21/10/22

Administering large scale Postgres installations

Jan Birk, Morten Bøgeholm & Peter Gram

Administering large scale Postgres installations

A complete software stack - for government agencies and others - meeting the **demands** for:

Agenda

✔ Fast and agile for development
✔ Stable, secure and high availability
✔ Backup, restore and restore tests
✔ Easy access to data
✔ Easy database analyzing
✔ Application migration

National Agency for IT and Learning

- numbers

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Two locations

350 employees

**35 agile teams
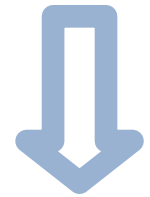(125 developers)**

**70 products
30 internal systems**

20 in IT operations
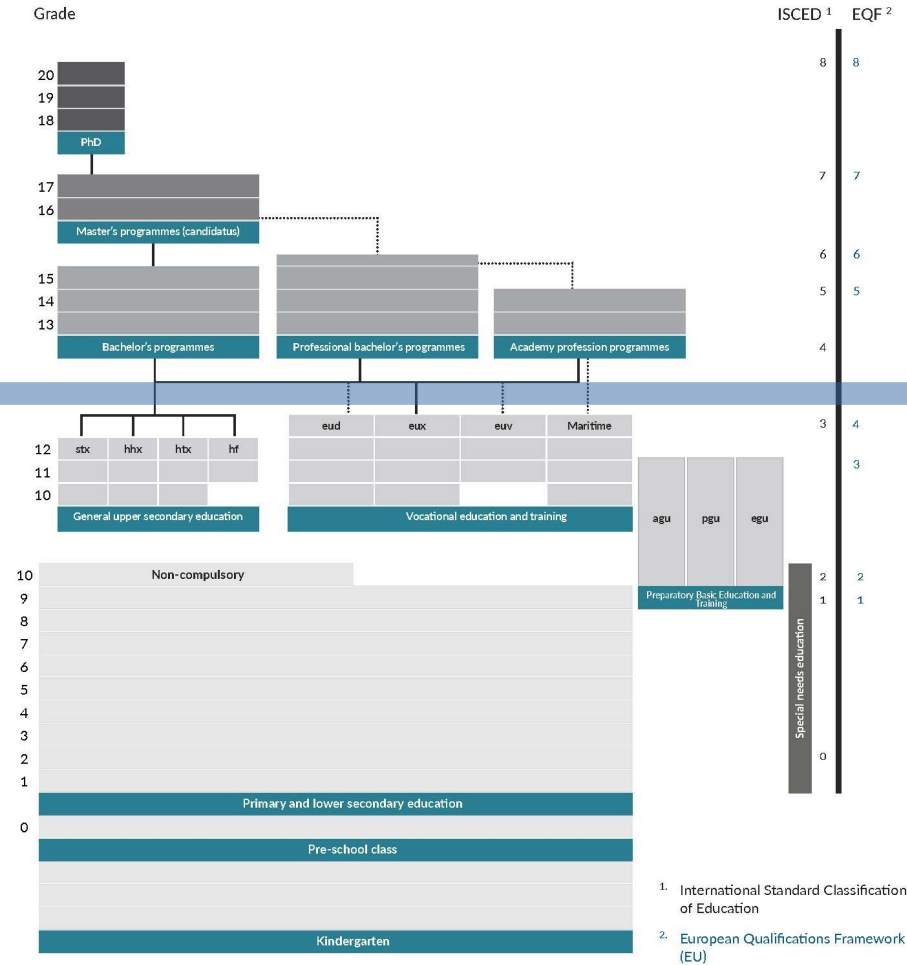
The Danish education system

- numbers

From kindergarten to
upper secondary education [

We & Postgres are supporting
around 1 mil students daily!

The SSO solution (Unilogin)
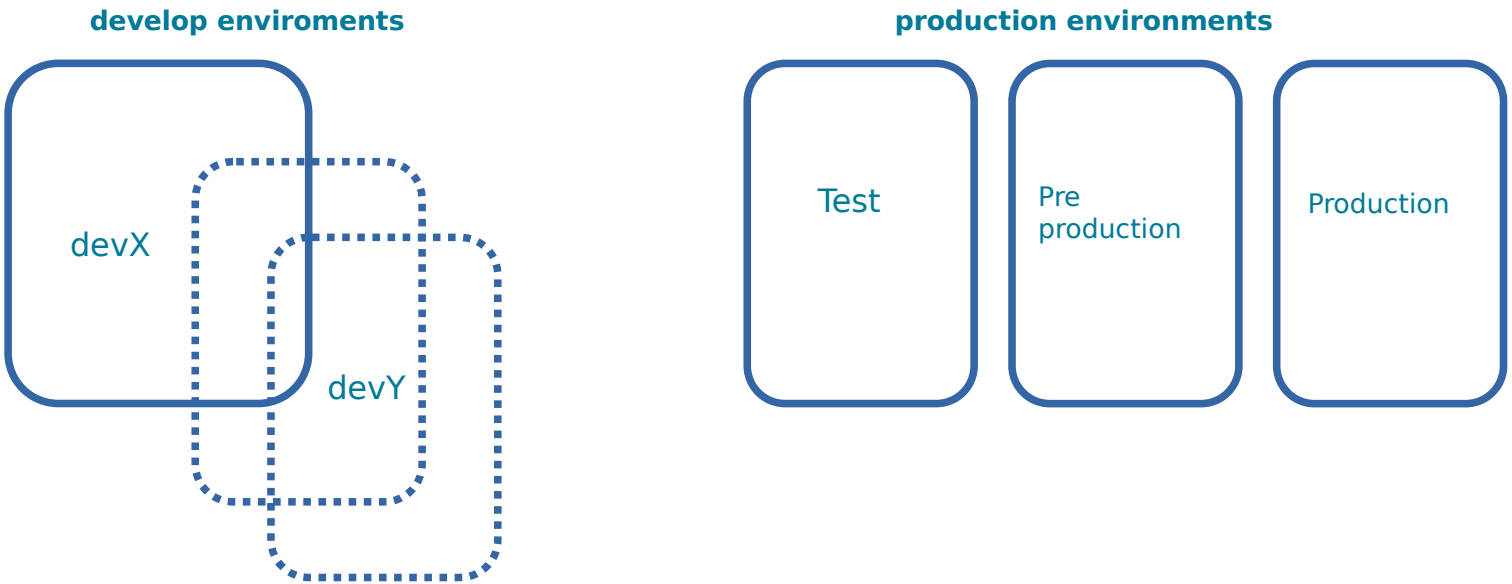supporting 1 mil logins a day

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Grade

ISCED [1]   EQF [2]

Grade		ISCED [1]	EQF [2]
20		8	8
19			
18			
	PhD		
17		7	7
16			
	Master's programmes (candidatus)		
15		6	6
14		5	5
13			
	Bachelor's programmes / Professional bachelor's programmes / Academy profession programmes	4	

eud   eux   euv   Maritime

12	stx	hhx	htx	hf		3	4
11							3
10							

General upper secondary education

Vocational education and training

agu   pgu   egu

Preparatory Basic Education and Training

Special needs education

10	Non-compulsory		2	2
9			1	1
8				
7				
6				
5				
4				
3				
2				
1			0	
	Primary and lower secondary education			
0				
	Pre-school class			
	Kindergarten			

1. International Standard Classification
    of Education

2. European Qualifications Framework
    (EU)

... the **demands** for:

[Fast and agile for development]
Stable, secure and high availability
Backup, restore and restore tests
Easy access to data
Easy database analyzing
Application migration

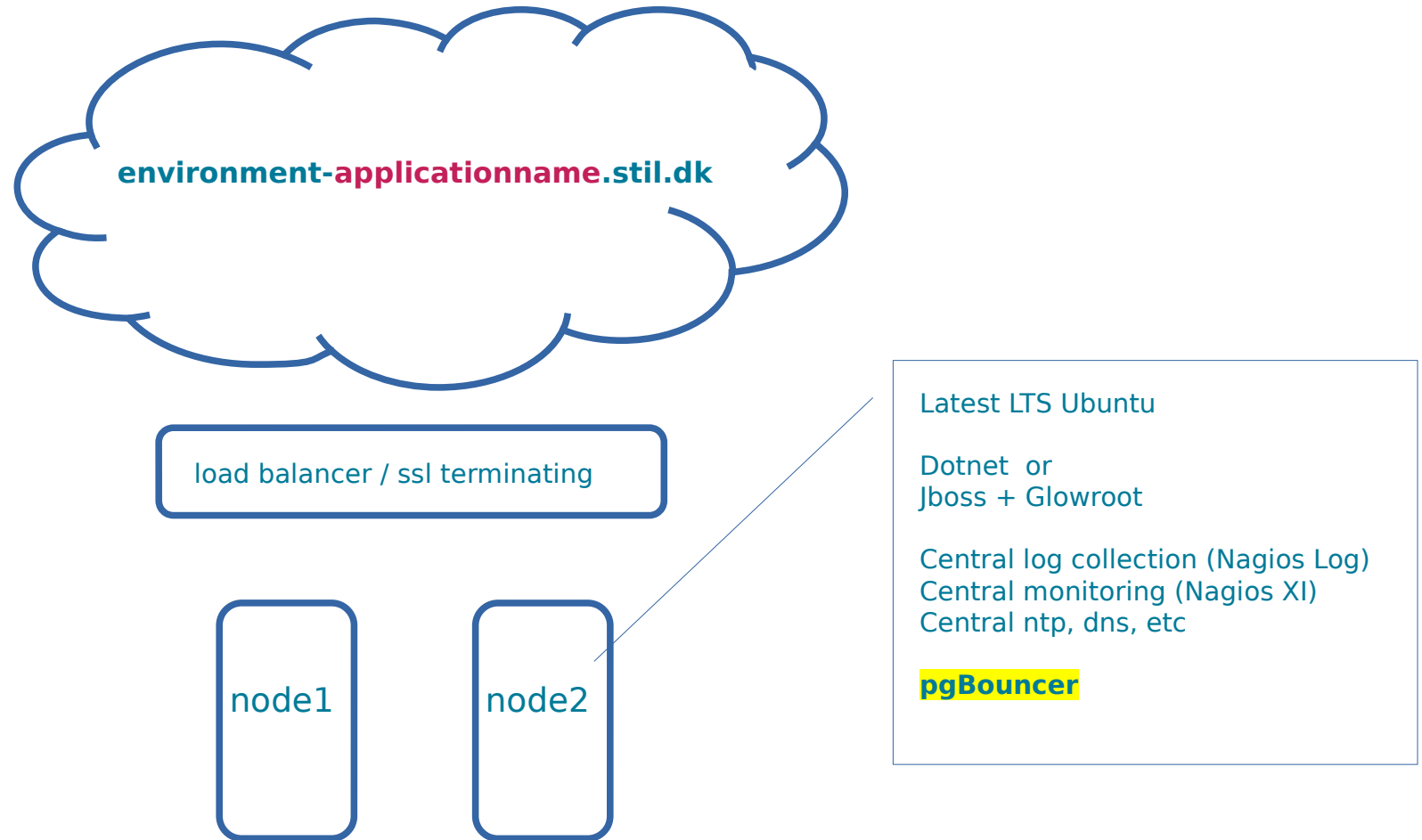MINISTRY OF CHILDREN
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Automated by Ansible – you will get 4-5 environments per system / product

DevOps

develop enviroments

devX

devY

production environments

Test

Pre
production

Production

6

...the **demands** for:
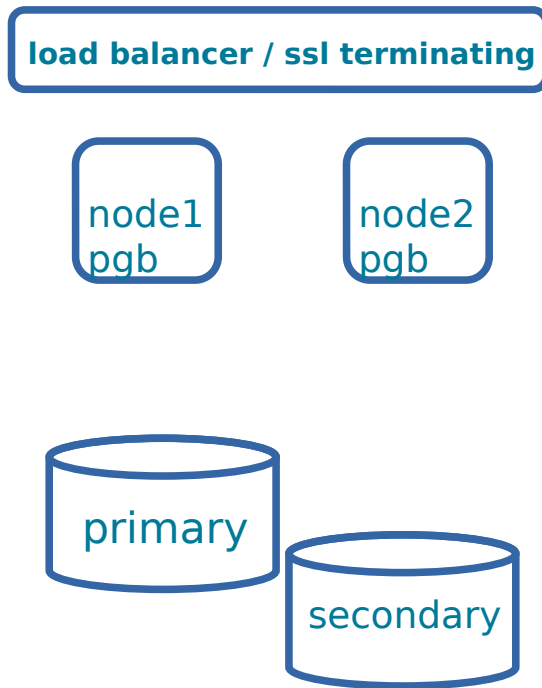
<mark>**[Fast and agile for development]**</mark>
Stable, secure and high availability
Backup, restore and restore tests
Easy access to data
Easy database analyzing
[Application migration]

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environment-applicationname.stil.dk

load balancer / ssl terminating

node1   node2

Latest LTS Ubuntu

Dotnet or
Jboss + Glowroot

Central log collection (Nagios Log)
Central monitoring (Nagios XI)
Central ntp, dns, etc

<mark>**pgBouncer**</mark>

Standard Environments

devX-applicationname.stil.dk
test-applicationname.stil.dk
prep-applicationname.stil.dk
applicationname.dk

...the **demands** for:

Fast and agile for development
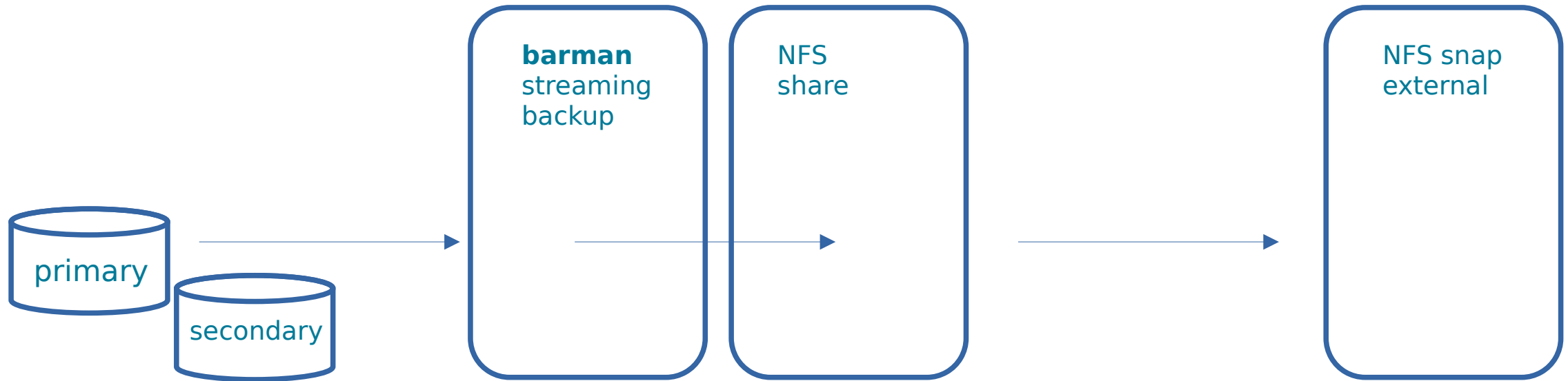[Stable, secure and high availability]
Backup, restore and restore tests
Easy access to data
Easy database analyzing
Application migration

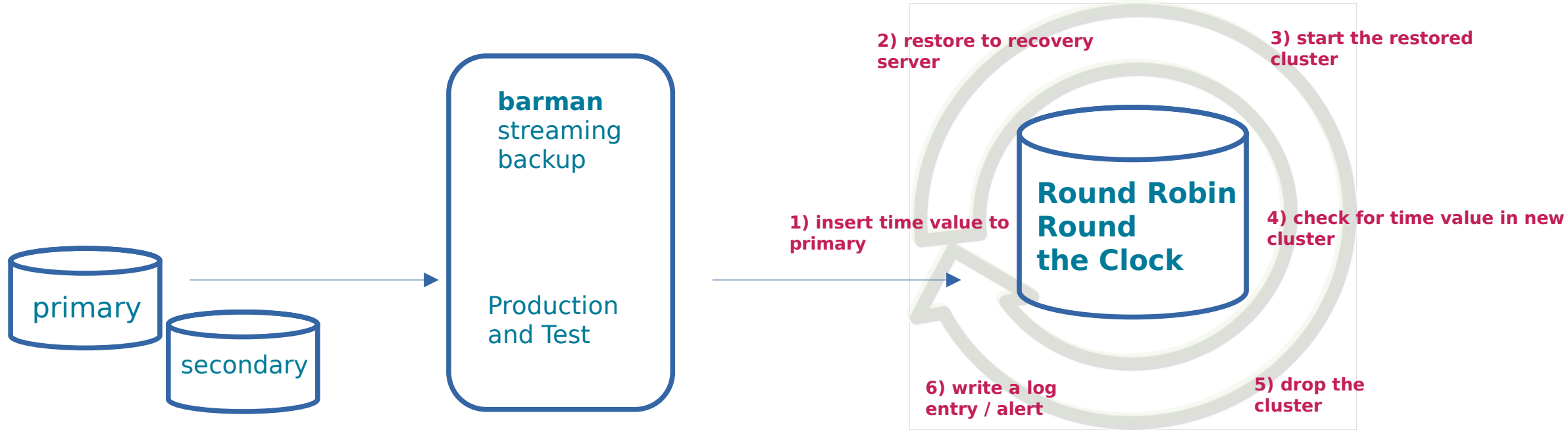MINISTRY OF CHILDREN
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load balancer / ssl terminating

node1
pgb

node2
pgb

primary

secondary

8

... the **demands** for:

Fast and agile for development
Stable, secure and high availability
[**Backup, restore** and restore tests]
Easy access to data
Easy database analyzing
Application migration

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primary

secondary

barman
streaming
backup

NFS
share

NFS snap
external

...the **demands** for:

Stable, secure and high availability
Fast and agile for development
[Backup, restore and restore tests]
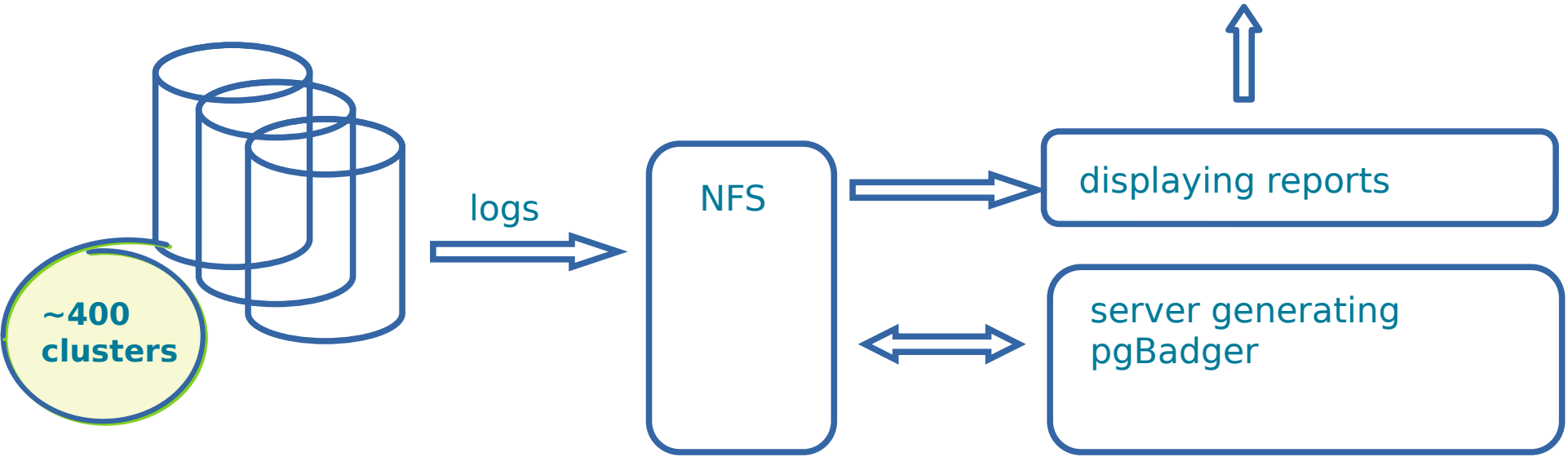Easy access to data
Easy database analyzing
Application migration

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primary

secondary

barman
streaming
backup

Production
and Test

2) restore to recovery server

3) start the restored cluster

Round Robin Round the Clock

1) insert time value to primary

4) check for time value in new cluster

6) write a log entry / alert
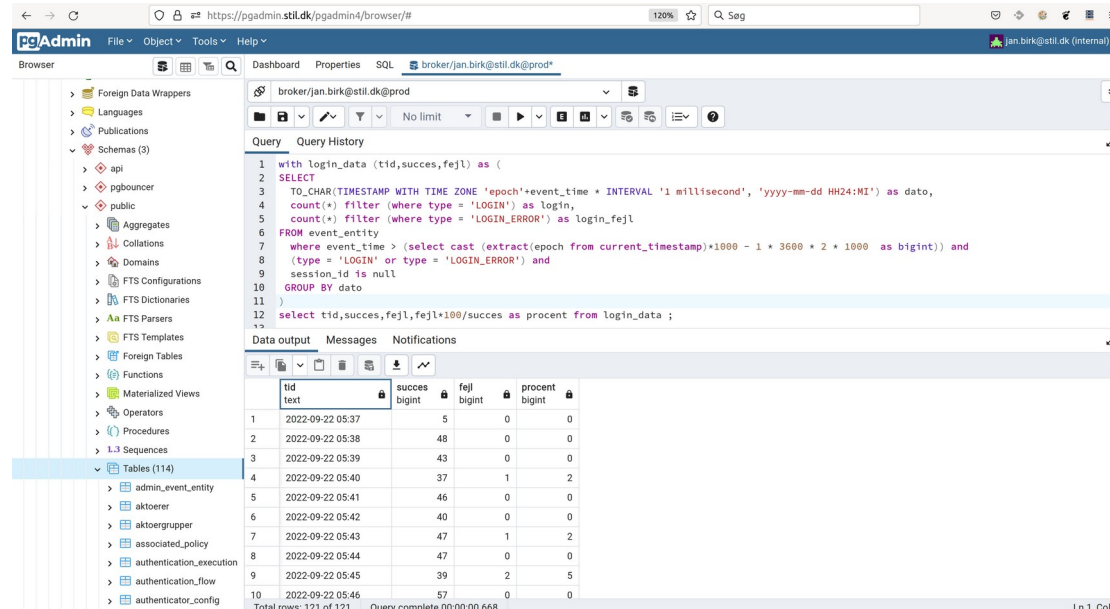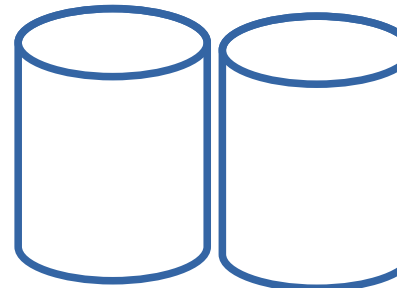
5) drop the cluster

10

...the **demands** for:

Stable, secure and high availability
Fast and agile for development
Backup, restore and restore tests
[Easy database analyzing]
Easy access to data
Application migration

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**Automated analyze-reports
with pgBadger**

https://pgbadger.stil.dk/**PORT**

~400
clusters

logs

NFS

displaying reports

server generating
pgBadger

...the **demands** for:

Stable, secure and high availability
Fast and agile for development
Backup, restore and restore tests
Easy database analyzing
[Easy access to data]
Application migration

~ **400 clusters / ~ 20 hosts**

~ **300 pgAdmin users**

...the **demands** for:

Fast and agile for development
Stable, secure and high availability
Backup, restore and restore tests
Easy database analyzing
Easy access to data
[Application migration]

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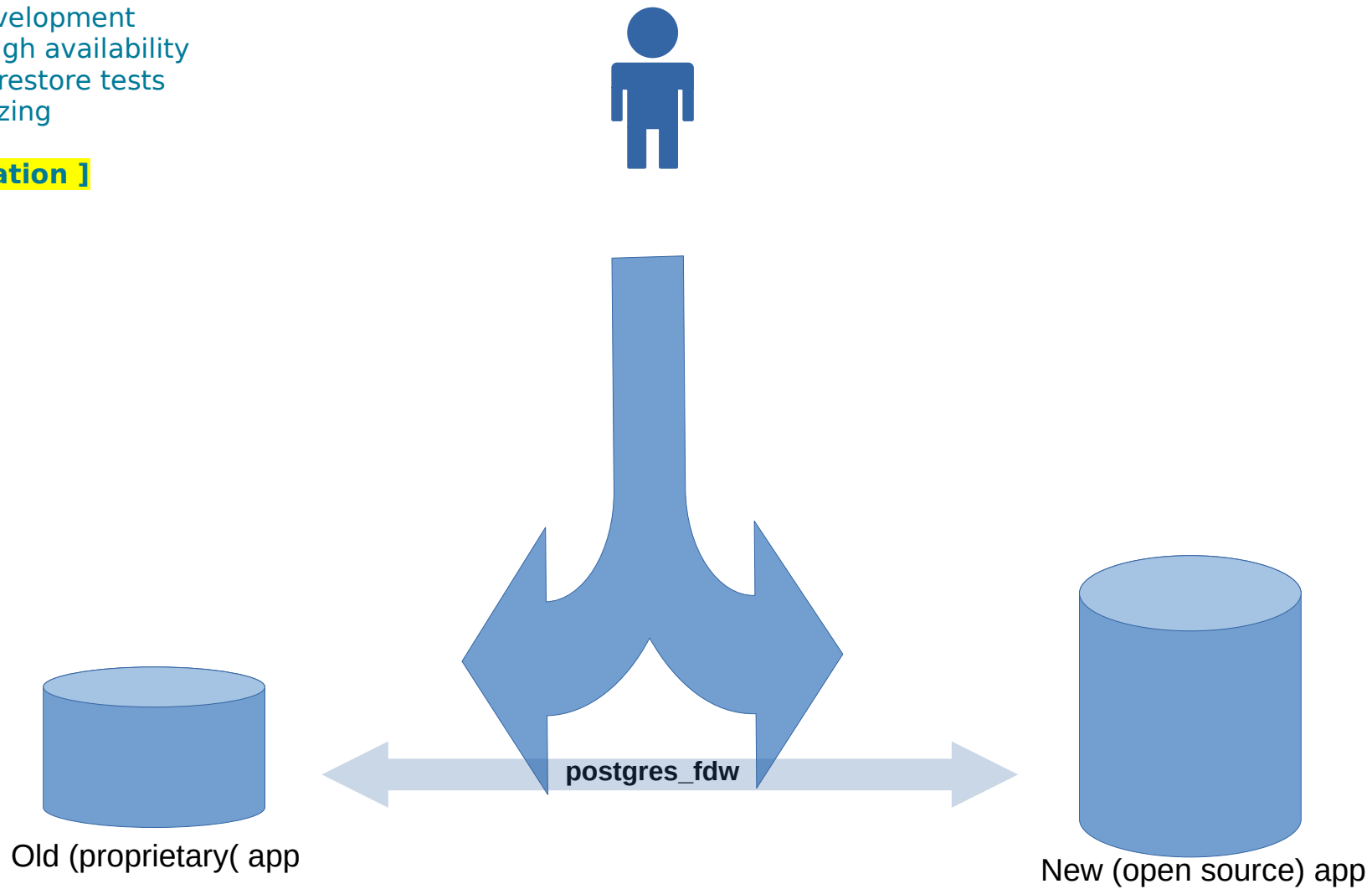NATIONAL AGENCY
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postgres_fdw

Old (proprietary(app

New (open source) app

13

...the **demands** for:

Fast and agile for development
[Stable, secure and high availability - work in progres]
Backup, restore and restore tests
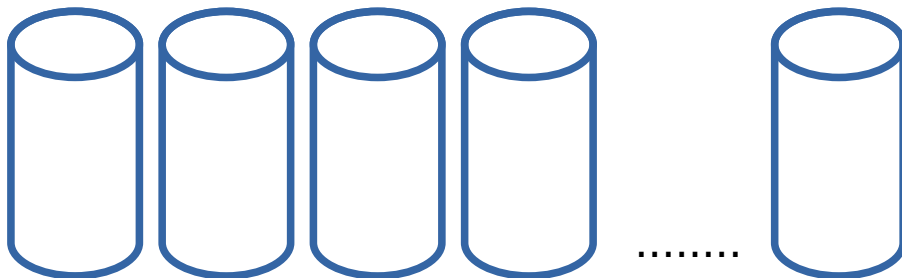Easy database analyzing
Easy access to data
Application migration

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WORK IN PROGRESS

rw-db.stil.dk/**PORT**
(ro-db.db.stil.dk/PORT)

1500 app instances / nodes
psql
pgadmin
-
-

Switch-over:
ansible-playbook db-shift-primary port=PORT

PORT

....

A complete software stack - for government agencies and others - meeting the **demands** for:

Summary

- ✔ Fast and agile for development
- ✔ Stable, secure and high availability
- ✔ Backup, restore and restore tests
- ✔ Easy access to data
- ✔ Easy database analyzing
- ✔ Application migration

Automated by Ansible and made possible by Postgres / open source

Qs

16

Thanks to:

- all the guys back home
- Postgres and it's community
- and with great help from the sponsors and other companies.

with special help from

Miracle42

https://www.miracle42.dk/

CYBERTEC

https://www.cybertec-postgresql.com/

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