Kubernetes IBMCloud SIG – Deep Dive

Sahdev Zala
spzala@us.ibm.com @sp_zala
SIG Co-Chair, Kubernetes contributor

Guang Ya Liu
liugya@cn.ibm.com @gyliu513
Architect, Kubernetes contributor
Agenda

- SIG overview
- SIG structure and activities
- Overview of IBM Cloud
  - IBM Cloud Kubernetes Service (IKS)
  - IBM Cloud Private (ICP)
- IBM Cloud Provider code
- SIG contributions to the Kubernetes upstream
- Summary
A SIG for building, deploying, maintaining, supporting, and using Kubernetes on IBM Public and Private Clouds
- IBM Cloud Kubernetes Service (IKS) and IBM Cloud Private (ICP)
- Both participate in the CNCF Certified Kubernetes Conformance Program and are certified

Many developers and leaders from IBM Cloud work openly in this group to determine the future of IBM Cloud team’s involvement in the Kubernetes community

You can follow the evolution of the IKS and ICP platforms with respect to Kubernetes and related CNCF projects

You interact directly with the team that builds and operates IBM Cloud

Created - April, 2018
Meet every other week
• Wednesdays at 14:00 EST. About 7-10 regular attendees

SIG Leads
• Richard Theis (IKS)
• Khalid Ahmed (ICP)
• Sahdev Zala (OSS)

Read more about the SIG
https://github.com/kubernetes/community/tree/master/sig-ibmcloud

Charter
https://github.com/kubernetes/community/blob/master/sig-ibmcloud/charter.md

Join the SIG ML
https://groups.google.com/forum/#!forum/kubernetes-sig-ibmcloud
Key Discussions in the SIG Meetings

- **Brief presentations**
  - IBM Cloud Kubernetes Service (IKS) updates
    - Overview and demo of IKS
    - Kubernetes update strategy - supports 3 concurrent releases at any time (1.8->1.11 today)
    - Multi-Zone cluster support
  - IBM Cloud Private (ICP) updates
    - Overview and demo of ICP
    - Scalability testing - certified to 1000 nodes. Incremental work - WIP.

- **Discussion around community work**
  - SIG-Cloud-Provider integration
    - We are working on moving as a sub-project
  - IBM Cloud Provider code public repo – WIP
  - SIG maintenance work
    - For example, creating charter
  - Contributions from IBM Cloud developers (PR, Issues, Discussions..)
IBM Cloud Kubernetes Service (IKS)

A managed Kubernetes service providing an intuitive user experience with simplified cluster lifecycle management. Built-in security and isolation to enable rapid delivery of apps, while leveraging IBM Cloud Services including Weather data, IoT, Analytics, or AI capabilities with Watson. Available in six IBM regions WW, including 25+ datacenters.

https://www.ibm.com/cloud/container-service
Datacenter Expansion

6 IBM Cloud Regions, 25+ Datacenters

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<th>Region</th>
<th>Location</th>
<th>City</th>
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<td>US South</td>
<td>dall0, dall12, dall13, hou01, sao01, sjc03, sjc04</td>
<td>Dallas, Sao Paulo, San Jose</td>
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</table>
Kubernetes Capabilities

Intelligent Scheduling
Self-healing
Horizontal scaling
Service discovery & load balancing
Automated rollouts and rollbacks
Secret and configuration management
Kubernetes Management Capabilities

- Simplified cluster management
- Design your own cluster
- Container security & isolation
- Extend with IBM Cloud & Watson
- Native open-source experience
- Integrated operational tools
Watson AI Workloads on IKS

IBM Watson workloads:
Proven AI workload on IBM Cloud Kubernetes Service

12 Watson services/apps represented as 800+ Kubernetes services

“We no longer worry about managing the infrastructure because IBM Cloud Kubernetes Service takes care of that for us.” – Watson Project Team

One deployment example:
3000+ pods on 500+ nodes
Recap – Benefits of IKS

- Multiple data centers where you can deploy your clusters
- Support for Ingress and Load balancer networking options
- Dynamic persistent volume support
- Highly available, IBM-managed Kubernetes masters
- Enhance your apps using 170+ services from IBM Cloud catalog, including Watson, Weather, IoT, and Analytics
IBM Cloud Provider Code

- Code to setup Load Balancer in IKS
- Currently an internal repo
  - We created this repo when there was no Cloud Provider repos in the upstream Kubernetes
- Making this repo available externally
  - Working on internal processes to open source it
  - Working on refactoring the code
  - Our goal is to have just one repo i.e. external repo
- Targeting to have it open sourced by Kubernetes 1.13 release
- We regularly attend SIG-Cloud-Provider and will follow their requirements for the cloud provider repos
IBM Cloud Private

Application Development, Integration, Operations & Management

IBM DevOps  Microservices  Hybrid Cloud Management

Next Generation Middleware, Data, Integration & Analytics

TensorFlow  WebSphere  DB2  z Systems  IBM MQ  Apache

IBM Cloud private Platform

Kubernetes-based Platform

Multiple open compute models

IaaS Automation, Containers, PaaS & Functions

Software & Policy driven Network & Storage

Autoscaling & Automatic Application Recovery

Multi-site HA/DR features

Stateful & Stateless Application Support

Built-in Monitoring & Logging

Integrated Enterprise-grade Security

Vulnerability Advisor to prevent risk

Solution Architectures & Best Practices

Integration Content

Middleware, Data, management & Analytics Content

Enterprise Infrastructure

IBM Storage  Power Systems  z Systems  vmware  openstack

IBM MQ

IBM Cloud Private Platform

Kubernetes

HELM

Apache

Development

Continuous Delivery

Image Registry

Continuous Integration

App Catalog

App Health

App Log Analysis

API Mgmt

Continuous Availability

Monitoring

Log Analysis

Auditing

Alerting

Metering

Continuous Security

Authentication

RBAC

Certificate Store

Key Store

Image Vulnerability

Cluster

kubernetes

apiserver

kubernetes scheduler

kubernetes proxy

kubelet

etcd

Highly Available

Masters

Virtual IP

Proxies

Virtual IP

Workers

Persistent Storage

Network Mesh with Support for Tenant Isolation
IBM Cloud Private Scalability Test

- **IBM Cloud Private 2.1 (k8s 1.9)**
  - 500 nodes
  - One etcd shared by k8s and calico
  - Calico 2.6 with Node to Node Mesh
  - Calico 2.x can only use etcd V2 API

- **IBM Cloud Private 3.1 (k8s 1.11)**
  - 2500 nodes
  - Separated etcd for k8s and calico
  - Calico 3.0.4 with Router Reflector
  - Calico 3.x can use etcd V3 API which has better performance
Why Multicloud

As our businesses become ecosystems for delivering greater value in a digital world, a multi-cloud strategy is not only the new reality, but the fastest path to new value - connecting multiple cloud environments or connecting cloud and on-premises environments. Connecting multiple cloud environments or connecting cloud and on-premises environments.

- **Unique Needs**
  You can run each workload where it performs best, for the lowest cost.

- **Legacy Apps**
  You can avoid the pain of migrating legacy apps to a new platform.

- **Desire to Diversify**
  You can avoid vendor lock-in and latency while creating redundancy.
IBM Multicloud Manager

Development & Programming Models
Data Placement & Governance
Operational & Application Management
Resource Propagation
Service Mesh

Hybrid Control Plane
- Resources, Configurations, Automation, Work Distribution, Policy, Security, Compliance

IBM Cloud Private
- Applications
- Core Services
- Platform
- Infrastructure

3rd Party Private Clouds
- Applications
- Core Services
- Platform
- Infrastructure

IBM Public Cloud
- Applications
- Core Services
- Platform
- Infrastructure

3rd Party Public Clouds

Visibility  Security  Application Management
IBM Cloud Private will support containers based on many base OS images.

Red Hat supports containers on Red Hat OpenShift only when created with a RHEL base OS image and a full stack topology based on RHEL.

IBM and Red Hat have partnered on a joint solution architecture using IBM Cloud Private and select IBM software built using RHEL base OS images.

This requires IBM to distribute containers with the RHEL base OS image. The partnership provides distribution for use with the joint solution architecture. This requires special packages of ICP and select software offered as Certified IBM Cloud Paks.
Contribution to Open Source

Kubernetes

Kubernetes Federation V2

Istio

1. Redhat
2. Huawei
3. IBM
Contribution to Open Source

- **Cluster-Registry**
  - Keep track of and perform operations on your clusters.
  - Cluster Registry API (code, design) as a Kubernetes CRD
  - Used by IBM Multicloud Manager

- **Application**
  - Simplify application deployment.
  - **Difference with Helm Chart**
  - Used by IBM Multicloud Manager

- **Ingress Controller**
  - Access Kubernetes service via Ingress
  - Used by IBM Cloud Private and IBM Multicloud Manager
Summary

- A SIG for building, deploying, maintaining, supporting, and using Kubernetes on IBM Public and Private Clouds
- The IBM Cloud team significantly contributes to the community
- The near term goal of the SIG is to open source the cloud provider code
- Join the SIG Discussions
  - Follow the evolution of the IKS, ICP and Multicloud Manager platforms with respect to Kubernetes and related CNCF projects
Thank you

@sp_zala @gyliu513
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https://ibm.biz/BdYLu8