

From Database in Container to DBaaS on Kubernetes



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Founder, Percona

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Early Days of Modern Open Source

```
Floppy drive(s): fd0 is 1.44M
floppy: FDC version 0x90
Swansea University Computer Society Net2Debugged [1.30]
IP Protocols: ICMP, UDP, TCP
NE*000 ethercard probe at 0x300: 52 54 00 12 34 57
eth0: NE2000 found at 0x300, using IRQ 9.
ne.c:v0.99-15k 3/3/94 Donald Becker (becker@super.org)
Checking 386/387 coupling... Ok, fpu using exception 16 error reporting.
Linux version 1.0 (root@softland) #1 Tue Apr 26 19:25:39 PDT 1994
Partition check:
  hda: hda1 hda2
EXT2-fs warning: mounting unchecked fs, running e2fsck is recommended
VFS: Mounted root (ext2 filesystem).
Cannot open *.o
[: argument expected
none on /proc type proc (rw)
/etc/rc.net: sls105(192.168.1.100), rpc.portmap, inetd, namedJul 22 13:57:32 nam
ed[45]: restarted

, rpc.nfsd, rpc.mountd

Welcome to Linux 0.99.15g
sls105 login:
```

Never Ending
Move towards
Simplicity





Download Sources, Patch and Compile



Tar.gz binaries and INSTALL



Packages with Dependencies - .deb .rpm



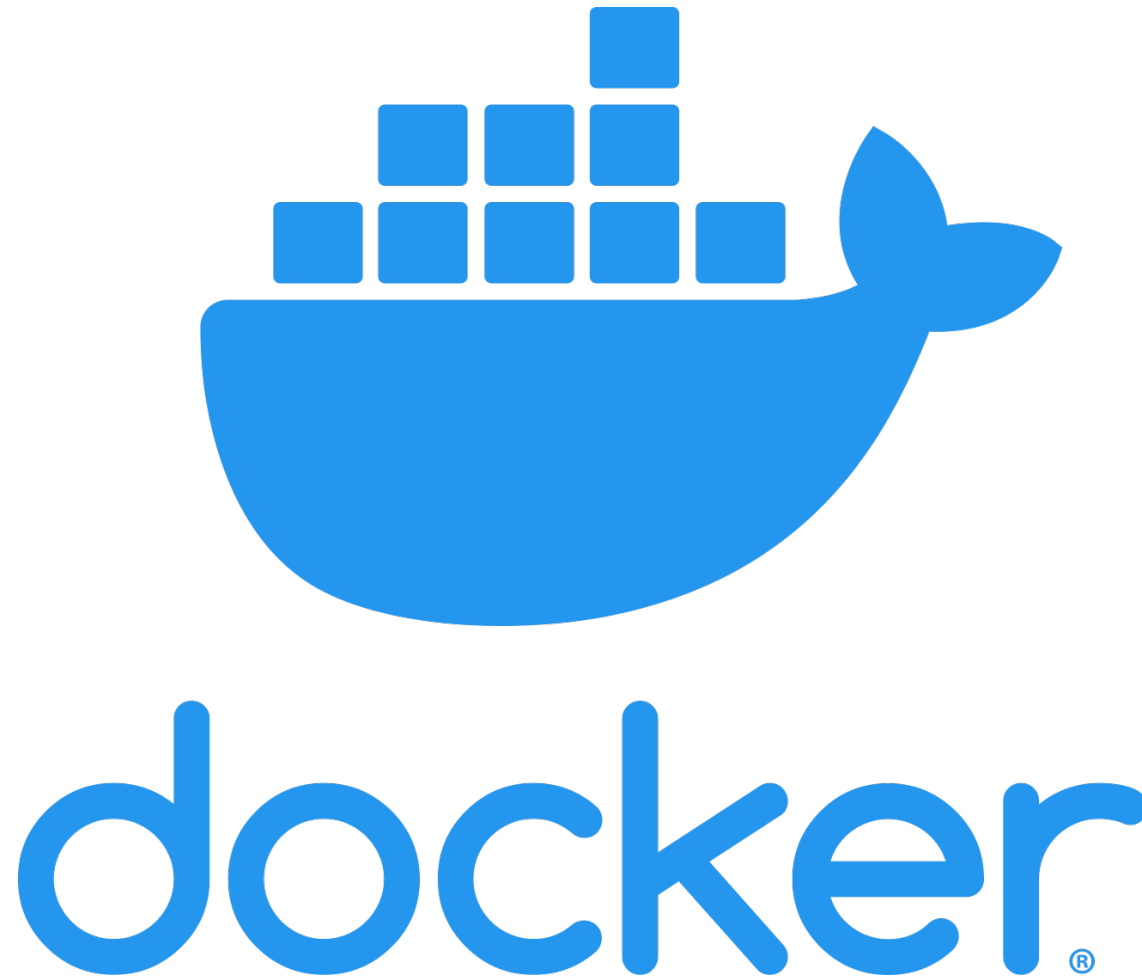
Package repositories APT and YUM

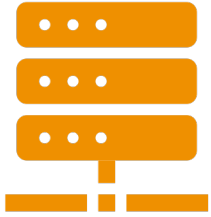


Docker, Snap etc

Installation of Open Source Software

Database in Docker





**Clean. Isolated from Other
Components in the
Environment**



**Easy to have Multiple
Environments**



**Simplify Deployment with
Docker Compose**

Test and Dev

(Mostly Unfounded) Fears of overhead

Extra Complexity. Need to use Data Volumes for Best Result

Some monitoring tools initially lacked proper Docker Support

Production

Most Open Source
Databases have
official Docker
Images

Commonly
Deployed for Test
and Dev

Limited
Deployment in
Production

Open Source Databases with Docker

**We Provide
Docker Packages
for MySQL,
MongoDB**

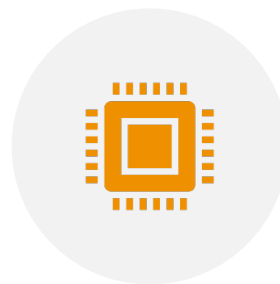
**Enhanced
Enterprise Grade
Distribution**

**100% Free and
Open Source**

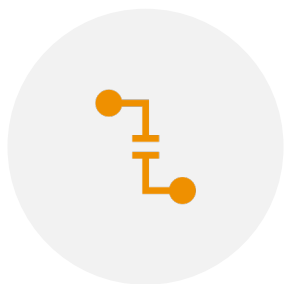
Percona Solution



**What about Day 2
Operations**



**Upgrades, High
Availability, Scaling Up
and Down**



**Must be done in the
context of “Cluster”
rather than single node**



**Docker does not provide
great Solution**

Unsolved Problem

Kubernetes





**Complicated
Relationship...**



**Kubernetes was
designed for Stateless
application first**



**... and Database is very
opposite of Stateless**



**Improved to manage
Stateful Applications
in Recent Years**

Kubernetes and Databases

Stateful Applications and Kubernetes



Kelsey Hightower ✓
@kelseyhightower



I'm always going to recommend people exercise extreme caution when running stateful workloads on Kubernetes. Most people who are asking "can I run stateful workloads on Kubernetes" don't have much experience with Kubernetes and often times the workload they are asking about.

3:10 AM · Mar 24, 2019 · [Twitter Web Client](#)

317 Retweets **903** Likes



DOK Community

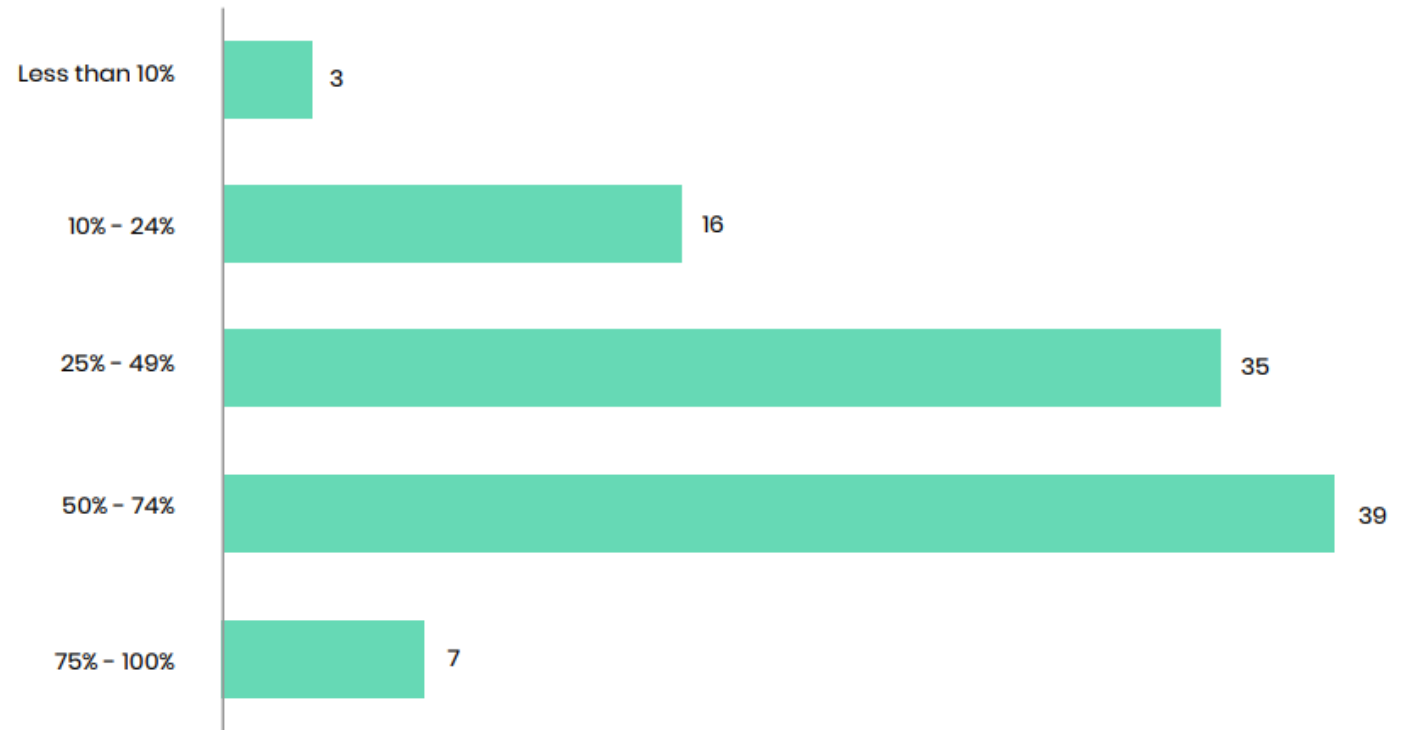


Dok
Community

<https://dok.community/>

Data on Kubernetes

What percentage of your organization's stateful production workloads are running on Kubernetes?



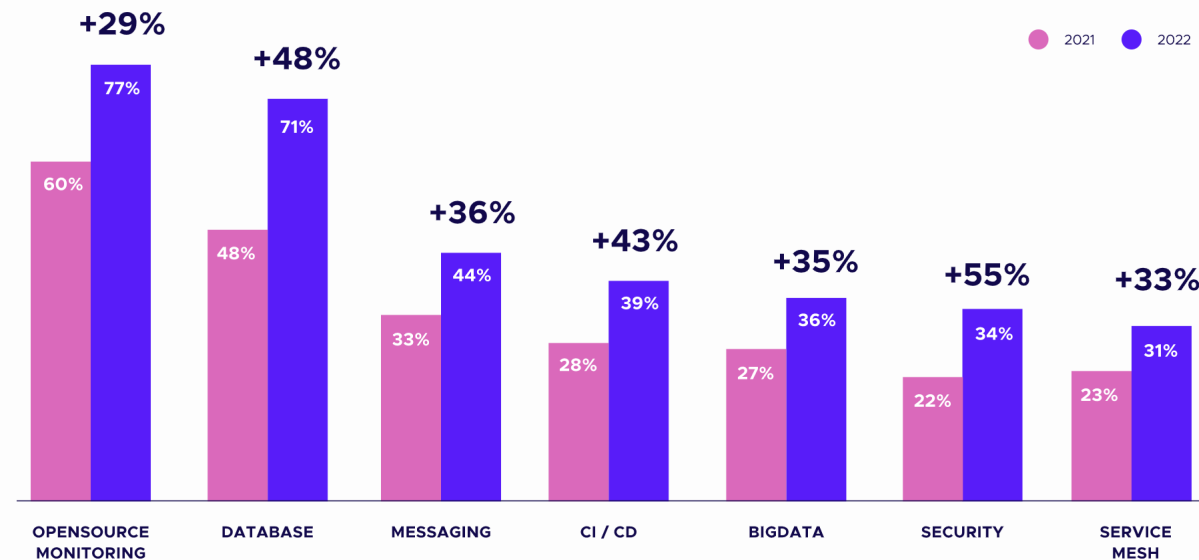
https://dok.community/wp-content/uploads/2021/10/DoK_Report_2021.pdf

Adoption Areas

KUBERNETES GROWTH AREAS

Focusing on non-application workloads, enterprises used an increasing variety of technologies. This reflects the need to enhance Kubernetes with better observability, security, and service-to-service communications. Other technologies enable specific use cases like CI/CD tools or databases.

Across all categories, **open source projects rank among the most frequently used solutions.**



<https://www.cncf.io/reports/cncf-annual-survey-2022/>

Kubernetes
Powers many
DBaaS



Promise of Kubernetes

**Operating System for your Data Center,
like Linux was for a single server**

**Robust mechanics to deal with node
failure**

**Operator Framework for Automating
Complex Database Operations Tasks**

Open Source
Databases on
Kubernetes

Slower Pickup by vendors

**Many Third Party Kubernetes
Solutions Were Developed**

**“Helm Chart” and “Operator”
packages**

Percona Solutions

**Operators
for MySQL,
MongoDB,
PostgreSQL**

**Available to
install
directly or
through
Helm Chart**

**Improved
with
Enterprise
Grade
Features**

**Open Source
and Source
Available
(MongoDB)**

Unsolved
Problems

Running Business Critical Statefull applications on Kubernetes is “Black Belt” level skill

Not an easy task for non Kubernetes expert

DBaaS “state of art” simplicity for databases



Cloud

Proprietary Clouds
bring Great
Usability at Great
Cost

Current State

Major Clouds have Proprietary DBaaS Offerings

- Amazon RDS, Aurora, Google Cloud SQL etc

Database Vendor Own Proprietary Solutions

- MongoDB Atlas, SkySQL, CockroachCloud etc

Multi Database Proprietary Solutions

- Aiven, Instaclustr etc



**Managing High
Availability**



Database Patching



Backups



**(Some)
Performance Tuning**



Easy to Scale

DBaaS Removes a lot of “Toil”



Do not worry, DBaaS is Open Source
Compatible

Limited, "Hotel California" Compatibility

DBaaS



PROMISE



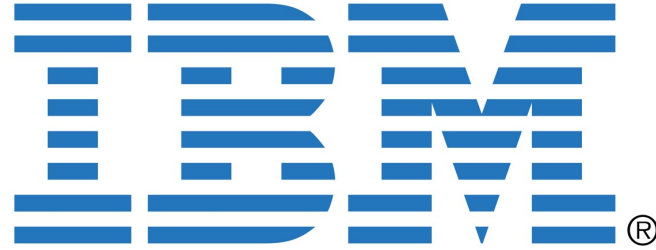
REALITY

Fully Managed DBaaS tends to be Overmarketed



DBaaS Vendor Lock-In

It may not be so painful **now**, but it is going to be painful in the **future**



History Lesson

Oracle used to Save its customer from IBM
Hardware Lock-in with Mainframe computers

How about Going Back to Basics ?

What is Cloud Computing?

An analogy: think of electricity services...

You simply plug into a vast electrical grid managed by experts to get a low cost, reliable power supply – available to you with much greater efficiency than you could generate on your own.

Power is a utility service - available to you on-demand and you pay only for what you use.



Kubernetes – Universal API for Public and Private Cloud



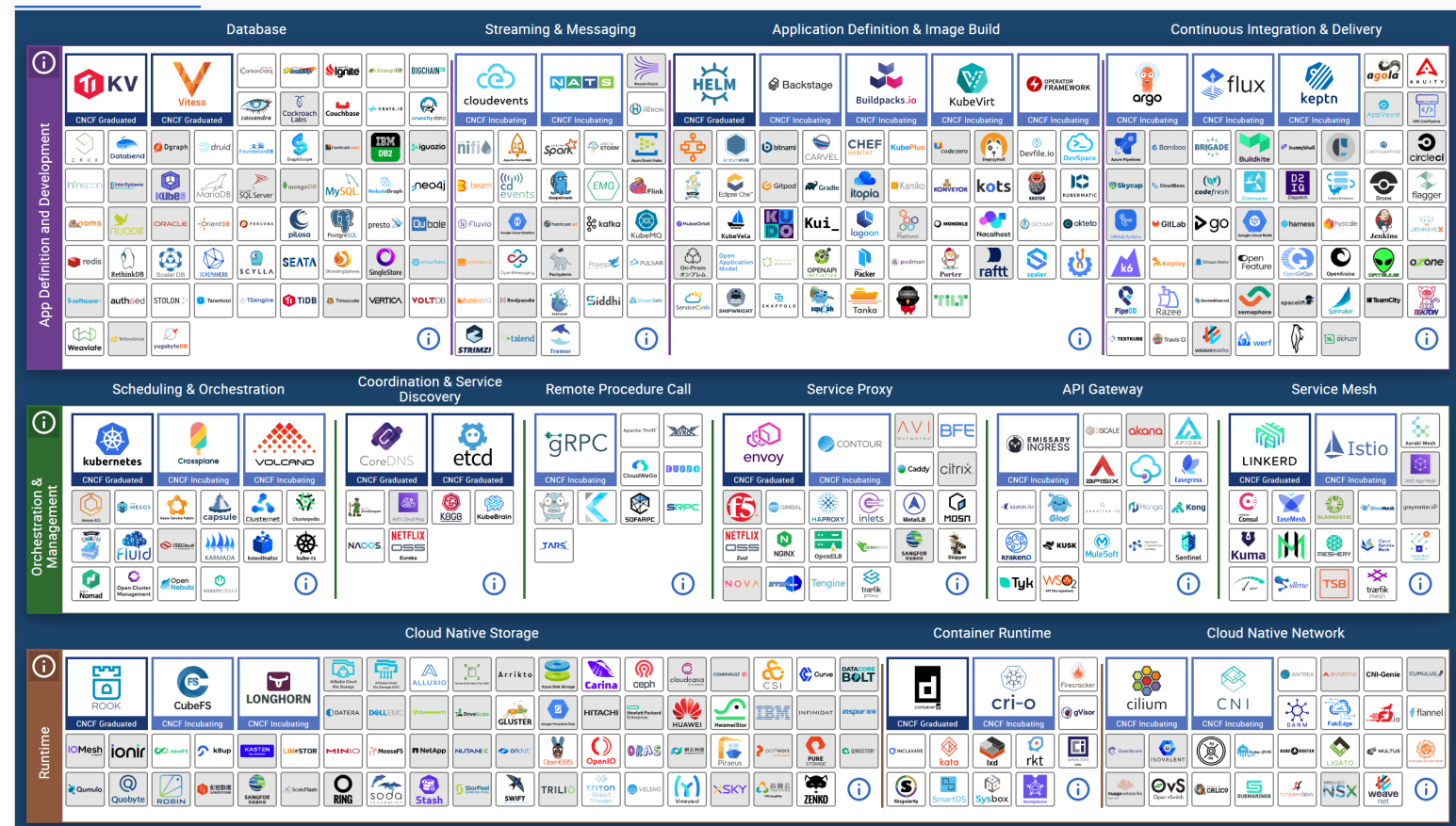
Open Source Catches Up Again



- **Freedom to Run Anywhere**
- **Use Open Source**
- **Cloud Is Commodity**
- **Customer**
- **Choice of Vendors**



Cloud Native is Going Strong



<https://landscape.cncf.io/>

Our Vision

Provide AWS RDS-Like DBaaS Experience in Public and Private with
Open Source Software and No Vendor Lock-in





Get look and feel for Basics ?

Kubernetes with Operators is
Easy and Powerful

<https://per.co.na/PXCMinkube>

Work in
Progress...

Create Cluster

⚠ If you want to use monitoring, you need to set your PMM installation public address in [settings](#) before cluster creation

✓ Basic Options


2 Advanced Options

Topology

Cluster Single Node

Number of Nodes

3

External Access 

Resources per Node

Small Medium Large Custom

ⓘ Resource calculations are an estimate

CPU

1

Using 0.75 CPU (9.4%) of 8 CPU in total

Consumed CPU

Required CPU (6 CPU)

Memory (GB)

1

Using 0.18 GB (0.7%) of 25.19 GB in total

Consumed Memory

Required Memory (6 GB)

Disk (GB)

2

Using 50.57 GB (64.3%) of 78.6 GB in total

Consumed Disk

Required Disk (12 GB)

Create Cluster

<https://www.percona.com/doc/percona-monitoring-and-management/2.x/setting-up/server/dbaas.html>

Open Source DBaaS Experience

- **Interface – Deploy full Database Cluster with single API Call, Including Backups, Self Healing, Self Patching, Self Tuning Etc**
 - Well Suited for Database Software
 - This is what Open Source DBaaS is
- **Management – When (not of) software fails the team to resolve exceptions**
 - Can't be entirely "Open Source"
 - Do it yourself or work with Partner



OPEN SOURCE DATABASES ARE ON THE PATH
FROM SUPPORT OF CONTAINERS TO FULL
DBAAS EXPERIENCE



DOCKER SUPPORT MATURE, KUBERNETES
SUPPORT IS GETTING WHERE AND DBAAS
EXPERIENCE IS STILL WORK IN PROGRESS



IN OPEN SOURCE YOU CAN ALWAYS BE PART
OF SOLUTION – HELP BUILD THE PROJECTS
YOU CARE ABOUT!

Summary

DBaaS has won

Unparallel convenience of using the database

The background of the slide is a photograph of a weathered, rusty metal door. The door has a prominent keyhole in the center, surrounded by a rectangular metal frame with four bolts. The door is set within a frame of vertical bars, suggesting a prison or a secure facility. The lighting is dramatic, with strong highlights and shadows, emphasizing the texture of the rust and the metallic surfaces.

Software Vendor Lock-in Sucks

Open Source to the Rescue

Thank you, Let's Connect!

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<https://twitter.com/PeterZaitsev>

<http://www.peterzaitsev.com>