

# Databases



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# What is a database?

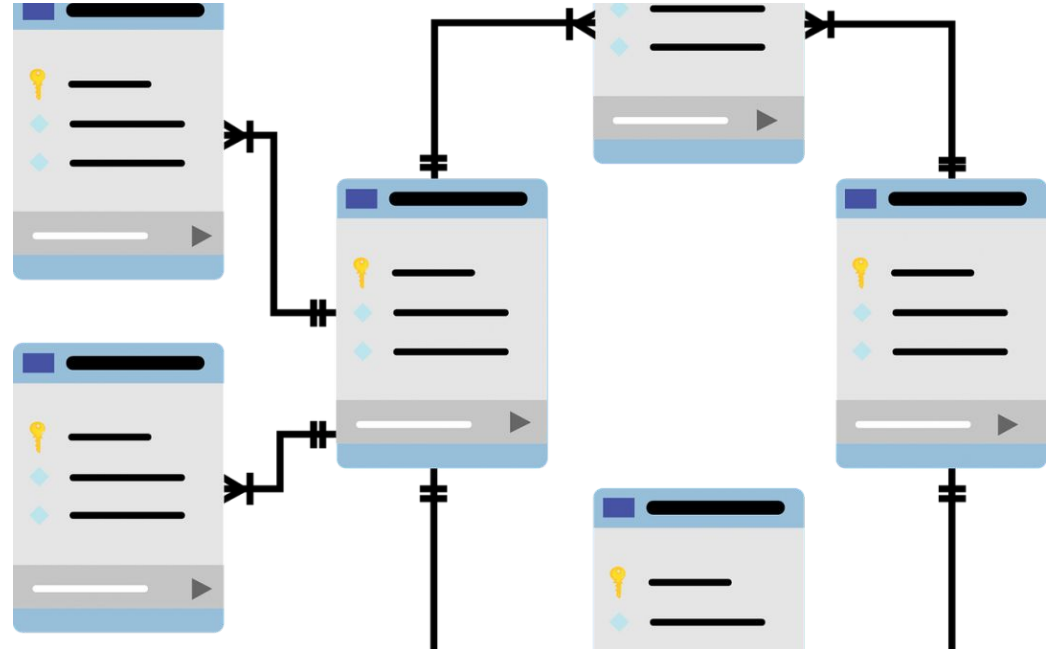
- Storage for application data
- Search, filtering, backup, restore, etc...
- Persistent (data stored on disk) vs Non-persistent (data stored in cache - Redis)

# Database types

- Relational SQL databases (MySQL, PostgreSQL, MSSQL, Oracle)
- NoSQL databases
  - Document databases (MongoDB, CosmosDB, “ElasticSearch”)
  - Key - value (Redis)
- Other
  - Graph databases
  - NewSQL databases

# Relational databases

- Tables
- Rows
- Columns
- Relations
- Primary keys



# SQL

- Structured Query Language
- CRUD - Create, Read, Update, Delete
- In SQL - INSERT, SELECT, UPDATE, DELETE

# SQL - Create table

```
CREATE TABLE users (  
  id INT NOT NULL AUTO_INCREMENT,  
  email VARCHAR(80) NOT NULL,  
  firstname VARCHAR(50) NOT NULL,  
  surname VARCHAR(50) NOT NULL,  
  password CHAR(41) NOT NULL,  
  PRIMARY KEY (id),  
  UNIQUE INDEX (email)  
) ENGINE=INNODB;
```

```
CREATE TABLE orders (  
  id INT NOT NULL AUTO_INCREMENT,  
  internal_number VARCHAR(80) NOT NULL,  
  date_created DATETIME DEFAULT CURRENT_TIMESTAMP,  
  user_id INT NOT NULL,  
  PRIMARY KEY (id),  
  UNIQUE INDEX (internal_number),  
  INDEX ord_ind (user_id),  
  FOREIGN KEY (user_id) REFERENCES users(id)  
    ON DELETE CASCADE  
) ENGINE=INNODB;
```

# SQL - Insert and Select

```
INSERT INTO `users` (`email`, `firstname`, `surname`, `password`) VALUES  
('urband@cngroup.dk', 'Daniel', 'Urban', sha1('pwd123'));
```

```
INSERT INTO `orders` (`internal_number`, `date_created`, `user_id`) VALUES  
('ORD123457', now(), 1);
```

```
SELECT u.surname, u.email, o.internal_number FROM users u INNER JOIN  
orders o ON u.id = o.user_id ORDER BY o.date_created DESC;
```

# ORM

## Object relational Mapping

```
$qb = $this->em->createQueryBuilder();
```

```
$leagueQuery = $qb->select('league_id, sum(num_fans) AS total_fans')
```

```
->from("(SELECT count(*) as num_fans, t.id AS team_id, l.id AS league_id ".  
FROM fan_link fl ".  
JOIN team t  
ON fl.team_id = t.id ".  
JOIN League l ON t.league_id = l.id GROUP BY fl.team_id)," 'a') ->groupBy("league_id")
```

```
->orderBy("total_fans", "DESC")
```

```
->setMaxResults(3)
```

```
->getQuery();
```



# NoSQL databases

- MongoDB - document DB
- Redis - Key - value DB (cache)