



Deuxfleurs Association

<https://garagehq.deuxfleurs.fr/>
Matrix channel: #garage:deuxfleurs.fr

Our objective at Deuxfleurs

**Promote self-hosting and small-scale hosting
as an alternative to large cloud providers**

Our objective at Deuxfleurs

**Promote self-hosting and small-scale hosting
as an alternative to large cloud providers**

Why is it hard?

Our objective at Deuxfleurs

**Promote self-hosting and small-scale hosting
as an alternative to large cloud providers**

Why is it hard?

Resilience

(we want good uptime/availability with low supervision)

How to be resilient (the hard way)

Enterprise-grade systems typically employ:

- ▶ RAID
- ▶ Redundant power grid + UPS
- ▶ Redundant Internet connections
- ▶ Low-latency links
- ▶ ...

→ it's costly and only worth it at DC scale

How to be resilient (the cheap way)

Instead, we use:

- ▶ Commodity hardware (e.g. old desktop PCs)

How to be resilient (the cheap way)



How to be resilient (the cheap way)



How to be resilient (the cheap way)

Instead, we use:

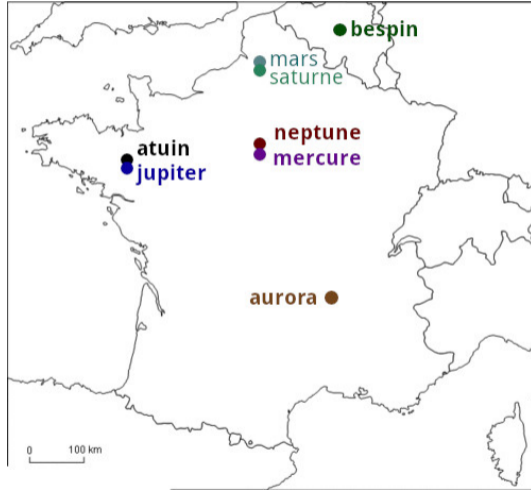
- ▶ Commodity hardware (e.g. old desktop PCs)
- ▶ Commodity Internet (e.g. FTTB, FTTH) and power grid

How to be resilient (the cheap way)

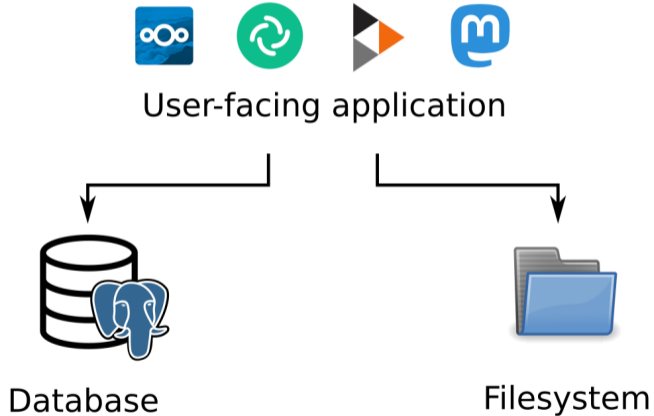
Instead, we use:

- ▶ Commodity hardware (e.g. old desktop PCs)
- ▶ Commodity Internet (e.g. FTTB, FTTH) and power grid
- ▶ **Geographical redundancy** (multi-site replication)

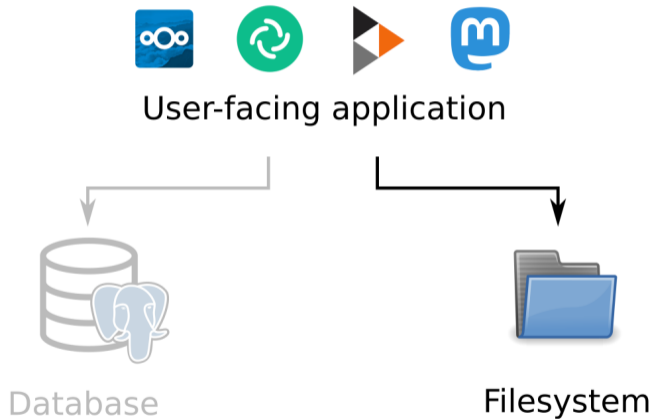
How to be resilient (the cheap way)



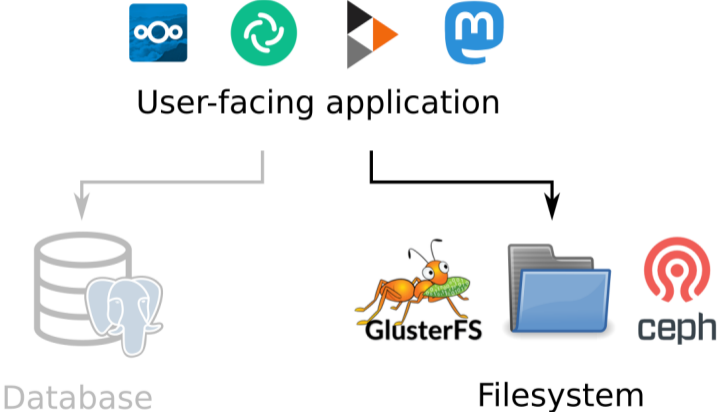
How to make this happen



How to make this happen



How to make this happen



Distributed file systems are slow

File systems are complex, for example:

- ▶ Concurrent modification by several processes
- ▶ Folder hierarchies
- ▶ Other requirements of the POSIX spec

Coordination in a distributed system is costly

Costs explode with commodity hardware / Internet connections
(we experienced this!)

A simpler solution: object storage

Only two operations:

- ▶ Put an object at a key
- ▶ Retrieve an object from its key

(and a few others)

Sufficient for many applications!

A simpler solution: object storage



S3: a de-facto standard, many compatible applications

MinIO is self-hostable but not suited for geo-distributed deployments

But what is Garage, exactly?

Garage is a self-hosted drop-in replacement for the Amazon S3 object store that implements resilience through geographical redundancy on commodity hardware



What makes Garage different?

Coordination-free:

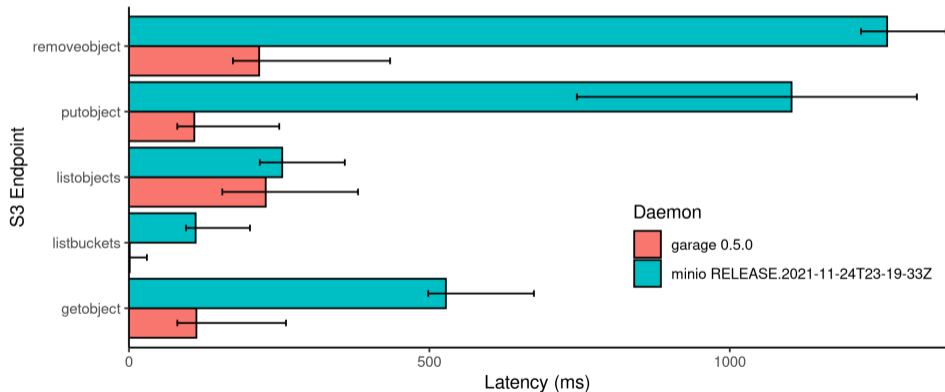
- ▶ No Raft or Paxos
- ▶ Internal data types are CRDTs
- ▶ All nodes are equivalent (no master/leader/index node)

→ less sensitive to higher latencies between nodes

What makes Garage different?

S3 endpoint latency in a simulated geo-distributed cluster

100 measurements, 6 nodes in 3 DC (2 nodes/DC), 100ms RTT + 20ms jitter between DC
no contention: latency is due to intra-cluster communications
colored bar = mean latency, error bar = min and max latency



Get the code to reproduce this graph at <https://git.deuxfleurs.fr/quentin/benchmarks>

What makes Garage different?

Consistency model:

- ▶ Not ACID (not required by S3 spec) / not linearizable
- ▶ **Read-after-write consistency**
(stronger than eventual consistency)

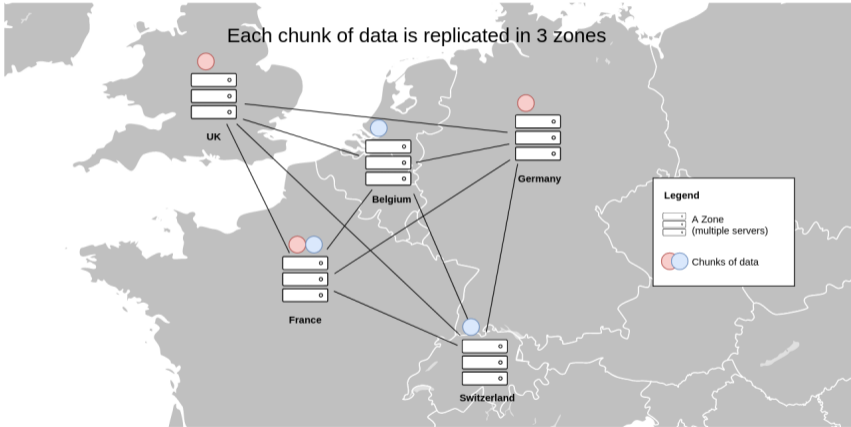
What makes Garage different?

Location-aware:

```
alex@io:~$ docker exec -ti garage /garage status
==== HEALTHY NODES ====
ID                Hostname  Address                               Tags                               Zone  Capacity
d9b5959e58a3ab8c... drosera   [2a01:e0a:260:b5b0::4]:3901        [drosera,atuin]                   atuin  20
156d0f7a88b1e328... digitale [2a01:e0a:260:b5b0::3]:3901        [digitale,atuin]                   atuin  10
966dfc7ed8049744... datura   [2a01:e0a:260:b5b0::2]:3901        [datura,atuin]                     atuin  10
7d50f042280fea98... io       [2a01:e0a:5e4:1d0::57]:3901        [io,jupiter]                       jupiter 20
alex@io:~$
```

Garage replicates data on different zones when possible

What makes Garage different?



An ever-increasing compatibility list



[matrix]



CyberDuck



RCLONE



PeerTube



Garage

Get Garage now!



Garage

<https://garagehq.deuxfleurs.fr/>
Matrix channel: #garage:deuxfleurs.fr



AGPL **3**
Free Software
Free as in Freedom

Demo time!