



**TUESDAY-
WEDNESDAY
JULY 13-14**

ORGANISERS



**•virtual
event•**

HOW TO RABBITMQ ON KUBERNETES


July 2021


Presented by Chunyi Lyu



A thick green diagonal line that starts from the left edge and points towards the top right, ending just before the word "AGENDA".


AGENDA


- Kubernetes Operator Patterns (~5min)
- RabbitMQ Cluster Operator
- Messaging Topology Operator
- Demo (~7min)


Kubernetes  is an open-source system for automating deployment, scaling, and management of containerized applications.


 [kubernetes / kubernetes](#)


 Watch  3.3k


 Star **78.8k**


 Fork 28.7k


 Code

 Issues 1.7k

 Pull requests 1.1k

 ZenHub

 Actions

 ...

```
kind: StatefulSet
```

StatefulSet ...*THE CHALLENGES*

- Day-2 operations: scaling, config changes, and upgrades

KUBERNETES OPERATOR PATTERN

- Extensions to Kubernetes that provide custom resources for management of applications, services and their components
- It makes use of custom resources and the concept of controllers to manage applications extensions to Kubernetes and encode product specific knowledge

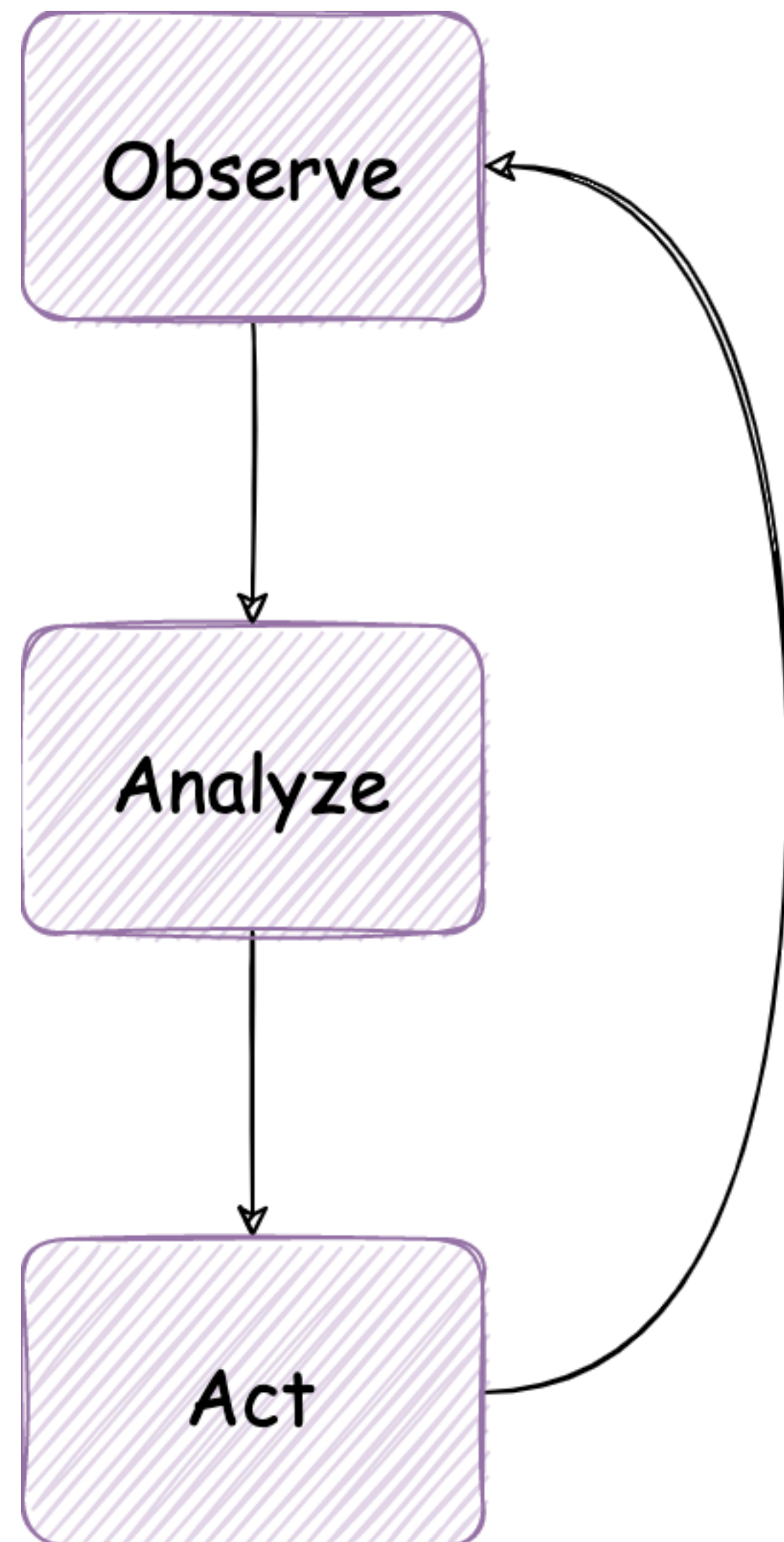
RABBITMQ CLUSTER OPERATOR



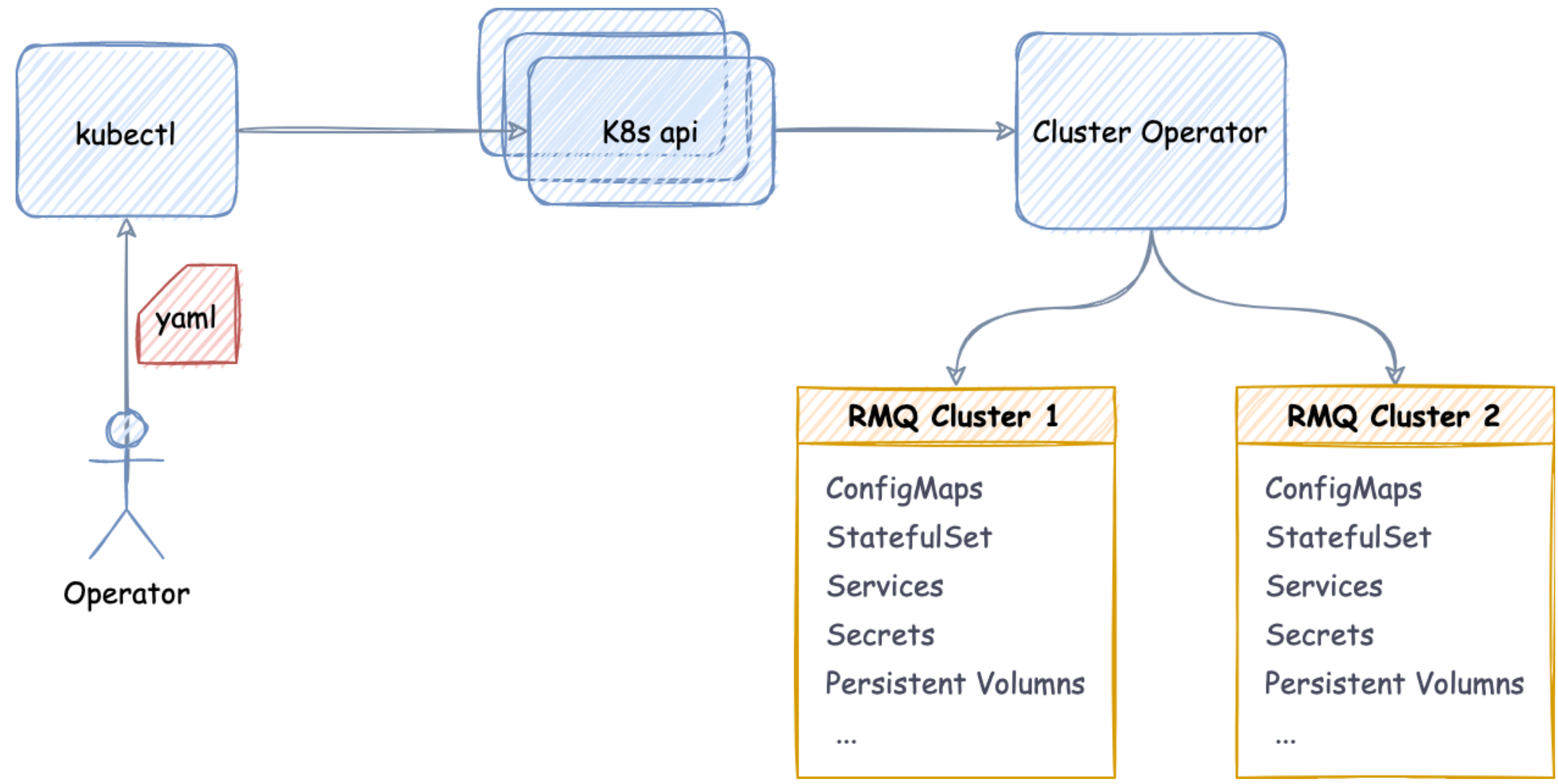
Controller



Custom Resource
Definition (CRD)



- Desired state defined in manifests
- Controllers analyze differences between observed and desired state
- Reconcile any difference



rabbitmq.yaml

```
1 apiVersion: rabbitmq.com/v1beta1
2 kind: RabbitmqCluster
3 metadata:
4   name: hello-world
```

custom resource type



rabbitmq.yaml

```
1 apiVersion: rabbitmq.com/v1beta1
2 kind: RabbitmqCluster
3 metadata:
4   name: plugins
5 spec:
6   rabbitmq:
7     additionalConfig: |
8       log.file.level = debug
9     additionalPlugins:
10      - rabbitmq_federation
11      - rabbitmq_federation_management
12      - rabbitmq_shovel
```

rabbitmq.conf configurations



additional plugins



```
rabbitmq.yaml m/rabbitmq.yaml | p/rabbitmq.yaml |
1 apiVersion: rabbitmq.com/v1beta1
2 kind: RabbitmqCluster
3 metadata:
4   name: example
5 spec:
6   replicas: 3
7   service:
8     type: LoadBalancer
9   persistence:
10    storageClassName: ssd
11    storage: "50Gi"
12  resources:
13    requests:
14      cpu: 4
15      memory: 10Gi
16    limits:
17      cpu: 4
18      memory: 10Gi
19  tls:
20    secretName: tls-secret
```

No. of nodes

Storage

Pod resources

Enable TLS

```
rabbitmq.yaml
1 apiVersion: rabbitmq.com/v1beta1
2 kind: RabbitmqCluster
3 metadata:
4   name: override
5 spec:
6   override:
7     service:
8     spec:
9     ports:
10      - name: additional-port
11        protocol: TCP
12          port: 12345
13   statefulSet:
14     spec:
15       template:
16         spec:
17           containers:
18             - name: rabbitmq
19               ports:
20                 - containerPort: 12345
21                   name: additional-port
22                     protocol: TCP
23             - name: side-car
24             ...
```

Service override



StatefulSet override

Support PVC expansion 🏆 #606

Edit Op

Merged ChunyiLyu merged 6 commits into `main` from `persistence-resize` on 18 Feb

Conversation 11 | Commits 6 | Checks 17 | Files changed 31 | +450



ChunyiLyu commented on 16 Feb • edited

Member 😊 ⋮

Note to reviewers: remember to look at the commits in this PR and consider if they can be squashed

Summary Of Changes

1. update default PVC 'persistence' storage capacity in statefulSetBuilder
2. `reconcilePVC()` check if the default PVC 'persistence' storage capacity has updated; if yes:
 - i. delete current statefulSet with delete propagation policy set to "Orphan"
 - ii. update PVCs manually
 - iii. recreate statefulSet (statefulSet will be automatically created by the `CreateOrUpdate()` call later as a result of its deletion in step 1; does not need to be done in `reconcilePVC()` explicitly)

Reviewers

 Zerpet

 mkuraczyk

Assignees

No one—assign your

Labels
















None yet

Projects

None yet

Milestone



	MrPsycho5 Add new podAntiAffinity example and modify existing production...	...	✓ 6 days ago	 History
..				
	additionalPorts	Test for documented examples (#590)		5 months ago
	community-plugins	Provide container name for pod exec in test examples		2 months ago
	custom-configuration	Test for documented examples (#590)		5 months ago
	default-security-context	Allow SecurityContext and PodSecurityContext to be reset t...		12 days ago
	federation-over-tls	Provide container name for pod exec in test examples		2 months ago
	hello-world	Test for documented examples (#590)		5 months ago
	import-definitions	Provide container name for pod exec in test examples		2 months ago
	mtls-inter-node	Provide container name for pod exec in test examples		2 months ago
	mtls	Link to the Troubleshooting TLS guide		3 months ago
	multiple-disks	Provide container name for pod exec in test examples		2 months ago
	plugins	Test for documented examples (#590)		5 months ago
	pod-anti-affinity	Add new podAntiAffinity example and modify existing produ...		6 days ago
	production-ready	Add new podAntiAffinity example and modify existina produ...		6 days ago

RabbitMQ Cluster Operator vs. Bitnami RabbitMQ Helm Chart vs.
DIY RabbitMQ on Kubernetes



tls.yaml

```
1 apiVersion: rabbitmq.com/v1beta1
2 kind: RabbitmqCluster
3   name: tls
4 spec:
5   replicas: 1
6   rabbitmq:
7     additionalPlugins:
8     - rabbitmq_mqtt
9     - rabbitmq_stomp
10  tls:
11  secretName: rabbitmq-tls-test-secret
```

Additional protocol plugins

TLS Secret

```
spec:
  containers:
  - name: rabbitmq
    volumeMounts:
    - mountPath: /etc/rabbitmq-tls/
      name: rabbitmq-tls
      readOnly: true
  volumes:
  - name: rabbitmq-tls
    projected:
      defaultMode: 400
      sources:
      - secret:
          name: rabbitmq-tls-test-secret
          optional: true
```

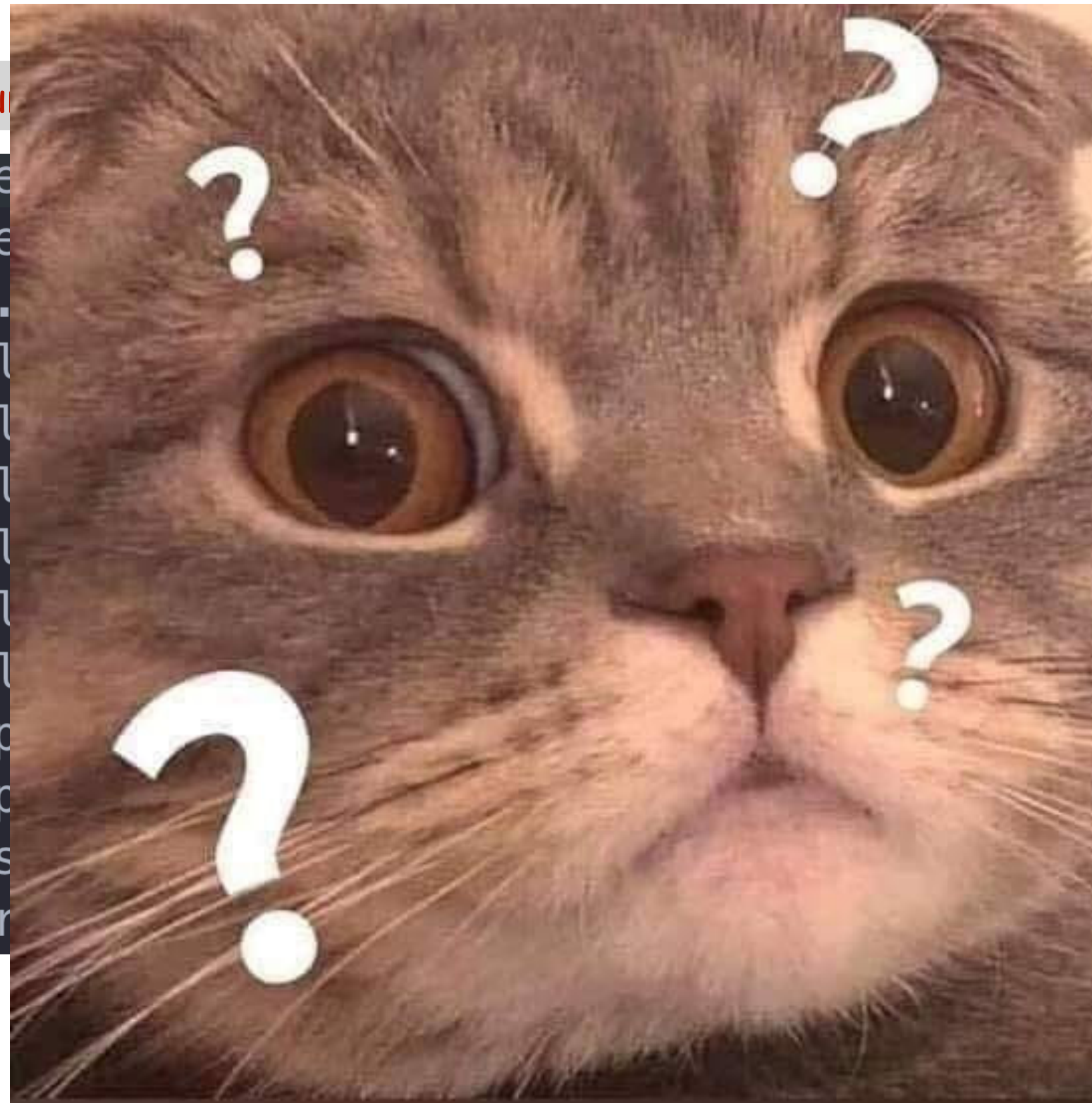
Mount TLS Secret

```
spec:
  template:
    spec: Additional ports for StatefulSet
    containers:
      - name: rabbitmq
        ports:
          - containerPort: 1883
            name: mqtt
            protocol: TCP
          - containerPort: 61613
            name: stomp
            protocol: TCP
          - containerPort: 5671
            name: amqps
            protocol: TCP
          - containerPort: 15671
            name: management-tls
            protocol: TCP
          - containerPort: 15691
            name: prometheus-tls
            protocol: TCP
          - containerPort: 8883
            name: mqttts
            protocol: TCP
          - containerPort: 61614
            name: stomps
            protocol: TCP
```

```
spec:
  ports: Additional ports for Service
  - name: amqps
    port: 5671
    protocol: TCP
    targetPort: 5671
  - name: mqtt
    port: 1883
    protocol: TCP
    targetPort: 1883
  - name: mqttts
    port: 8883
    protocol: TCP
    targetPort: 8883
  - name: stomp
    port: 61613
    protocol: TCP
    targetPort: 61613
  - name: stomps
    port: 61614
    protocol: TCP
    targetPort: 61614
  - name: prometheus-tls
    port: 15691
    protocol: TCP
    targetPort: 15691
  - name: management-tls
```

rabbitmq.conf TLS configuration

```
ssl_options.cert  
ssl_options.key  
listeners.ssl.  
management.ssl.  
management.ssl.  
management.ssl.  
prometheus.ssl.  
prometheus.ssl.  
prometheus.ssl.  
management.tcp  
prometheus.tcp  
mqtt.listeners  
stomp.listener
```



```
mq-tls/tls.crt  
mq-tls/tls.key  
mq-tls/tls.crt  
mq-tls/tls.key  
mq-tls/tls.crt  
mq-tls/tls.key
```

RABBITMQ CLUSTER OPERATOR

- Encode RabbitMQ specific knowledge
- ``rabbitmq-queues rebalance``
- Enable rabbitmq plugins dynamically
- Graceful termination with ``rabbitmq-upgrade drain`` and ``rabbitmq-upgrade await_online_quorum_plus_one``

RABBITMQ CLUSTER OPERATOR

- Supports rolling upgrades of RabbitMQ
- Customizable with StatefulSet and Service override
- Volume expansions
- Reasonable defaults
- Easy to manage and configure
- Encode RabbitMQ operation knowledge such as queue rebalance and graceful termination
- Developed and maintained by RabbitMQ team 😊
- ...



MESSAGING TOPOLOGY OPERATOR

- Manage RabbitMQ topology objects within a RabbitMQ cluster
- Work with RabbitMQ created by RabbitMQ Cluster Operator

MESSAGING TOPOLOGY OPERATOR

- Create topology objects: queues, exchanges, users, bindings, policies, and vhosts
- Configure: shovel, federations, and user permissions

quorum-queue.yaml

```
1 ---
2 apiVersion: rabbitmq.com/v1beta1
3 kind: Queue
4 metadata:
5   name: example
6 spec:
7   name: example # queue name
8   vhost: "/test-vhost" # vhost; defaults to '/'
9   type: quorum
10  autoDelete: false
11  durable: true
12  rabbitmqClusterReference:
13    name: test
```

fanout-exchange.yaml

```
1 ---
2 apiVersion: rabbitmq.com/v1beta1
3 kind: Exchange
4 metadata:
5   name: fanout
6 spec:
7   name: fanout-exchange # name of the exchange
8   vhost: "/test-vhost" # default to '/' if not provided
9   type: fanout # default to 'direct' if not provided
10  autoDelete: false
11  durable: true
12  rabbitmqClusterReference:
13    name: test # name of the rabbitmqCluster
```

main ▾

messaging-topology-operator / docs / examples /

Go to file

Add file ▾











...



ChunyiLyu Link tutorial in README ...

✓ 3 days ago [History](#)

..

 bindings	Remove hardcoded namespace from all examples	last month
 exchanges	Remove hardcoded namespace from all examples	last month
 federations	Remove hardcoded namespace from all examples	last month
 permissions	Example uses spec.userReference for permissions crd	11 days ago
 policies	Remove hardcoded namespace from all examples	last month
 queues	Remove hardcoded namespace from all examples	last month
 shovels	Remove hardcoded namespace from all examples	last month
 users	Remove hardcoded namespace from all examples	last month
 vhosts	Remove hardcoded namespace from all examples	last month
 README.md	Link tutorial in README	3 days ago

☰ README.md 

[🔗 Messaging Topology Operator examples](#)

Messaging Topology Operator vs. importing definitions vs. declaring objects by applications?



WHAT IS GITOPS?

- Used for Kubernetes cluster management and application delivery
- Use Git as the source of truth for declarative infrastructure and applications
- Infrastructure as Code



DEMO



- Argo CD (GitOps tool)
- RabbitMQ Cluster Operator and Messaging Topology Operator
- Two RabbitMQ clusters
- RabbitMQ Cluster 1 will be 3 vhosts, 3 queues, and 3 exchanges created
- RabbitMQ Cluster 2 will have federation plugin enabled with federations created between 2 queues (in different vhosts)

Useful links

- [RabbitMQ Cluster Operator](#)
- [Messaging Topology Operator](#)
- RabbitMQ community slack #kubernetes
- [RabbitMQ Cluster Operator examples](#)
- [Messaging Topology Operator examples](#)
- [Kubernetes operator pattern](#)
- [CNCF 2020 survey report](#)
- [Argo CD kubecon talk](#)
- [GitOps Demo Repo](#)



Thank you!