

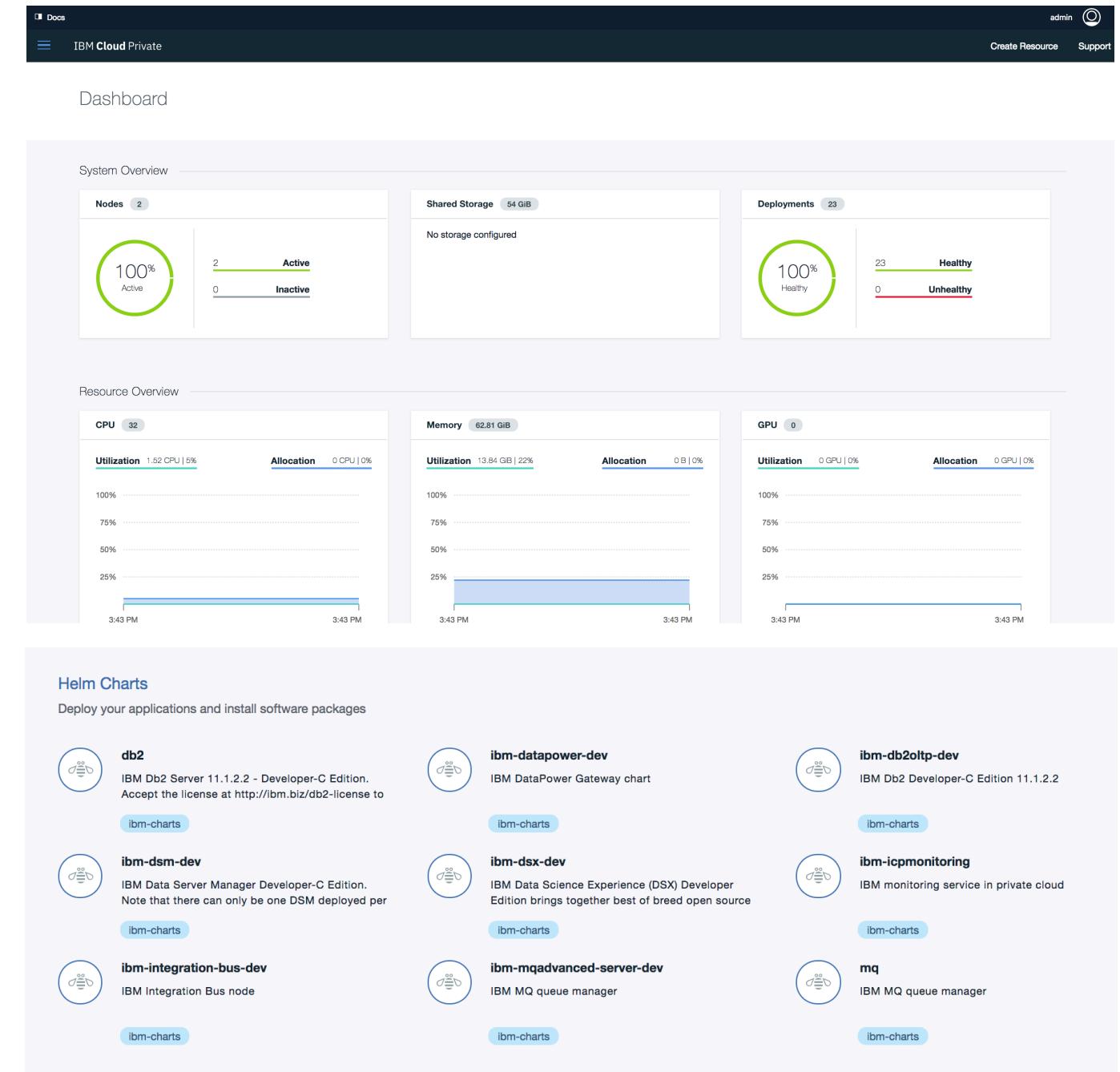


IBM Cloud private

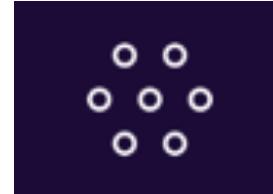
A Customer-managed Private Cloud Solution

IBM Cloud Private Overview

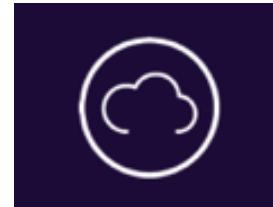
- A customer-managed Private Cloud software solution based on Kubernetes, Docker and Cloud Foundry technology that runs on customer-provided infrastructure (or in Public Cloud IAAS)
- A platform to run containerized versions of IBM Software such as Datapower, IIB, MQ, DB2, Cloudant, Data Science Experience (Apache Spark), Blockchain
- A platform to build Cloud Native 12 Factor apps including powerful developer tools to jump-start projects
- A platform to run Modernized and Containerized Legacy Applications including tools and services to help transform code.



IBM Cloud Private is central to IBM's Hybrid Cloud Strategy



Choice with consistency



Hybrid integration



DevOps productivity



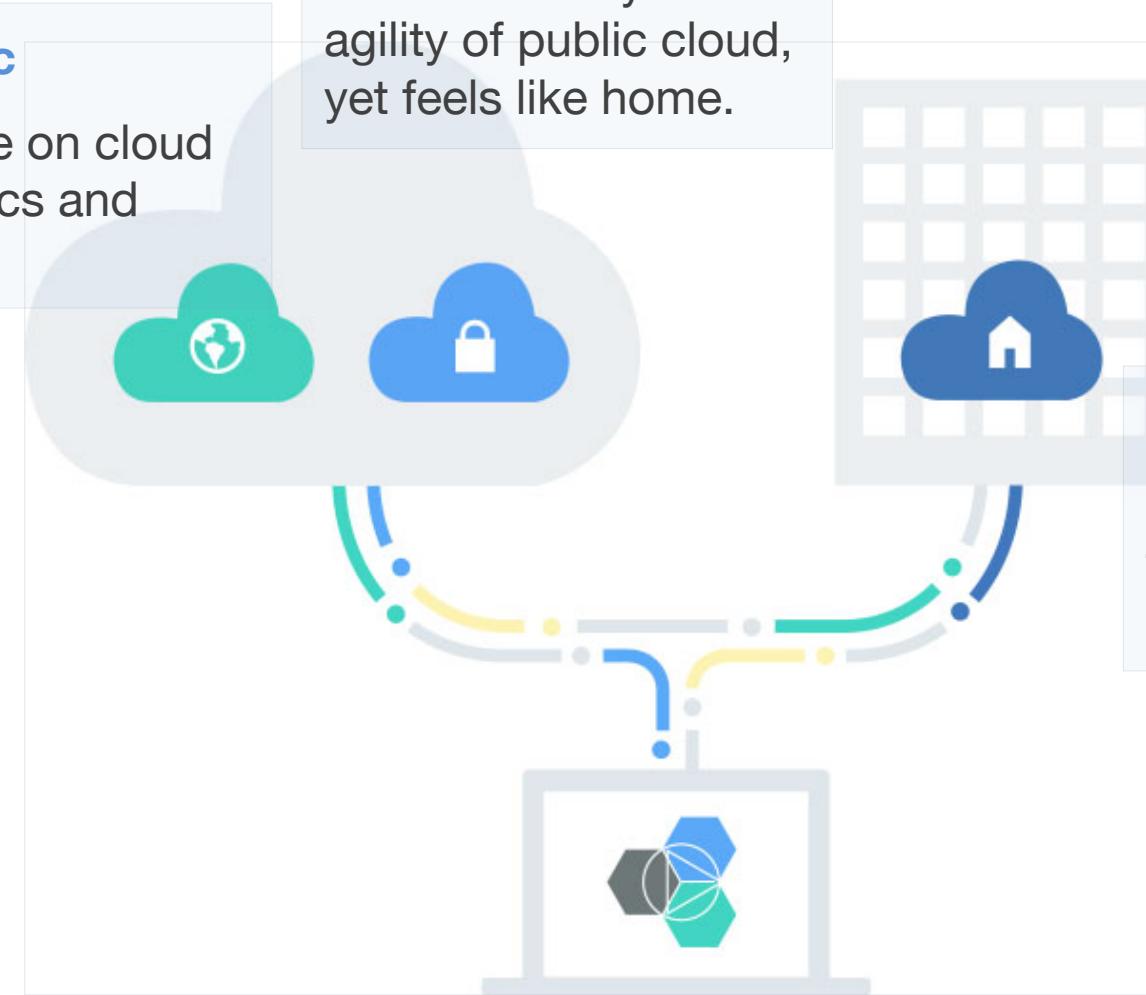
Powerful, accessible data and analytics



Cognitive solutions

1 | Public

Maximize on cloud economics and agility.



2 | Dedicated

Everything is dedicated and connected to you — agility of public cloud, yet feels like home.

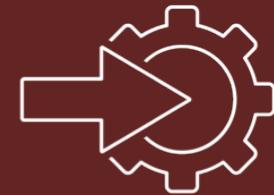
3 | Private

Behind the firewall for the most sensitive workloads.

Seamless Experience

Regardless of which combination you choose, you can expect a single, seamless experience.

Four Primary Use Cases

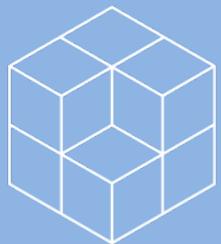


Building/Running Cloud Native Apps

Kubernetes to run Docker images

Cloud Foundry for app dev and deployment

Microservices Builder to build Web app and/or microservices scaffolding



App Modernization

Move Traditional WAS apps to Liberty Containers

Use Transformation Advisor to understand required JAVA changes and effort required to transform apps



Run IBM Products

Containerized versions of IBM Middleware (WebSphere, IIB, MQ, Datapower)

Create an IBM SW Hub to buy/deploy/manage IBM software

Work with existing apps, data, skills, infrastructure



Analytics Platform

Containerized version of IBM Analytics Products (DB2, DB2 Warehouse, DSX/Spark, Data Server Manager)

Add in Open Source Data Science projects via Service Catalog



IBM Cloud Private

Kubernetes based container platform



Industry leading container orchestration platform across private, dedicated & public clouds

Common Services



To simplify operations management, DevOps and hybrid integration

IBM Middleware, Data & Analytics Services



Cloud enabled middleware, application runtimes, messaging, databases and analytics to optimize current investments and rapidly innovate

Cloud Foundry

For prescribed application development & deployment

Value Added Components

- Better UI than kubeui
- Integrated Prometheus and Grafana for performance management and alerting
- Integrated ELK Stack for message aggregation and interrogation
- Vulnerability Advisor
- Calico for IP Routing/Firewalling
- Simple Installer (not kubeadm)
- Integrated Helm Catalog in UI
- Metering of applications for chargeback
- Cloud Automation Manager
- Transformation Advisor
- RBAC security to restrict actions by user login

Great Catalog of Services

- DB2 (Warehouse and Transaction)
- Blockchain (coming)
- WAS Liberty Profile
- Data Science Experience
- Datapower
- IIB
- Data Server Manager
- MQ
- Jenkins
- Postgresql
- RabbitMQ
- Transformation Advisor
- Microservices Builder
- Cloud Automation Manager
- MariaDB/MySQL
- Redis

Helm Charts
Deploy your applications and install software packages

 db2 IBM Db2 Server 11.1.2.2 - Developer-C Edition. Accept the license at http://ibm.biz/db2-license to ibm-charts	 ibm-datapower-dev IBM DataPower Gateway chart ibm-charts	 ibm-db2oltp-dev IBM Db2 Developer-C Edition 11.1.2.2 ibm-charts
 ibm-dsm-dev IBM Data Server Manager Developer-C Edition. Note that there can only be one DSM deployed per ibm-charts	 ibm-dsx-dev IBM Data Science Experience (DSX) Developer Edition brings together best of breed open source ibm-charts	 ibm-icpmonitoring IBM monitoring service in private cloud ibm-charts
 ibm-integration-bus-dev IBM Integration Bus node ibm-charts	 ibm-mqadvanced-server-dev IBM MQ queue manager ibm-charts	 mq IBM MQ queue manager ibm-charts

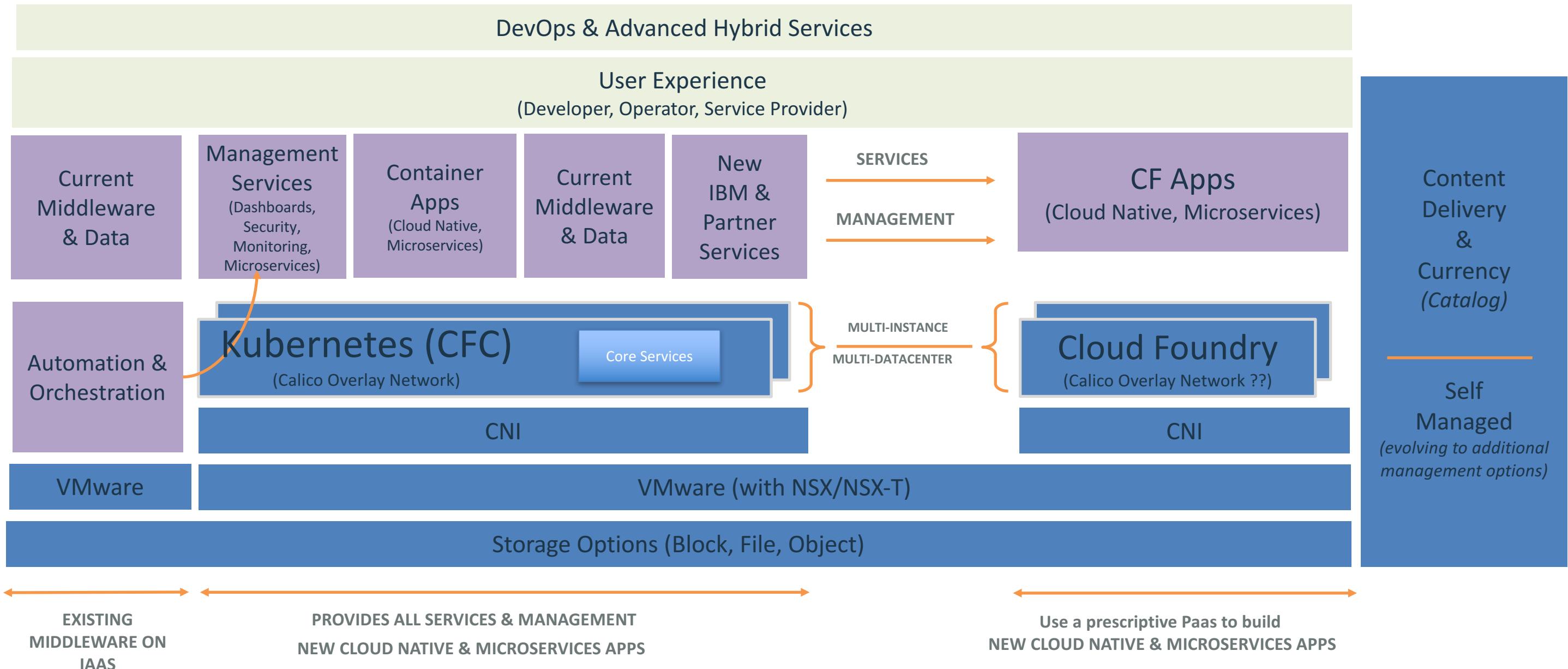
More Services Coming Fast

- ODM
- Blockchain
- Connections
- FileNet
- What do you want?

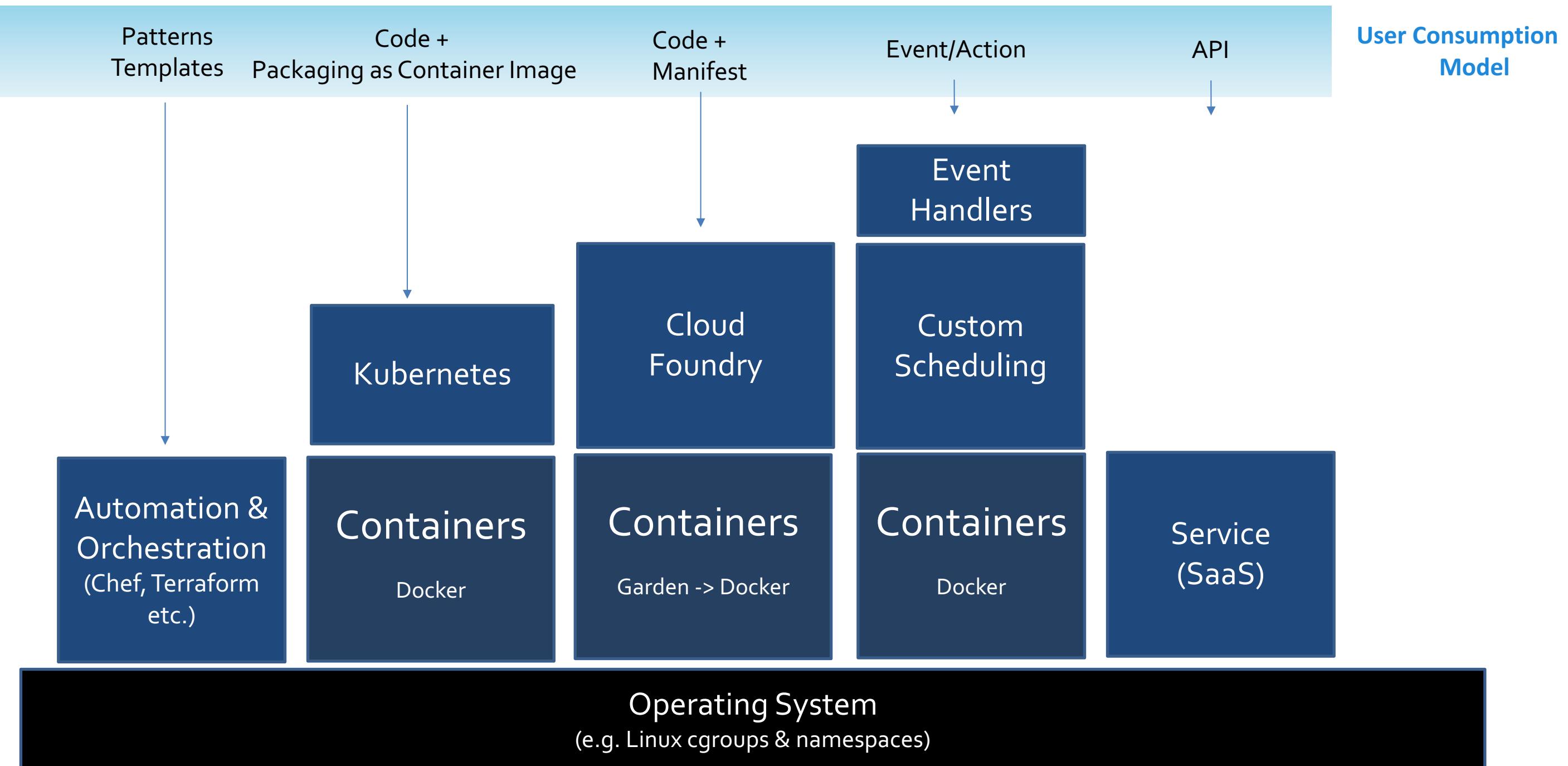
Helm Charts
Deploy your applications and install software packages

 db2 IBM Db2 Server 11.1.2.2 - Developer-C Edition. Accept the license at http://ibm.biz/db2-license to ibm-charts	 ibm-datapower-dev IBM DataPower Gateway chart ibm-charts	 ibm-db2oltp-dev IBM Db2 Developer-C Edition 11.1.2.2 ibm-charts
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 ibm-integration-bus-dev IBM Integration Bus node ibm-charts	 ibm-mqadvanced-server-dev IBM MQ queue manager ibm-charts	 mq IBM MQ queue manager ibm-charts

IBM Cloud Private – Architecture



Choice with consistency



Speed & Cost: Just the parts you need, rapidly installed, configured and ready for you to innovate. Installs in as little as 2 hours

Large Catalog of Services: Tomcat, Nginx, Postgresql, Jenkins, DB2, MQ, Redis, RabbitMQ plus ability to add in 100s of additional services from public Docker/Chart/Helm catalogs

Content: Middleware, Data & Analytics packaged as containers and using common cloud management services

Portability & Open Ecosystem: Seamlessly integrate with the IBM Public cloud as well as Amazon and Azure via Kubernetes APIs; Provide a hybrid cloud experience including multi-cloud DevOps and management capabilities

Integration: Application and data integration with the IBM Cognitive & Cloud Platform; Integration with existing applications, middleware and data

Delivery: Flexible options to choose your deployment and management model

Technology: Leveraging IBM and open source technologies providing choice of containers or Cloud Foundry

Supported HW and Specs

Specs		Support Statement
# of Nodes (Physical or virtual)	Minimum	1 (single node install supported)
	Tested	60 Power nodes, 300 x86 nodes (tested limits, not hard limits)
# of Pods		9000 (tested limit)
# of Users		10000 (tested limit, not hard limit)
Node specs	Master	2+ cores @2.4 GHz, 4 GB RAM, 100 GB Disk (x86 and Power supported)
	Worker	1+ core @2.4 GHz, 4 GB RAM, 100 GB Disk (x86, Power, Z supported)
	Management	4+ core @2.4 GHz, 8 GB RAM, 100 GB Disk (x86, Power supported)
OS	x86	RHEL 7.1, 7.2, 7.3, 7.4 Ubuntu 16.04 LTS
	Power	RHEL 7.1, 7.2, 7.3 Ubuntu 16.04 LTS
	Z	RHEL 7.1, 7.2 Ubuntu 16.04 LTS
Browsers	Windows	Latest versions of Edge, Mozilla Firefox, Google Chrome
	Linux	Mozilla Firefox, Google Chrome
	MacOS	Safari 9.0.1, Mozilla Firefox, Google Chrome
Docker	X86, Power, Z	Docker CE: 1.12, 1.13.1, 17.03, 17.05, and 17.06 Docker EE: 1.12, 1.13.1, 17.03
Storage		NFS 4, Gluster FS 3.10.1, vSphere Virtual Volume, Spectrum Scale (via NFS or Hostpath) + all Kubernetes supported storage types from CLI

IBM Cloud private Differentiators

Support for Kubernetes and Cloud Foundry in one platform (and soon OpenWhisk)

Consistency between IBM Cloud/Bluemix Public, Dedicated, and Private

Prebuilt content for IBM Middleware and data / analytics portfolio

Ability to manage Multi-cloud environment, including VMs, Kubernetes and Cloud Foundry

Support for multiple OSs/HW (RedHat, Ubuntu, Centos, pLinux, and zLinux)

Full array of Developer Tools and Migration Tools to convert Legacy Java apps to Cloud Native

Full Services Capabilities to help plan and migrate to Cloud Native/microservices/devops methodology

IBM Cloud Professional Services for IBM Cloud Private

for immediate success and long term value

Foundational services



Solution Initiation Workshop for IBM Cloud Private

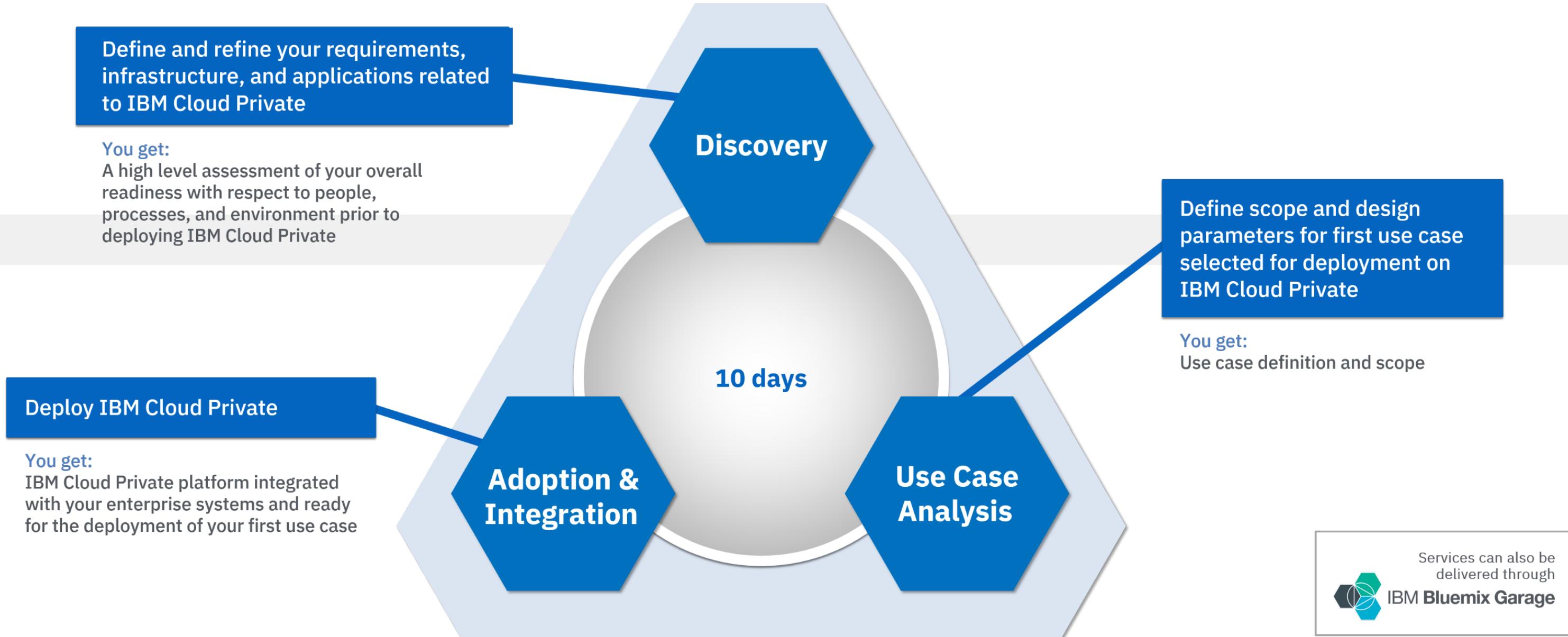
- Two weeks of consulting services to get ready for quick and optimal deployment of IBM Cloud Private.
- Provides assistance in areas such as cloud adoption, integration, and onboarding assistance.

Advanced services

- **WebSphere Liberty on IBM Cloud Private**
- **IBM Cloud Private Design Thinking Workshop**
- **Architectural Consultancy and MVP Build-Up*** for:
 - Cloud Integration
 - Cloud Native Application Development
 - Cloud Service Management Operations (CSMO)
- **DB2 with Data Sciences** (coming soon)

Solution Initiation Workshop for IBM Cloud Private

Offering at a glance



Multi-cloud management with Cloud Automation Manager

- CAM **extends** IBM Cloud Private with capabilities to automate workloads in VMware, AWS EC2, Azure, PowerVC, and IBM Cloud
- CAM is implemented with Docker containers and installed into IBM Cloud Private with a Kubernetes Helm chart
- CAM is fully entitled as a component of IBM Cloud Private. CAM is only available as a component in IBM Cloud Private
- CAM leverages Terraform and infrastructure as code for multi-cloud management
- Can be integrated into other tools like Service Now

Cloud Automation Manager Console

← Application Services



Bring Your Own Template

Create an instance using your own cloud resource templates

Getting Started

Cloud Connections

Template Library

Deployed Instances

Starter Templates



LAMP stack deployment

LAMP - A fully-integrated environment for full stack PHP web development.

Amazon EC2



1 Virtual Server with SSH Key

A sample cloud resource template that creates a Debian virtual server and sets up SSH access.

IBM Cloud



MongoDB on a Single VM

MongoDB - An open-source cross-platform document-oriented database.

IBM Cloud



Kubernetes Cluster with Nginx Deployment

Kubernetes - An orchestration system for containerized applications, e.g.,

IBM Cloud



Node.js on a Single VM

Node.js - An execution environment for event-driven server-side

IBM Cloud



Strongloop Stack on a Single VM

Strongloop - An easy starting point for full stack JavaScript web developer

IBM Cloud



Amazon EC2 Virtual Server with SSH Key

A sample cloud resource template that creates a Ubuntu 14.04 virtual server

Amazon EC2



MEAN stack deployment

MEAN - A simple and scalable starting point for full stack JavaScript web

Amazon EC2



Kubernetes Cluster with Strongloop 3 Tier Deployment

Kubernetes - An orchestration system for containerized applications, e.g.,

IBM Cloud

Sample Terraform File

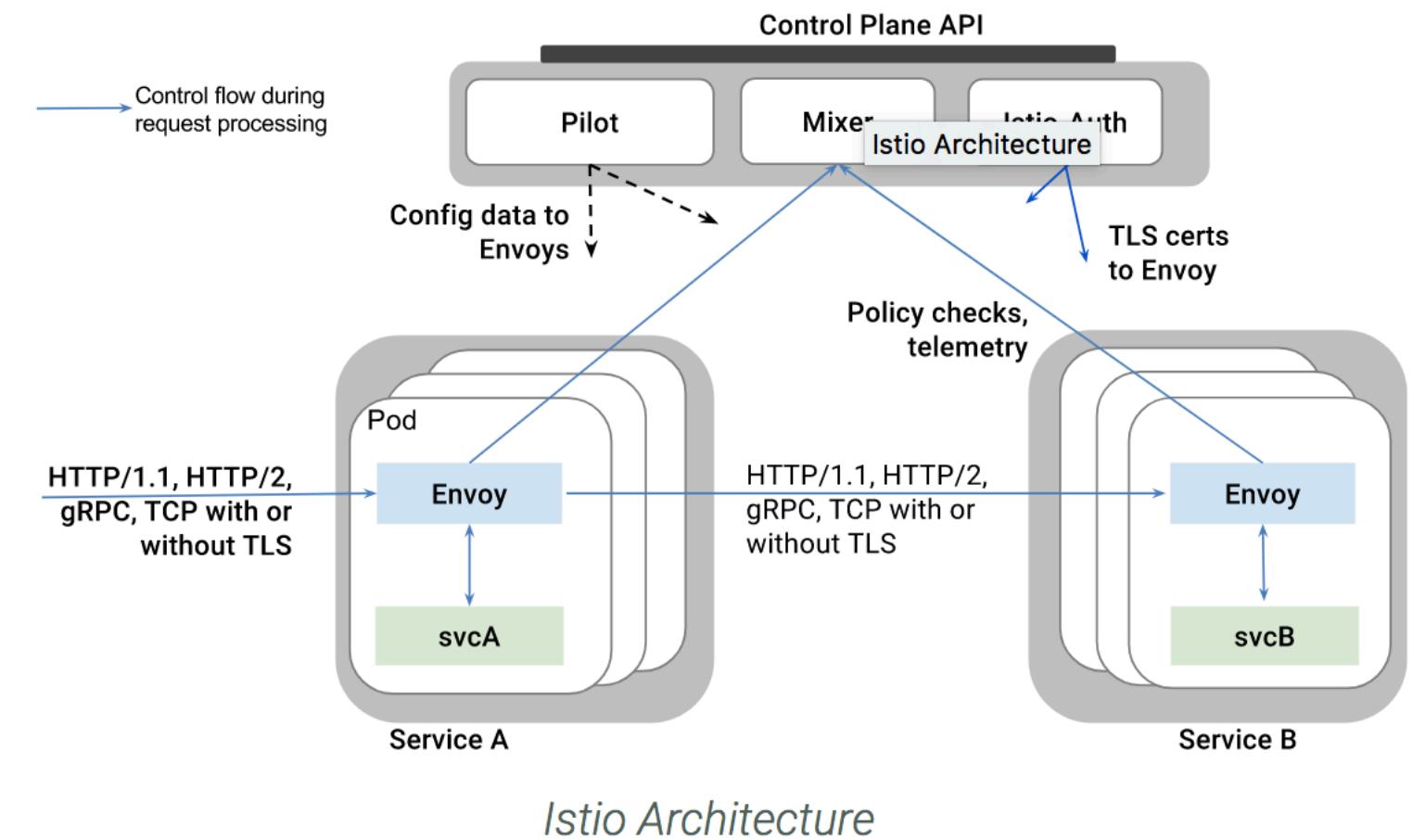
```
provider "aws" {  
    access_key = "XXX"  
    secret_key = "YYY"  
    token      = "ZZZ"  
    region     = "us-east-1"  
}  
  
variable "aws_ami" {  
    description = "AWS AMI Image"  
    default     = "ami-XXX"  
}  
  
variable "aws_instancetype" {  
    description = "AWS Instance type"  
    default     = "t2.micro"  
}  
  
variable "aws_keyname" {  
    description = "Keyname used to provision the ICP  
cluster"  
    default     = "ibm-icp-key"  
}  
  
variable "aws_subnet" {  
    description = "Subnets"  
    default     = [ "subnet-1cfxx444", "subnet-1cfxx444" ]  
}
```

```
resource "aws_instance" "web" {  
    ami          = "${var.aws_ami}"  
    key_name     = "${var.aws_keyname}"  
    instance_type = "${var.aws_instancetype}"  
    count        = "1"  
    security_groups = ["sg-d83deea2"]  
    subnet_id    = "${var.aws_subnet[0]}"  
  
    user_data = <<EOF  
#!/bin/bash  
sudo apt-get update -y  
sudo apt-get install -y tomcat8  
sudo systemctl start tomcat  
EOF  
  
tags {  
    Name = "IBMTomcat"  
    AssetID = "MSR00676"  
    CostCenter = "792"  
    Environment = "Lab"  
    ApplicationName = "CETS"  
}
```

```
output "New node ip address " {  
    value = "http://${aws_instance.web.private_ip}:8080"  
}
```

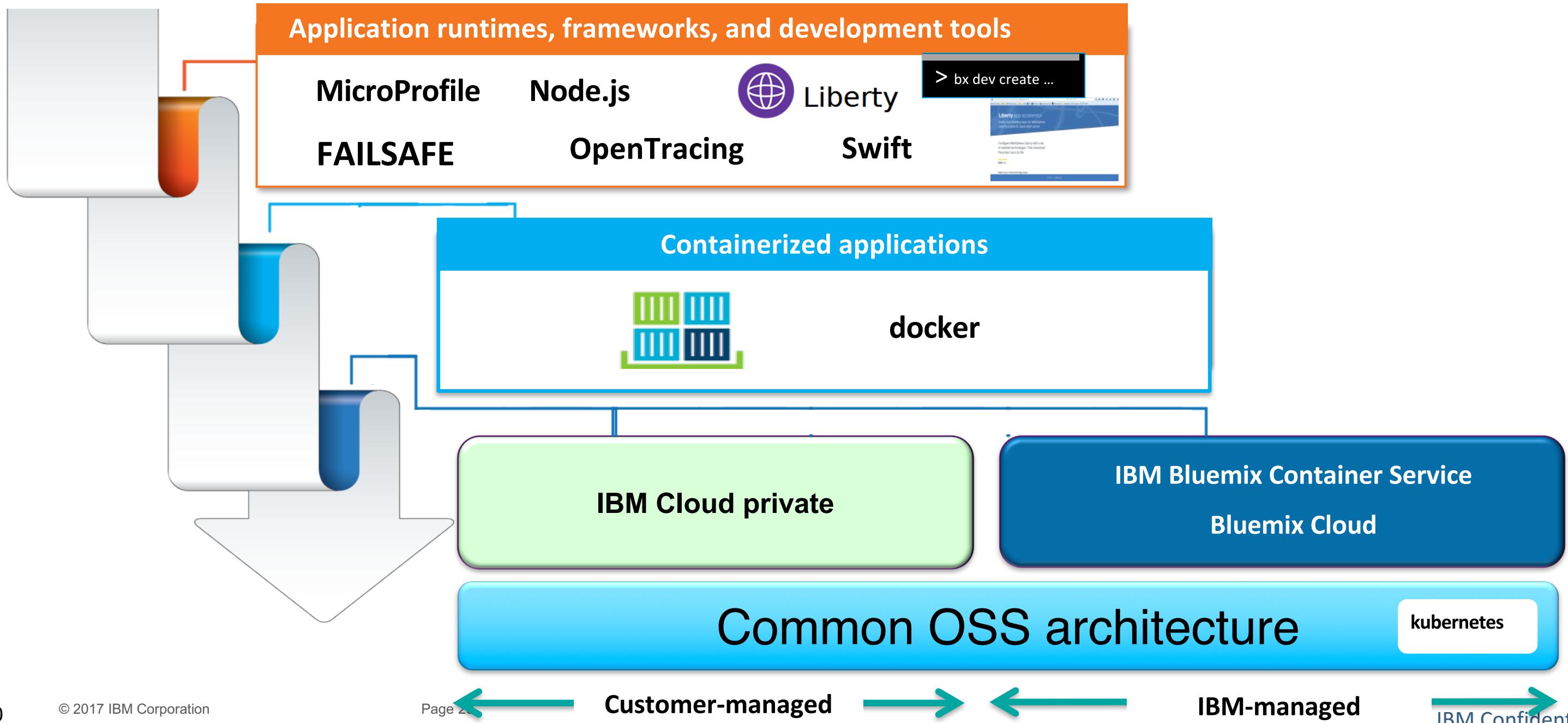
Introducing Istio – Microservices Fabric

- Istio provides an easy way to create a network of deployed services with load balancing, service-to-service authentication, monitoring, and more, without requiring any changes in service code
- dynamic service discovery
- load balancing
- TLS termination
- HTTP/2 & gRPC proxying
- circuit breakers
- health checks
- staged rollouts with %-based traffic split
- fault injection
- rich metrics



Microservice acceleration with Microservice Builder

Accelerate the creation and deployment of microservice, hybrid, and containerized applications, targeting Kubernetes-based Docker clouds: in Bluemix or on-premises



Kubernetes Overview

What Is Kubernetes?

Kubernetes is an open-source platform designed to automate deploying, scaling, and operating application containers.

With Kubernetes, you are able to quickly and efficiently respond to customer demand:

- Deploy your applications quickly and predictably.
- Scale your applications on the fly.
- Roll out new features seamlessly.
- Limit hardware usage to required resources only.

Kubernetes is

- **Portable:** public, private, hybrid, multi-cloud
- **Extensible:** modular, pluggable, hookable, composable
- **Self-healing:** auto-placement, auto-restart, auto-replication, auto-scaling

Benefits of Containers

Agile application creation and deployment: Increased ease and efficiency of container image creation compared to VM image use.

Continuous development, integration, and deployment: Provides for reliable and frequent container image build and deployment with quick and easy rollbacks (due to image immutability).

Dev and Ops separation of concerns: Create application container images at build/release time rather than deployment time, thereby decoupling applications from infrastructure.

Environmental consistency across development, testing, and production: Runs the same on a laptop as it does in the cloud.

Cloud and OS distribution portability: Runs on Ubuntu, RHEL, CoreOS, on-prem, Google Kubernetes Engine, and anywhere else.

Application-centric management: Raises the level of abstraction from running an OS on virtual hardware to run an application on an OS using logical resources.

Loosely coupled, distributed, elastic, liberated [micro-services](#): Applications are broken into smaller, independent pieces and can be deployed and managed dynamically – not a fat monolithic stack running on one big single-purpose machine.

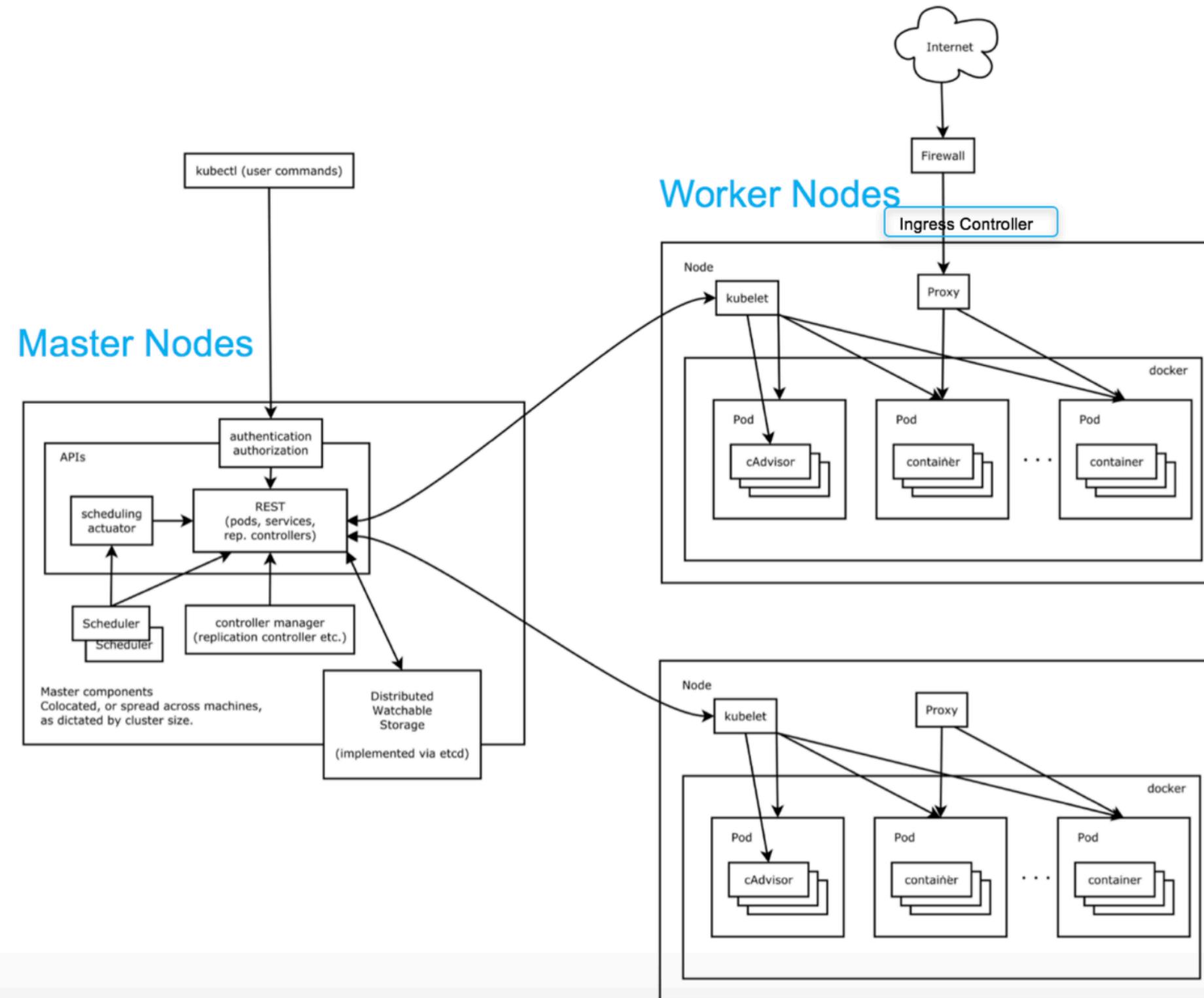
Resource isolation: Predictable application performance.

Resource utilization: High efficiency and density

What Capabilities Does Kubernetes Provide?

- Co-locating helper processes
- Mounting storage systems
- Distributing secrets
- Checking application health
- Replicating application instances
- Using Horizontal Pod Autoscaling
- Naming and discovering
- Balancing loads
- Rolling updates
- Monitoring resources
- Accessing and ingesting logs
- Debugging applications
- Providing authentication and authorization

Kubernetes Architecture



Kubernetes Resource Model

Config Maps

Daemon Sets

Deployments

Events

Endpoints

Ingress

Jobs

Nodes

Namespaces

Pods

Persistent Volumes

Replica Sets

Secrets

Service Accounts

Services

Stateful Sets

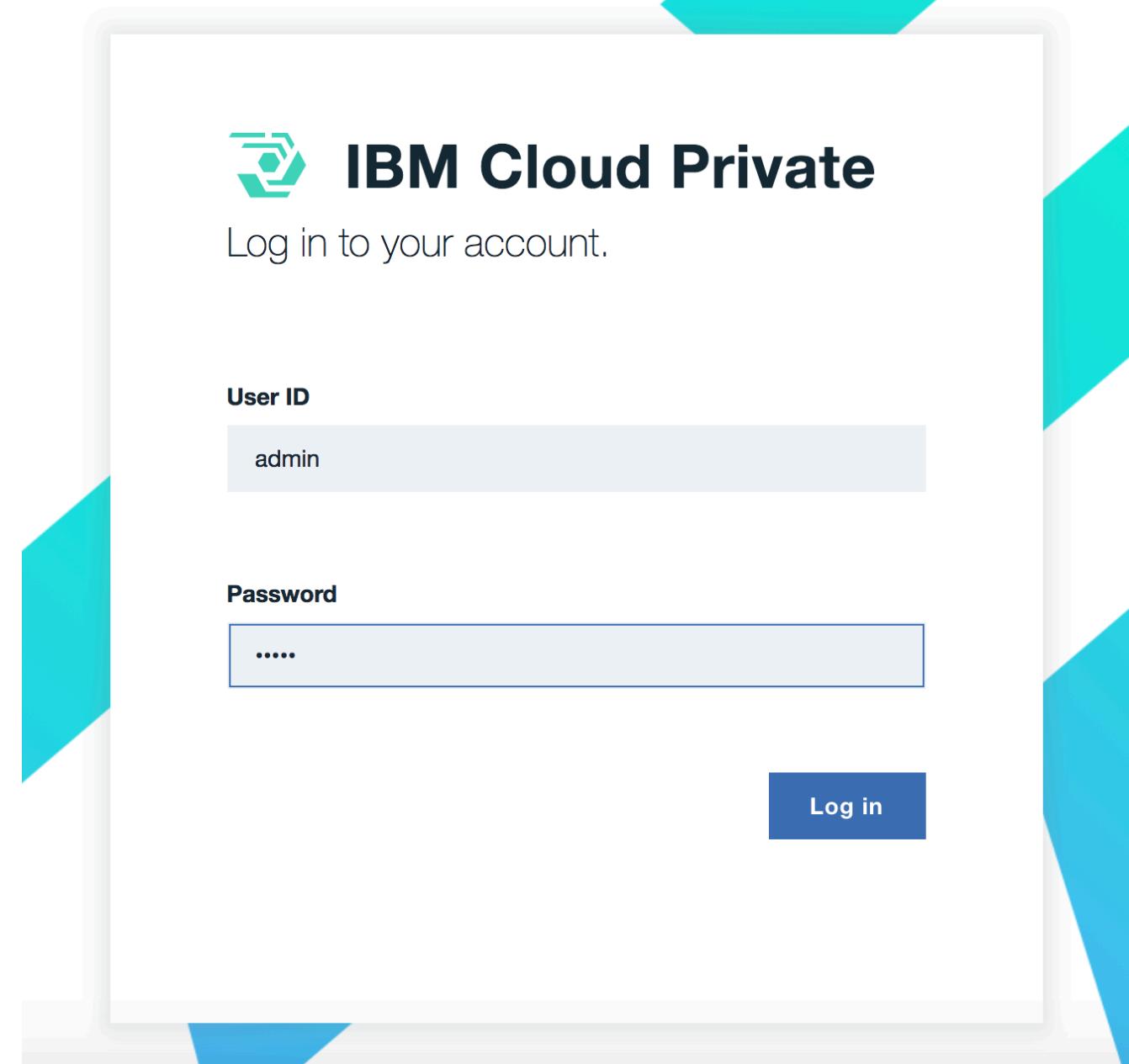
Deployment Process (The YAML file)

```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: web
spec:
  replicas: 2
  template:
    metadata:
      labels:
        app: web
    spec:
      containers:
        name: web
        image: mhbauer/webapp
        imagePullPolicy: Always
        ports:
          - containerPort: 5000
```

kubectl create –f deploy.yaml

SCREEN SHOTS

Login



Dashboard

Docs admin

IBM Cloud Private Create Resource Support

Dashboard

System Overview

Nodes 2

100% Active

2 Active | 0 Inactive

Shared Storage 54 GiB

No storage configured

Deployments 23

100% Healthy

23 Healthy | 0 Unhealthy

Resource Overview

CPU 32

Utilization 1.52 CPU | 5%

Allocation 0 CPU | 0%

3:43 PM

Memory 62.81 GiB

Utilization 13.84 GiB | 22%

Allocation 0 B | 0%

3:43 PM

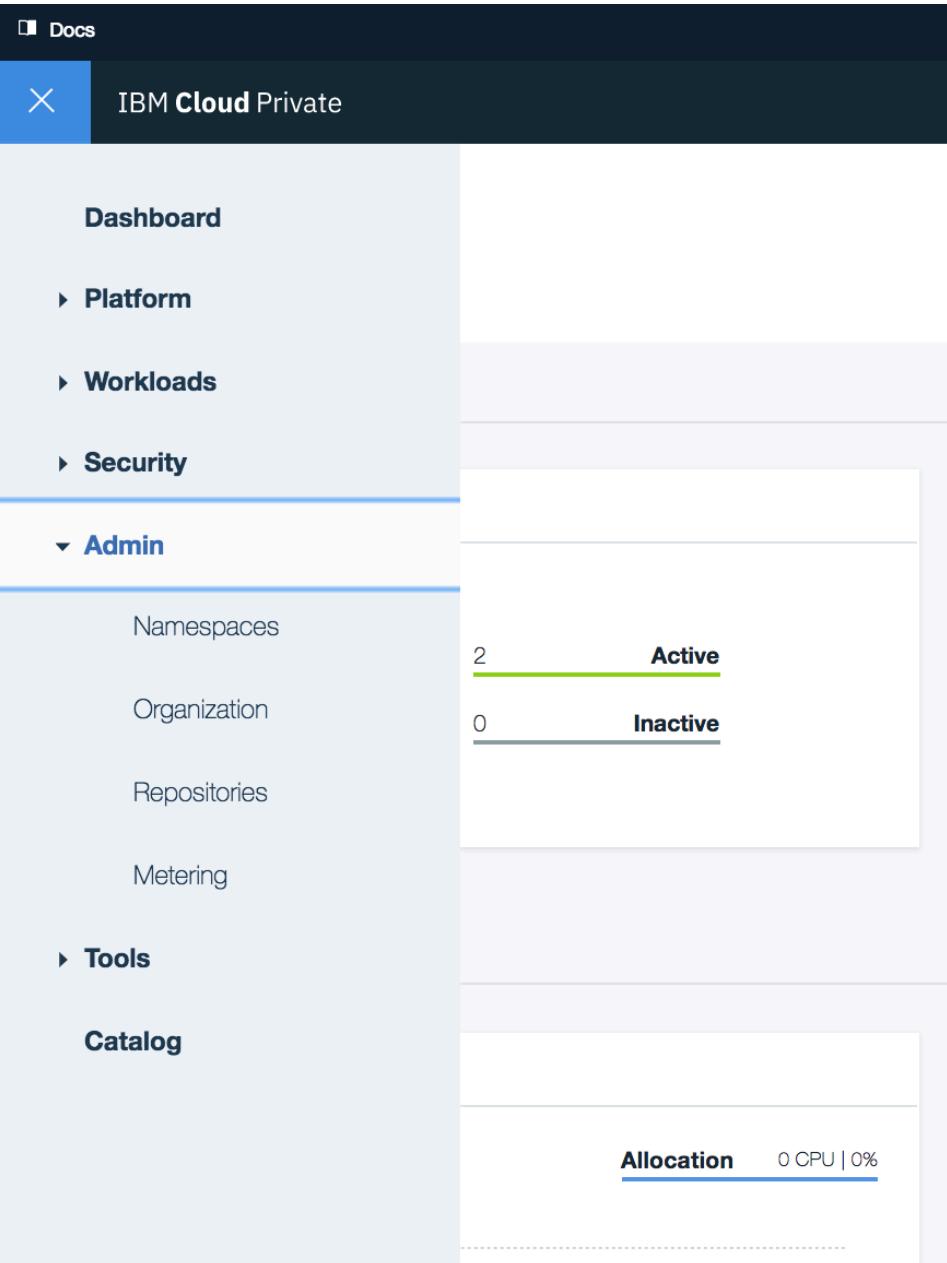
GPU 0

Utilization 0 GPU | 0%

Allocation 0 GPU | 0%

3:43 PM

Menu



IBM Cloud Private CLI

What is it?

The IBM Cloud Private CLI provides the command line interface to manage applications, containers, infrastructures, services, and other resources.

Install CLI and plug-ins

You can download the installer for macOS, Windows, and Linux. For installation instructions, see [Installing the IBM® Cloud Private CLI](#).

Use the IBM Cloud Private CLI

After you install the CLI, you can use it from your command line by typing `bx pr [command]`. For command details, see [IBM® Cloud Private CLI command reference](#).

[DOWNLOAD FOR
Mac OS X](#)

[DOWNLOAD FOR
Linux \(32-bit\)](#)

[DOWNLOAD FOR
Linux \(64-bit\)](#)

[DOWNLOAD FOR
Windows \(32-bit\)](#)

[DOWNLOAD FOR
Windows \(64-bit\)](#)

Helm Charts/Catalog

Helm Charts

Deploy your applications and install software packages



db2

IBM Db2 Server 11.1.2.2 - Developer-C Edition.
Accept the license at <http://ibm.biz/db2-license> to

ibm-charts



ibm-datapower-dev

IBM DataPower Gateway chart

ibm-charts



ibm-db2oltp-dev

IBM Db2 Developer-C Edition 11.1.2.2

ibm-charts



ibm-dsm-dev

IBM Data Server Manager Developer-C Edition.
Note that there can only be one DSM deployed per

ibm-charts



ibm-dsx-dev

IBM Data Science Experience (DSX) Developer
Edition brings together best of breed open source

ibm-charts



ibm-icpmonitoring

IBM monitoring service in private cloud

ibm-charts



ibm-integration-bus-dev

IBM Integration Bus node

ibm-charts



ibm-mqadvanced-server-dev

IBM MQ queue manager

ibm-charts



mq

IBM MQ queue manager

ibm-charts

Applications/Deployments

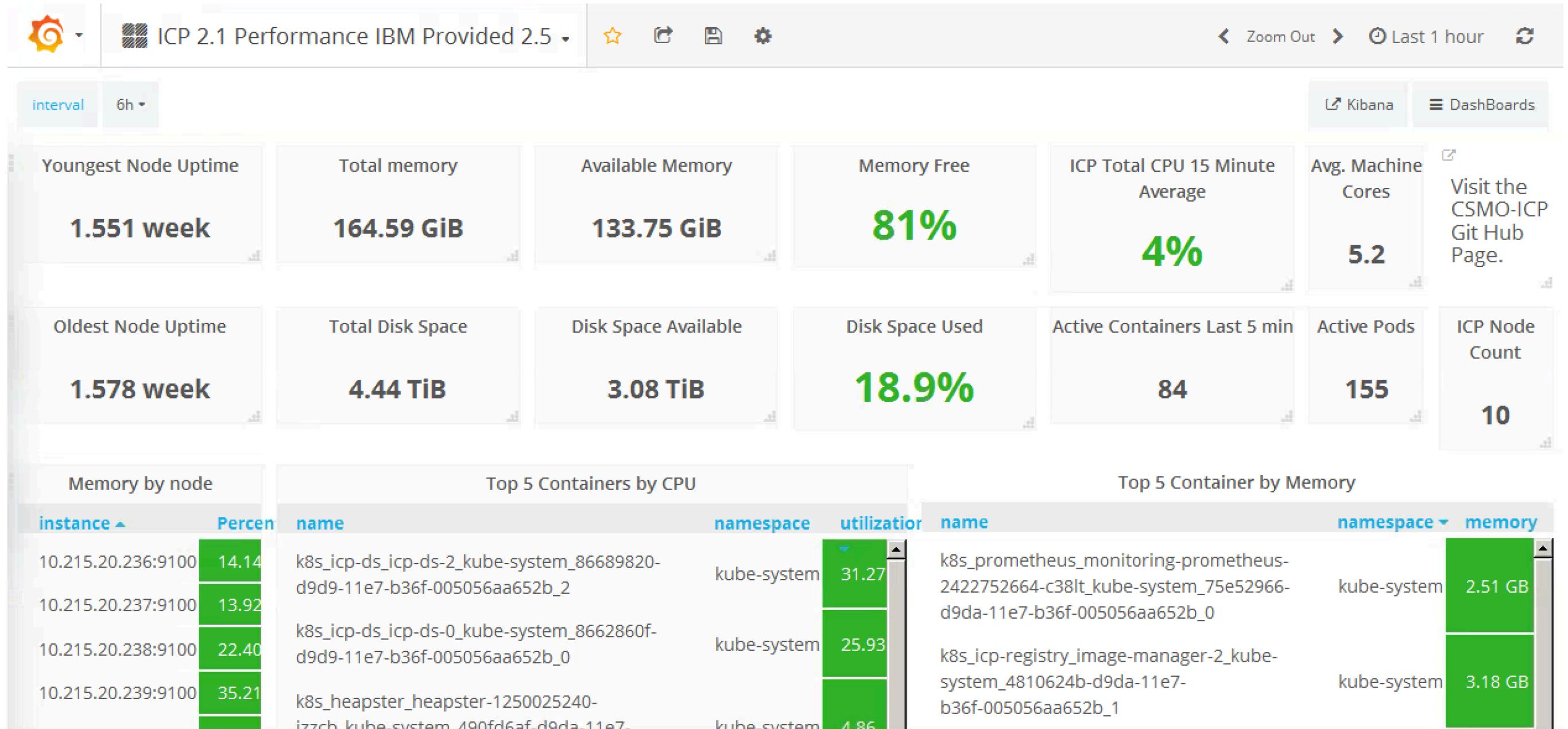


Deployments

A table listing 23 deployment entries. Each entry includes the name, namespace, desired and current count, ready status, availability, creation time, and an 'ACTION' column with a three-dot menu. A search bar at the top left and a 'Create Deployment' button at the top right are also visible.

NAME	NAMESPACE	DESIRED	CURRENT	READY	AVAILABLE	CREATION TIME	ACTION
calico-policy-controller	kube-system	1	1	1	1	Oct 11th 2017 at 3:09 PM	⋮
catalog-catalog-controller-manager	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
default-http-backend	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
default-monocular-api	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
default-monocular-prerender	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
elasticsearch-client	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
elasticsearch-data	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
elasticsearch-master	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
heapster	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
helm-api	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
helmrepo	kube-system	1	1	1	1	Oct 11th 2017 at 3:17 PM	⋮
kube-dns	kube-system	1	1	1	1	Oct 11th 2017 at 3:11 PM	⋮

Grafana Dashboard



Grafana Alert Email

[OK] Container CPU Utilization alert

10:54 AM

Grafana to me

[Show more](#)

