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Service Discovery and Postgresql HA

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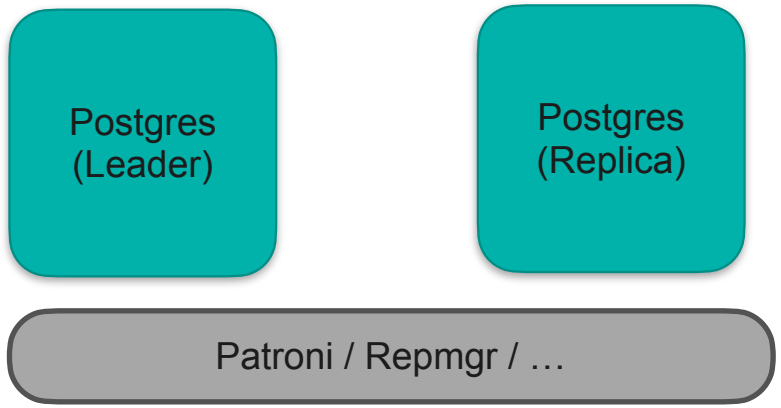
Yes

- Quick Overview of Postgresql HA
- Intro into Service Discovery
- Implementation Design

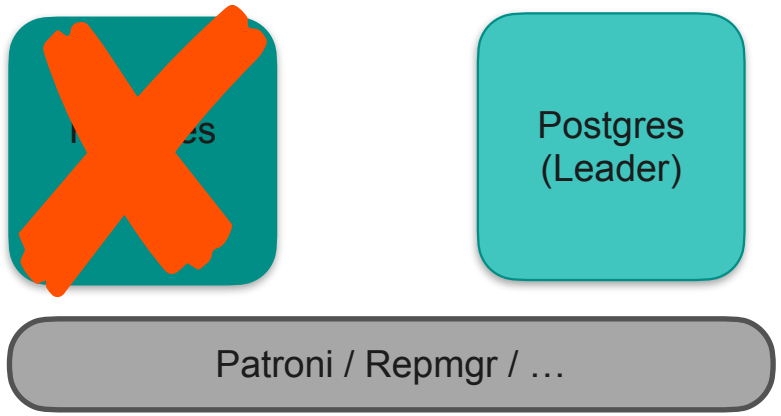
No

- Postgres
- Kubernetes
- Demo

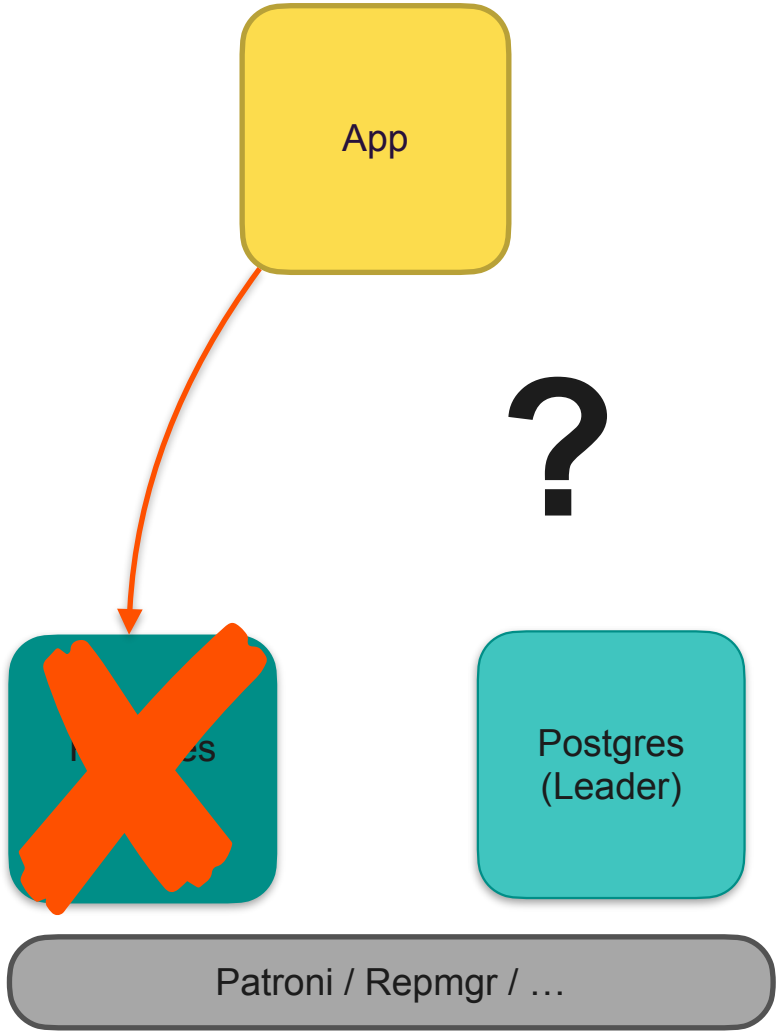
Postgresql HA / DBA View



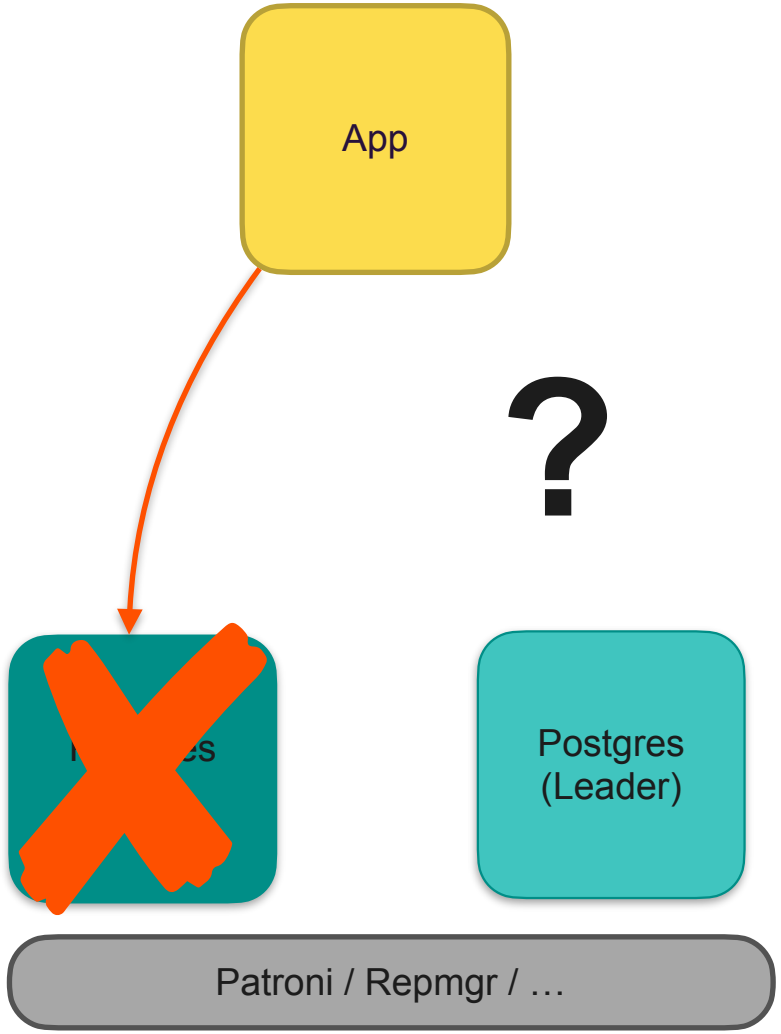
Postgresql HA / DBA View



Postgresql HA

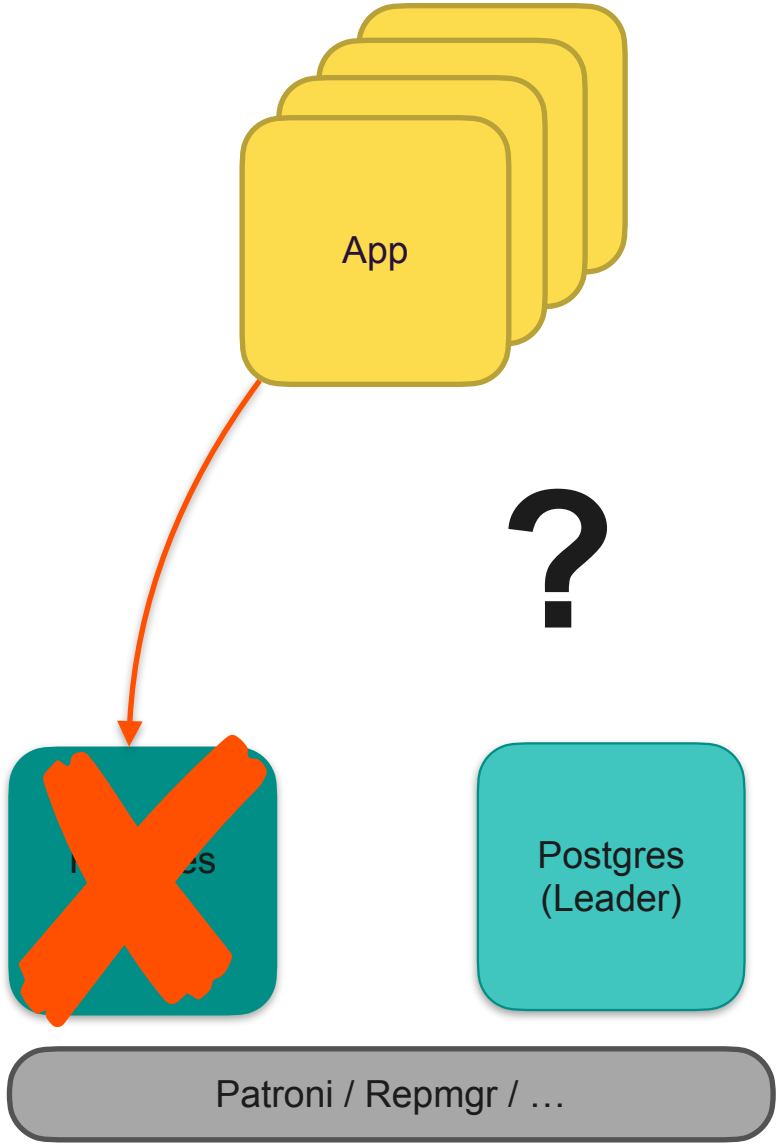


Postgresql HA



1. Reconfigure App

Postgresql HA



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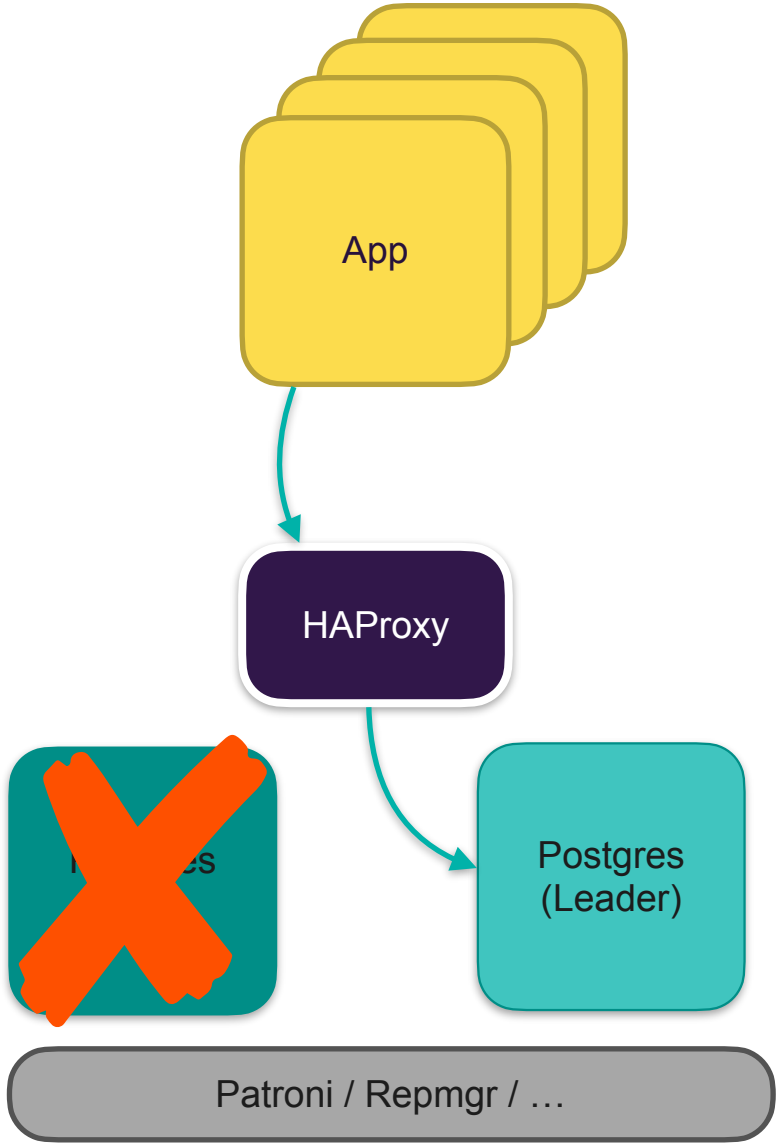
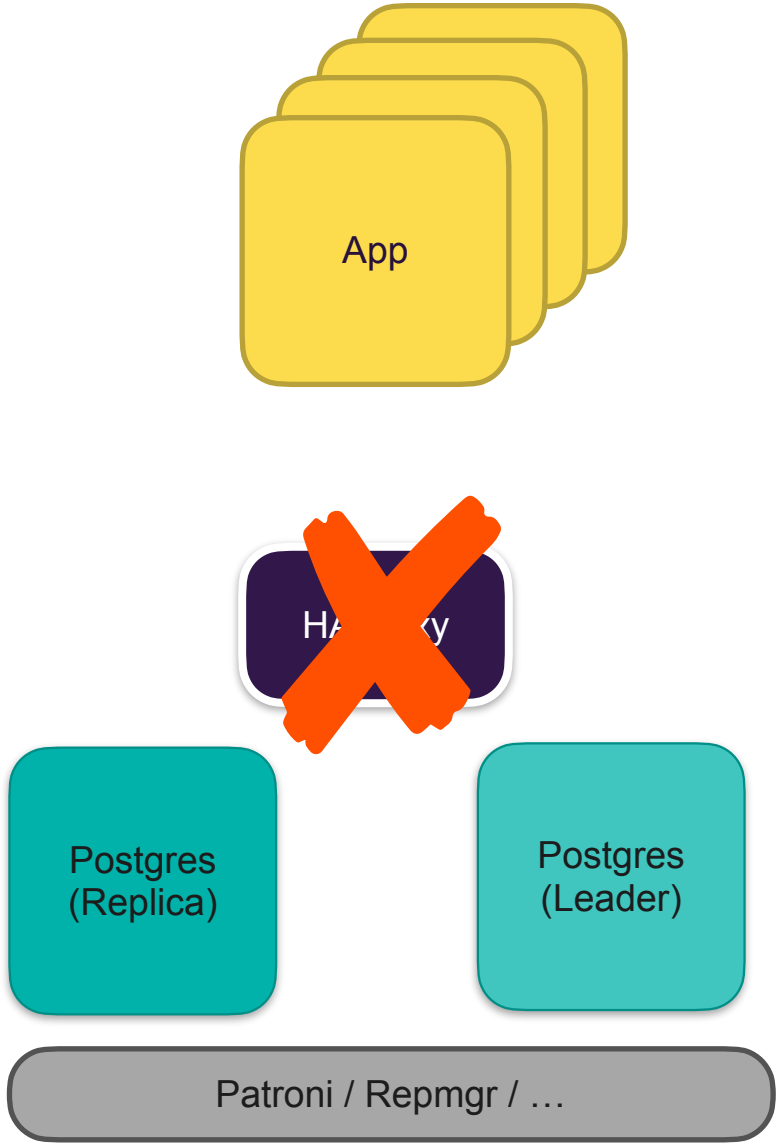
Postgresql HA



1. Reconfigure App
2. Load Balancer

Postgresql HA



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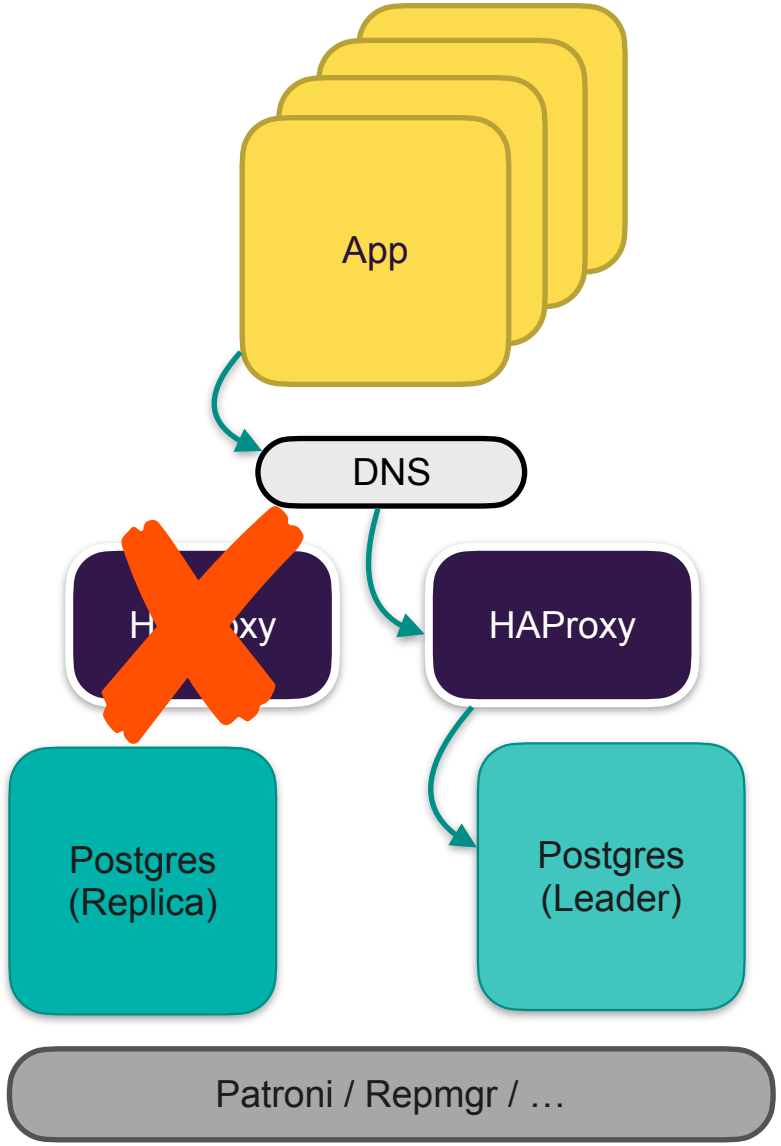
Postgresql HA



1. Reconfigure App
2. Load Balancer

Service Discovery

- Design pattern for the microservices architecture
- Mechanism for finding and connecting to the services available on a network
- Allows services to find each other and communicate dynamically, without hard-coding IP addresses or URLs
- Enables services to fail over to another instance if one instance goes down, improving reliability and availability of the overall system
- Kubernetes built-in

Service Discovery / Service Registry

- Central database for service discovery
- Keeps track of available services and their status
- Services register themselves in the registry on startup
- Clients query the registry to find services they need
- Examples: Etcd, Consul, Zookeeper

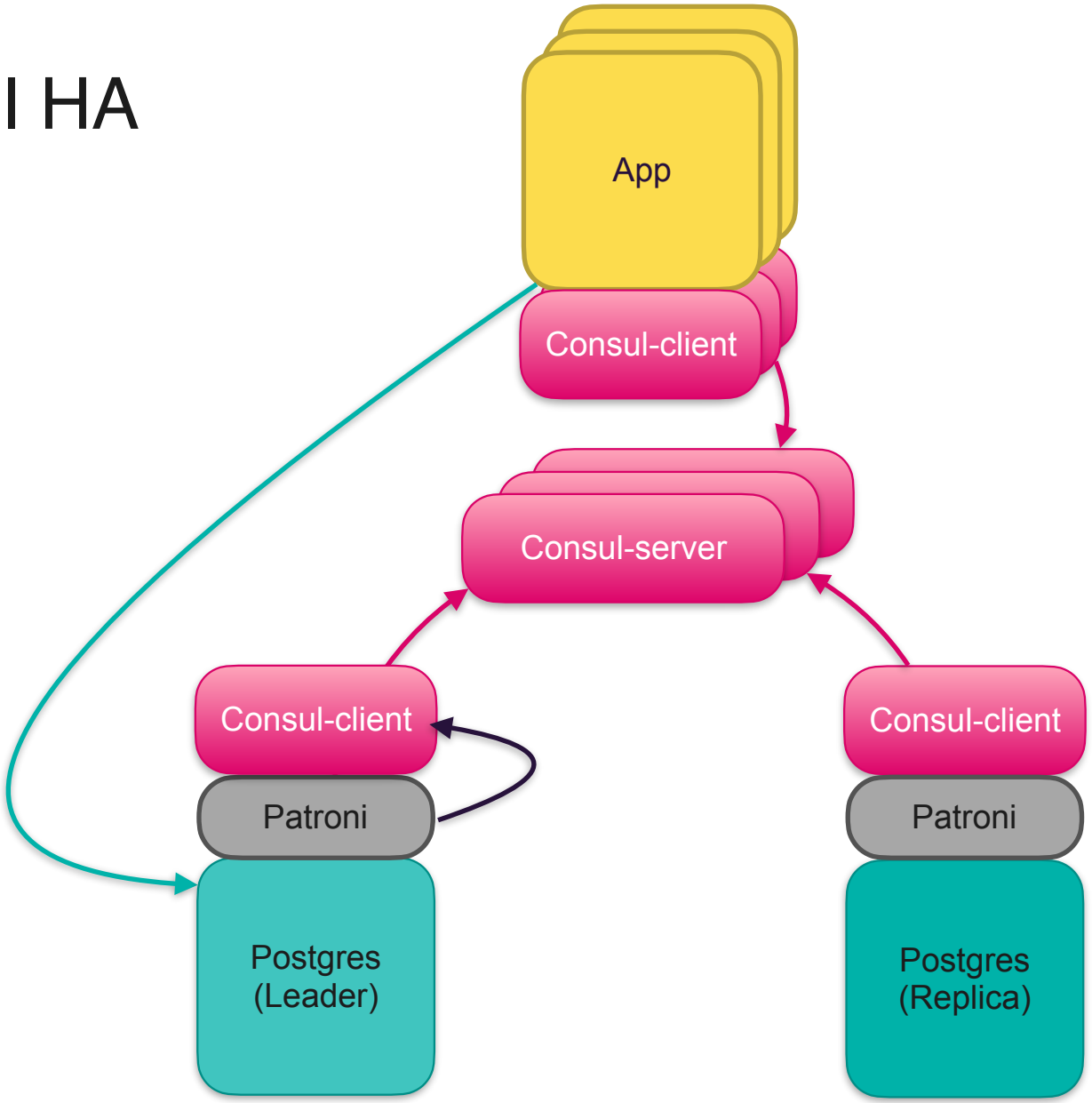
Service Discovery / Sidecar Pattern

- Another design pattern for the microservices architecture
- A separate process running alongside the main application to provide some extra functionality
- Enables adding features and functionality without changing the main application code
- Examples: PGBouncer, Patroni, Prometheus Exporter

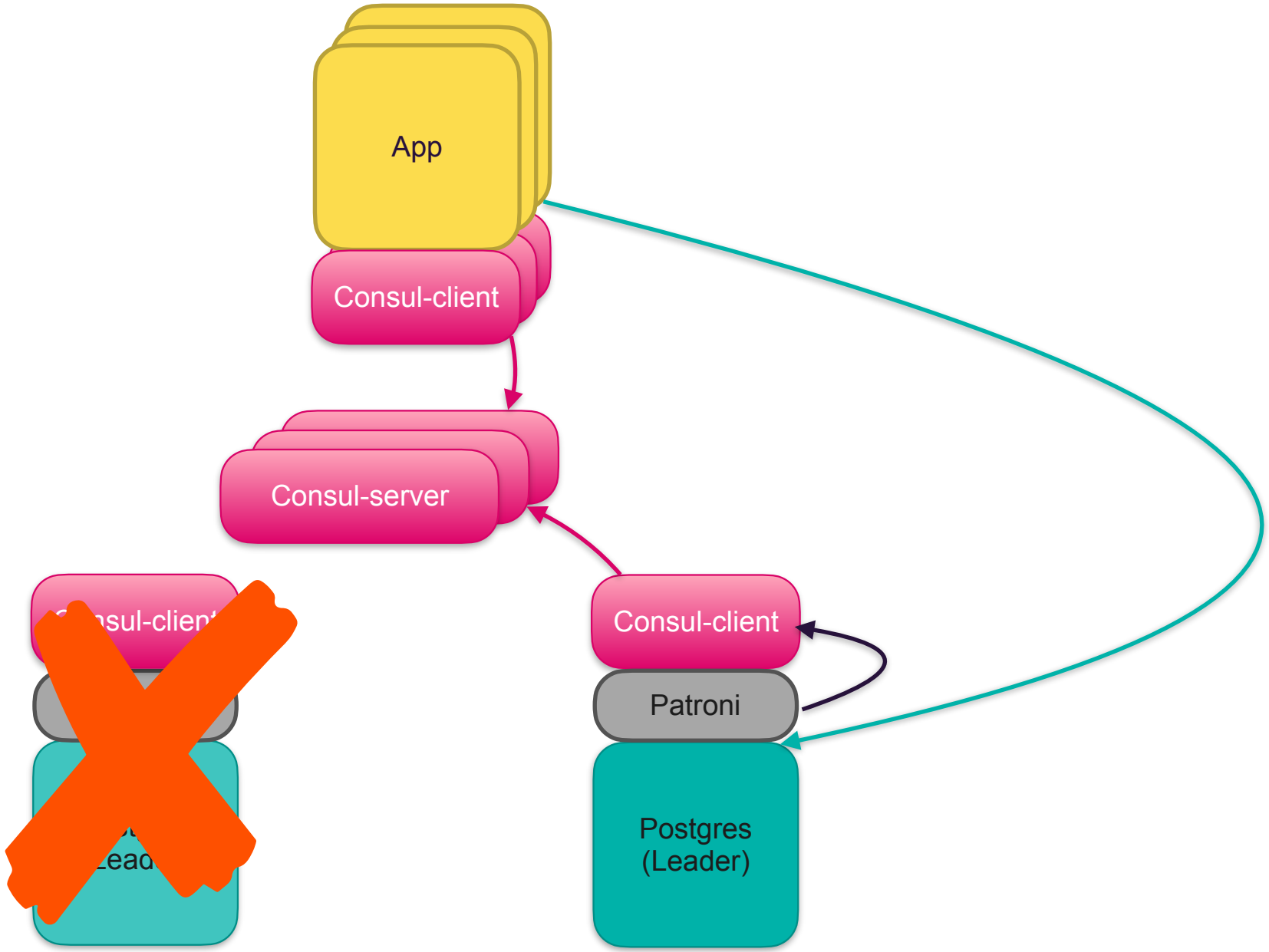
Service Discovery / Consul

- Service registry and service discovery framework
- Developed by HashiCorp and written in Go
- Consul-servers are responsible for voting and storing the data (3-5 nodes is optimal)
- Consul-clients run as a sidecar alongside the main process and responsible for communication with consul-servers
- Applications communicate only with local consul-clients
- Consul agents have a DNS interface

Postgresql HA



Postgresql HA



Postgresql HA / Consul server config

```
{
    "node_name": "consul01",
    "server": true,
    "ui_config": {
        "enabled" : true
    },
    "data_dir": "/consul/data",
    "addresses": {
        "http" : "0.0.0.0"
    },
    "retry_join":[
        "consul01",
        "consul02",
        "consul03"
    ]
}
```

Postgresql HA / Consul client config

```
{
    "node_name": "${HOSTNAME}",
    "data_dir": "/consul/data",
    "retry_join":[
        "consul01",
        "consul02",
        "consul03"
     ],
    "recursors": ["127.0.0.11"],
    "addresses": {
        "dns": "127.0.0.1",
        "http": "127.0.0.1"
    }
}
```

This flag provides addresses of upstream DNS servers used for recursive resolving queries if they are not inside the Consul service domain

Postgresql HA / Patroni config

```
scope: pglab
consul:
  url: http://127.0.0.1:8500
  register_service: true
```

Patroni doesn't register services in Consul by default, but turning it on creates a service with the <scope> name and two tags: "master" and "replica".

Access the master node using "**master.pglab.service.consul**"

Postgresql HA / DNS settings

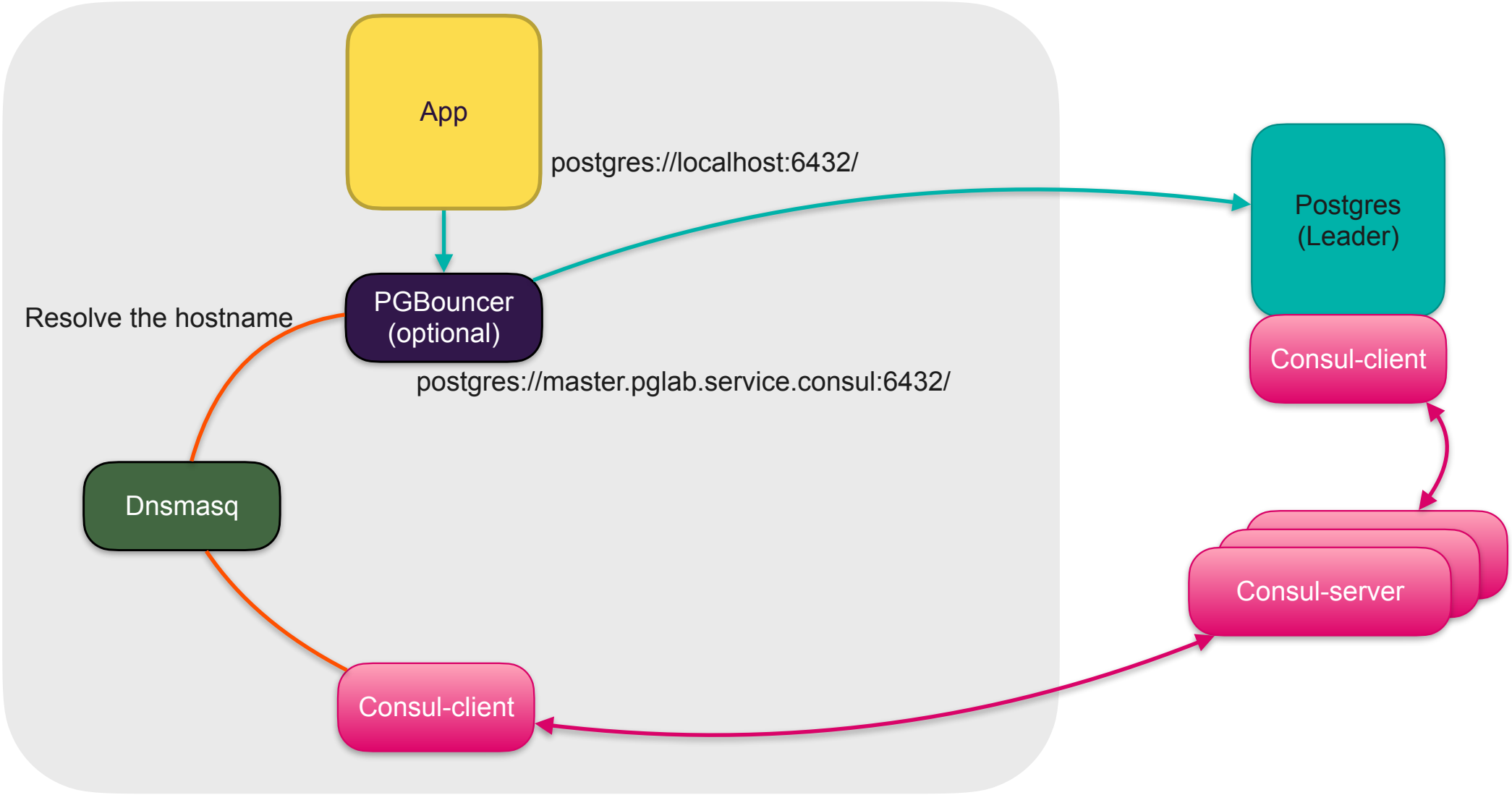
resolv.conf

```
nameserver 127.0.0.1
nameserver 127.0.0.11
options ndots:0
```

dnsmasq.conf

```
server=/consul/127.0.0.1#8600
```

Postgresql HA / PGBouncer



Postgresql HA / PGBouncer

```
[databases]
postgres = host=master.pglab.service.consul port=5432 dbname=postgres

[pgbouncer]
listen_port = 6432
listen_addr = localhost
auth_type = md5
auth_file = /etc/pgbouncer/userlist.txt
logfile = /var/log/pgbouncer/pgbouncer.log
pidfile = /home/pgbouncer/pgbouncer.pid
admin_users = app_user
pool_mode = session
dns_max_ttl = 0
server_login_retry = 0
```

Don’t cache DNS records internally

Retry to login immediately after failing connection attempt

Thank you

Question?

https://github.com/sasha-alias/postgresql-consul-demo