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Workshop 3 – Minikube essentials & Services

Les objectifs :

- 1) Les commandes de base Minikube, Kubectl
- 2) Node, Pod, et crud Deployment
- 3) Services, Secret, ConfigMap

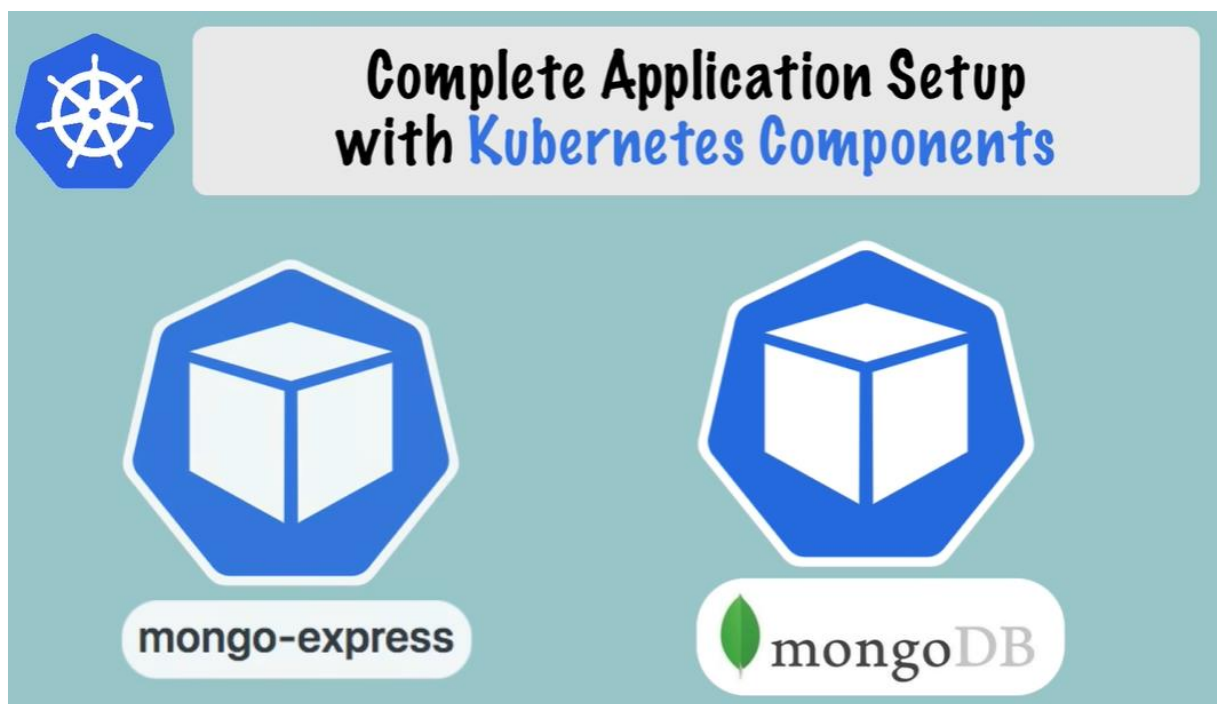
Application Complète

MongoDB and Mongo-Express

L'objectif de ce workshop est de vous présenter le déploiement de bout en bout une application complète constituée de deux conteneurs MongoDB (Base de données NoSQL) et MongoExpress (Client Mongo).

Les objets qu'on va manipuler sont :

- 1-Deployment
- 2-Service
- 3-ConfigMap
- 4-Secret



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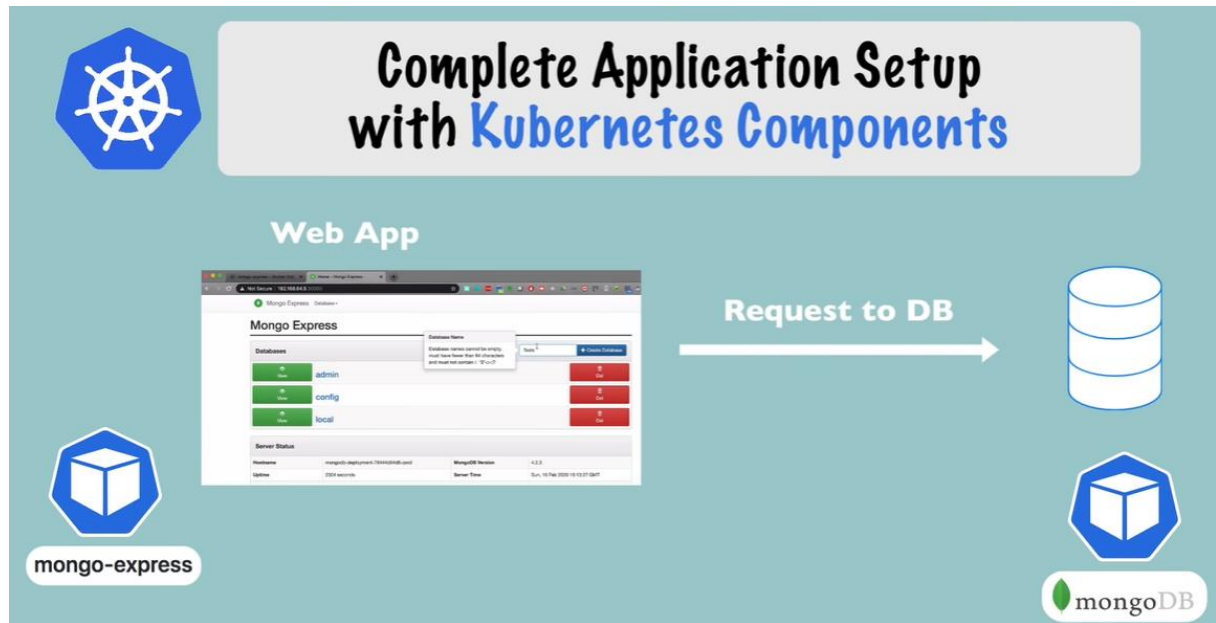
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Le schéma générale de l'application va être comme suit :



Les services internes n'acceptent pas des requests externes, du coup on est obligé de passer par des services externes qu'on appelle des LoadBalancer



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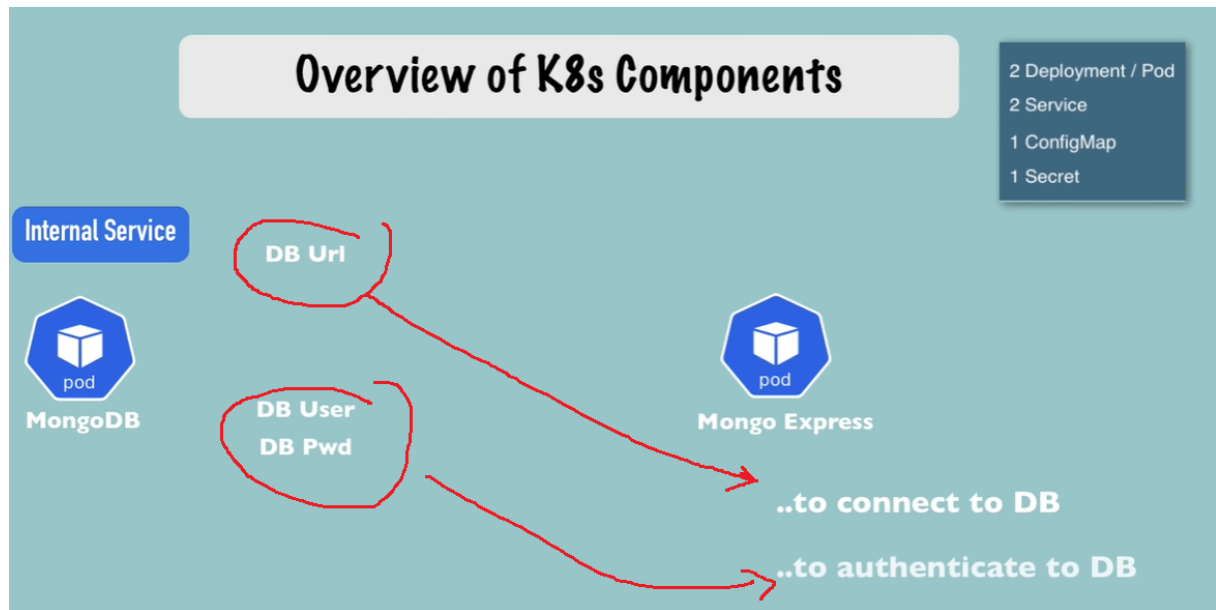


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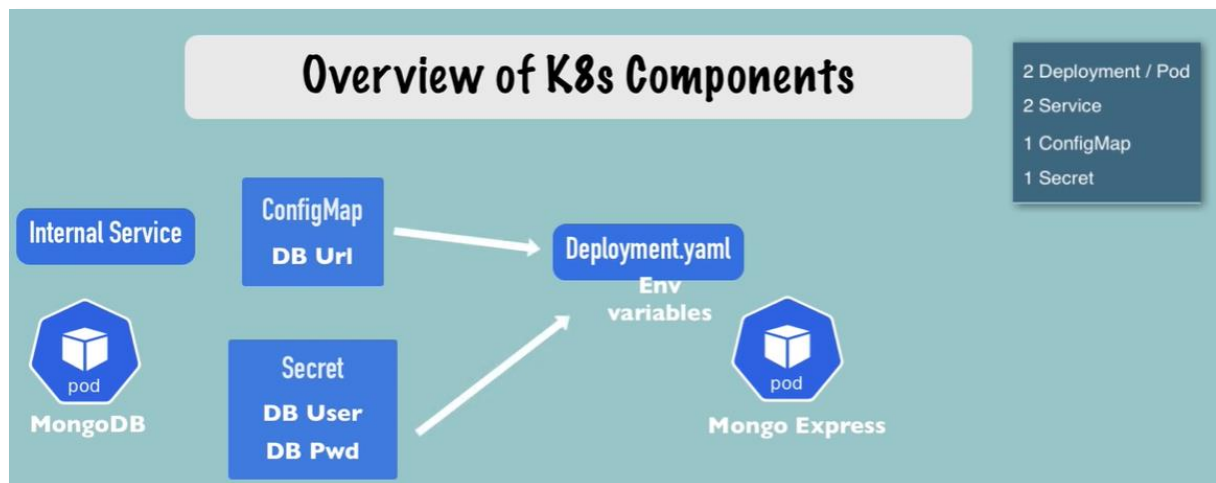
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Pour stocker des informations (comme les variables d'environnement docker), on fait appel à des composants Kubernetes à savoir les **ConfigMap** et les **Secret** à travers les fichiers de configurations.



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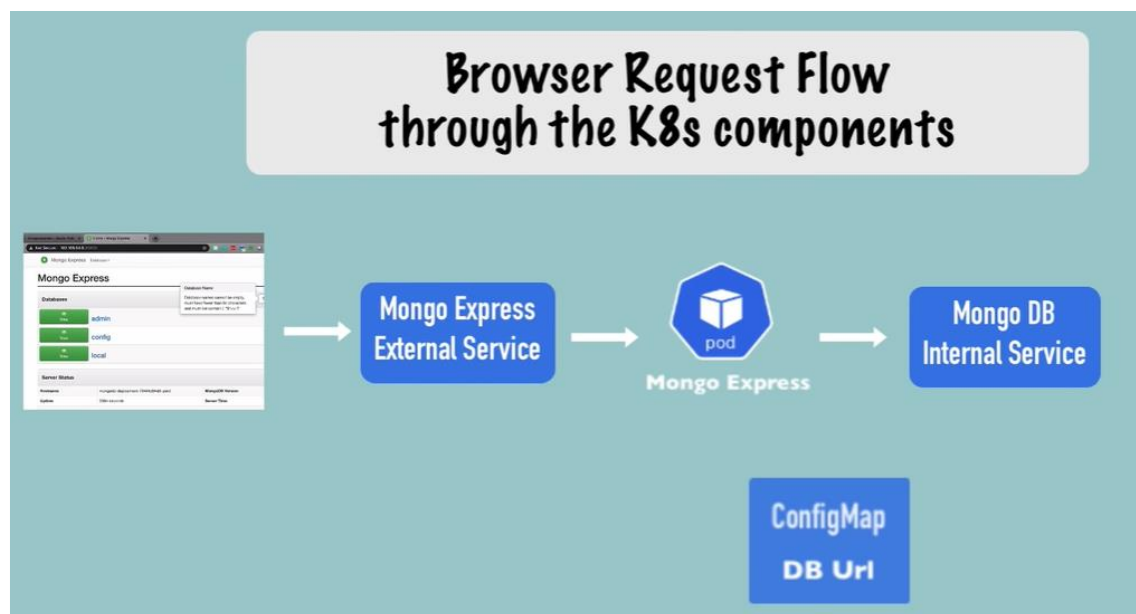
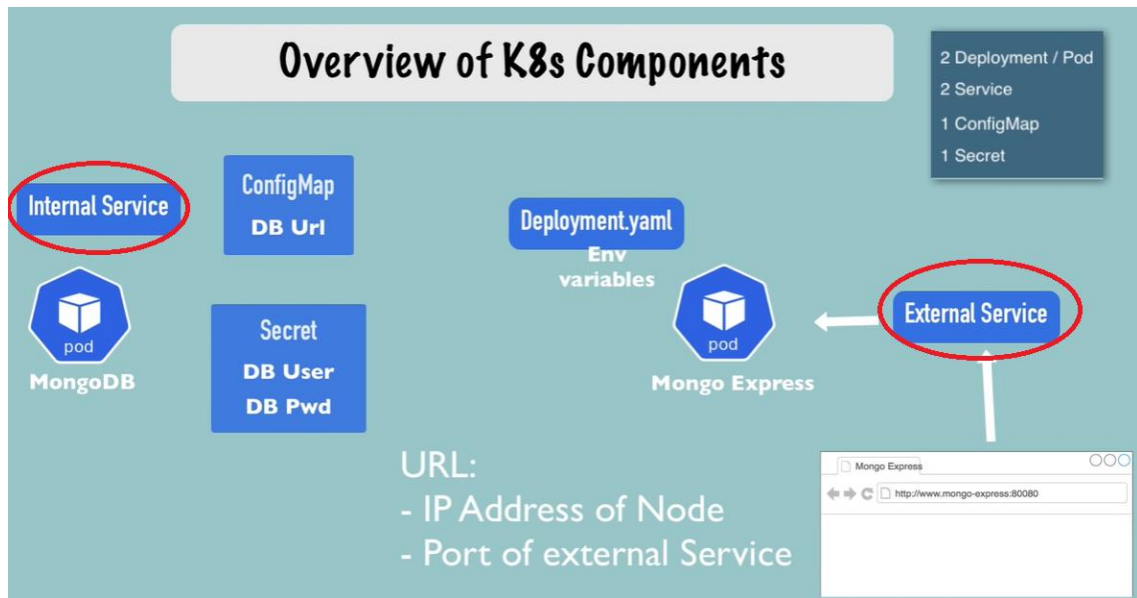
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Enfin on a besoin de créer un service externe pour accéder au composant Mongo Express



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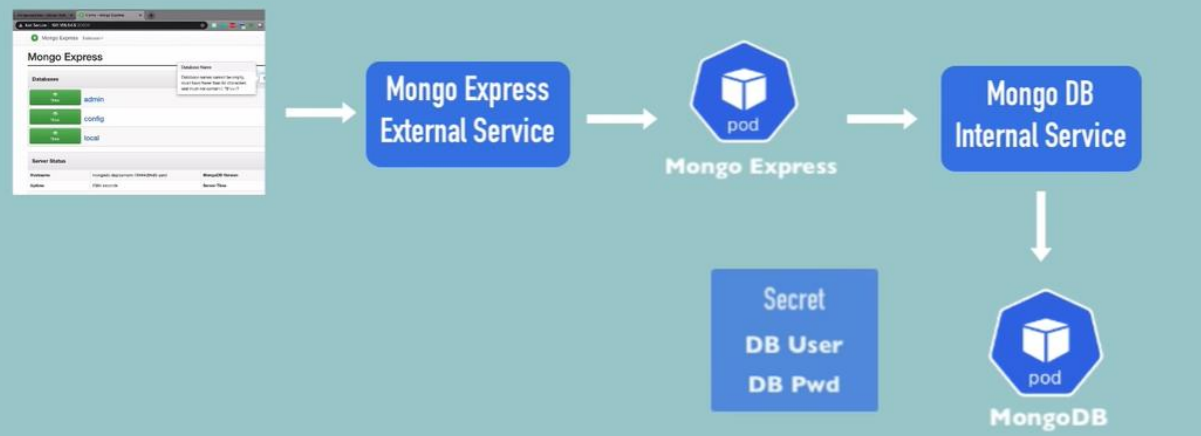
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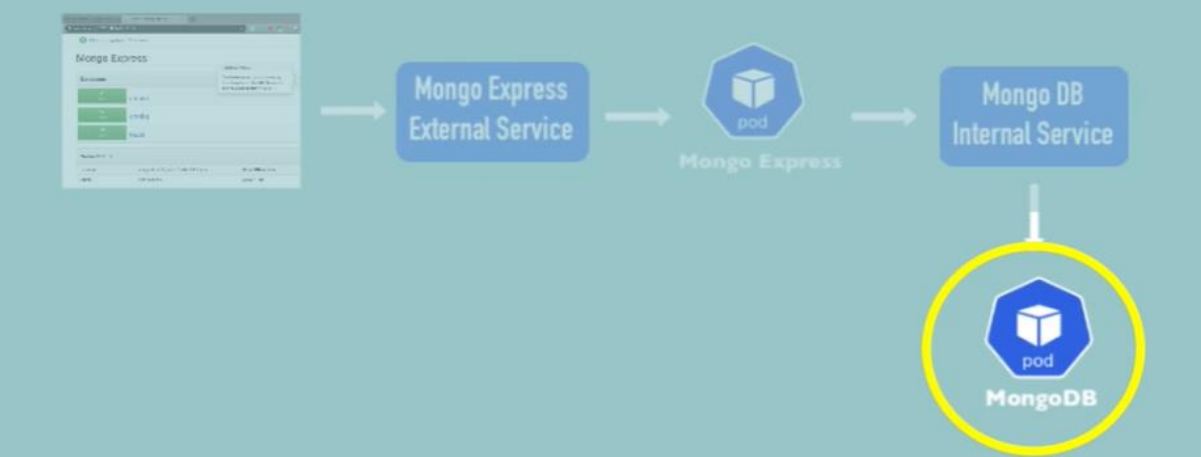
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Browser Request Flow through the K8s components



Mongo DB Deployment



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```
[~]$ kubectl get all
NAME                                     TYPE          CLUSTER-IP    EXTERNAL-IP    PORT(S)
service/kubernetes                     ClusterIP      10.96.0.1     <none>         443/TCP
[~]$
```



```
app: mongodb
template:
  metadata:
    labels:
      app: mongodb
  spec:
    containers:
      - name: mongodb
        image: mongo
        ports:
          - containerPort: 27017
        env:
          - name: MONGO_INITDB_ROOT_USERNAME
            value:
          - name: MONGO_INITDB_ROOT_PASSWORD
            value:
```

Deployment Config File is checked into repository.

Username and Password should not go here!

Leave it blank

On va référencer ces valeurs de l'objet Secret



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```
! mongo.yaml ! mongo-secret.yaml x
1  apiVersion: v1
2  kind: Secret
3  metadata:
4    name: mongodb-secret
5  type: Opaque
6  data:
7    mongo-root-username: dXNlcm5hbWU=
8    mongo-root-password: cGFzc3dvcmQ=
```

On va créer un secret ici (les user name et password doivent être cryptés)

```
[~]$ kubectl get all
NAME                                TYPE
AGE
service/kubernetes                 ClusterIP
10m
[~]$ echo -n 'username' | base64
dXNlcm5hbWU=
[~]$ echo -n 'password' | base64
cGFzc3dvcmQ=
```

L'ordre est très important, on va commencer par créer l'objet secret puis mongo-deployment

```
[k8s-configuration]$ kubectl apply -f mongo-secret.yaml
secret/mongodb-secret created
```



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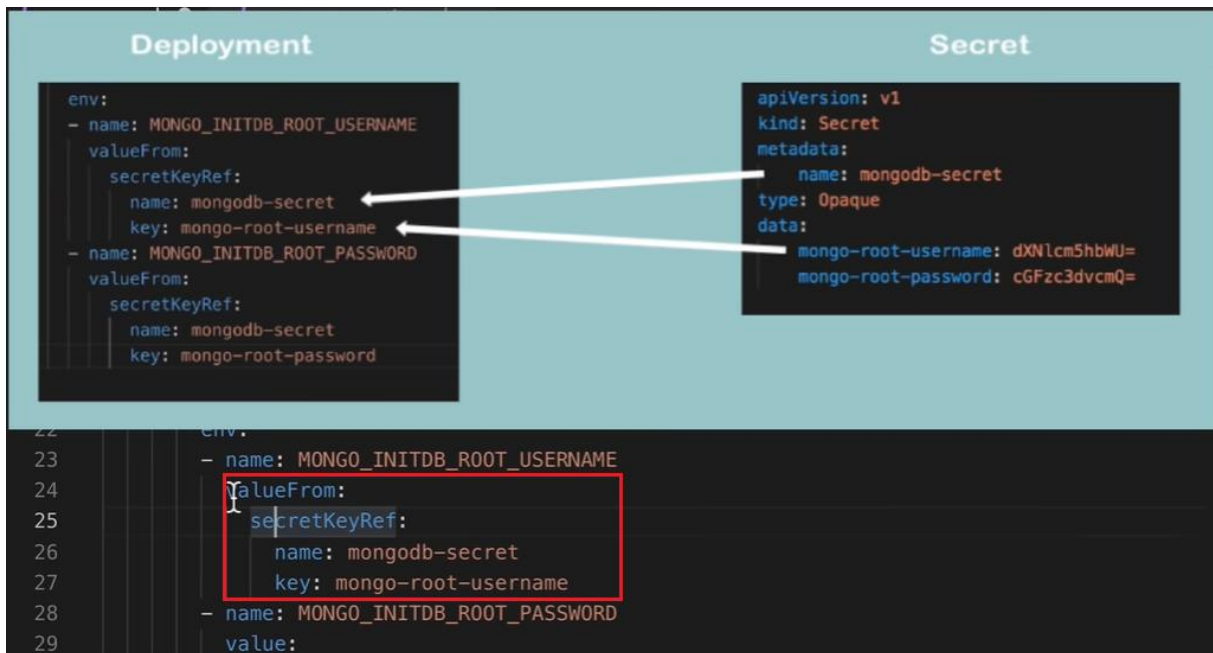
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```
[k8s-configuration]$ kubectl get secret
NAME                                TYPE                                DATA  AGE
default-token-4clzs                kubernetes.io/service-account-token 3      22m
mongodb-secret                     Opaque                              2      68s
```



```
[k8s-configuration]$ kubectl get secret
NAME                                TYPE                                DATA  AGE
default-token-4clzs                kubernetes.io/service-account-token 3      22m
mongodb-secret                     Opaque                              2      68s
[k8s-configuration]$ kubectl apply -f mongo.yaml
deployment.apps/mongodb-deployment created
```

Etape suivante, création d'un service interne pour pouvoir joindre mongodb



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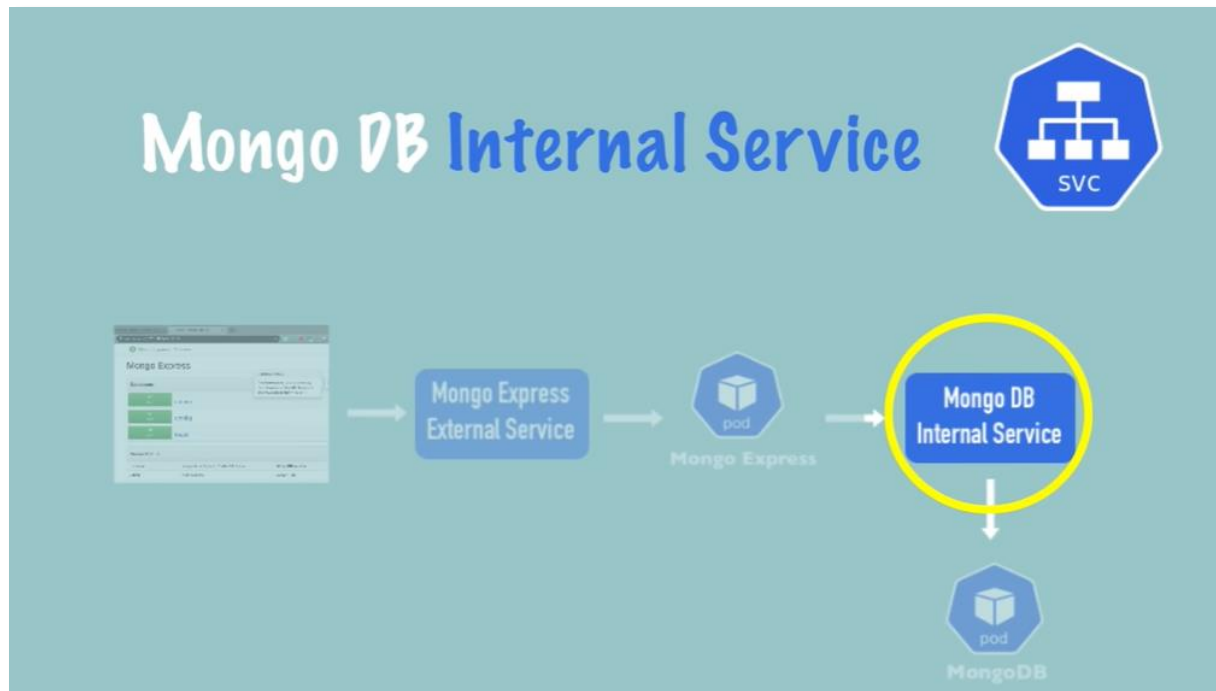


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```
21 - containerPort: 27017
22 env:
23 - name: MONGO_INITDB_ROOT_USERNAME
24   valueFrom:
25     secretKeyRef:
26       name: mongodb-secret
27       key: mongo-root-username
28 - name: MONGO_INITDB_ROOT_PASSWORD
29   valueFrom:
30     secretKeyRef:
31       name: mongodb-secret
32       key: mongo-root-password
33 ---
34
```

**Deployment & Service in 1 file,
because they belong together.**



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```
! mongo.yaml • ! mongo-secret.yaml
27 |         key: mongo-root
28 |         - name: MONGO_INITDB_
29 |           valueFrom:
30 |             secretKeyRef:
31 |               name: mongodb-s
32 |               key: mongo-root
33 | ---
34 | apiVersion: v1
35 | kind: Service
36 | metadata:
37 |   name: mongodb-service
38 | spec:
39 |   selector:
40 |     app: mongodb
41 |   ports:
42 |     - protocol: TCP
43 |       port: 27017
44 |       targetPort: 27017
45
```

Service Configuration File

- **kind:** "Service"
- **metadata / name:** a random name
- **selector:** to connect to Pod through label
- **ports:**
 - port:** Service port
 - targetPort:** containerPort of Deployment

```
[k8s-configuration]$ kubectl apply -f mongo.yaml
deployment.apps/mongodb-deployment unchanged
service/mongodb-service created
```

```
[k8s-configuration]$ kubectl get service
NAME                TYPE        CLUSTER-IP    EXTERNAL-IP    PORT(S)          AGE
kubernetes           ClusterIP   10.96.0.1     <none>          443/TCP          36m
mongodb-service      ClusterIP   10.96.86.105  <none>          27017/TCP        51s
```



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```
[k8s-configuration]$ kubectl describe service mongodb-service
Name:                mongodb-service
Namespace:           default
Labels:              <none>
Annotations:         kubectl.kubernetes.io/last-applied-configuration:
                      {"apiVersion":"v1","kind":"Service","metadata":{"name":"mongodb-service","namespace":"default"},"spec":{"selector":{"app":"mongodb"},"ports":[{"port":27017,"targetPort":27017}],"type":"ClusterIP"}}
Selector:            app=mongodb
Type:                ClusterIP
IP:                  10.96.86.105
Port:                <unset> 27017/TCP
TargetPort:          27017/TCP
Endpoints:           172.17.0.6:27017
Session Affinity:    None
```



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Configuration

Environment variables are passed to the `run` command

Name	Default
ME_CONFIG_BASICAUTH_USERNAME	''
ME_CONFIG_BASICAUTH_PASSWORD	''
ME_CONFIG_MONGODB_ENABLE_ADMIN	'true'
ME_CONFIG_MONGODB_ADMINUSERNAME	''
ME_CONFIG_MONGODB_ADMINPASSWORD	''
ME_CONFIG_MONGODB_PORT	27017
ME_CONFIG_MONGODB_SERVER	'mongo'
ME_CONFIG_OPTIONS_EDITORTHEME	'default'
ME_CONFIG_REQUEST_SIZE	'100kb'
ME_CONFIG_SITE_BASEURL	'/'
ME_CONFIG_SITE_COOKIESECRET	'cookiesecret'
ME_CONFIG_SITE_SESSIONSECRET	'sessionsecret'
ME_CONFIG_SITE_SSL_ENABLED	'false'
ME_CONFIG_SITE_SSL_CERT_PATH	''
ME_CONFIG_SITE_SSL_KEY_PATH	''

Which database to connect?

MongoDB Address / Internal Service

...MONGODB_SERVER

Which credentials to authenticate?

...ADMINUSERNAME

...ADMINPASSWORD

ConfigMap pour le stockage des Data centralisés

```
! mongo.yaml  Untitled-1  ! m
16 spec:
17   containers:
18   - name: mongo-express
19     image: mongo-express
20     ports:
21     - containerPort: 8081
22     env:
23     - name: ME_CONFIG_MONGO
24       valueFrom:
25         secretKeyRef:
26           name: mongodb-sec
27           key: mongo-root-u
28     - name: ME_CONFIG_MONGO
29       valueFrom:
30         secretKeyRef:
31           name: mongodb-sec
32           key: mongo-root-p
33     - name: ME_CONFIG_MONGO
34       value: |
```

ConfigMap

- external configuration
- centralized
- other components can use it



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```
! mongo.yaml      ! mongo-express.yaml  Untitled-2
1  apiVersion: v1
2  kind: ConfigMap
3  metadata:
4    name: mongodb-configmap
5  data:
6    database_url: mongodb-service
```

ConfigMap Configuration File

- kind: "ConfigMap"
- metadata / name: a random name
- data: the actual contents - in key-value pairs

```
ngo.yaml      ! mongo-express.yaml x  ! mongo-configmap.yaml
ports:
- containerPort: 8081
env:
- name: ME_CONFIG_MONGODB_ADMINUSERNAME
  valueFrom:
    secretKeyRef:
      name: mongodb-secret
      key: mongo-root-username
- name: ME_CONFIG_MONGODB_ADMINPASSWORD
  valueFrom:
    secretKeyRef:
      name: mongodb-secret
      key: mongo-root-password
- name: ME_CONFIG_MONGODB_SERVER
  valueFrom:
    configMapKeyRef:
      name: mongodb-configmap
      key: database_url
```



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```
[k8s-configuration]$ kubectl apply -f mongo-configmap.yaml
configmap/mongodb-configmap created
[k8s-configuration]$ kubectl apply -f mongo-express.yaml
deployment.apps/mongo-express created
[k8s-configuration]$ kubectl get pod
```

NAME	READY	STATUS	RESTARTS
mongo-express-797845bd97-p9grr	0/1	ContainerCreating	0
mongodb-deployment-78444d94d6-zsrcl	1/1	Running	0

```
[k8s-configuration]$ kubectl get pod
```

NAME	READY	STATUS	RESTARTS
mongo-express-797845bd97-p9grr	0/1	ContainerCreating	0
mongodb-deployment-78444d94d6-zsrcl	1/1	Running	0

```
! mongo.yaml ! mongo-express.yaml • !
31 |         name: mongodb-secret
32 |         key: mongo-root-password
33 |     - name: ME_CONFIG_MONGODB_SERVER
34 |       valueFrom:
35 |         configMapKeyRef:
36 |           name: mongodb-configmap
37 |           key: database_url
38 | ---
39 | apiVersion: v1
40 | kind: Service
41 | metadata:
42 |   name: mongo-express-service
43 | spec:
44 |   selector:
45 |     app: mongo-express
46 |   type: LoadBalancer
47 |   ports:
48 |     - protocol: TCP
49 |       port: 8081
50 |       targetPort: 8081
51 |       nodePort: 30000
```

How to make it an External Service?

- type: "Loadbalancer"
- ..assigns service an external IP address and so accepts external requests
- nodePort: must be between 30000-32767



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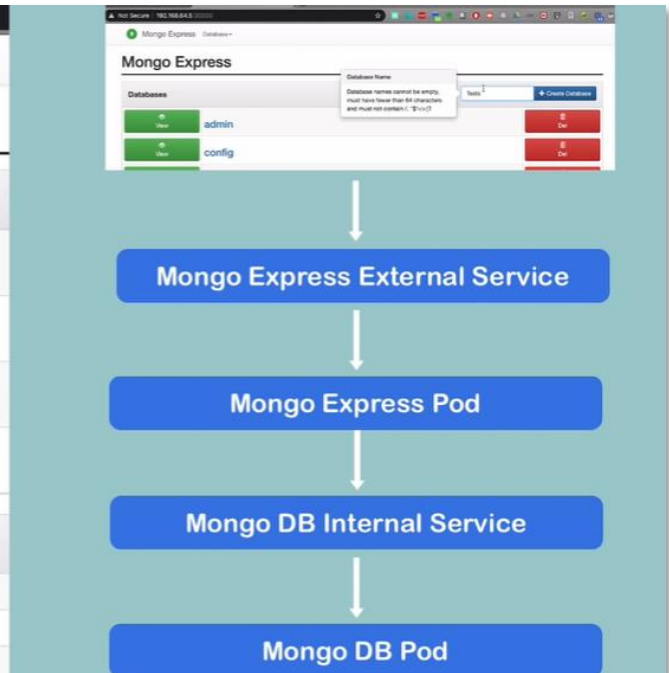


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