

By Praparn Luengphoonlap
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Agenda

- Fantastic disk and where to find them
- Kubernetes for all (All-in-one solution)
- Case study: Push message processing
 - Solution design
 - Enhancement
 - Future improve
- Demo Case: Wordpress on scale
- Q&A

Who are we ? (Opcellent)

The image features the Opcellent logo at the top left, consisting of a blue stylized 'O' with three horizontal lines extending from its right side. To the right of the logo is the word "Opcellent" in a bold, black, sans-serif font. A thin horizontal line runs across the top of the page. Below the logo is a large, semi-transparent teal graphic element shaped like a comet's tail, pointing downwards. In the center of this teal shape is a smaller, solid teal circle containing a white stylized 'O'. Below this graphic, the text "Modern Server Technology Implementer" is displayed in a white, sans-serif font. At the bottom of the teal shape is a white rectangular button with the text "GET DETAILS" in a black, sans-serif font.

● ABOUT

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s.

- [အနေဖြင့်ဆုံးသူမှူးဆုံးသူမှူး](#)
- [Setup AWS Server](#)
- [AWS Server](#)
- [Corporate Training](#)
- [Public Training](#)
- [စီပွဲနှင့် Cloud](#)
- [Consult utilize AWS Cloud သူမှူးဆုံးသူမှူး AWS နားလည်](#)
- [AWS Hardware server စီပွဲနှင့်](#)



● SERVICE

Docker

Kubernetes

Placeholder Logo

Docker
Lorem Ipsum is
simply dummy text
of the printing and
typesetting industry.

Kubernetes
Lorem Ipsum is
simply dummy text
of the printing and
typesetting industry.

Placeholder Text
Placeholder Text

The image shows a detailed event listing for a workshop titled "Advanced Docker and Kubernetes 101". The listing includes logos for Heng Leasing, GDG Chiang Mai, and Artisan Digital. It features a Docker logo and a Kubernetes logo. The workshop is presented by Praparn Lungpoonlap. The event details are: Saturday, 12 May 2018 at Punspace Tha Pae Gate. The schedule includes: 6pm : Register and Networking, 7pm : Workshop, 9pm : Networking and Games. A note at the bottom states: "FREE FOOD AND BEER! - BUT PLEASE BRING YOUR OWN LAPTOP :)" and adds: "*Attendees should have basic knowledge or experience in Docker or container technology." At the bottom, there are buttons for "Interested" and "Going", and a three-dot menu icon.



The image is a collage of four screenshots from different websites:

- Kiriwana Resort & Spa Thailand:** Shows a night view of a multi-story wooden resort building with warm lighting.
- Heng Liseung Khao Yai:** A green-themed website with a phone number 02-153-9587.
- A creative map of Thailand:** A stylized map where Thailand is depicted as a person. Labels include "Guest Room", "Facilities", "Passion", "The Passion", "Contact Us", "Reservation", "Gallery", "Bangkok Update", and "Special Offers".
- Mantis Bug Traders:** A login page with fields for "Password for 'administrator'" and "Login". It also includes a note about staying logged in and a "Forgot your password?" link.

Present by: Praparn L. (eva10409@gmail.com)



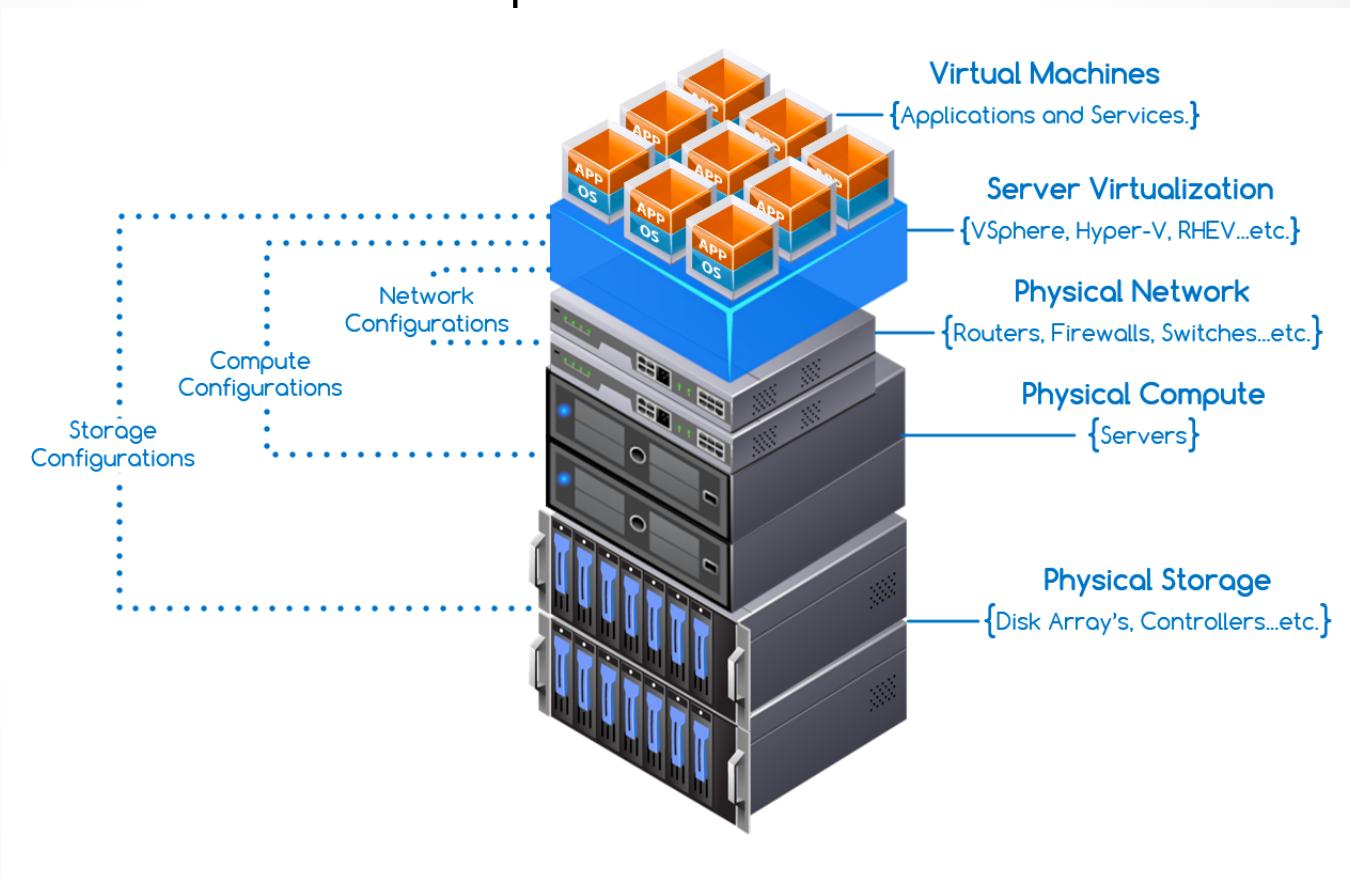
Fantastic disk and where to find them

- Find disk (Storage) for enterprise is like find monster
- Storage consist many in product
 - IBM V9000, V7000, V5000
 - HP 3PAR Storeserve
 - Dell EMC
 - NFS Storage
 - etc
- Each product need special skill
- Discussion ?
 - How many disk space ?
 - Is it need redundancy disk ?
 - What the characteristic of storage ? (ssd/sas)
 - Fiber disk ? How about network zoning ?
 - Ahhhh!!!



Fantastic disk and where to find them

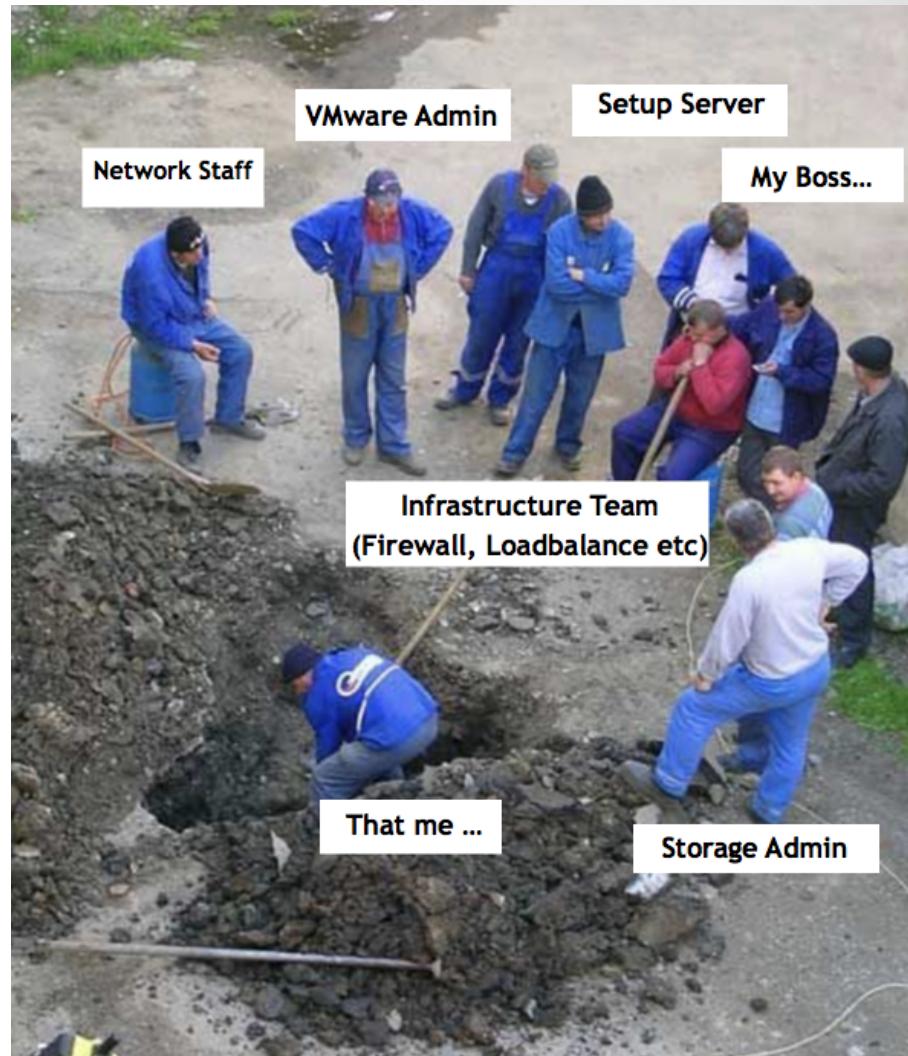
- How about other component ?



Fantastic disk and where to find them

Imaginary that ...

- How many staff need to join?
- How many skill be need ?
- How about complexity be here
- ...
- ...
- Is it necessary to like there ?



Kubernetes for All



K8S Storage Build-In

 Opcellent

Kubernetes for All

- Kubernetes is orchestrator for control container running in multiple server like cluster system
- Kubernetes will short name with “K8S”
- K8S will provide all component in single platform

VMWare / Physical Server	Kubernetes
Application/Database install	Pods (Set of container)
Server / Guest OS	No need
Networking	SDN (Calico, Flennel etc)
Load Balance	Service (native,Istio,kong,traefik etc)
Firewall	Service (native,Istio,kong,traefik etc)
Storage	All you need ☺

Kubernetes for All

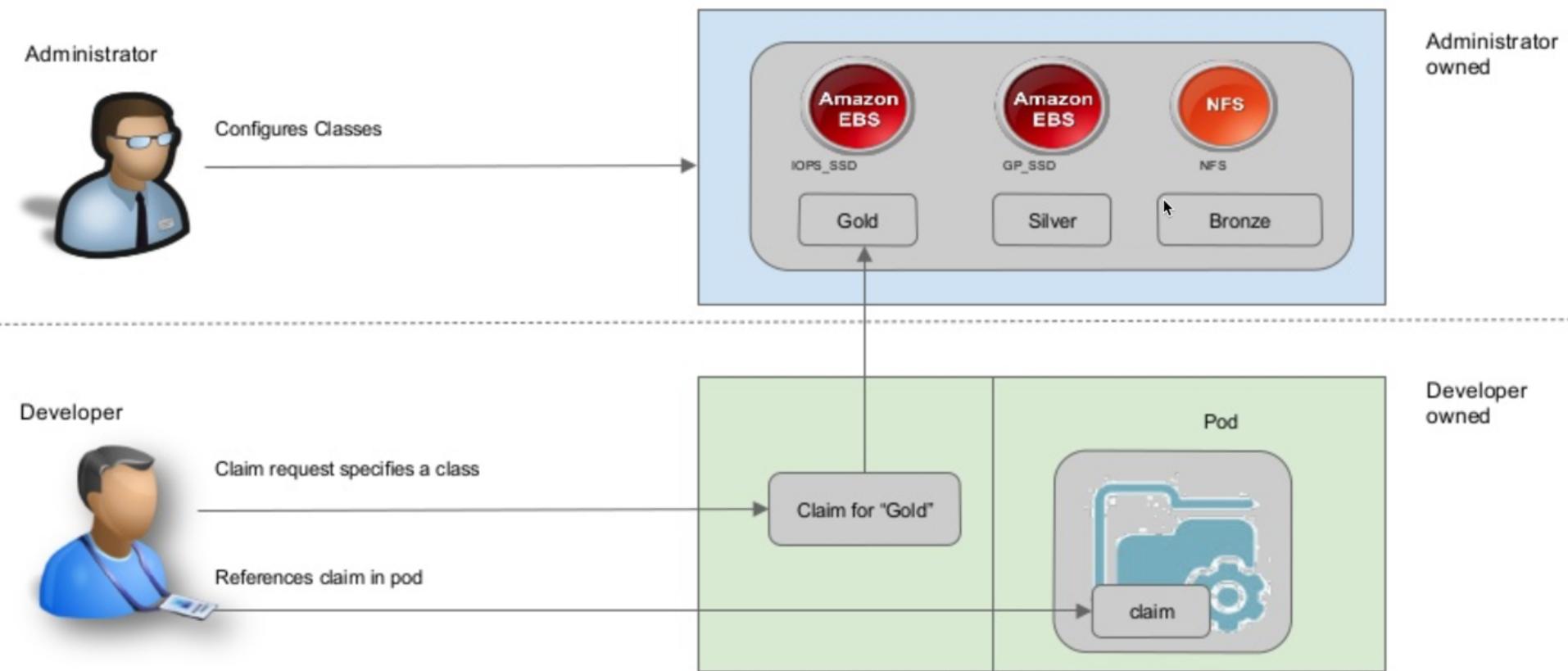
- Kubernetes support storage in many solution upon our request
 - Dynamic Provision by “StorageClass”
 - Create storage real-time when application request

Volume Plugin	Internal Provisioner	Config Example
AWElasticBlockStore	✓	AWS
AzureFile	✓	Azure File
AzureDisk	✓	Azure Disk
CephFS	-	-
Cinder	✓	OpenStack Cinder
FC	-	-
FlexVolume	-	-
Flocker	✓	-
GCEPersistentDisk	✓	GCE
Glusterfs	✓	Glusterfs
iSCSI	-	-
Quobyte	✓	Quobyte
NFS	-	-
RBD	✓	Ceph RBD
VsphereVolume	✓	vSphere
PortworxVolume	✓	Portworx Volume
ScaleIO	✓	ScaleIO
StorageOS	✓	StorageOS
Local	-	Local

Ref: <https://kubernetes.io/docs/concepts/storage/storage-classes/>

Kubernetes for All

- Dynamic Provision

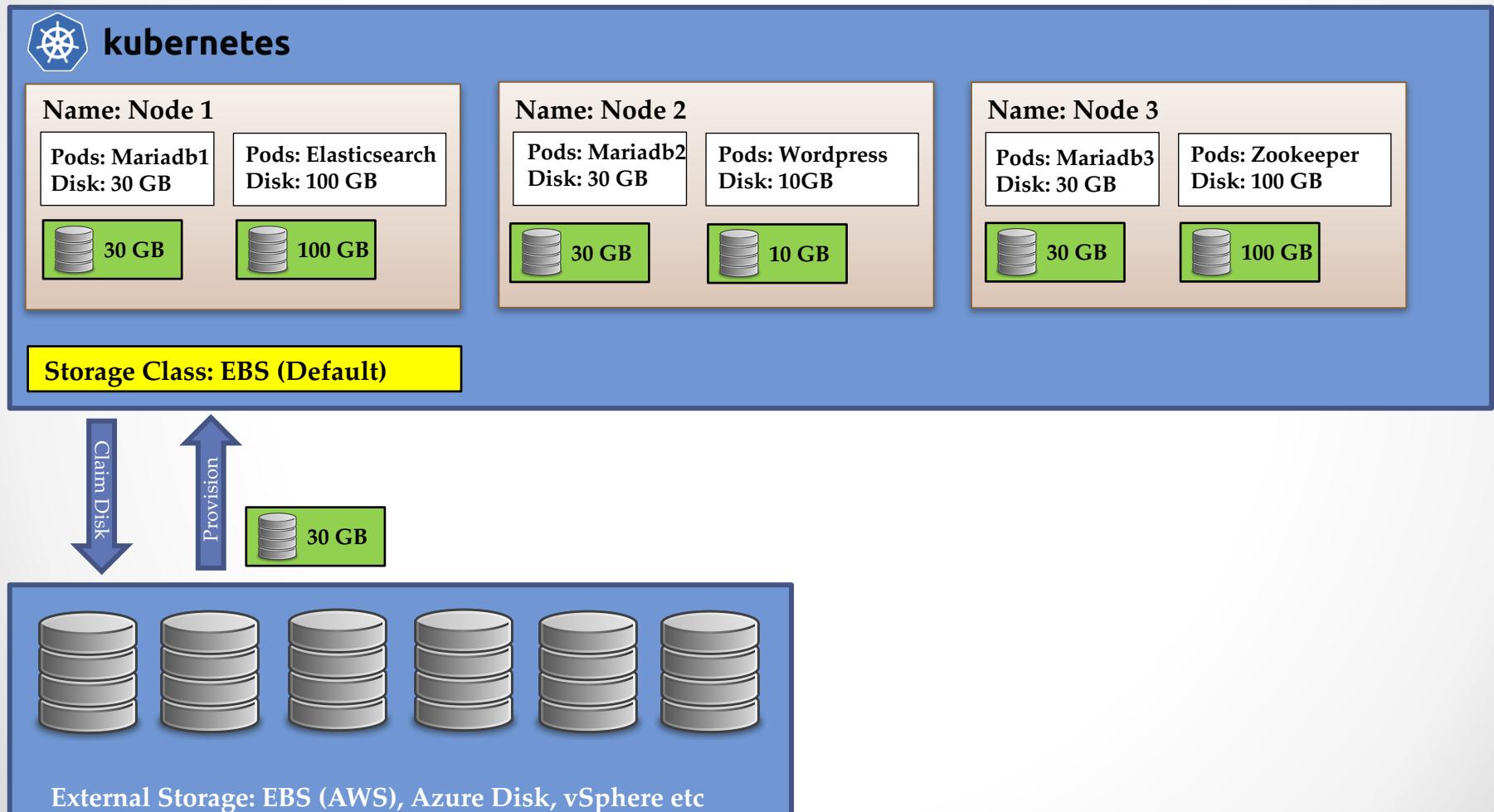


Ref: <https://kubernetes.io/docs/concepts/storage/storage-classes/>

K8S Storage Built-In

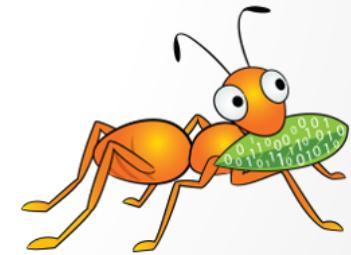
Kubernetes for All

- External Storage: Kubernetes will request storage from outside

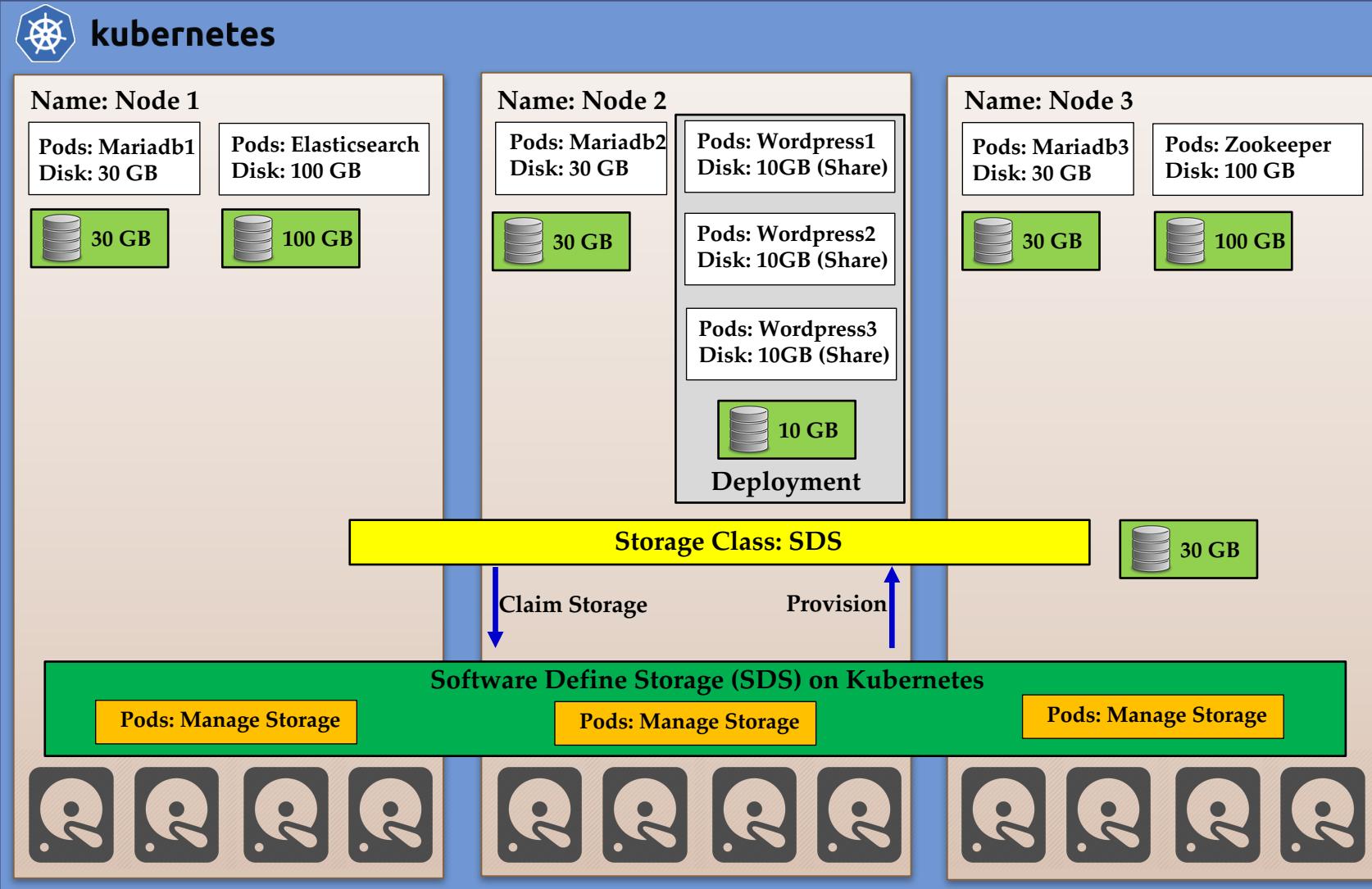


Kubernetes for All

- Storage Built-In: Kubernetes will manage disk with SDS (software define storage)
- Manage end-to-end with single platform
 - Manage raw disk to be storage system
 - Provision storage on application demand
 - Manage storage network to application (End-Point)
 - No overhead network outside kubernetes cluster
 - Total open-source solution



Kubernetes for All



Case Study: Push Message Processing



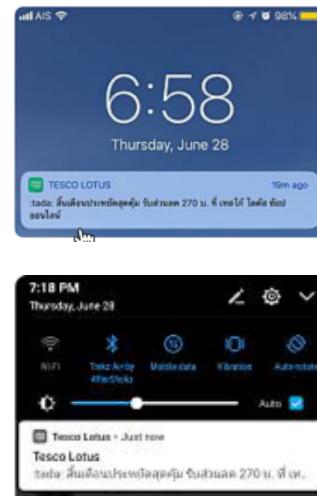
K8S Storage Build-In

 Opcellent

The logo for Opcellent features a stylized blue icon resembling a flame or a series of dots arranged in a circular pattern, positioned to the left of the word "Opcellent" in a bold, sans-serif font.

Push Messaging Processing

- Business Purpose
 - Operate push message notification to all mobile's customer
 - Message is about 50,000 – 1M message each round
 - Push notification need to keep logging for cross-check message
 - System need to handling all message



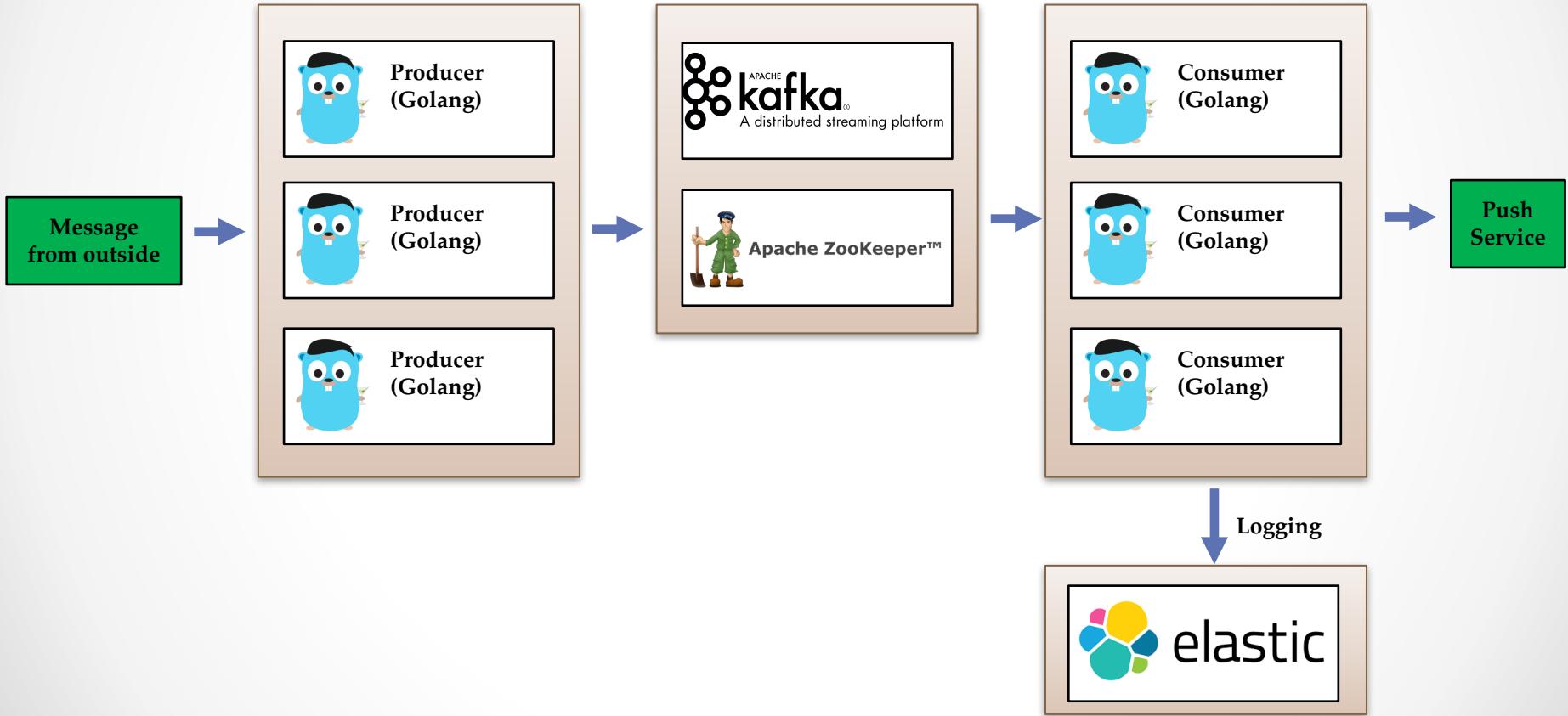
Push Messaging Processing

- Solution Design
 - We're select to handling message queue via "Apache Kafka" and keep data on zookeeper
 - Producer/Consumer was developed base on "golang"
 - Output will send to external push notification service
 - Logging will keep to elasticsearch
 - Solution was design base on "CNCF Landscape" for operate this system anywhere (On-prem/On-Cloud)



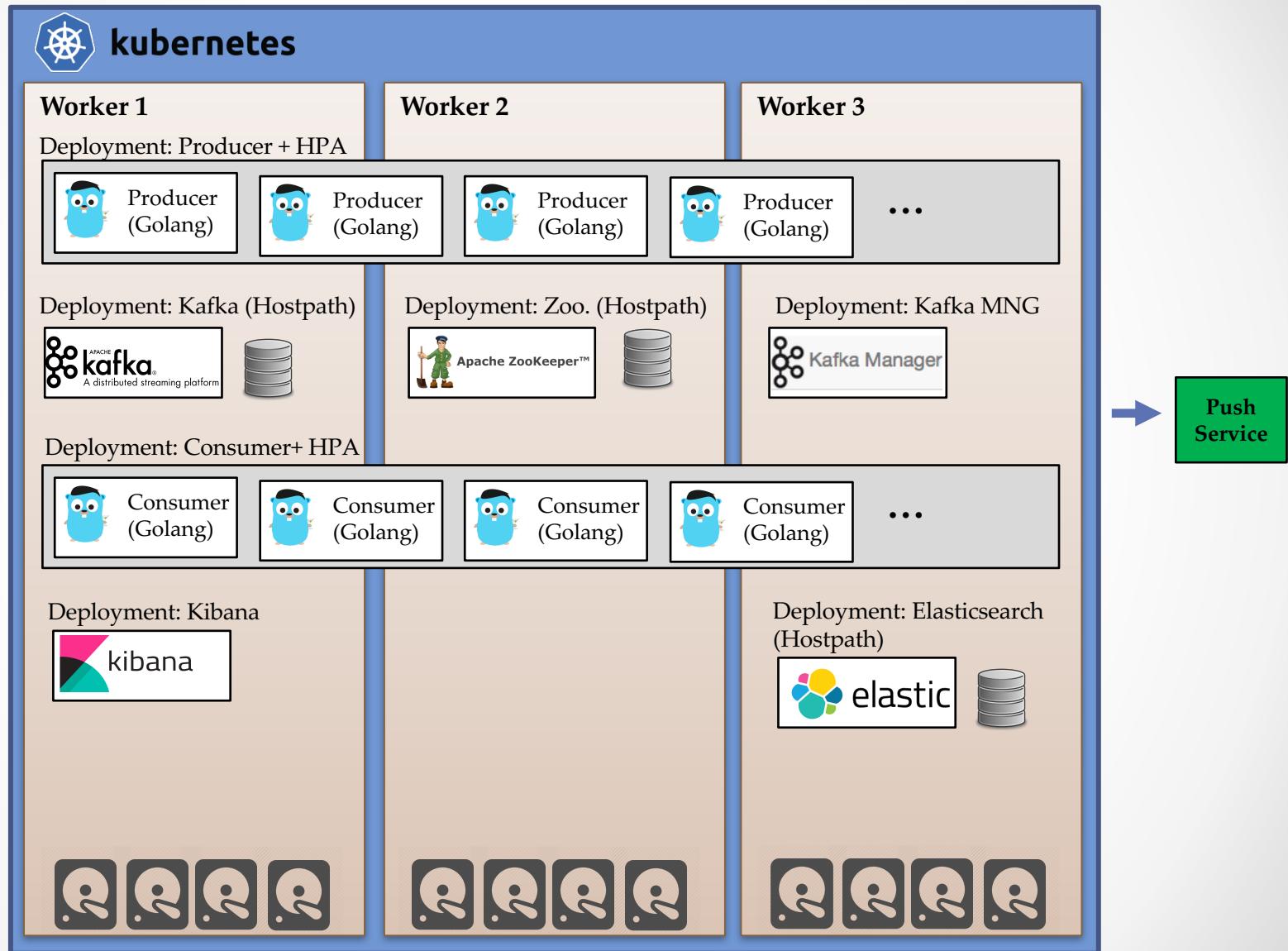
Push Messaging Processing

- Solution Design



Push Messaging Processing

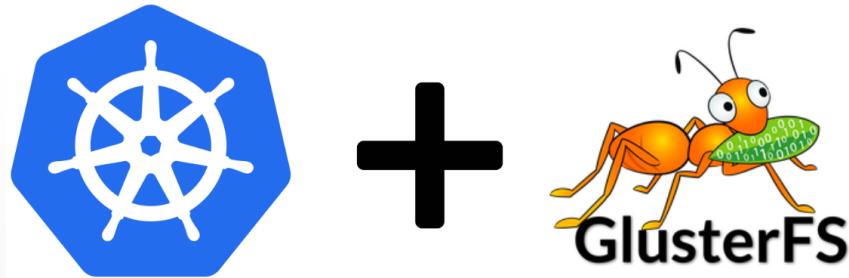
Version 1.0



K8S Storage Built-In

Push Messaging Processing

- Enhancement
 - Change “Hostpath” to “StorageClass” for dynamic provision storage.
 - For avoid dependency component. We will provide storage by kubernetes itself.
 - We choose “GlusterFS” to provide storage system from 3 worker node with standard
 - All GlusterFS need “heketi” for provide RESTful volume management interface



Push Messaging Processing

- Enhancement
 - <https://github.com/gluster/gluster-kubernetes>
 - GlusterFS official project “gluster-kubernetes”
 - Component
 - Kubernetes Farm (With RAW disk)
 - GlusterFS (Pods)
 - Heketi (Pods)
 - Control disk layout by define “topology.json”

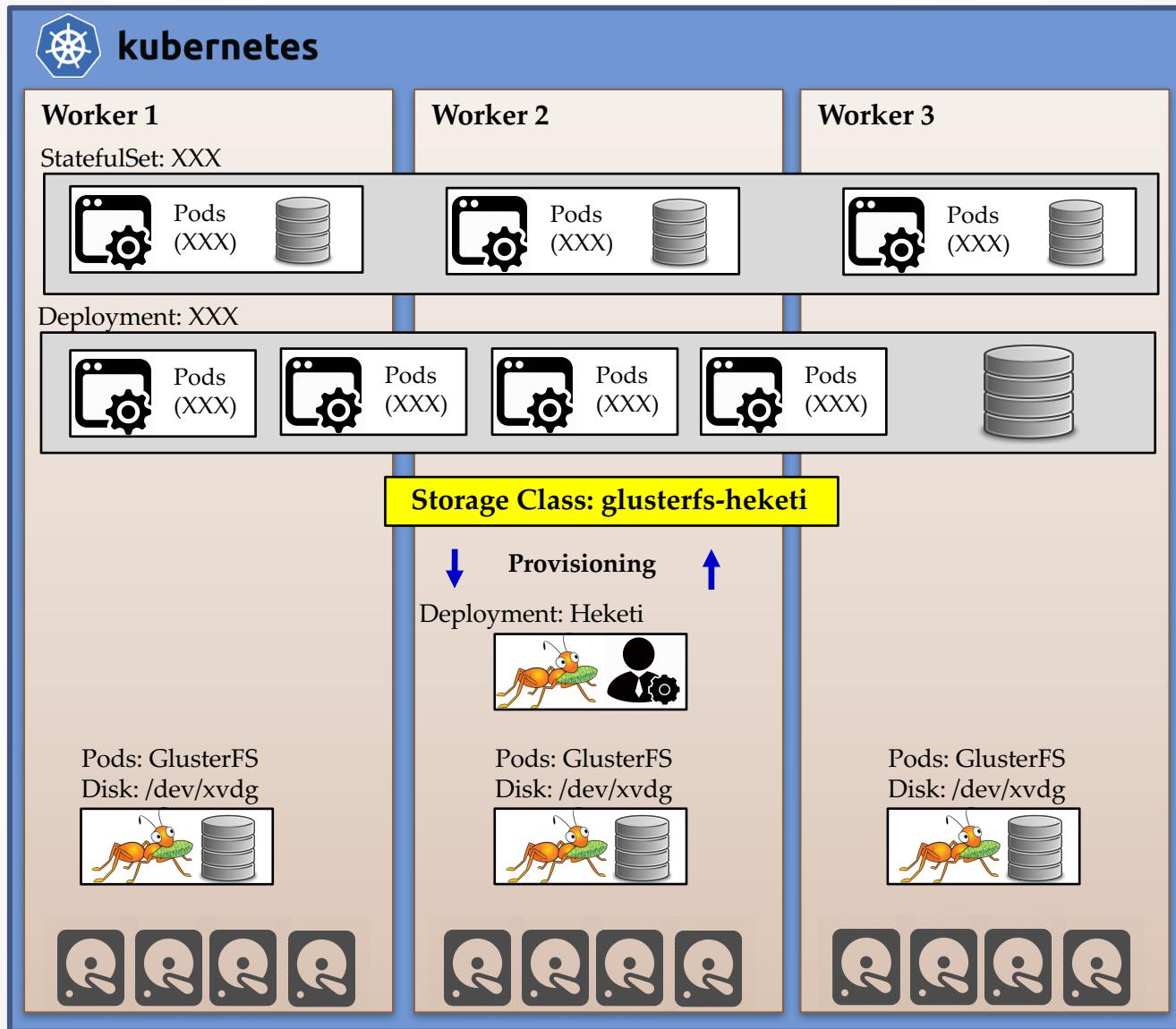
Push Messaging Processing



```
shortnote      topology.json  instructions
{
  "clusters": [
    {
      "nodes": [
        {
          "node": {
            "hostnames": {
              "manage": [
                "ip-10-21-1-164"
              ],
              "storage": [
                "10.21.1.164"
              ]
            },
            "zone": 1
          },
          "devices": [
            "/dev/xvdd"
          ]
        },
        {
          "node": {
            "hostnames": {
              "manage": [
                "ip-10-21-1-213"
              ],
              "storage": [
                "10.21.1.213"
              ]
            },
            "zone": 1
          },
          "devices": [
            "/dev/xvdd"
          ]
        }
      ]
    }
  ]
}

37   {
38     "node": [
39       {
40         "hostnames": {
41           "manage": [
42             "ip-10-21-1-97"
43           ],
44           "storage": [
45             "10.21.1.97"
46           ]
47         },
48         "zone": 1
49       },
50       {
51         "devices": [
52           "/dev/xvdd"
53         ]
54       }
55     ]
56   }
```

Push Messaging Processing



Push Messaging Processing

```
ubuntu@ip-10-21-1-158:~$ kubectl get nodes
NAME      STATUS    ROLES   AGE     VERSION
ip-10-21-1-130 Ready    <none>  13d    v1.9.2
ip-10-21-1-158 Ready    master   13d    v1.9.2
ip-10-21-1-210 Ready    <none>  13d    v1.9.2
ip-10-21-1-242 Ready    <none>  13d    v1.9.2
ubuntu@ip-10-21-1-158:~$ kubectl get pods --all-namespaces |grep gluster
default    glusterfs-44cp2           1/1     Running   0          13d
default    glusterfs-5hd2h           1/1     Running   0          13d
default    glusterfs-cpqkv          1/1     Running   1          13d
ubuntu@ip-10-21-1-158:~$ kubectl get pods --all-namespaces |grep heketi
default    deploy-heketi-7c4898d9cd-99s7t  1/1     Running   0          13d
ubuntu@ip-10-21-1-158:~$ kubectl get sc
NAME        PROVISIONER          AGE
glusterfs-heketi (default)  kubernetes.io/glusterfs  13d
ubuntu@ip-10-21-1-158:~$ 
```

```
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pvc
No resources found.
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pv
No resources found.
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl create -f galera-mariadb.yaml
service "galera-mariadb" created
secret "mysql-password" created
statefulset "galera-mariadb" created
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get statefulset
NAME      DESIRED  CURRENT  AGE
galera-mariadb  3         1       18s
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get statefulset
NAME      DESIRED  CURRENT  AGE
galera-mariadb  3         1       1m
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pvc
NAME      STATUS    VOLUME
mysql-datadir-galera-mariadb-0 Bound    pvc-770ca40c-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pv
NAME      CAPACITY  ACCESS MODES  RECLAIM POLICY  STATUS    CLAIM
REASON    AGE
pvc-770ca40c-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO        Delete    Bound    default/mysql-datadir-galera-mariadb-0  glusterfs-heketi
i          2m
```

Push Messaging Processing

```
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get statefulset
NAME      DESIRED  CURRENT  AGE
galera-mariadb  3        2        3m
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get statefulset
NAME      DESIRED  CURRENT  AGE
galera-mariadb  3        2        4m
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pvc
NAME          STATUS  VOLUME
mysql-datadir-galera-mariadb-0  Bound   pvc-770ca40c-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO    glusterfs-heketi  4m
mysql-datadir-galera-mariadb-1  Bound   pvc-e6160659-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO    glusterfs-heketi  1m
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pv
NAME          CAPACITY  ACCESS MODES  RECLAIM POLICY  STATUS  CLAIM
REASON AGE
pvc-770ca40c-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO        Delete  Bound  default/mysql-datadir-galera-mariadb-0  glusterfs-heketi
i        4m
pvc-e6160659-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO        Delete  Bound  default/mysql-datadir-galera-mariadb-1  glusterfs-heketi
i        1m
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get statefulset
NAME      DESIRED  CURRENT  AGE
galera-mariadb  3        3        7m
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pvc
NAME          STATUS  VOLUME
mysql-datadir-galera-mariadb-0  Bound   pvc-770ca40c-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO    glusterfs-heketi  7m
mysql-datadir-galera-mariadb-1  Bound   pvc-e6160659-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO    glusterfs-heketi  4m
mysql-datadir-galera-mariadb-2  Bound   pvc-54fc46b-9de5-11e8-9b3b-02a8867c3a3a  11G    RWO    glusterfs-heketi  55s
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pv
NAME          CAPACITY  ACCESS MODES  RECLAIM POLICY  STATUS  CLAIM
REASON AGE
pvc-54fc46b-9de5-11e8-9b3b-02a8867c3a3a  11G    RWO        Delete  Bound  default/mysql-datadir-galera-mariadb-2  glusterfs-heketi
i        54s
pvc-770ca40c-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO        Delete  Bound  default/mysql-datadir-galera-mariadb-0  glusterfs-heketi
i        7m
pvc-e6160659-9de4-11e8-9b3b-02a8867c3a3a  11G    RWO        Delete  Bound  default/mysql-datadir-galera-mariadb-1  glusterfs-heketi
i        4m
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$
```

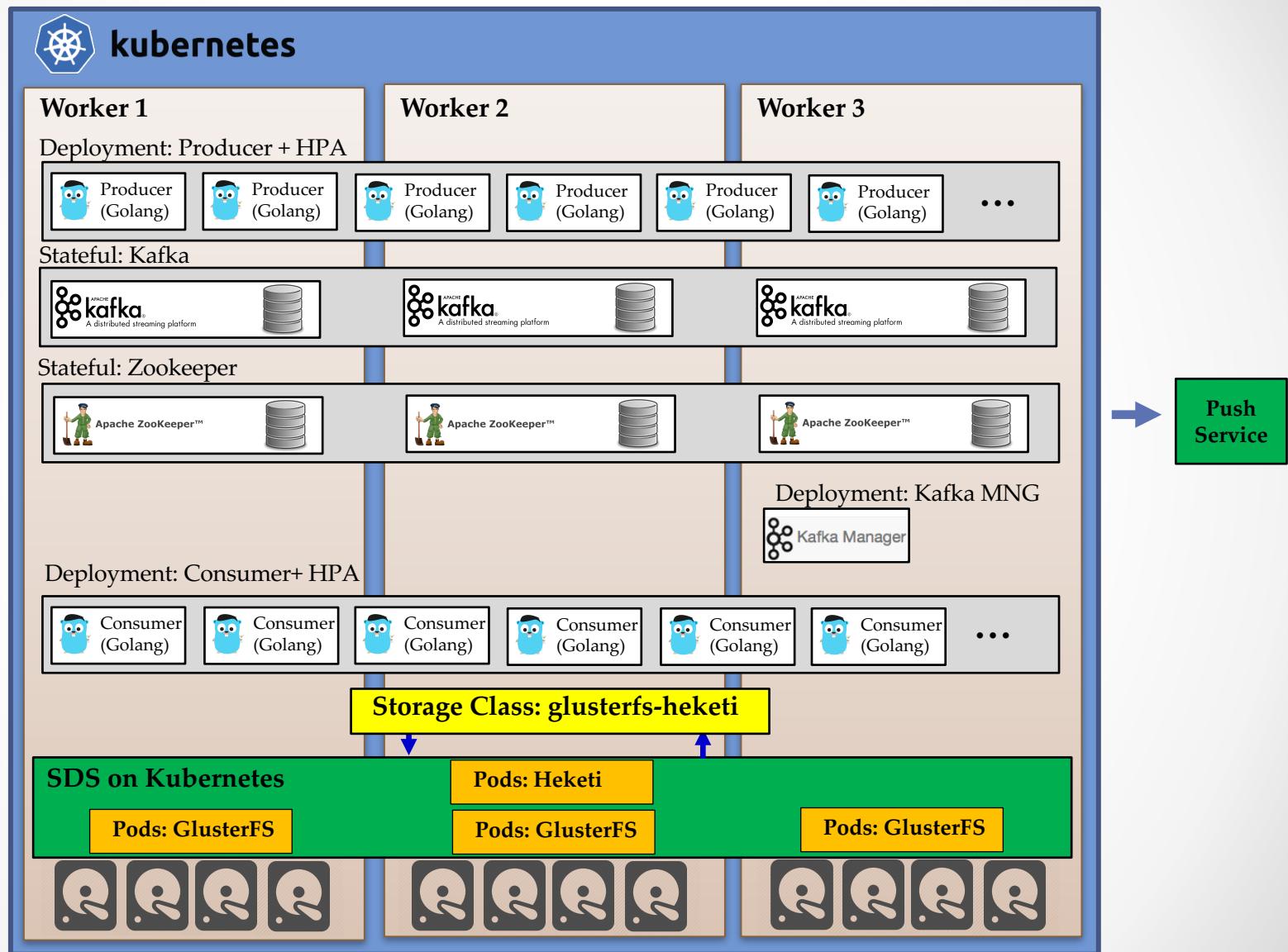
Push Messaging Processing

- Enhancement
 - Component:
 - Kafka create cluster component:
 - Kafka (Stateful) with 3 Replicas
 - Zookeeper (Stateful) with 3 Replicas
 - Kafka MNG (Deployment) with 1 Replica
 - Producer (Deployment) with 10 Replicas + HPA
 - Consumer (Deployment) with 6 Replicas + HPA



Push Messaging Processing

Kafka Module



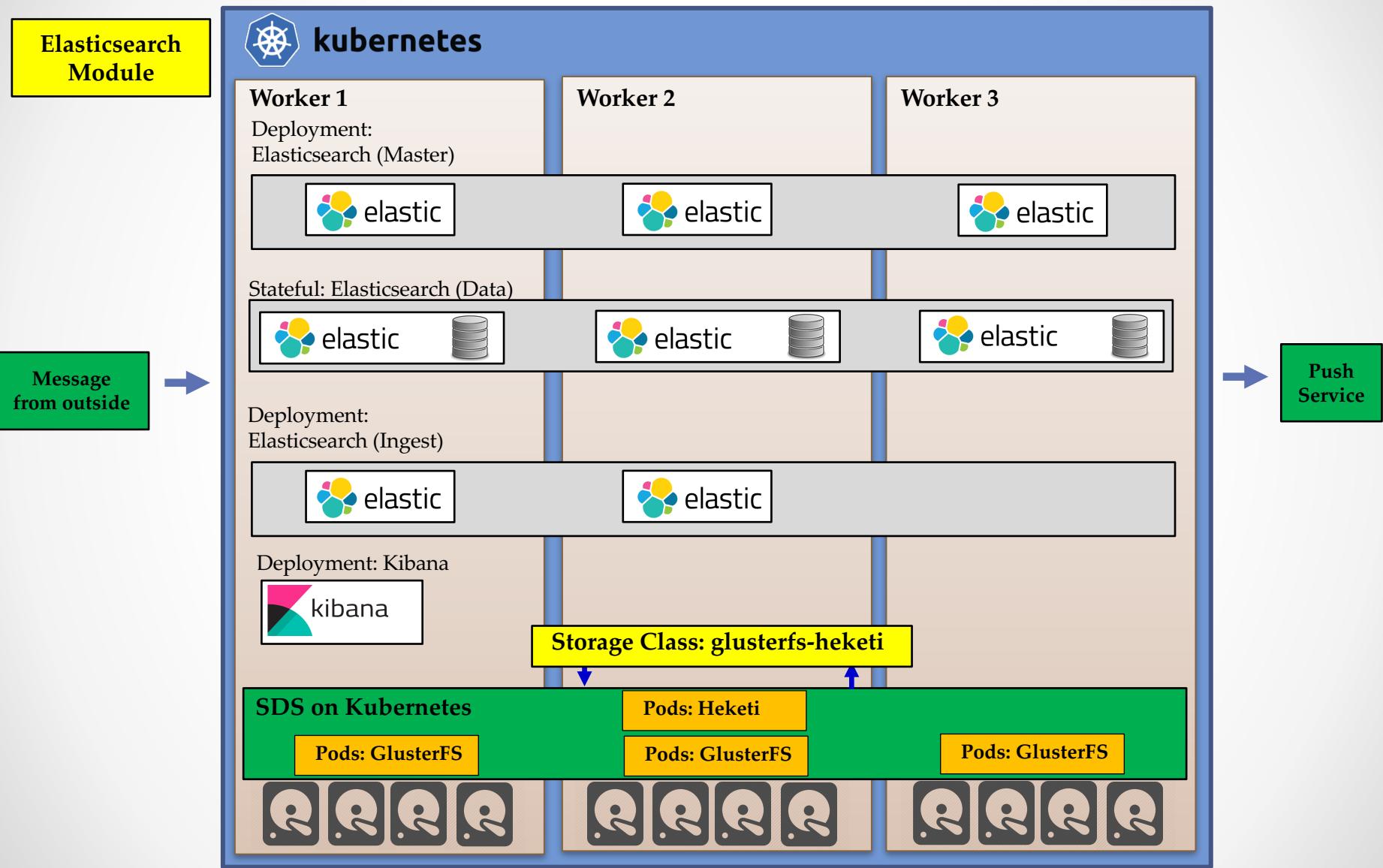
K8S Storage Built-In

Push Messaging Processing

- Enhancement
 - Component:
 - Elasticsearch create cluster and separate role as best practice:
 - Master Node (Deployment) with 3 Replicas
 - Data Node (Stateful) with 3 Replicas
 - Ingest Node (Deployment) with 2 Replicas
 - Kibana (Deployment) with 1 Repica
 - Ref:<https://www.elastic.co/guide/en/elasticsearch/reference/6.2/modules-node.html>



Push Messaging Processing



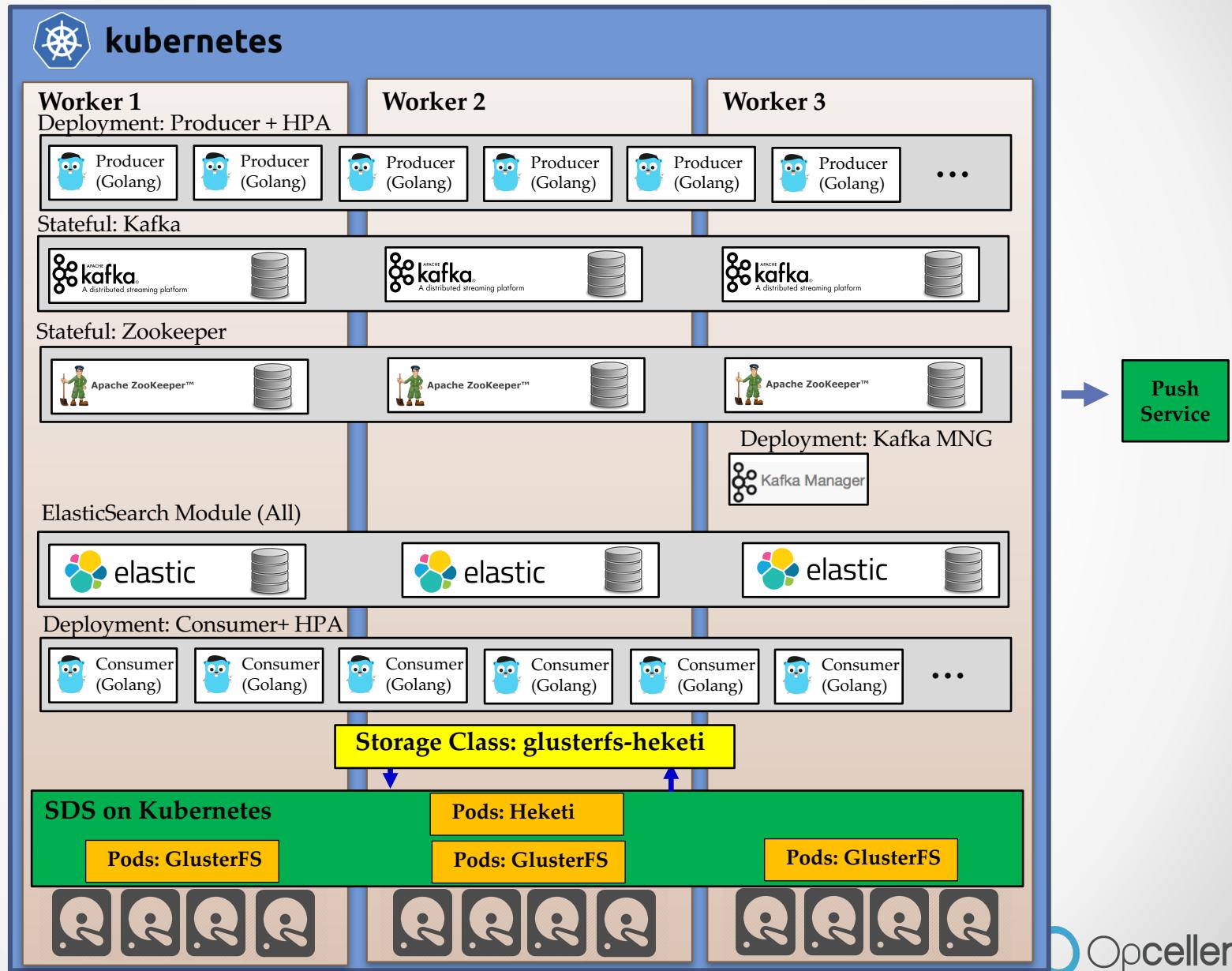
K8S Storage Built-In

Push Messaging Processing

- Benefit for enhancement
 - Cut storage dependency for each application by Storage Class
 - Remove all single point failure component
 - Compute
 - Network
 - Storage
 - Complete cluster for all component
 - Extend capability for support message queue

Push Messaging Processing

Version 2.0



Push Messaging Processing

- Future Improvement
 - Change storage provision to “Ceph RBD” (Block Storage)
 - Optional integrate with external storage on AzureDisk, AWS(EBS) etc
 - Enhance feature for online file system extension via kubernetes (“ExpandInUsePersistentVolumes”,Alpha feature on Version 1.11)
 - Replication storage from Production Site to DR Site

Demo Case: Wordpress on Scale



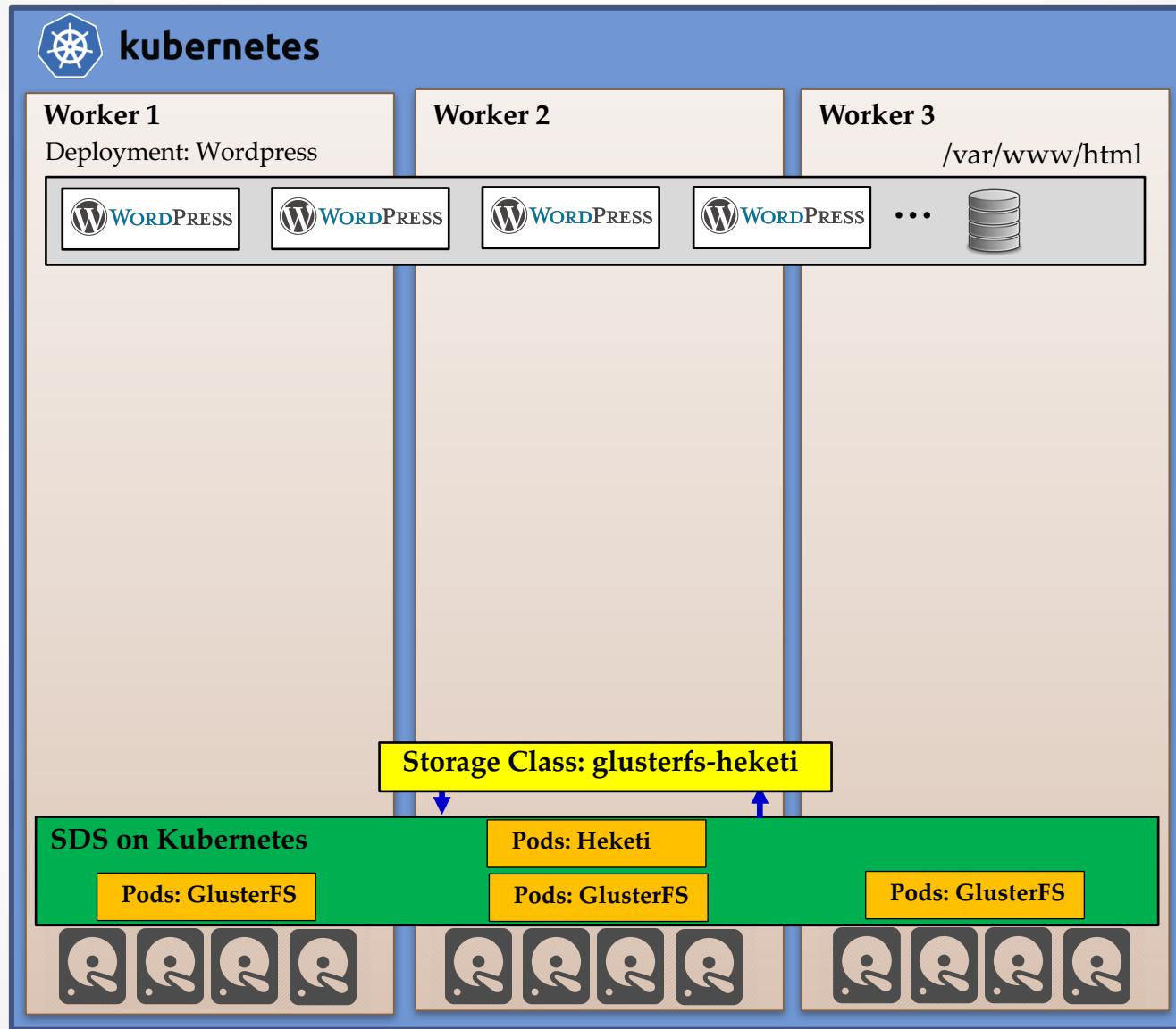
K8S Storage Build-In

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Wordpress OnScale

- Solution Design
 - Wordpress major container 2 components
 - Web Module: Apache + PHP (Last update also support NGINX)
 - Database Module: MariaDB / Mysql
 - How we scale it ?
 - Web Module: Will use deployment and share storage on path “/var/www/html” for all wordpress.
 - This will make all wordpress share session on same place and resolve problem of stateful at all

Push Messaging Processing



Wordpress OnScale

- Solution Design
 - How we scale it ?
 - Database Module:
 - We select to use MariaDB with Galera Cluster
 - Provide Active/Active multi master technology
 - Provide 3 active database node (Read/Write)
 - Application read/write database normally
 - Keep state on “etcd” for all member of mariadb
 - wsrep_local_state_comment = “Synced”
 - wsrep_last_committed=<value>

Wordpress OnScale

The screenshot shows the MariaDB Documentation website with the following navigation bar:

- Products
- Services
- Resources
- About Us
- Contact
- Get Started (button)
- Download (button)

The breadcrumb navigation path is: Home > Resources > Knowledge Base > Library > MariaDB Documentation > High Availability & Performance Tuning > MariaDB Galera Cluster > What is MariaDB Galera Cluster?

What is MariaDB Galera Cluster?

On the left, there is a sidebar with the following links:

- Home
- Open Questions
- MariaDB
- MariaDB MaxScale
- MariaDB ColumnStore
- Connectors
- All Topics
- History
- Source
- Flag as Spam / Inappropriate
- Translate

Below the sidebar, there is a box containing information about MariaDB 10.3:

The most recent release of MariaDB 10.3 is:
MariaDB 10.3.8 Stable (GA) [Download Now](#)

Below that, there is a box for MariaDB 10.2:

The most recent release of MariaDB 10.2 is:
MariaDB 10.2.16 Stable (GA) [Download Now](#)

Below that, there is a box for MariaDB 10.1:

The most recent release of MariaDB 10.1 is:
MariaDB 10.1.35 Stable (GA) [Download Now](#)

Below that, there is a box for MariaDB Galera Cluster 10.0:

The most recent MariaDB Galera Cluster 10.0 release is:
MariaDB Galera Cluster 10.0.36 [Download Now](#)

Below that, there is a box for MariaDB Galera Cluster 5.5:

The most recent MariaDB Galera Cluster 5.5 release is:
MariaDB Galera Cluster 5.5.61 [Download Now](#)

About

MariaDB Galera Cluster is a synchronous multi-master cluster for MariaDB. It is available on Linux only, and only supports the XtraDB/InnoDB storage engines (although there is experimental support for MyISAM - see the wsrep_replicate_myisam system variable).

Starting with MariaDB 10.1, the wsrep API for Galera Cluster is included by default. This is available as a separate download for MariaDB 10.0 and MariaDB 5.5.

Features

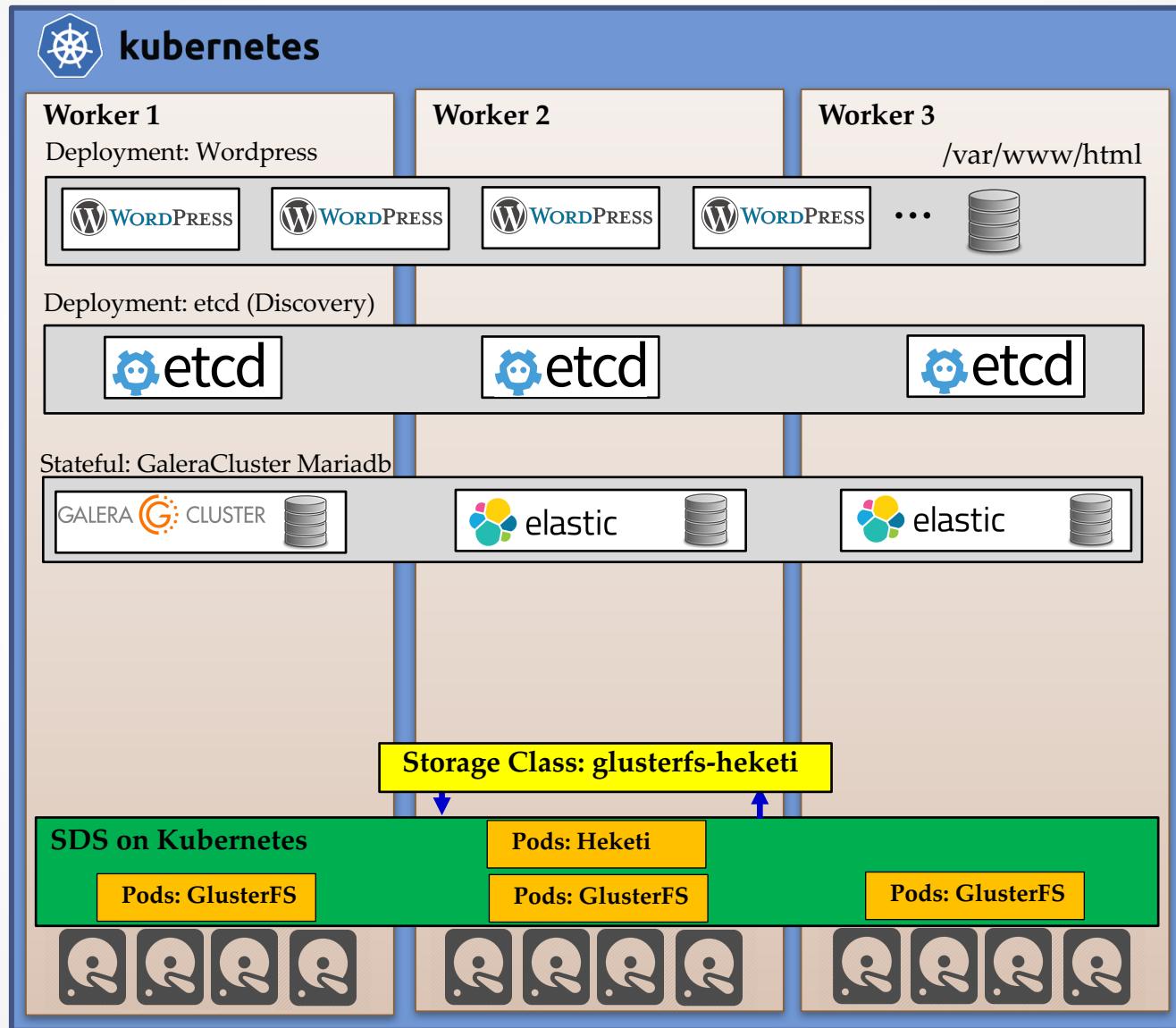
Contents

1. About
2. Features
3. Benefits
4. Technology
 - 1. Galera wsrep provider Versions
5. See Also

On the right side, there is a vertical sidebar with the following links:

- ↑ MariaDB Galera Cluster
- ↑
- What is MariaDB Galera Cluster?**
- About Galera Replication
- Galera Use Cases
- Getting Started with MariaDB Galera Cluster
- MariaDB Galera Cluster - Known Limitations
- Galera Cluster Status Variables
- Galera Cluster System Variables
- Building the Galera wsrep Package on Ubuntu and Debian
- Building the Galera wsrep Package on Fedora
- Installing Galera from Source
- Galera Test Repositories
- wsrep_provider_options
- Galera Cluster Address
- Galera Load Balancer
- MariaDB Galera 10.0 Release Notes
- MariaDB Galera 10.0 Changelogs
- MariaDB Galera 5.5 Release Notes
- MariaDB Galera 5.5 Changelogs
- Tips on Converting to Galera
- Upgrading from MariaDB Galera Cluster 10.0 to MariaDB 10.1
- Upgrading from MariaDB Galera Cluster 5.5 to MariaDB Galera Cluster 10.0

Push Messaging Processing



K8S Storage Built-In

Wordpress OnScale

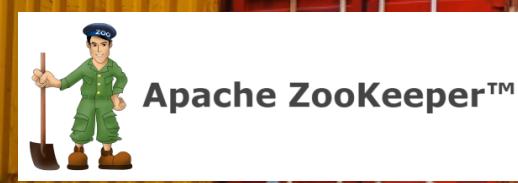
- Demo Session

```
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl get pods -o wide
NAME           READY   STATUS    RESTARTS   AGE     IP          NODE
deploy-heketi-7c8989dcd-99s7t  1/1    Running   0          1h      192.168.250.1  ip-10-21-1-242
etcd0          1/1    Running   0          47m    192.168.250.2  ip-10-21-1-242
etcd1          1/1    Running   0          47m    192.168.99.130 ip-10-21-1-210
etcd2          1/1    Running   0          47m    192.168.9.2    ip-10-21-1-130
galera-mariadb-0  1/1    Running   0          5m     192.168.99.144 ip-10-21-1-210
galera-mariadb-1  1/1    Running   0          43m    192.168.9.3    ip-10-21-1-130
galera-mariadb-2  1/1    Running   0          39m    192.168.250.3 ip-10-21-1-242
glusterfs-44cp2  1/1    Running   0          1h     10.21.1.242   ip-10-21-1-242
glusterfs-5hd2h  1/1    Running   0          1h     10.21.1.210   ip-10-21-1-210
glusterfs-cpqkv 1/1    Running   0          1h     10.21.1.130   ip-10-21-1-130
wordpress-7875b685c8-4fpp1  1/1    Running   1          22m    192.168.99.142 ip-10-21-1-210
wordpress-7875b685c8-4qp85  1/1    Running   1          22m    192.168.9.11   ip-10-21-1-130
wordpress-7875b685c8-522jw  1/1    Running   0          22m    192.168.250.10 ip-10-21-1-242
wordpress-7875b685c8-b9c7x  1/1    Running   2          22m    192.168.250.12 ip-10-21-1-242
wordpress-7875b685c8-bg9p9  1/1    Running   1          22m    192.168.250.11 ip-10-21-1-242
wordpress-7875b685c8-gd29v  1/1    Running   0          22m    192.168.9.10   ip-10-21-1-130
wordpress-7875b685c8-h9vdb  1/1    Running   2          22m    192.168.9.12   ip-10-21-1-130
wordpress-7875b685c8-nzkbk  1/1    Running   0          22m    192.168.99.143 ip-10-21-1-210
wordpress-7875b685c8-pb2st  1/1    Running   0          22m    192.168.99.140 ip-10-21-1-210
wordpress-7875b685c8-v5kdg  1/1    Running   2          22m    192.168.99.141 ip-10-21-1-210
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ kubectl delete pods/galera-mariadb-0
pod "galera-mariadb-0" deleted
ubuntu@ip-10-21-1-158:~/DevOpsThailand2018_Storage_K8S$ 
```

```
ip-10-21-1-213      ip-10-21-1-213      Worker2      10.21.1.213  54.251.14.14  scblf_laminsta...
ip-10-21-1-97      ip-10-21-1-97      Worker3      10.21.1.97   52.221.14.14  scblf_laminsta...
=====
Device Disk on device: /dev/xvdf on Worker 1/2/3
1. Create StorageClass for Dynamic Provision:
kubectl get svc
cd ./DevOpsThailand2018_Storage_K8S
vi Storageclass.yaml ==> Add ip address of heketi server
kubectl create -f Storageclass.yaml
kubectl get sc
2. Create Etdc Cluster for Discovery Service:
kubectl create -f etcd-cluster.yaml
watch kubectl get pods -o wide
watch kubectl get svc
3. Create Galera Cluster MariaDB by command: (5 - 10 min)
kubectl create -f galermariadb.yaml
watch kubectl get pods -o wide
4. Create Wordpress for Access and Get by command: (5 - 10 min)
kubectl create -f wordpress.yaml
watch kubectl get pods -o wide
5. Check Service by Command: kubectl get svc and tried to access via browser==> http://<public ip address>:31000
```



WORDPRESS



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K8S Storage Built-In

