One click Hadoop clusters - anywhere

Janos Matyas, Senior Director of Engineering

October, 2015
Overview

- Introduction
- Goals and motivations
- Technology stack
- How it works
- Results/achievements/future plans
- Demo and Q&A
Goals and motivations

- Full Hadoop stack provisioning – everywhere
- Automate and unify the process
- Zero-configuration approach
- Same process through a cluster lifecycle (Dev, QA, UAT, Prod)
- Provide tooling - UI, REST API and CLI/shell
- Secure and multi-tenant
- SLA policy based autoscaling
Technology stack

- Docker
- Swarm
- Consul
- Apache Ambari
Docker

- Container based virtualization
- Lightweight and portable
- Build once, run anywhere
- Ease of packaging applications
- Automated and scripted
- Isolated
Docker – How it works

- Containers are isolated, but share OS and bins/libraries
- No need to emulate hardware
Swarm

• Native clustering for Docker
• Distributed container orchestration
• Same API as Docker
Swarm – How it works

- Swarm managers/agents
- Discovery services
- Advanced scheduling
Consul

- Service discovery/registry
- Health checking
- Key/Value store
- DNS
- Multi datacenter aware
Consul – How it works

- Consul servers/agents
- Consistency through a quorum (RAFT)
- Scalability due to gossip based protocol (SWIM)
- Decentralized and fault tolerant
- Highly available
- Consistency over availability (CP)
- Multiple interfaces - HTTP and DNS
- Support for watches
Apache Ambari

• Easy Hadoop cluster provisioning
• Management and monitoring
• Key feature - Blueprints
• REST API, CLI shell
• Extensible
  • Stacks
  • Services
  • Views
Apache Ambari – How it works

• Ambari server/agents
• Define a blueprint (blueprint.json)
• Define a host mapping (hostmapping.json)
• Post the cluster create
Cloudbreak

Cloudbreak is a cloud-agnostic Hadoop as a Service API. Abstracts the provisioning and ease management and monitoring of on-demand clusters.
Cloudbreak

• Benefits
  • Zero configuration
  • Elastic
  • Secure
  • Infrastructure agnostic
  • Heterogenous clusters
  • Auto-scaling

• Main REST resources
  • /template – specify an instance group infrastructure
  • /stack – creates an infrastructure based on a template
  • /blueprint – describes a Hadoop cluster
  • /cluster – creates a Hadoop cluster
Cloudbreak – How it works

• Start VMs - with a running Docker daemon
• Cloudbreak Bootstrap
  • Start Consul Cluster
  • Start Swarm Cluster (Consul for discovery)
• Start Ambari servers/agents - Swarm API
• Ambari services registered in Consul (Registrar)
• Post Blueprint
Cloudbreak - Features

• Extensible – easy to implement Service Provider Interface
• Cloudbreak “recipes”
  • Automate host configuration
  • Pre/post Ambari lifecycle hooks
  • Services reconfiguration
  • Automate/execute custom actions
• Side – effects
  • Ambari CLI/shell and Groovy based client
  • Cloud Foundry’s UAA Dockerized
  • Munchausen – bootstrap Swarm with Consul
  • Dockerized full Hadoop stack (Apache Hadoop 60K+, Ambari 12K+, Spark 10K+ downloads)
Cloudbreak - Hadoop as a Service API

• Public tech preview
  • Microsoft Azure
  • Amazon AWS
  • Google Cloud Platform
  • OpenStack

• Private tech preview – R&D
  • Bare metal
  • Rackspace Managed Cloud
  • HP Helion Public Cloud

*Integration SPI is available
Cloudbreak – SPI

- Cloud providers have very different API, though model is very similar
- Non-invasive implementation
- One interface to implement - `CloudPlatformConnector`
Periscope is a heuristic Hadoop scheduler associated with a QoS profile. Built on YARN schedulers, cloud and VM resource management API’s it allows to associate SLA’s to applications and customers.
Periscope

• **Benefits**
  • Zero configuration
  • Metric and time based alarms
  • SLA policy based autoscaling
  • Secure
  • Hostgroup specific

• **Main REST resources**
  • `/clusters` – specify a cluster to be monitored
  • `/alerts` – time and metric based
  • `/policies` – specify an SLA policy for a cluster based on an alarm
  • `/applications` – specify an SLA policy for an application (under development)
Periscope – How it works

- Configures/monitors alarms in Ambari
- Setup alarm, cooldown periods
- Manages cluster sizes
- Allow to associate SLA scaling policies to alarms
- Orchestrates Cloudbreak to up/downscale the cluster
Demo and Q&A