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SCD Database Services Overview

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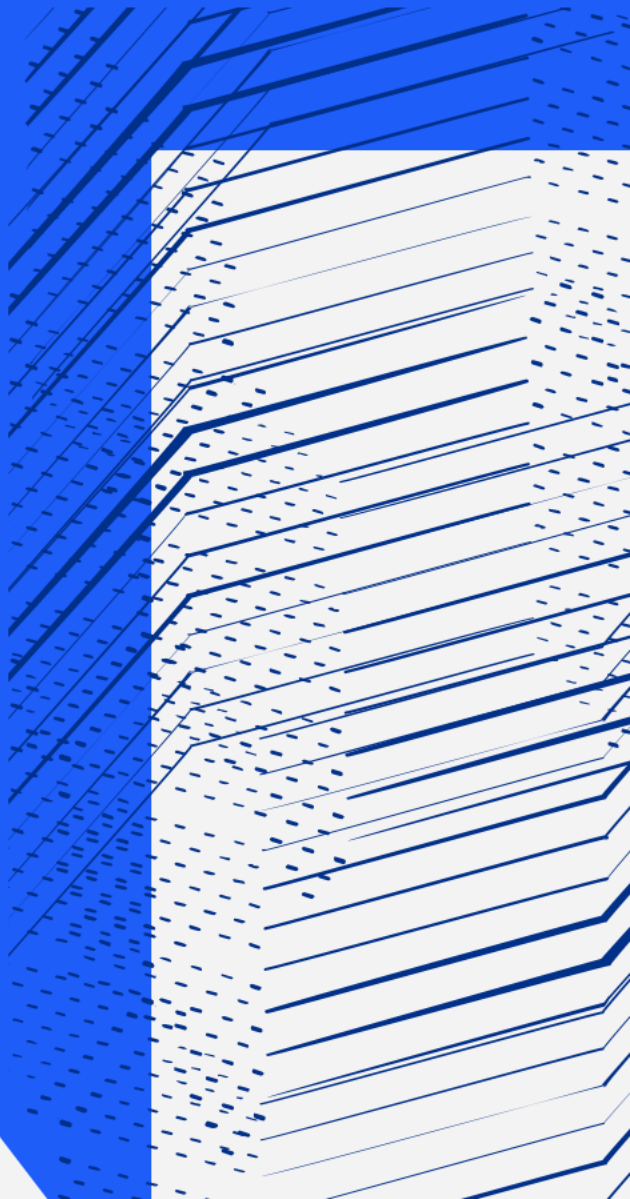
Oracle Database Administrator



Agenda

- Introduction
- Oracle Services
- PostgreSQL Services
- MariaDB Services
- MongoDB Services

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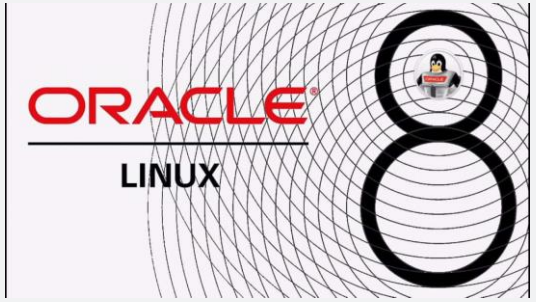
Introduction



- The Database Services team is part of SCD Data Services Group, led by Alison Packer:
  - Miguel Lopez F.
  - Kashif Hafeez.
  - Maheswari Gopu.

- We provide development, test and production environments covering several database technologies for internal and external stakeholders.

- Platforms where our database servers reside:
  - Oracle Linux 7/8 for Oracle databases (Physical).
  - Rocky Linux 8 for MongoDB, MariaDB and PostgreSQL (VMs/Physical).
  - SL 7 for MariaDB hosts (decommissioning in progress).

Introduction – DB Technologies

- The two main database technologies we support are:
  - **Relational databases** (traditionally called RDBMS).
  - **Non-relational databases** (commonly named as NoSQL databases). In our case, we support **document-based** NoSQL databases (MongoDB).
- The Relational Databases store their data, using one or more columns, as rows in structures called **tables**.
- The tables have “relationships” with others by associating their primary keys (unique values).
- The data is accessed using **SQL** instructions.

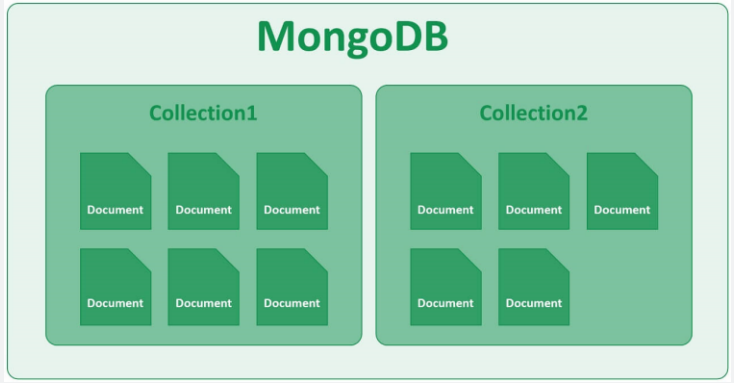
student_Id	name	age
1	Akon	17
2	Bkon	18
3	Ckon	17
4	Dkon	18

subject_Id	name	teacher
1	Java	Mr. J
2	C++	Miss C
3	C#	Mr. C Hash
4	Php	Mr. P H P

student_Id	subject_Id	marks
1	1	98
1	2	78
2	1	76
3	2	88

Introduction – DB Technologies

- NoSQL is an umbrella term for any alternative system to traditional SQL databases.
- A **document-based database** stores data in JSON, BSON, or XML documents. Each document container is called a “**collection**” in MongoDB.
- Data is accessed using object-oriented commands.
- Documents in the database can be nested**.**



SQL	MongoDB
`CREATE TABLE users ( user_id VARCHAR(20) NOT NULL, age INTEGER NOT NULL, status VARCHAR(10));`	Implicitly created on first `insertOne()` or `insertMany()` operation. The primary key `_id` is automatically added if `_id` field is not specified. However, you can also explicitly create a collection: `db.createCollection("users")`
`INSERT INTO users(user_id, age, status) VALUES ('bcd001', 45,"A");`	`db.users.insertOne({ user_id: "bcd001", age: 45, status: "A" }) // see note below table.`
`SELECT * FROM users;`	`db.users.find()`
`UPDATE users SET status = 'C' WHERE age > 25;`	`db.users.updateOne( { age: { $gt: 25 } }, { $set: { status: "C" } }, { multi: true } ) // see note below table.`

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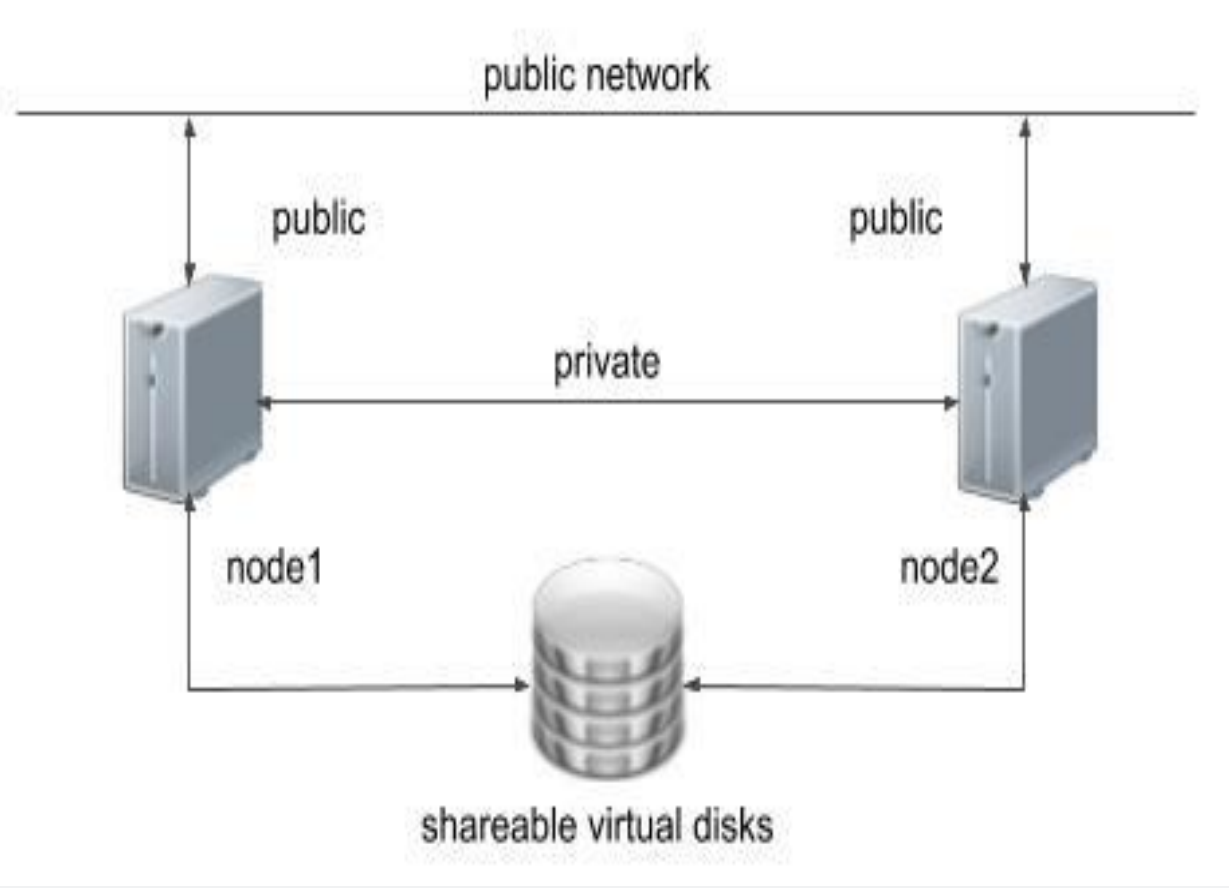
Oracle Services

19c ORACLE Database

- Most of our Oracle services are Oracle19c RAC Clusters to provide Highly Available solutions for our customers.

- Examples of services we support as a backend:
  - Antares (CTA Team).
  - Diamond User Office, StorageD, ICAT-Based Diamond Archive (Diamond), in total 11TB of data!
  - Business Applications (ISIS).
  - ICAT-Based Data Catalogue (CLF).
  - CEDA Archive, StorageD (CEDA).



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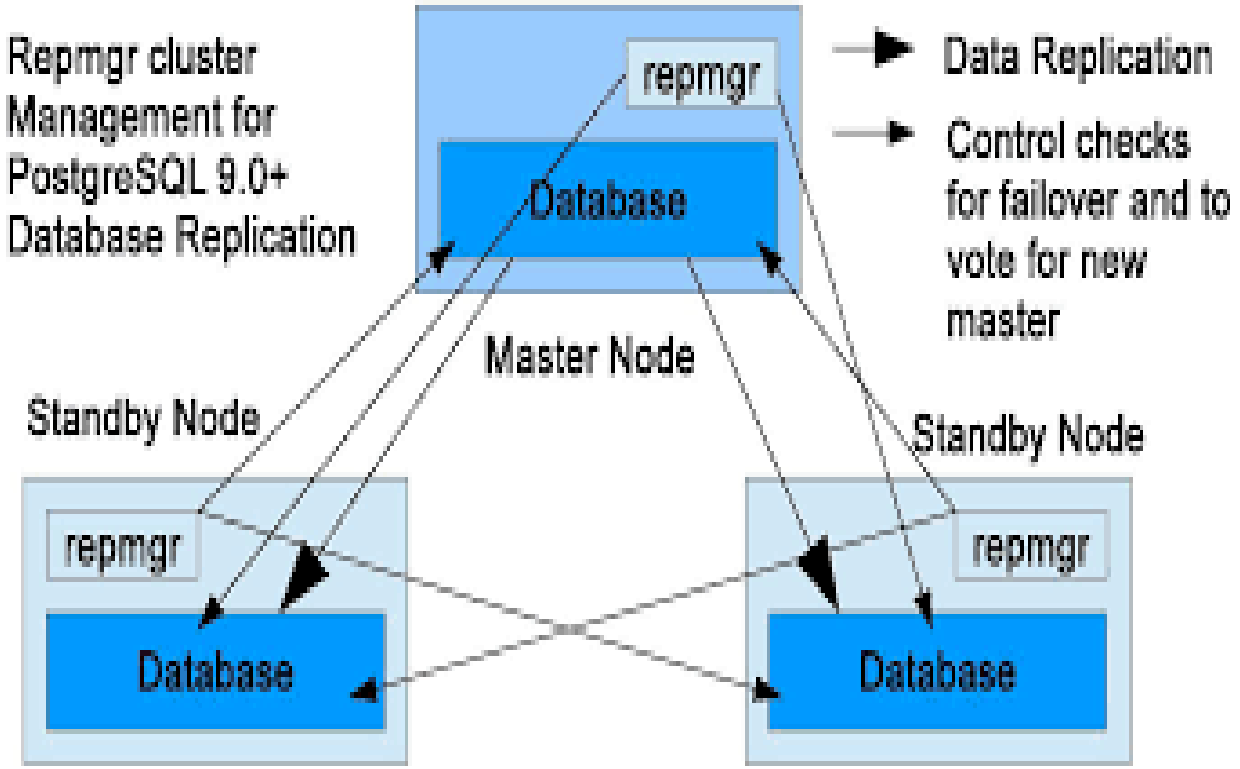
PostgreSQL Services

- Open-source alternative to Oracle for small/medium-sized databases.
- Bears the legacy of the legendary INGRES from the early 1970s and POSTGRES from the mid-1980s.
- We currently support PostgreSQL version 14, configured with Replication Manager (repmgr) and Keepalived, providing a Primary-Standby Highly Available solution.
- Examples of external services we support as a backend:
  - ISIS Proposals Submission System (ISIS)
  - Galaxy



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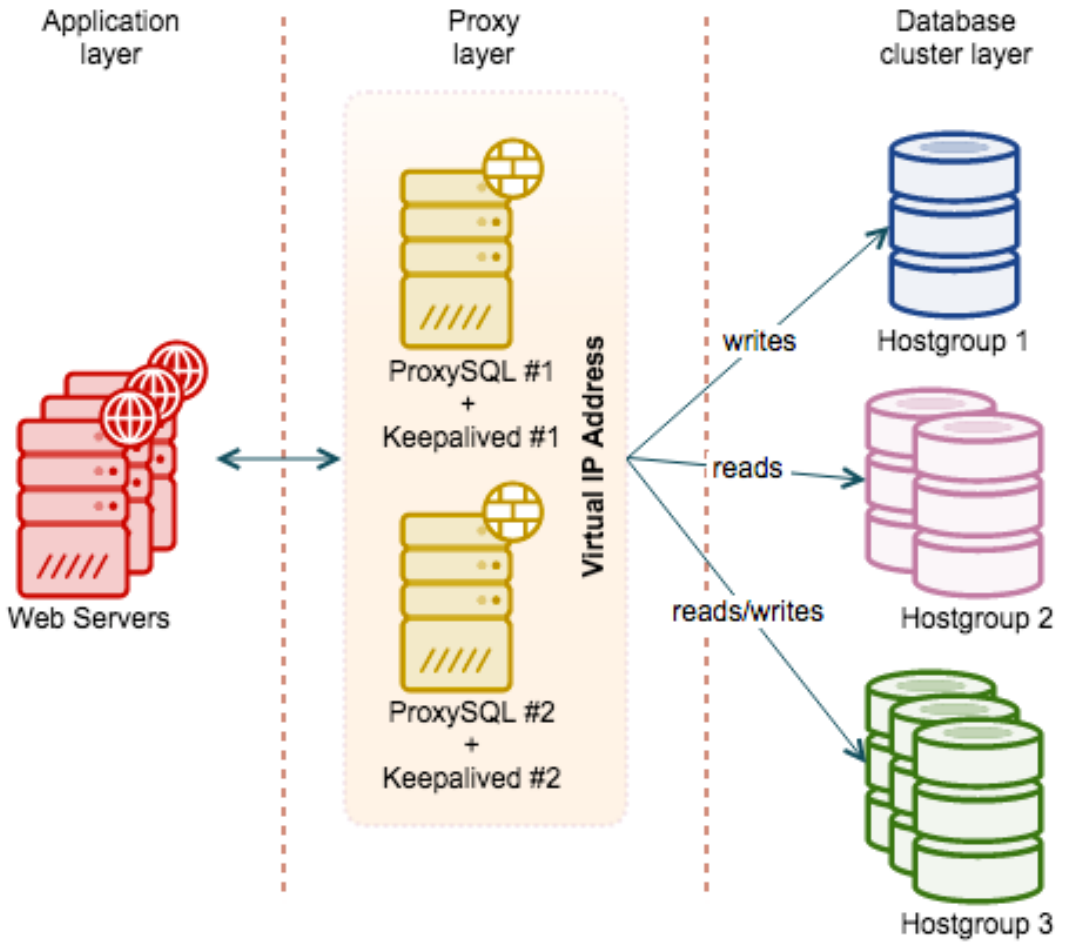
MariaDB Services

- MySQL-compatible database technology.

- We currently support MariaDB long-term release 10.3, configured as a Multimaster Highly Available solution:
  - Five-node Galera Cluster.
  - ProxySQL Load Balancer.
  - Keepalived.

- We are migrating to MariaDB 10.11 in the short-term, with the same HA configuration.

- Examples of services we support as a backend:
  - Epubs (STFC Libraries).
  - Infrastructure Portal.
  - GocDB.



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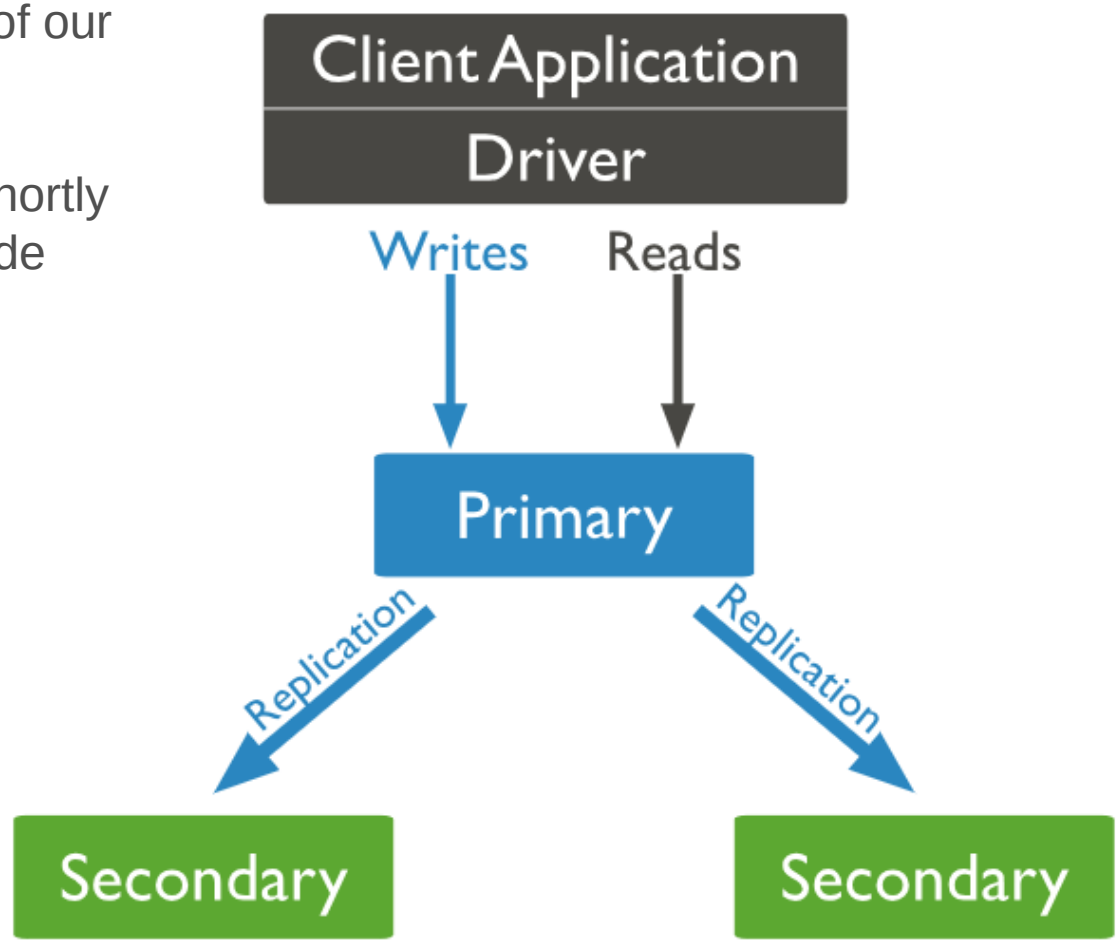
MongoDB Services

- Non-relational, document-based database technology.
- Our latest service addition, used by an increasing number of our customer base.
- We currently support MongoDB long-term release 5, and shortly we're migrating to version 7, both configured as a three-node Replica Set Highly Available solution.
- Examples of services we support as a backend:
  - IDAaaS (IDAaaS Team).
  - OPS Gateway (SEG).
- New groups showing interest in our MongoDB service:
  - EPAC.
  - RFI.



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Thank you

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