Lifecycle Management with BOSH

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What is BOSH?

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„BOSH let's you orchestrate the lifecycle of large-scale deployments of **distributed systems** to infrastructure.“

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Why BOSH?

- Infrastructure independent
- Operating System independent
- Upgrade handling
- Horizontal and vertical scalable deployments
- Monitoring and Self-Healing
- Orchestration and automation on one hand

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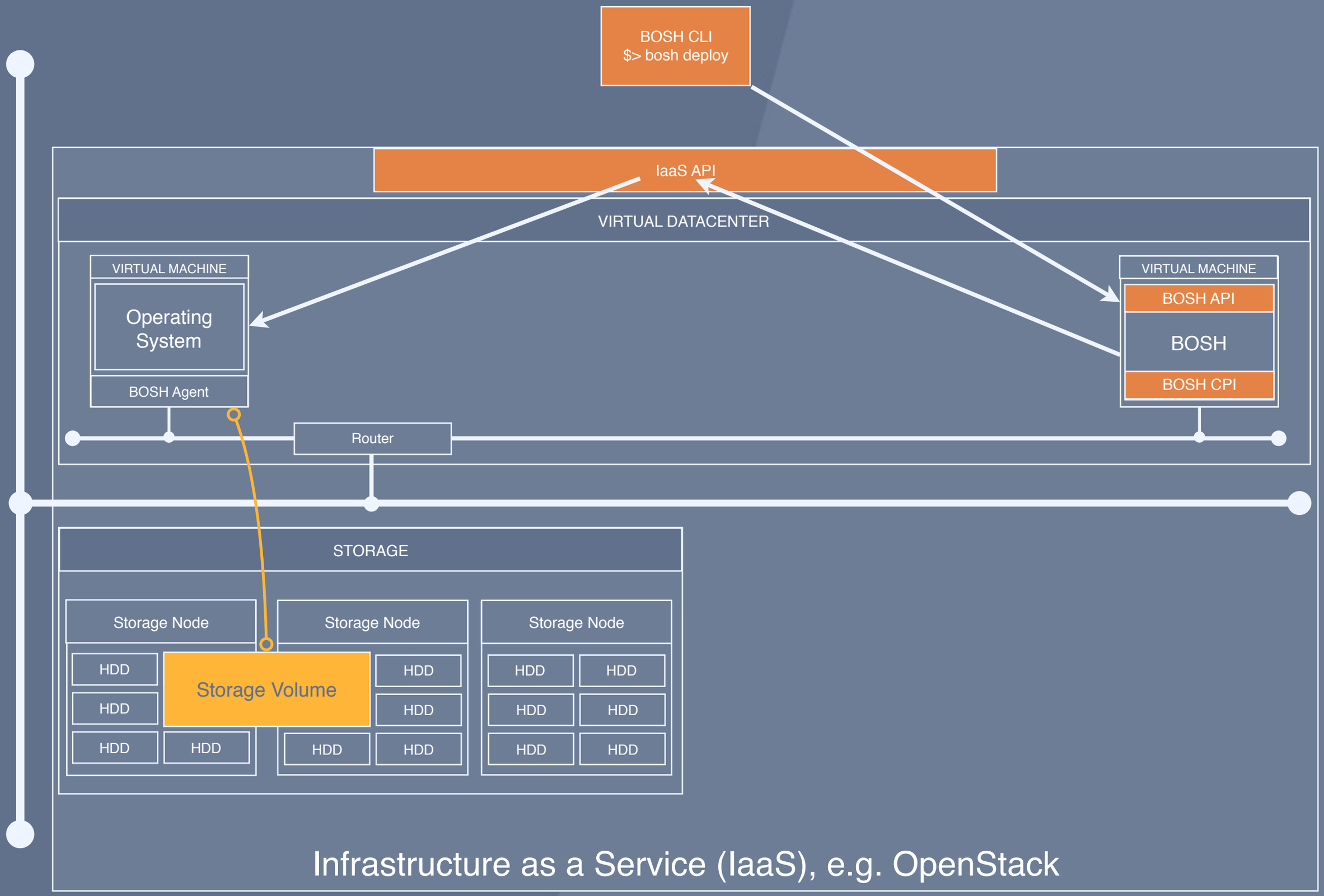
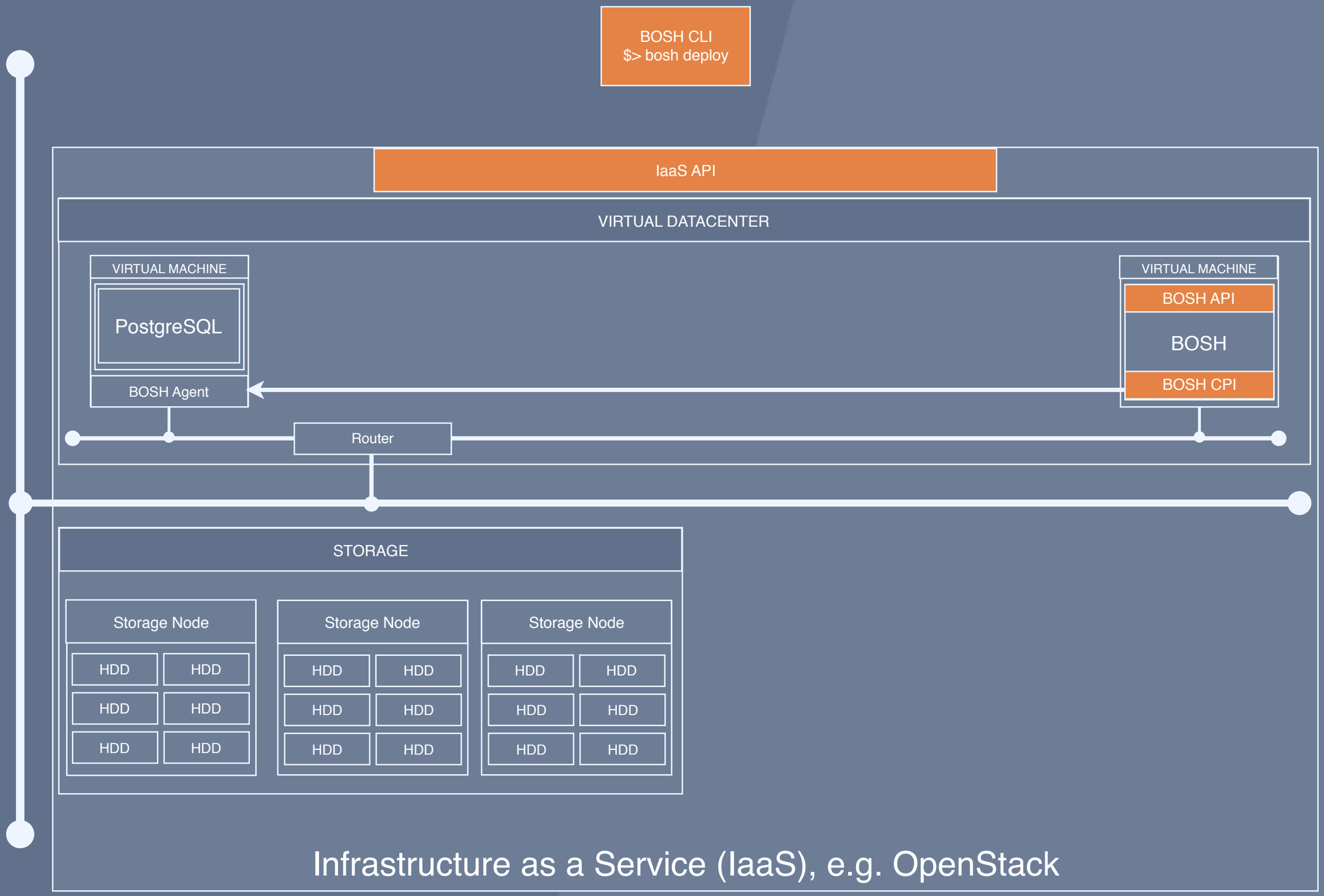
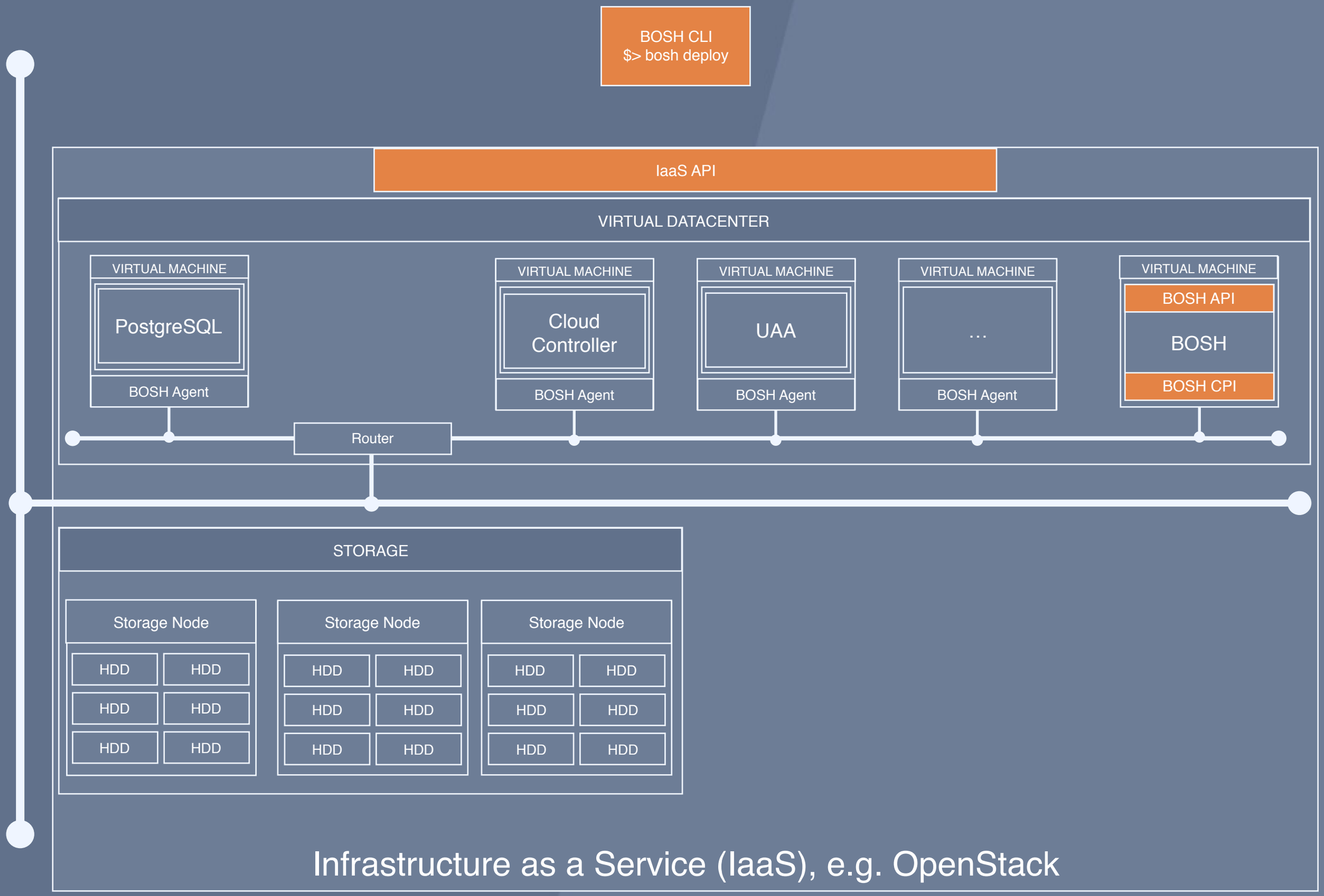
Features of BOSH

- Orchestration and automation tool
- Lifecycle management included (for OS and the running software)
  - Monitoring and self healing
  - Update handling
- Infrastructure independent


BOSH CLI
$> bosh deploy
IaaS API
VIRTUAL DATACENTER
VIRTUAL MACHINE
Operating System
BOSH Agent
VIRTUAL MACHINE
BOSH API
BOSH
BOSH CPI
Router
STORAGE
Storage Node
Storage Node
Storage Node
HDD
Storage Volume
Infrastructure as a Service (IaaS), e.g. OpenStack



Infrastructure as a Service (IaaS), e.g. OpenStack



Infrastructure as a Service (IaaS), e.g. OpenStack

How BOSH works

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BOSH Architecture

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BOSH Installation

BOSH Health Monitor

BOSH Director

CPI

NATS Message Bus

BOSH Registry

BLOB Store

BOSH Managed Infrastructure Resources

VIRTUAL MACHINE

BOSH Agent | Process Monitor

Some process

VIRTUAL MACHINE

BOSH Agent | Process Monitor

Some other process

VIRTUAL MACHINE

BOSH Agent | Process Monitor

Yet another process

Infrastructure settings

settings are contained in the

Cloud Config

- Contains VM and disk sizes
- Contains network specific settings
- Contains IaaS specific settings (i.e. AZ informations)

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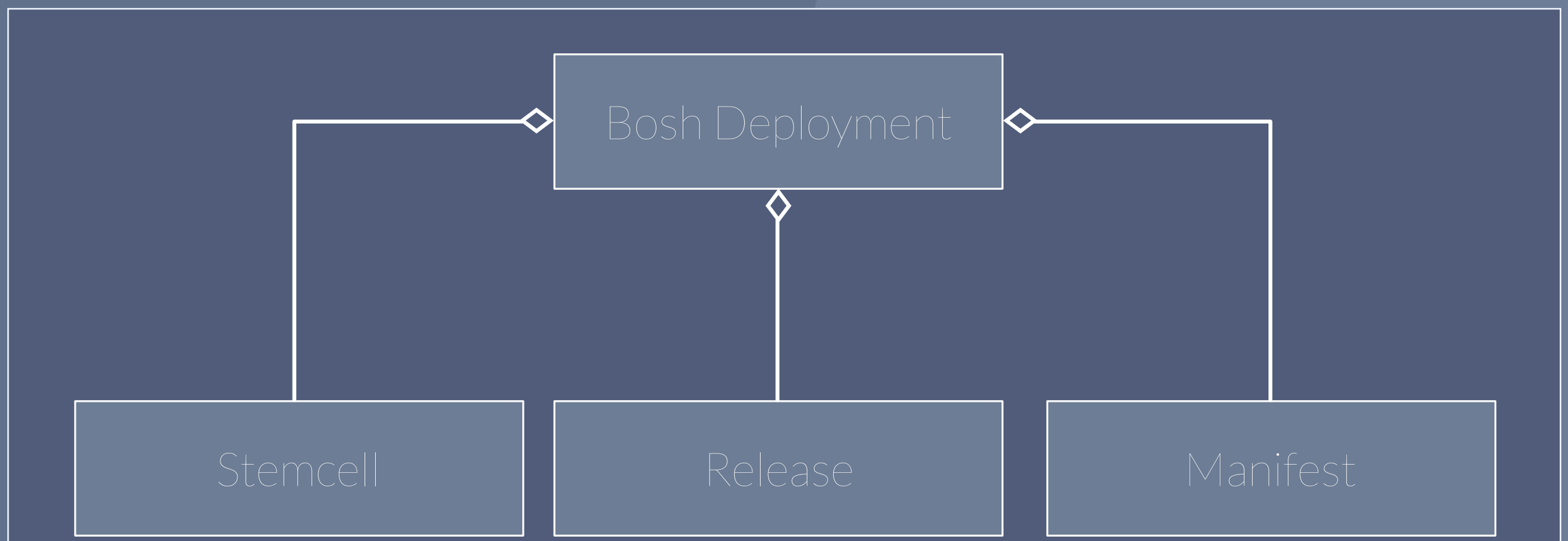
What a BOSH deployment consists of



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BOSH Stemcell

- VM template
- BOSH clones new VMs from stemcells
- Stemcell = OS + BOSH Agent
- BOSH Agent acts on the VM
- Stemcells are infrastructure and OS specific (VMware + Ubuntu, OpenStack + CentOS, etc.)

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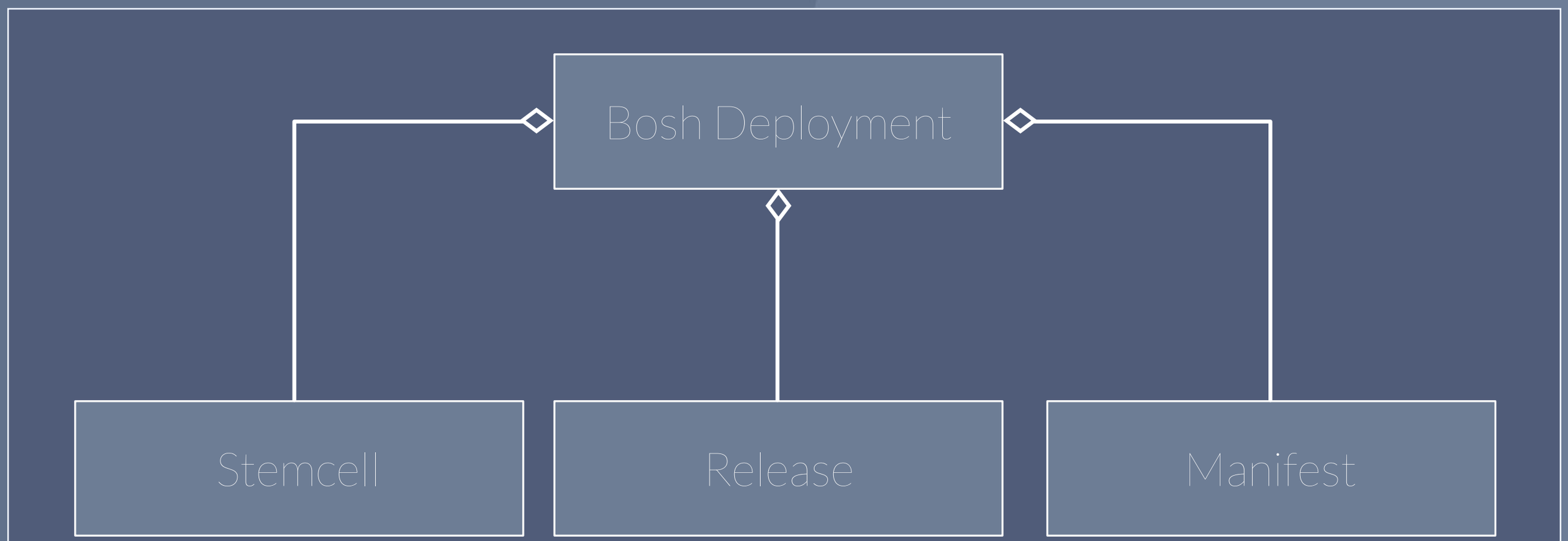
What a BOSH deployment consists of



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BOSH Releases contain the automation

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A BOSH Release contains:

- Blobs (source code archives)
- Packages (descriptions how to build blobs)
- Jobs (descriptions how to run things)

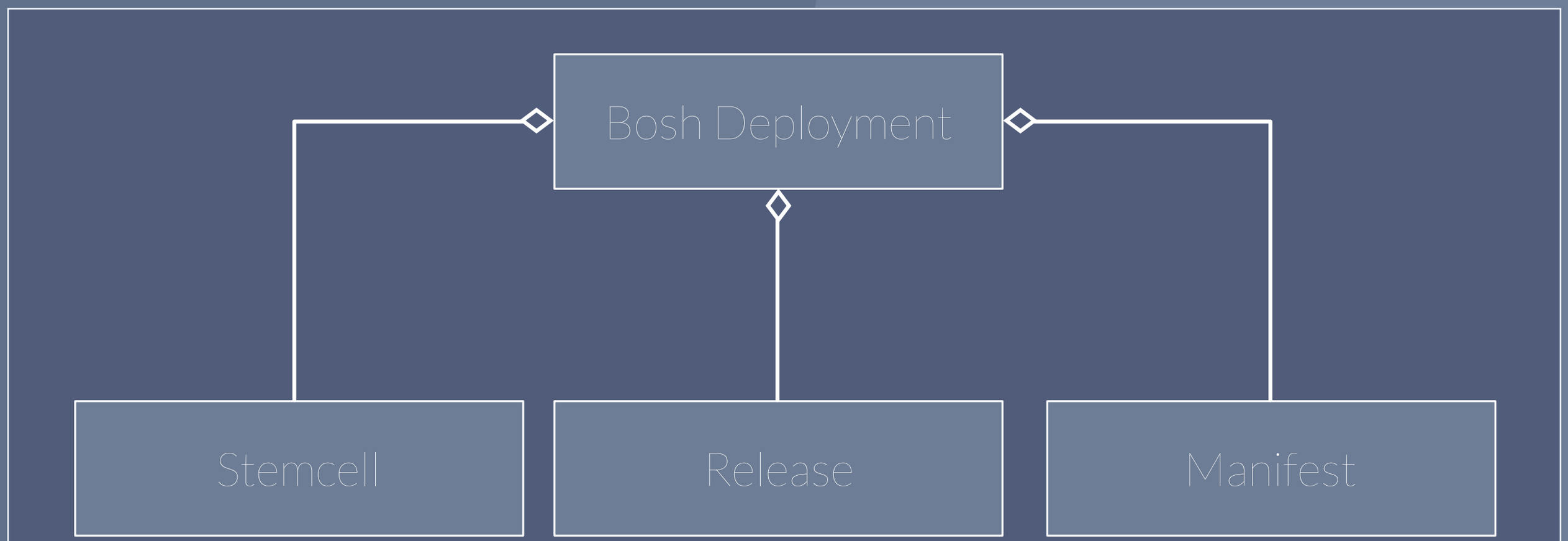
- Blobs:
  - source code archives
  - binaries

- Package
  - related to a Blob or source code
    - compile script
    - install script

- Jobs = Processes to be run
  - set of configuration files
  - control scripts
    - monit configuration
    - properties
    - run process from a package
      e.g. mysqld

- Release is a collection of
  - source code
  - configuration files
  - startup and control scripts
  - software packages

What a BOSH deployment consists of



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BOSH Manifest

- defines the layout and properties of a deployment
  - network architecture
  - VM dimensions, used stemcells (OS)
  - Properties for the Jobs in a Release
  - Which Releases and Jobs should be started on how many VMs

```
---
name: postgresql1

update:
  canaries: 0
  canary_watch_time: 30000-600000
  max_in_flight: 50
  serial: true
  update_watch_time: 30000-600000

stemcells:
- os: ubuntu-xenial
  alias: default
  version: 3541.4

releases:
- name: a9s-postgresql11
  version: latest
- name: a9s-consul
  version: latest
```

```
instance_groups:
- name: pg
  vm_type: small
  instances: 1
  azs: [z1,z2,z3]
  persistent_disk_type: medium
  stemcell: default
  jobs:
  - name: consul
    release: a9s-consul
  - name: postgresql-ha
    release: a9s-postgresql11
  networks:
  - name: dynamic

properties:
  postgresql-ha:
    port: 5432
    admin_credentials:
      username: admin
      password: admin
```


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Creating a Deployment

- bosh cli pushes manifest to BOSH director
- BOSH director creates a deployment

```
bosh -d postgresql1 deploy postgresql1.yml
```


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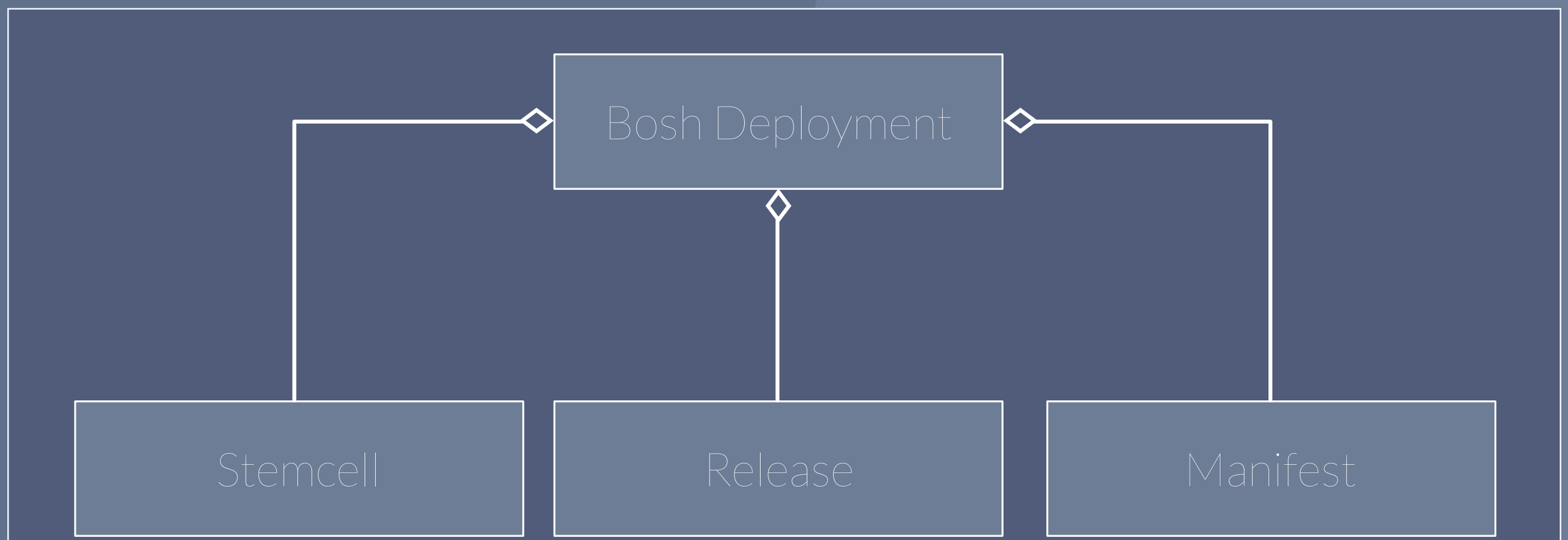
What a BOSH deployment consists of



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Benefits of using BOSH

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Infrastructure Independent

- A BOSH release contains the main-automation (software packages, how to run processes)
- BOSH releases can be re-used on every* infrastructure
- Automate once and deploy everywhere

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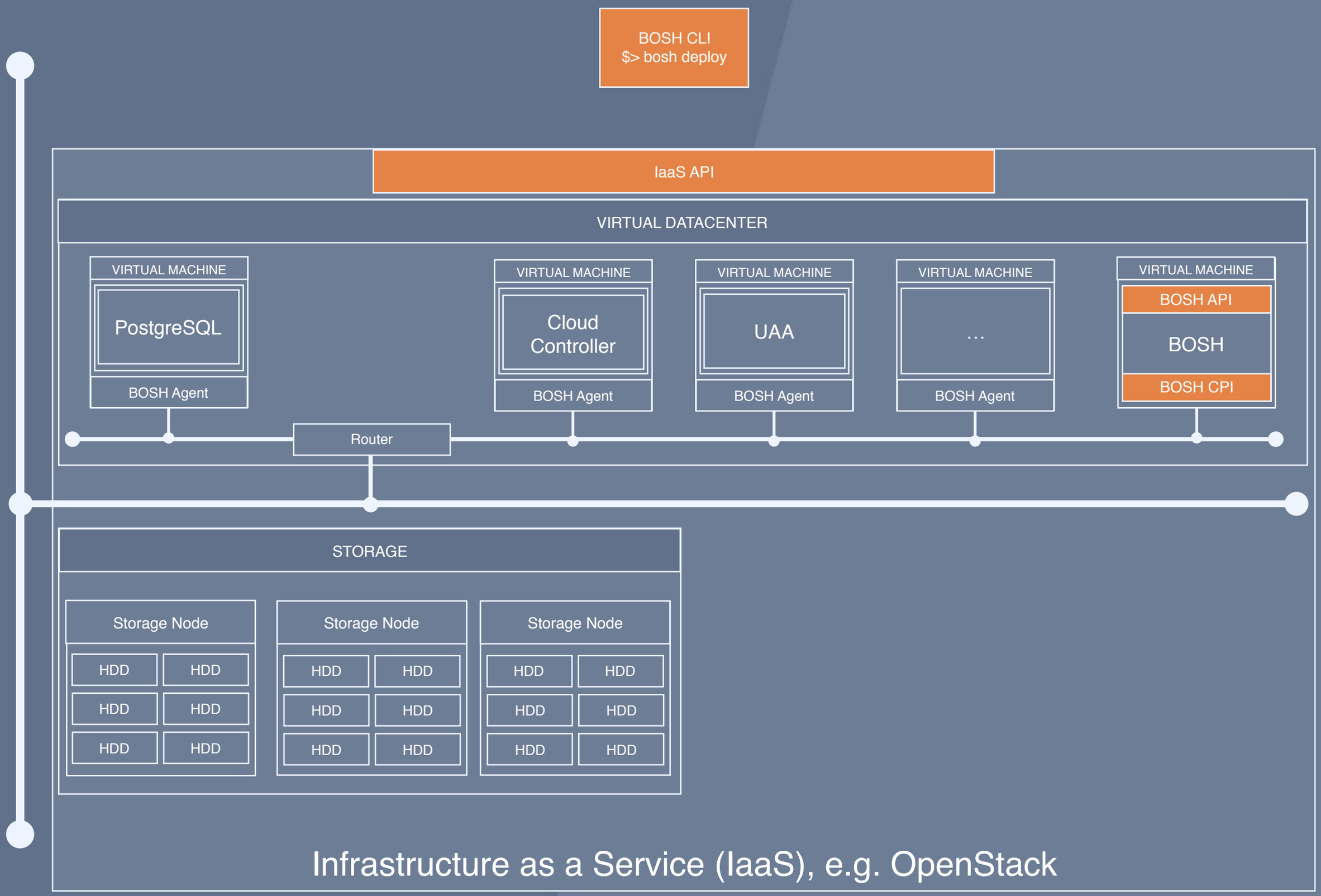


Infrastructure as a Service (IaaS), e.g. OpenStack

BOSH CLI
$> bosh deploy

IaaS API

VIRTUAL DATACENTER

VIRTUAL MACHINE
PostgreSQL
BOSH Agent

VIRTUAL MACHINE
Cloud Controller
BOSH Agent

VIRTUAL MACHINE
UAA
BOSH Agent

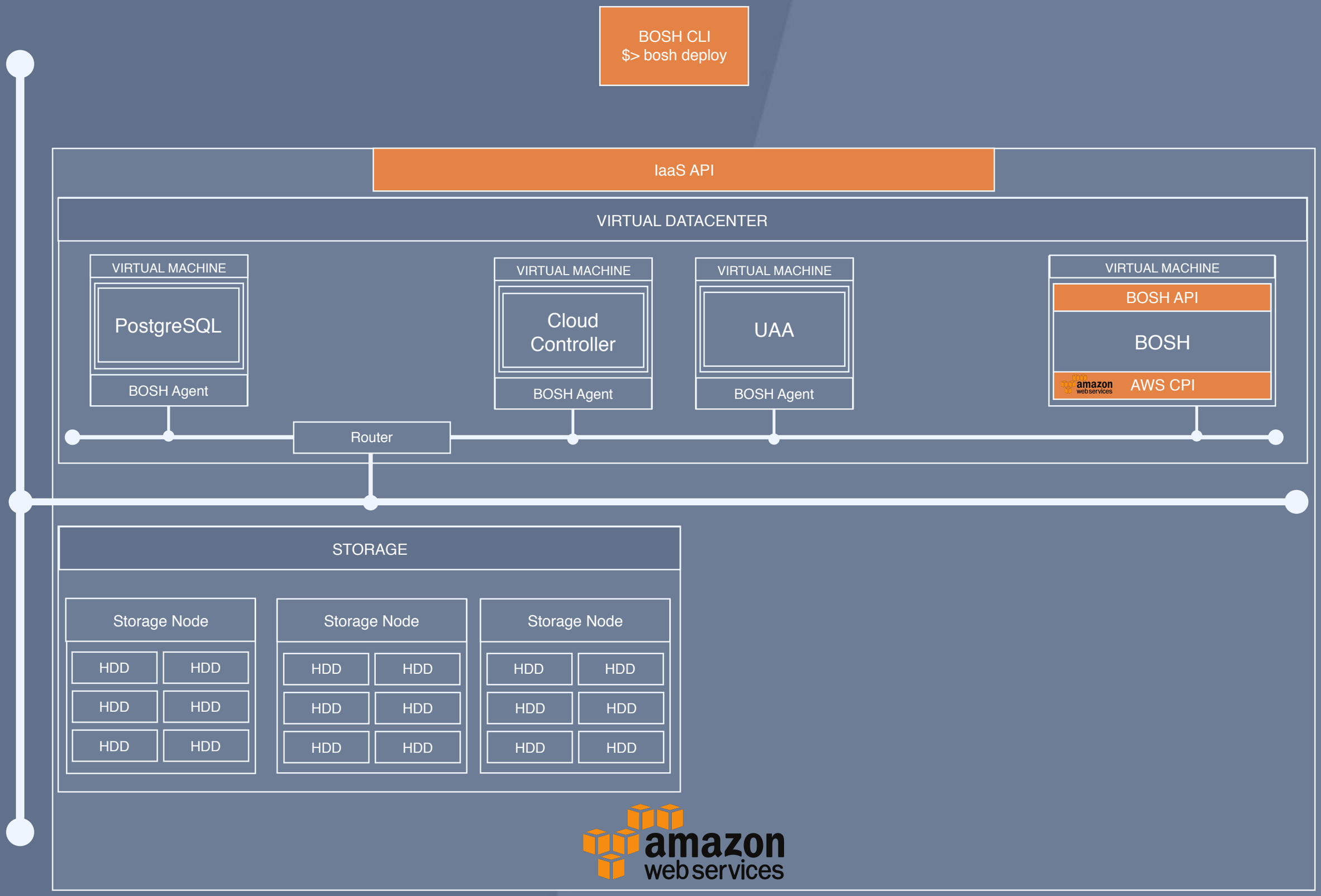
VIRTUAL MACHINE
BOSH API
BOSH
OPENSTACK CPI

Router

STORAGE

Storage Node	Storage Node	Storage Node
HDD HDD	HDD HDD	HDD HDD
HDD HDD	HDD HDD	HDD HDD
HDD HDD	HDD HDD	HDD HDD

OpenStack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amazon web services
AWS CPI
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Storage Node
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HDD
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HDD
HDD
Storage Node
HDD
HDD
HDD
HDD
HDD
HDD
amazon
web services

- **Switch deployment between IaaS**
  - Keep the same release
  - Use a stemcell specific to the new cloud
  - Adapt the cloud config

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Operating System Independent

- A BOSH release contains the main-automation (software packages, how to run processes)
- BOSH releases can be re-used on every* stemcell

- Stemcell needs to be switched (easy Release Upgrades)

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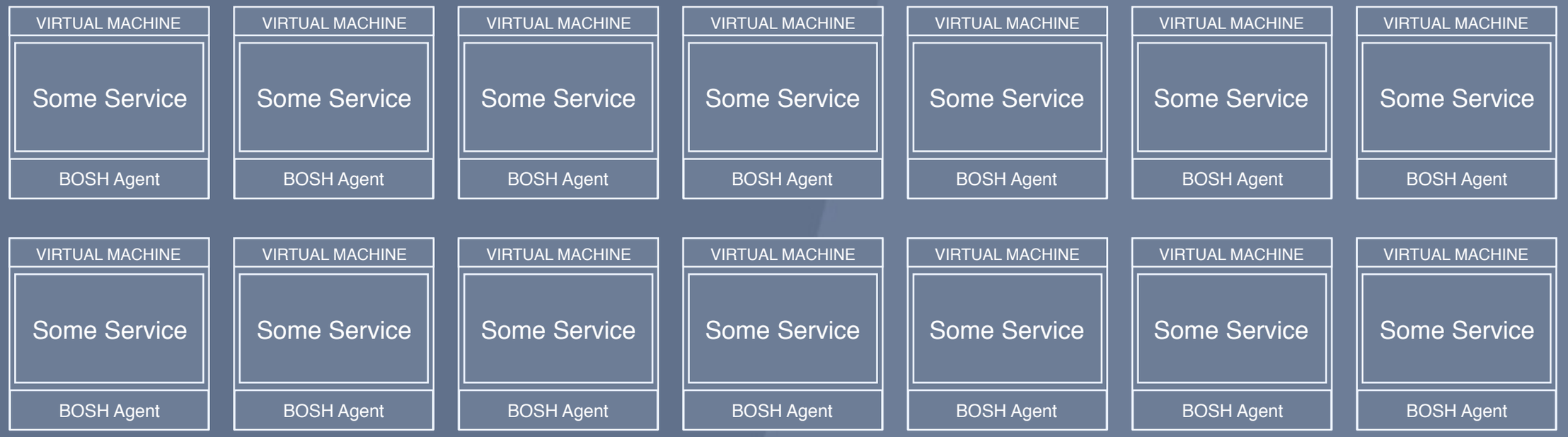
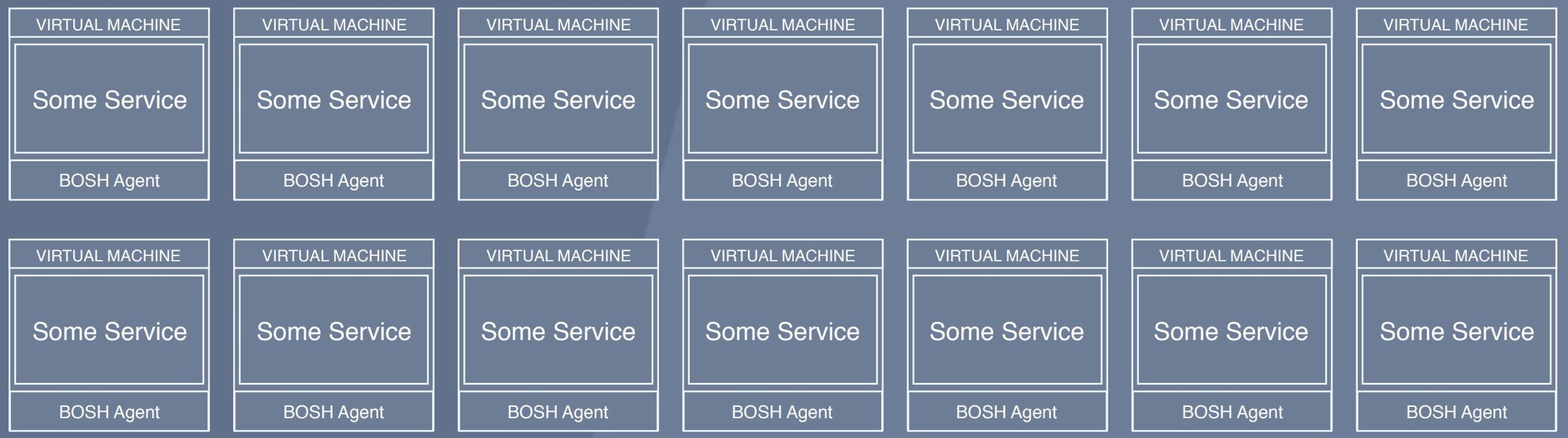


Horizontal Scaling



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- **Scaling-out a BOSH deployed system**
  - Keep the same release
  - Use the same stemcell
  - Change the manifest

Vertical Scaling

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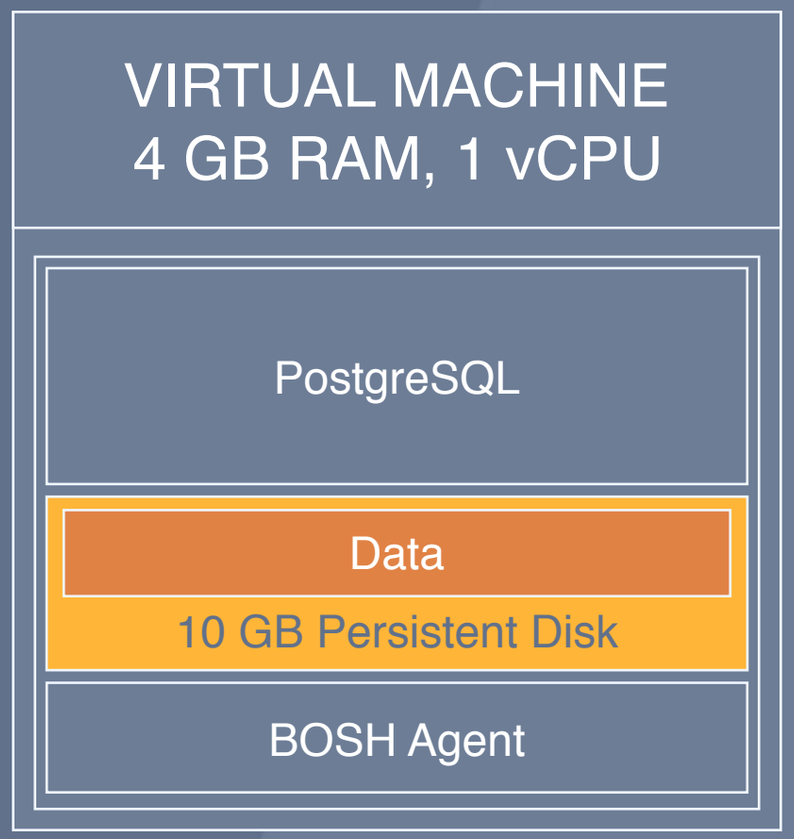
4GB RAM
1 vCPU

10GB persistent disk



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VIRTUAL MACHINE
4 GB RAM, 1 vCPU

PostgreSQL

Data

10 GB Persistent Disk

BOSH Agent

VIRTUAL MACHINE
8 GB RAM, 2 vCPUs

PostgreSQL

Data

10 GB Persistent Disk

20 GB Persistent Disk

BOSH Agent

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Monitored & Self-Healing

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Self-healing process failures

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Self-healing process monitor failures

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Self-healing VM failures

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Self-healing BOSH Agent failures

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Use Case:

Deploy Cloud Foundry

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Use Case:

a9s Data Service Framework

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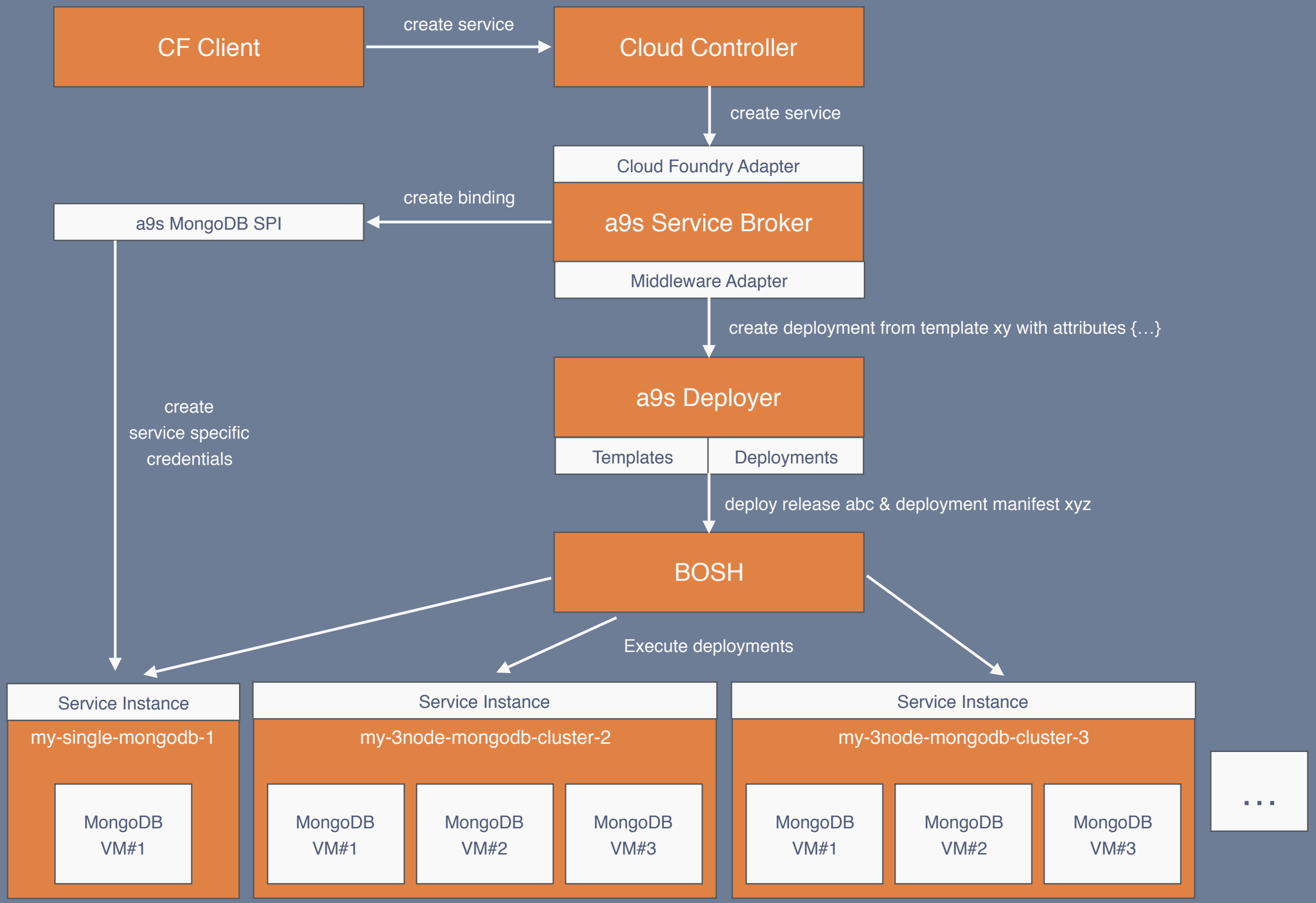
CF Client
create service
Cloud Controller
create service
Cloud Foundry Adapter
create binding
a9s MongoDB SPI
a9s Service Broker
Middleware Adapter
create deployment from template xy with attributes {…}
a9s Deployer
create
service specific
credentials
Templates
Deployments
deploy release abc & deployment manifest xyz
BOSH
Execute deployments
Service Instance
my-single-mongodb-1
MongoDB
VM#1
Service Instance
my-3node-mongodb-cluster-2
MongoDB
VM#1
MongoDB
VM#2
MongoDB
VM#3
Service Instance
my-3node-mongodb-cluster-3
MongoDB
VM#1
MongoDB
VM#2
MongoDB
VM#3
...

Learn BOSH

https://mariash.github.io/learn-bosh/

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Thank you.

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