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Modernize mainframes workloads with Red Hat OpenShift Platform

Fabio Alessandro "Fale" Locati
Principal Specialist Solution Architect @ Red Hat

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About me

- Working in IT since 2004, mostly in consulting roles
- Author of 5 books
- EMEA Associate Principal Specialist Solution Architect @ Red Hat


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Containers advantages

- Less overhead
- Increased portability
- More consistent operation
- Greater efficiency
- Better application development

Containers usecases

- “Lift and shift” existing applications into modern cloud architectures
- Refactor existing applications for containers
- Develop new container-native applications
- Provide better support for microservices architectures
- Provide DevOps support for continuous integration and deployment (CI/CD)
- Provide easier deployment of repetitive jobs and tasks

Kubernetes advantages

- Service discovery and load balancing
- Storage orchestration
- Automated rollouts and rollbacks
- Automatic bin packing
- Self-healing
- Secret and configuration management

Kubernetes naming

- **Container**: a group of processes with limited access to the system and resources, leveraging *cgroups*
- **Container Image**: a tar file containing all the required files and configurations to run a container
- **Pod**: a group of container
- **Service**: Kubernetes way to expose Pods ports over network
- **Persistent Volume**: a disk that is usable by a Pod
- **Config Map**: Kubernetes way to set configuration in Pods via file or *ENV_VARS*
- **Secret**: Kubernetes way to store and inject secret strings

Kubernetes components

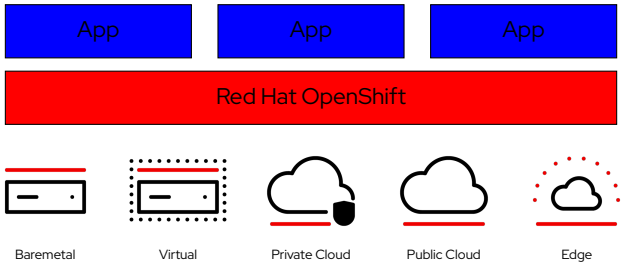
- **etcd**: a decentralised file storage database
- **api-server**: Kubernets API Control Plane
- **Control Plane node**: a node that controls the cluster by running *etcd* and *api-server*
- **Worker node**: a node that runs workload
- **Infrastructure node**: a node that runs additional system components

Hybrid and multicloud is the new normal

- 95% of enterprises will be using a mix of cloud models
- 31% of all compute capacity will be in a Private, on premises cloud in 2 years
- 60% of enterprises will utilize flexible conumption models by 2023

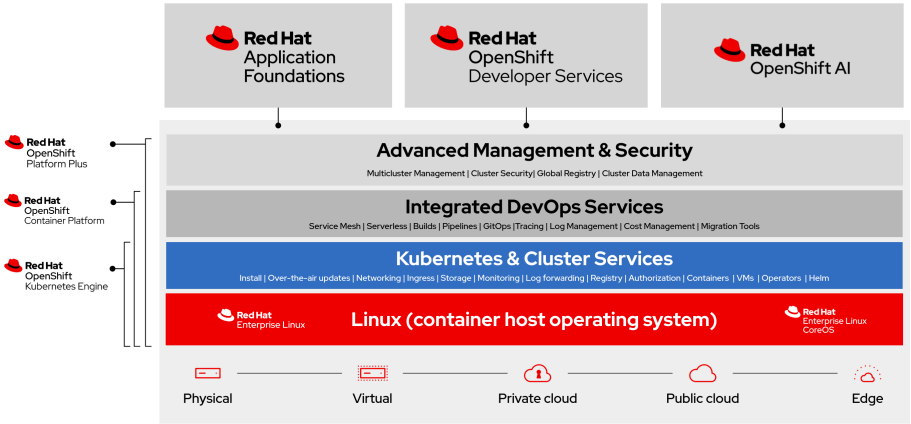
Sources: IDC Cloud Forecast, BCG, and McKinsey

Red Hat OpenShift - an abstraction platform



Red Hat

Red Hat OpenShift, much more than Kubernetes



Red Hat

Installation options

SNO

Cluster with a single node combining control and compute

- Pro:
  - Reduced IFL footprint
  - Compute can be added
  - Kubernetes functions available
  - Good for Dev/Test
- Cons:
  - No infrastructure High Availability
  - Updates contain service interruptions

3 Nodes

Cluster with initally three nodes combining control and compute

- Pro:
  - Reduced IFL footprint
  - Can grow by adding compute nodes
  - Cluster High Availability given
- Cons:
  - Cluster size might be limited for applications and grow cluster might be required

Production

Cluster with a minimum of 3 control nodes and 2 compute nodes

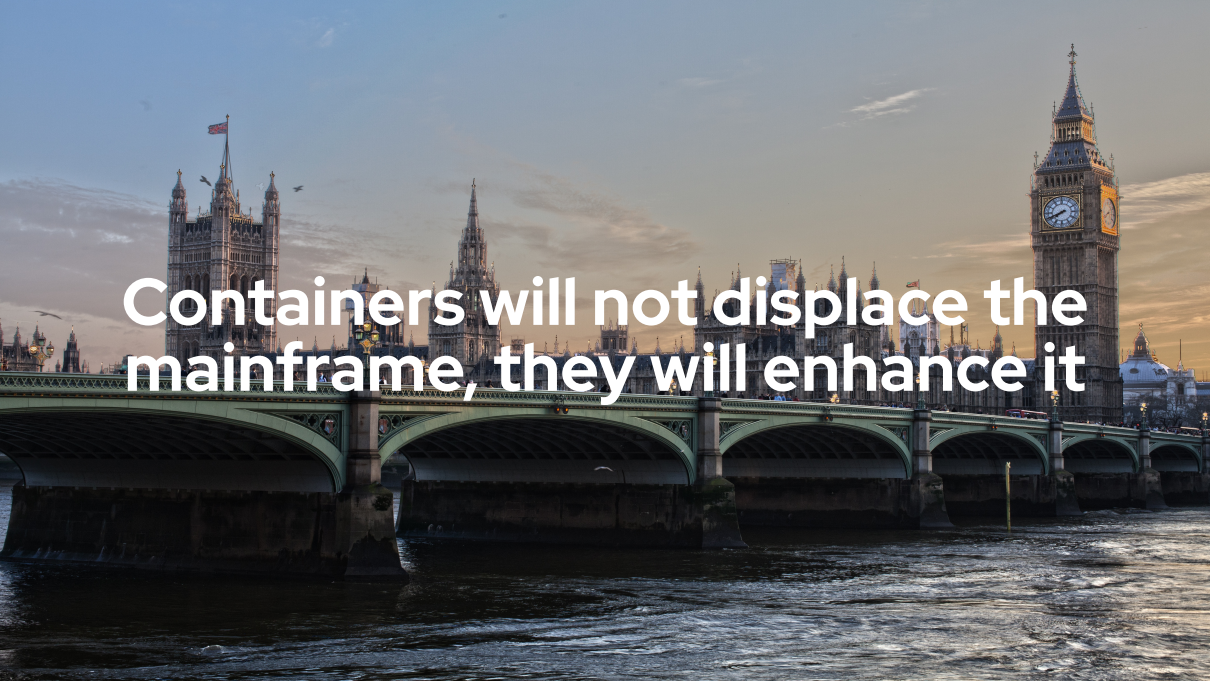
- Pro:
  - Full cluster availability
  - Full Flexibility placing applications and grow
  - Dedicated control nodes for High Availablity
- Cons:
  - Cluster IFL footprint highest. But will only slightly grow
  - Setup for Dev/Test env potentially oversized

Multiarchitecture deployment options

- 4.14
  - A cluster with control planes and compute nodes on x86 architecture
  - With additional s390x compute nodes
- 4.15
  - A cluster with control planes and compute nodes on s390x architecture
  - With additional x86 compute nodes

LinuxOne as Management Hub

- Hybrid Multi-Architecture Multi Cloud management
  - Using RH Advanced Cluster Management for Kubernetes
  - Single Pane of Glas
  - On-premise
  - Heterogeneous Kubernetes Container environments
  - Multi Cloud & Multi-Architecture
  - Including Kubernetes in public clouds
- Centralized integrated RH OpenShift Automation
  - Using OpenShift Pipelines
  - Across RH OpenShift environments


Containers will not displace the mainframe, they will enhance it

Why Red Hat OpenShift on the Mainframe

- Application Development Consistency
- Leverage industry knowledge and tools
- Workload portability

Why the Mainframe under Red Hat OpenShift

- Data gravity
- Low latency between LPARs
- Consolidation and TCO reduction
- Business Continuity
- Leverage Mainframe unique hardware capabilities

HA and DR in Red Hat OpenShift and Mainframe

- OpenShift only handles `Pod` failures not `Node` failures
- OpenShift needs a majority of `etcd` nodes running to maintain cluster stability. If a majority of `etcd` nodes go down the recovery might need to be done manually
- Software-defined persistent storage alone cannot achieve zero RTO and zero RPO that mission critical stateful workloads demand

- The Mainframe's HA capabilities can ensure that OpenShift nodes do not go down while providing near zero RTO ane zero RPO for stateful workloads when combined with external storage
- Does not need to be enabled for everything – can be partially enabled for workloads that require it

Wrapping up

- It is key to focus on portable applications
- Containers can bring new tooling to Mainframe development
- The Mainframe is a great platform to run containerized workloads
- Red Hat OpenShift enables portable applications without giving up the specific platform optimizations

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