
Azure AD Authentication
Azure Disk Dynamic Storage Provisioning
Teams
Teams

Red Hat & Microsoft: two engineering teams working on the same product

- Weekly bluejeans sync-up calls
- Slack channel
- Email
- Github issues and PRs
- Occasional f2f meetings
  - First meeting in Raleigh (Mar ‘18)
  - Second meeting in San Francisco (May ‘18)
  - Third meeting in San Francisco (Jan ‘19)
Teams

Currently:

- **Microsoft:**
  - Team based in PST timezone
  - Mainly San Francisco

- **Red Hat:**
  - 4 North America
  - 3 Europe
  - 2 APAC
Red Hat SRE

- The goal is a 24x7 follow the sun model
- Limited access to customer clusters via Geneva *(no system:admin)*
- Predefined Geneva actions:
  - Get cluster status
  - Rotate infrastructure credentials
  - Backup and restore etcd
  - Ad hoc security updates
Red Hat dev

- https://github.com/openshift/openshift-azure
- https://github.com/openshift/azure-misc
- CI: Prow + ci-operator
  - Unit tests
  - Verification tests
  - Image builds
  - E2e tests
    - OSA e2es
    - Key rotation, etcd backup+restore, scale up+down, ...
    - Origin Conformance
Support
Service responsibilities

Red Hat / Microsoft
- Cluster installation
- Software and security updates
- Cluster monitoring
- Support

Customer
- User and quota management
- Image registry management*
- Application lifecycle & monitoring
- External service integration
Support

- **In-portal** customer experience for PAYG deployments
- **ISO 27001** compliant B2B communication channel
- Integrated support is available 24x7 for Cloud Access (BYOS) as well as On-Demand (PAYG) deployments
Timeline
Timeline

- Announcement
  RH Summit 2018
- Private Preview #1
  October 2018
- Private Preview #2
  Jan/Feb 2019
- Generally Available
  Q1-Q2 2019
References
References


- Private Preview Material
  - Docs: https://github.com/Azure/OpenShift
  - Interest List: https://aka.ms/openshiftazureinterest
Q&A
THANK YOU

plus.google.com/+RedHat
linkedin.com/company/red-hat
youtube.com/user/RedHatVideos
facebook.com/redhatinc
twitter.com/RedHat