Running PostgreSQL on Kubernetes:

Is It a Blessing or a Curse?

Swiss PGDay 2026

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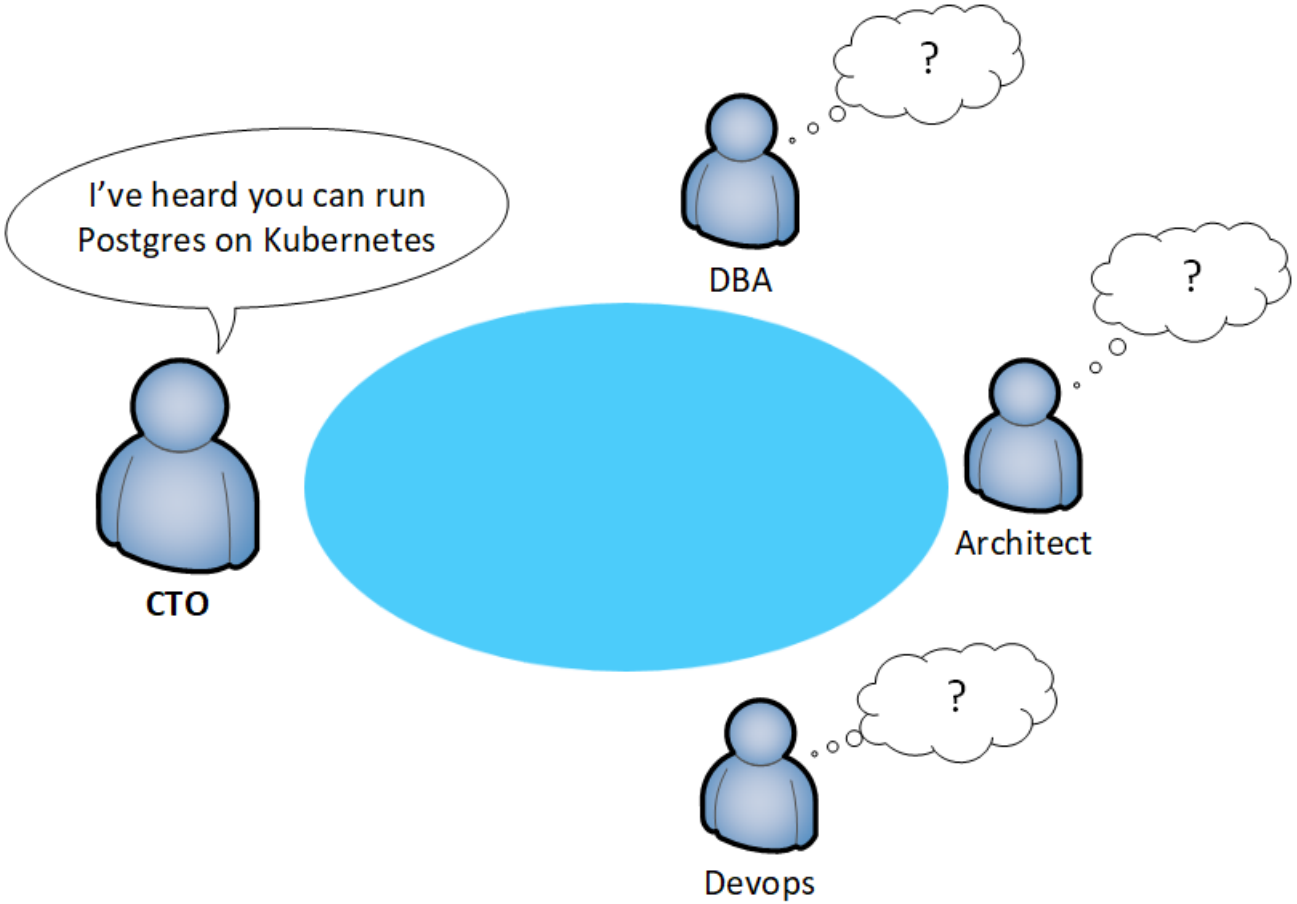
25 June 2026


I've heard you can run Postgres on Kubernetes
CTO
?
DBA
?
Architect
?
Devops

Hello!

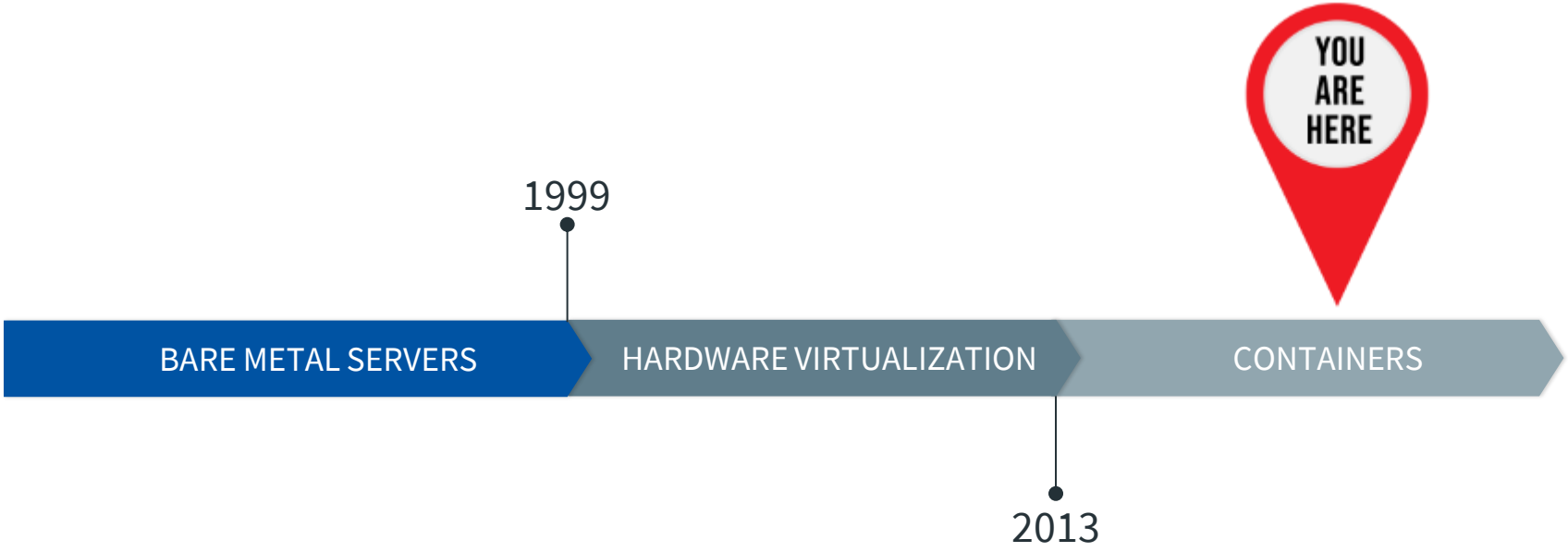
I am Emrah Becer

* A computer engineer who spent last 20 years administering databases.
* Currently working as an independent PostgreSQL consultant at European Patent Office (EPO)
* Have special interest in Linux kernel and database internals

Evolution of Virtualization Technologies

How we ended up with containers

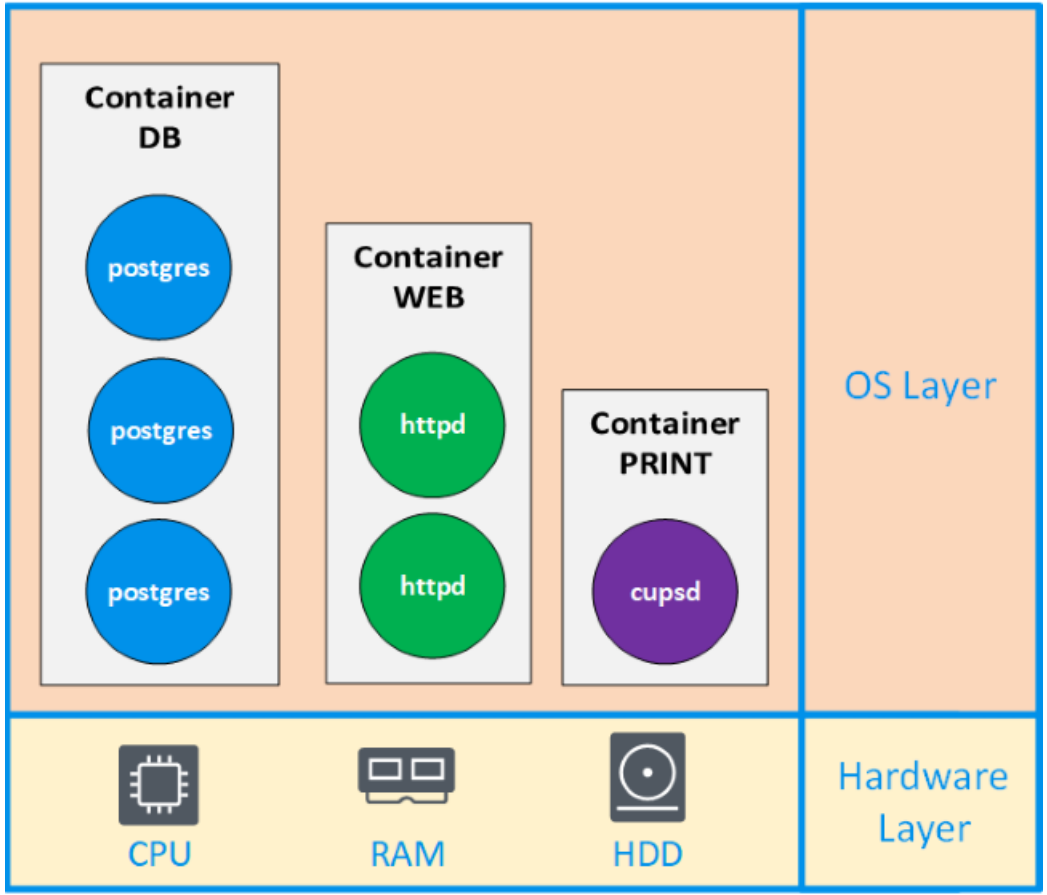
Trend in Modern Virtualization Technologies



Fitting the Elephant Inside a Container

A new way of running your postgres

Postgres
Inside a Container



Technology Behind Containers

How the magic works

Container = A Group of Processes

Linux Kernel Does All The Work

Namespaces:

- Isolate processes

Control Groups (Cgroups):

- Limit resources
- Reserve resources

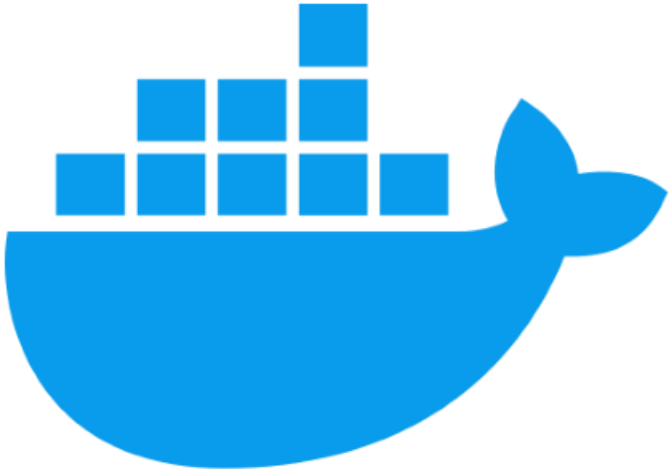
Pivot_Root:

- Restrict file access

Administering Containers

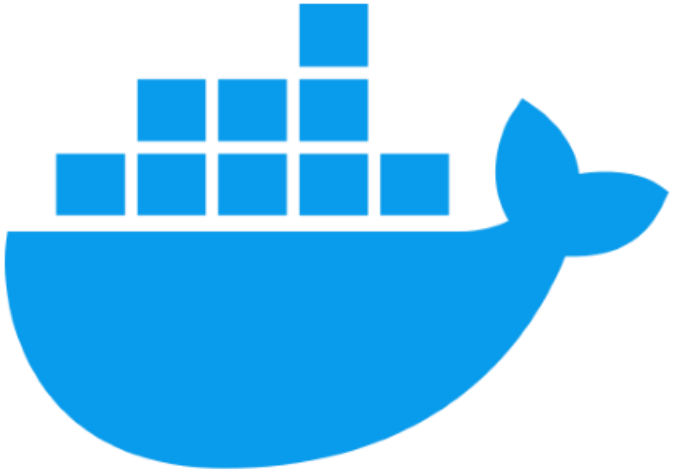
The easy way

The Docker Project



- Simplified working with containers
- Increased containers' popularity and adoption

The Docker Hub



- Repositories for docker images
- Download images created by others
- Upload images you've built

The PostgreSQL Docker Community

Provides images for:

- <major>.<minor> versions of postgres
- Different CPU architectures (x86, arm, ppc etc.)

1 billion+ downloads so far.
https://hub.docker.com/_/postgres

Docker with Postgres is Great

- For development and test environments
- If you don’t have a DBA background

Going Beyond Docker

When you simply need more

The Need For a Container “Orchestrator”

- Horizontal Scalability
- High Availability
- Load Balancing

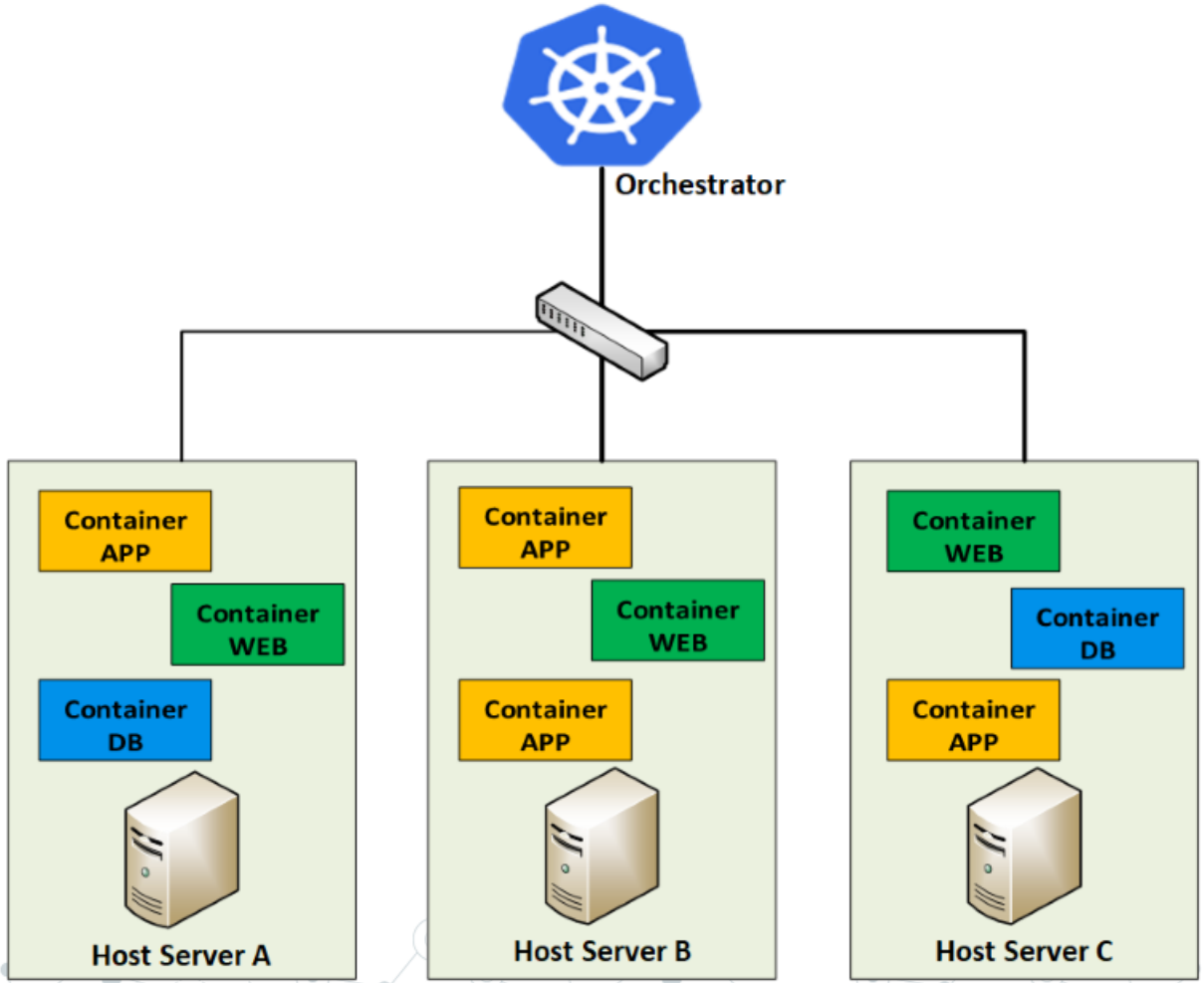
Open Source Container Orchestrators

Kubernetes

Docker Swarm

Redhat Openshift

Kubernetes Cluster



Running a Production Postgres Cluster on Kubernetes

Time to get more serious

The Need For a Kubernetes Operator

- Kubernetes is a generic platform
- Can be extended using “operators”

Postgres Operator = Make Kubernetes Postgres Aware

Open Source PostgreSQL Operator Projects

- Zalando Postgres Operator
- CloudNativePG
- CrunchyData

The Zalando Postgres Operator Project

- Written in GO
- Docker Image
- Based on Ubuntu
- Postgres and Patroni bundled together

A Complete Running Example of Postgres Cluster on Kubernetes

Finally !..

Step 1: Define your Postgres Cluster

- Postgres Operator is declarative.
- YAML (Yet Another Markup Language) files
- Infrastructure As a Code

Postgres Cluster Definition (Part 1)

```
apiVersion: "acid.zalan.do/v1"
kind: postgresql
metadata:
  name: my-first-pg-cluster
spec:
  dockerImage: ghcr.io/zalando/spilo-17:4.0-p2
  numberOfInstances: 3
  users:
    my_dba_user:
    - superuser
    hr_user:
    - login
  databases:
    hrdb: hr_user
```

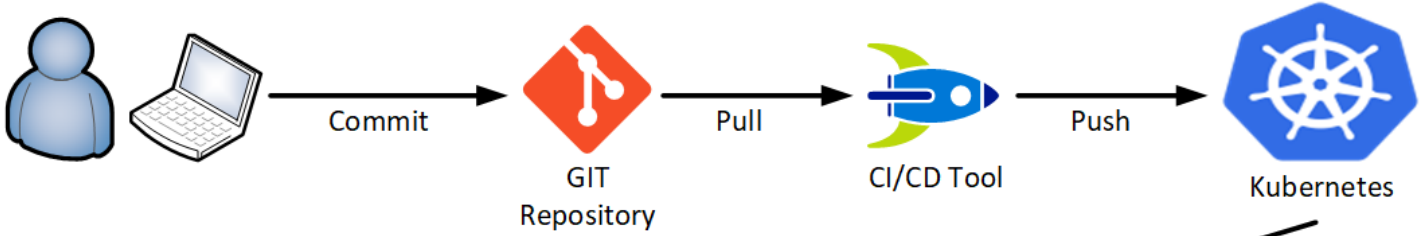
Postgres Cluster Definition (Part 2)

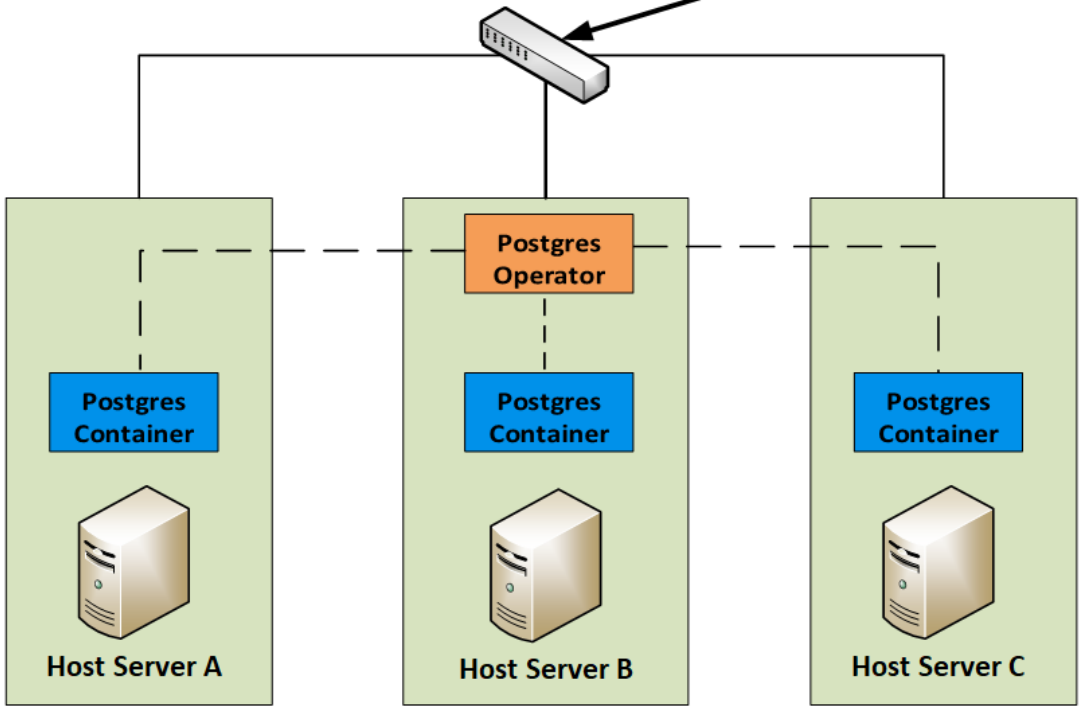
```
postgresql:
  version: "16"
  parameters:
    shared_buffers: "1024MB"
    max_connections: "50"
    log_statement: "all"
 volume:
  size: 20Gi
 resources:
  requests:
    cpu: 500m
    memory: 2Gi
  limits:
    cpu: 2000m
    memory: 4Gi
```

Step 2: Deploy the Cluster Configuration to Kubernetes

- Build a pipeline from GIT to Kubernetes
- Use a CI/CD tool like ArgoCD

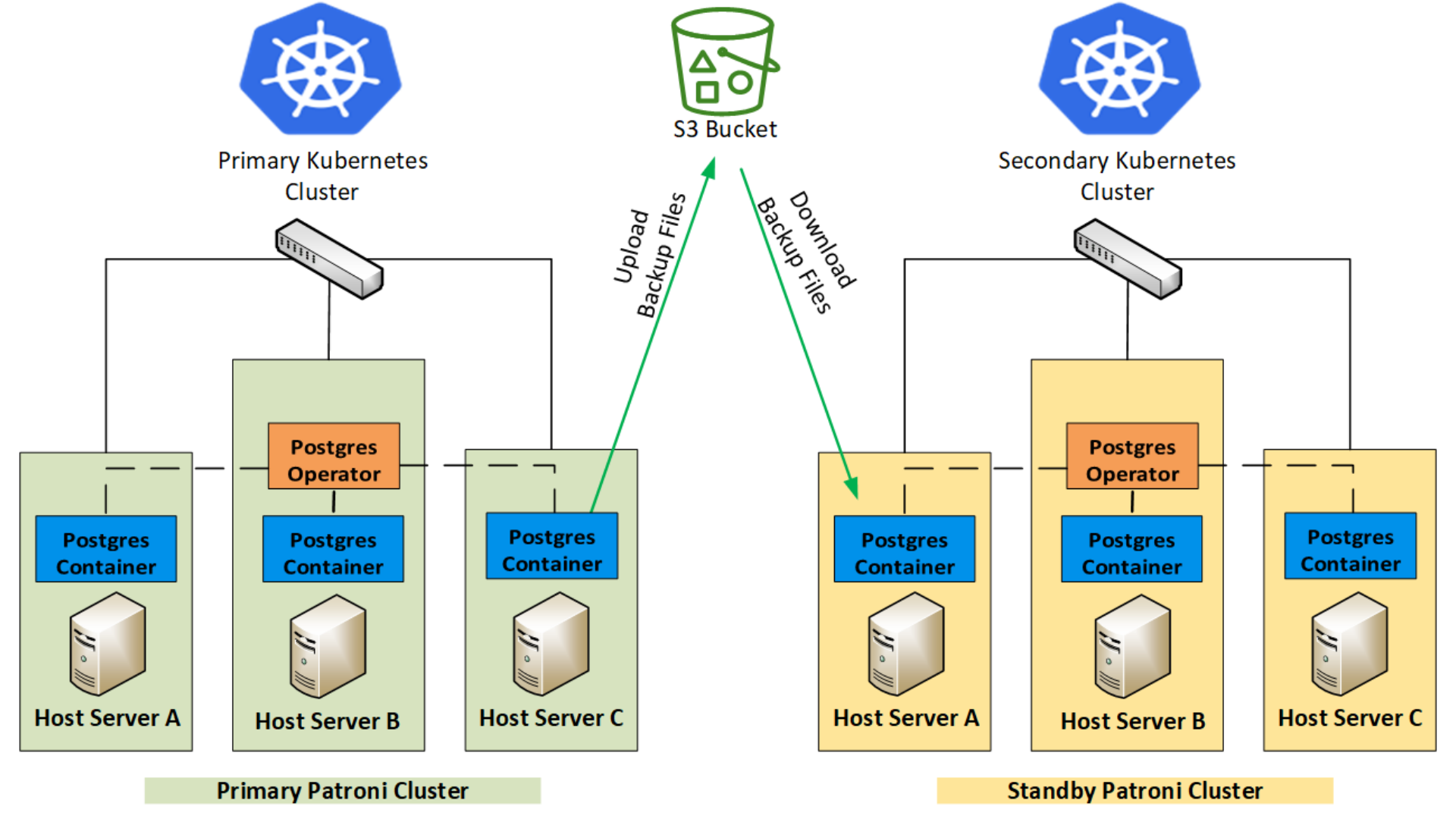
Postgres Pipeline





Backup/Restore and Disaster Recovery Features

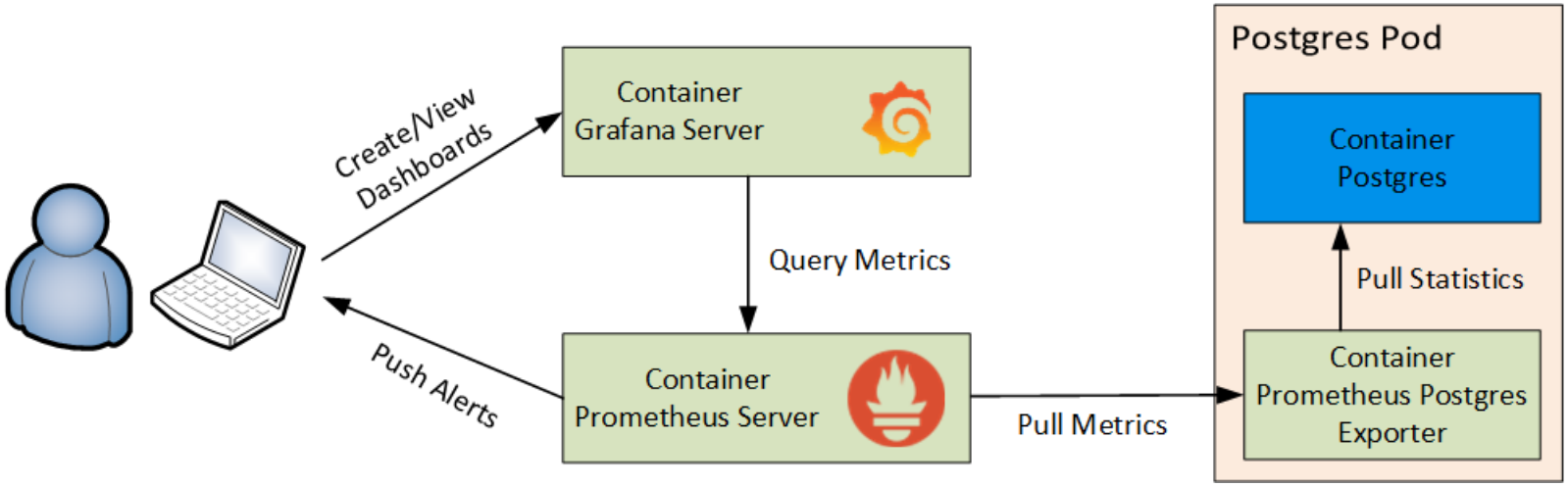
- Backups are stored in S3 (simple storage service) buckets
- On-prem or cloud S3 buckets
- Patroni standby cluster


Primary Kubernetes Cluster
S3 Bucket
Secondary Kubernetes Cluster
Upload Backup Files
Download Backup Files
Postgres Operator
Postgres Container
Postgres Container
Postgres Container
Host Server A
Host Server B
Host Server C
Postgres Operator
Postgres Container
Postgres Container
Postgres Container
Host Server A
Host Server B
Host Server C
Primary Patroni Cluster
Standby Patroni Cluster

Monitoring and Observability

- Deploy a “sidecar” container.
- For ex: Prometheus postgres exporter

Monitoring and Observability



Should We Migrate Our Postgres to Kubernetes?

The ultimate question

Reasons to Love Postgres on Kubernetes

- Self-healing
- Database As A Service (DBaaS)
- Offload some DBA tasks to Postgres Operators

Reasons to Dislike Postgres on Kubernetes

Prepare for more Postgres switchovers:

- Kubernetes maintenance
- OOM killer and node evictions
- Kubernetes issues

Reasons to Dislike Postgres on Kubernetes

Challenges For DBAs:

- Learning container and Kubernetes concepts.
- Learning curve is steep.

Final Words

We'll Probably Have to Migrate Postgres to Kubernetes

- Paradigm in virtualization technologies has shifted to containers. Databases cannot stay out of this.
- Communities/vendors are constantly developing projects for better database experience on Kubernetes. It will be difficult to provide arguments against using them.
- Your company/clients may want to quit hypervisors or at least keep them at minimum due to licensing and maintenance costs.

Thank You!

Emrah Becer

Any questions?

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