Relational DataBases Tools

DataBase Foundations

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2024-III

Outline

1. DataBase Management Systems — DBMS
2. UI: GUI vs. CLI
3. DataBases in the Cloud
4. Local Environment
5. DevOps

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FRANCISCO JOSÉ DE CALDAS

Outline

1. DataBase Management Systems — DBMS

motor BD

2. UI: GUI vs. CLI
3. DataBases in the Cloud
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What is a DBMS?

- A **Database Management System** (DBMS) is a software system that uses a standard method to store and organize data.
- The **data** can be stored in tables, which are related to each other.
- A **DBMS** is a software system that allows users to define, create, maintain, and control access to the database.
- A **DBMS** is a software package designed to manipulate, retrieve, and manage data in a database.

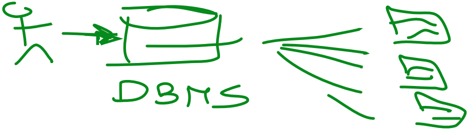
. ; . ; .CSV

Comma separa

Values

.txt

plaintext



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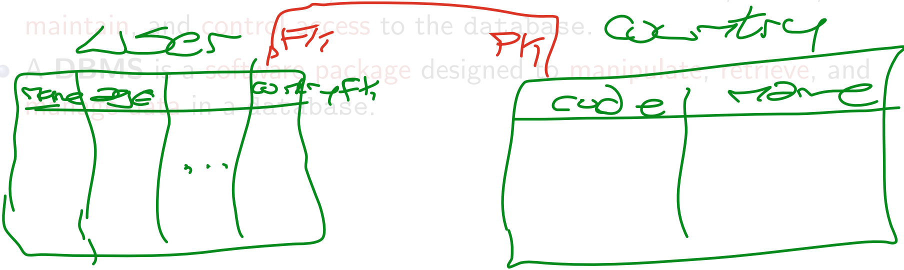

attribute → column

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GUI

CLI

create

tables

grants

add

update data

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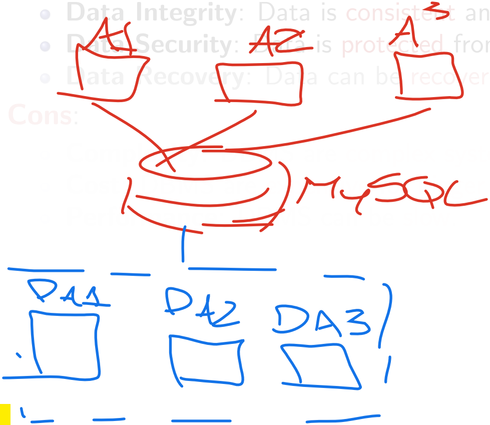
GUI

mysql → workbench

postgresql → PGAdmin

Pros & Cons of DBMS

- **Pros**:
  - **Data Independence**: Data is stored independently of the applications that use it.
  - **Data Integrity**: Data is consistent and accurate.
  - **Data Security**: Data is protected from unauthorized access.
  - **Data Recovery**: Data can be recovered in case of failure.
- **Cons**:
  - Complexity: DBMS are complex systems.
  - Cost: DBMS are expensive for larger data volumes.
  - Performance: DBMS can be slow.



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Backup (Temp)

Partial Recovery

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+expensive -low

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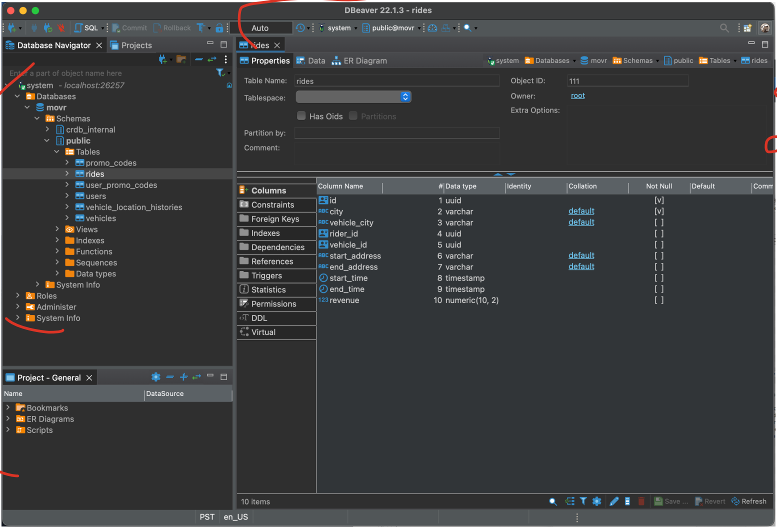
GUI Assistants

- A **Graphical User Interface** (*GUI*) is a type of user interface that allows users to interact with electronic devices using graphical icons and visual indicators.
- **GUIs** are easier to use than Command Line Interfaces (*CLI*) because they allow users to interact with the system using visual elements such as windows, buttons, and menus.
- **GUIs** are more intuitive and user-friendly than CLIs, which makes them ideal for users who are not familiar with the system.

Case of Study: DBeaver → industry



DBeaver 22.1.3 - rides

```
Enter a part of object name here
system  - localhost:26257
  Databases
    movr
      Schemas
        crdb_internal
        public
          Tables
            promo_codes
            rides
            user_promo_codes
            users
            vehicle_location_histories
            vehicles
          Views
          Indexes
          Functions
          Sequences
          Data types
      System Info
  Roles
  Administer
  System Info
```

Proj

Table Name: rides

Tablespace:

□ Has Oids □ Partitions

Partition by:

Comment:

Object ID: 111

Owner: root

Extra Options:

work area

Column Name	#	Data type	Identity	Collation	Not Null	Default	Comm
id	1	uuid			[v]		
city	2	varchar		default	[v]		
vehicle_city	3	varchar		default	[ ]		
rider_id	4	uuid			[ ]		
vehicle_id	5	uuid			[ ]		
start_address	6	varchar		default	[ ]		
end_address	7	varchar		default	[ ]		
start_time	8	timestamp			[ ]		
end_time	9	timestamp			[ ]		
revenue	10	numeric(10, 2)			[ ]		

10 items

Project - General

Name	DataSource
Bookmarks	
ER Diagrams	
Scripts	

Rep.

PST en_US

Command Line

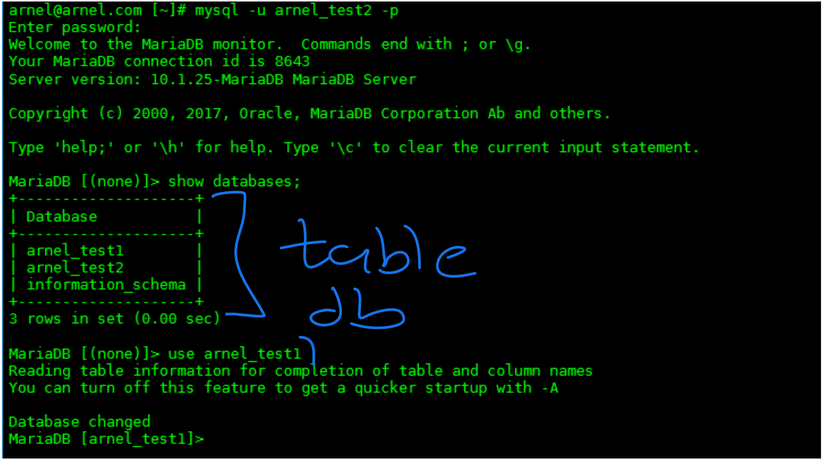
Gx

- A **Command Line Interface** (*CLI*) is a type of user interface that allows users to interact with electronic devices using text-based commands.
- CLIs are more powerful and flexible than GUIs because they allow users to perform complex tasks using simple commands.
- **CLIs** are more efficient than GUIs because they do not require users to navigate through menus and windows to perform tasks.

↓ +experience

Case of Study: MariaDB CLI

CLI => Admin DB



```
arnel@arnel.com [~]# mysql -u arnel_test2 -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 8643
Server version: 10.1.25-MariaDB MariaDB Server

Copyright (c) 2000, 2017, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| arnel_test1        |
| arnel_test2        |
| information_schema |
+--------------------+
3 rows in set (0.00 sec)

MariaDB [(none)]> use arnel_test1
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [arnel_test1]>
```

table

db

GUI => Explore & Retrieve

Why use an agnostic tool?

- An **agnostic tool** is a tool that is not tied to a specific technology or platform.
- **Agnostic tools** are useful because they allow users to work with multiple databases without having to learn different tools.
- **Agnostic tools** are also useful because they allow users to work with multiple databases without having to switch between different tools.

DBeaver

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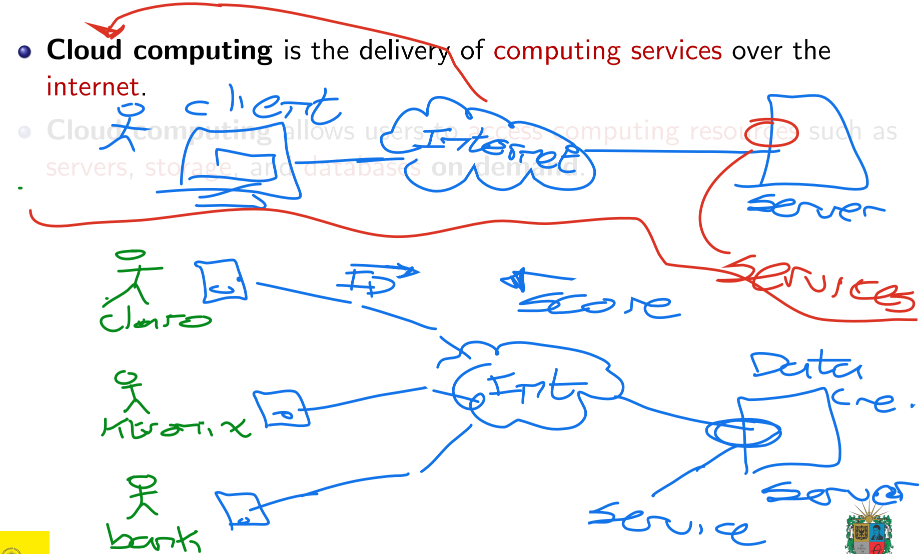
What is the cloud Computing?

- **Cloud computing** is the delivery of computing services over the internet.
- Cloud computing allows users to access computing resources such as servers, storage, and databases **on demand**.



What is the cloud Computing?

0.01 USD

1000000 free

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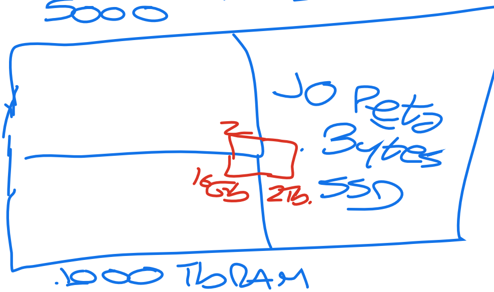
5000 CPUs

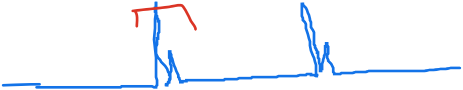
✓

OneDrive

Drive

Dropbox





What is On-Premises Computing?

- **On-premises computing** is the traditional way of accessing computing resources.
- **On-premises computing** requires users to purchase and maintain their own computing resources such as servers, storage, and databases.

office

company facilites

low cost → high cost

short

medium-long

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✓

$

Pros & Cons of Cloud Computing

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  - **Flexible**: Cloud computing is a flexible way to access computing resources.
- **Cons**:
  - **Security**: Cloud computing can be less secure than on-premises computing.
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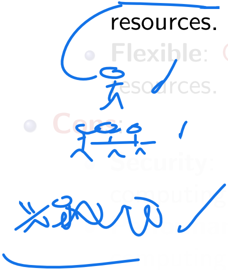

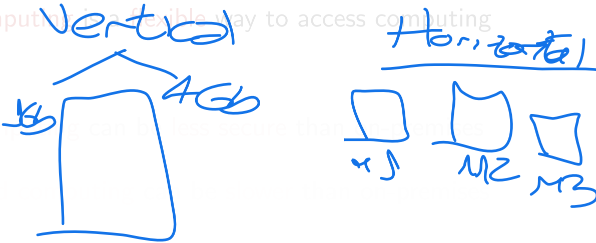

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SaaS Vs. IaaS Vs. PaaS

- **Software as a Service** (*SaaS*) is a software distribution model in which a third-party provider hosts applications and makes them available to customers over the internet.
- **Infrastructure as a Service** (*IaaS*) is a cloud computing model that provides virtualized computing resources over the internet.
- **Platform as a Service** (*PaaS*) is a cloud computing model that provides a platform for developers to build, deploy, and manage applications over the internet.

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IaC ⇒ Infrastructure

as

Code

Terraform

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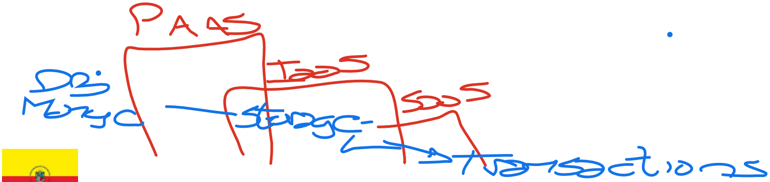
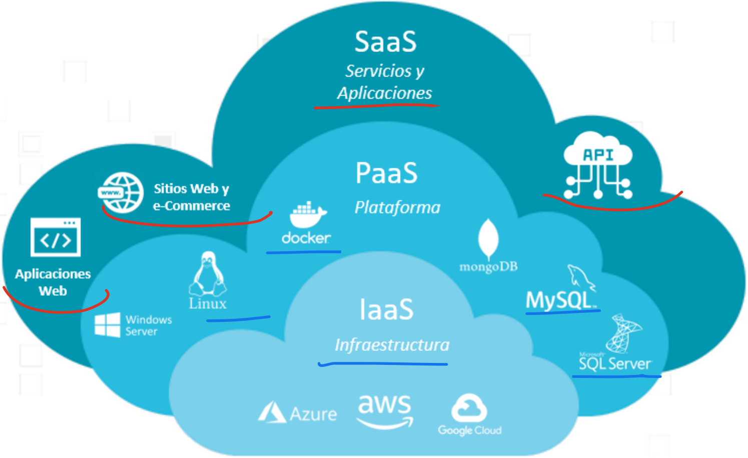
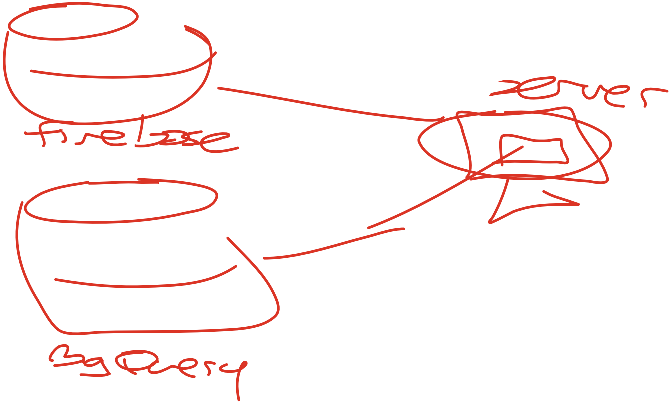


Cloud Levels

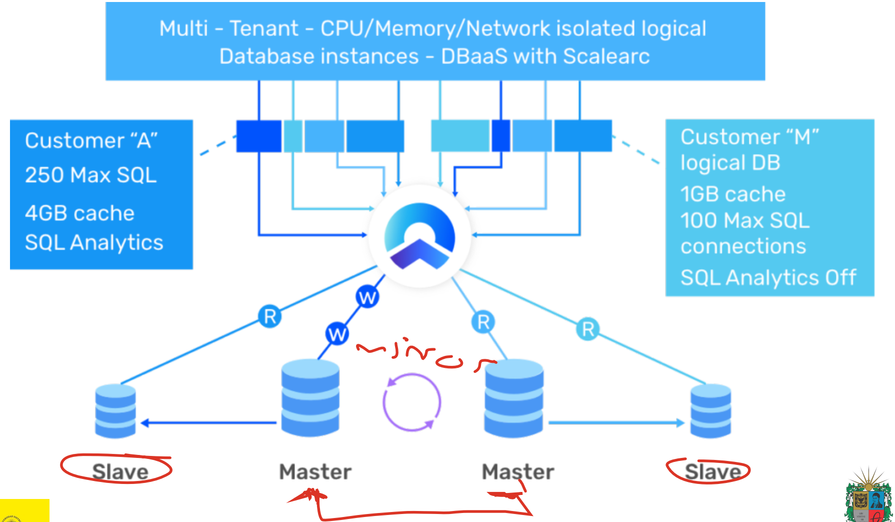


DataBases as a Service

Database as a Service (DBaaS) is a cloud computing model that provides database services over the internet.



Case of Study: DBaaS Custom for Clients



Multi - Tenant - CPU/Memory/Network isolated logical Database instances - DBaaS with Scalearc

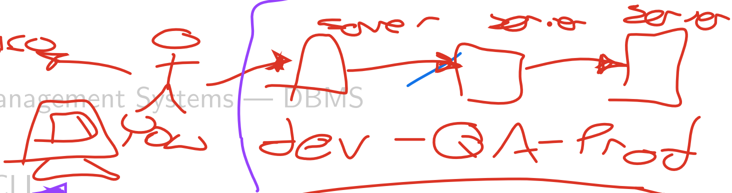
Customer "A"
250 Max SQL
4GB cache
SQL Analytics

Customer "M"
logical DB
1GB cache
100 Max SQL connections
SQL Analytics Off

Outline

→ GPUs ⇒ TPU's

dramático



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Now

Time
performance
↓ $$ ↗

CEO
Gerente

Chief Technology Office
CTO

Localhost

- **Localhost** is a hostname that refers to the local computer that a program is running on.
- **Localhost** is used to access the services that are running on the local computer.
- **Localhost** is used to access the database services that are running on the local computer.
- **Localhost** is used to access the web services that are running on the local computer.

browser

IPv4
10.40.42.2
142.250.218.110

Domain
udistrital.edu.co
google.com

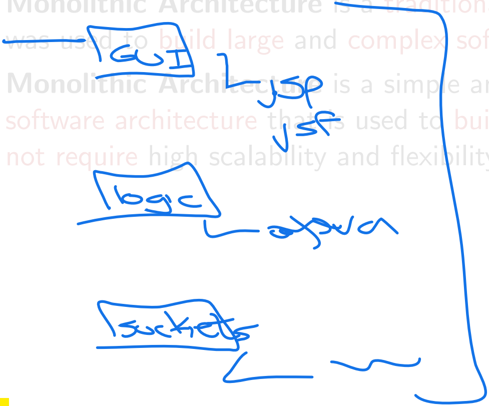
127.0.0.1 — localhost

client/server

MACADDRESS => ID device

Monolithic Architecture

- **Monolithic Architecture** is a software architecture in which all the components of the software are combined into a single program.
- **Monolithic Architecture** is a traditional software architecture that was used to build large and complex software systems.
- **Monolithic Architecture** is a simple and easy-to-understand software architecture that is used to build software systems that do not require high scalability and flexibility.



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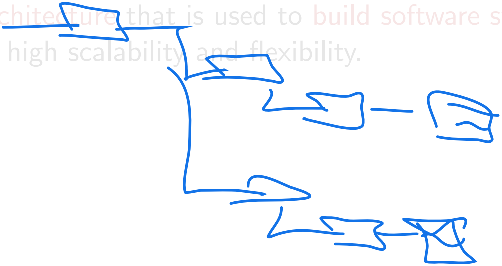

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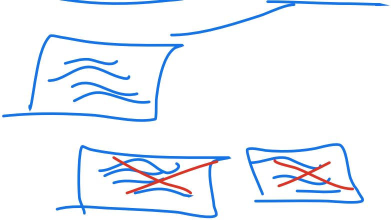
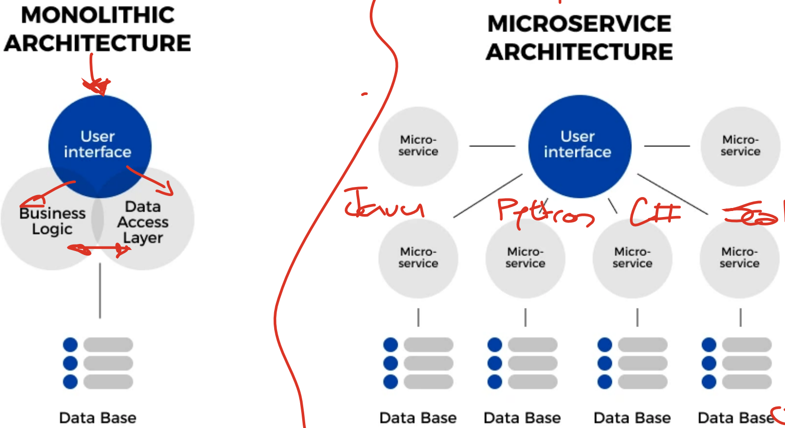


Monolithic Architecture Schema

localhost



Java Python C# Scala

MySQL Mongo Databricks Oracle

Outline

test quality tools validation deployments

Poner en producción

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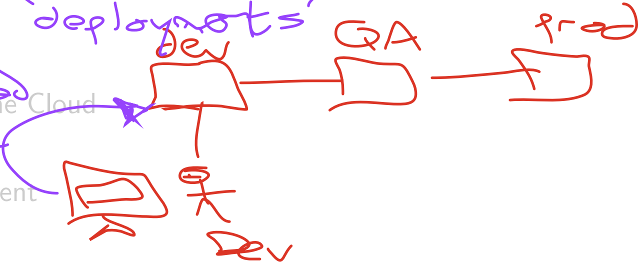
git push

upload code



Continuous Integration

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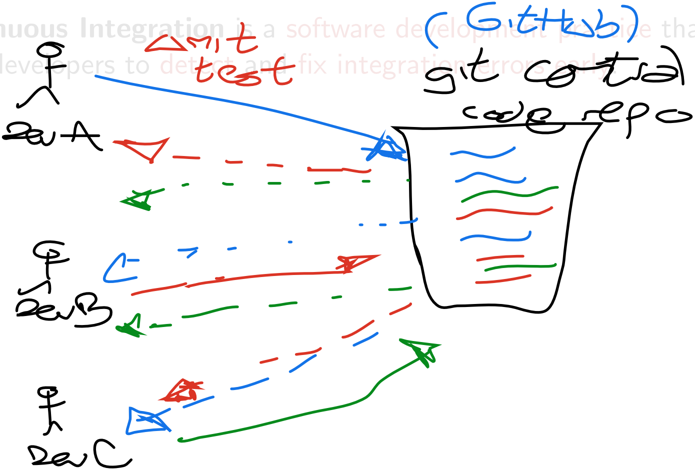
- **Continuous Integration** is a software development practice that helps developers to detect and fix integration errors early.



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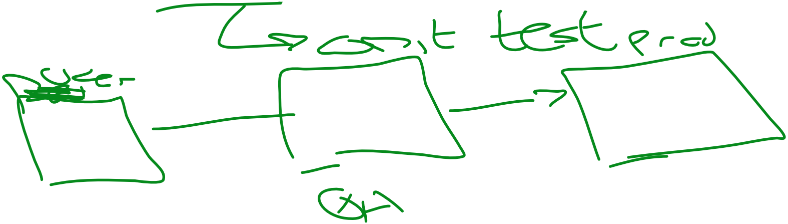

Continuous Deployment

C I/C D

- **Continuous Deployment** is a software development practice in which developers deploy code into production frequently.

CI/CD

- **Continuous Deployment** is a software development practice that helps developers to deliver new features to customers quickly.
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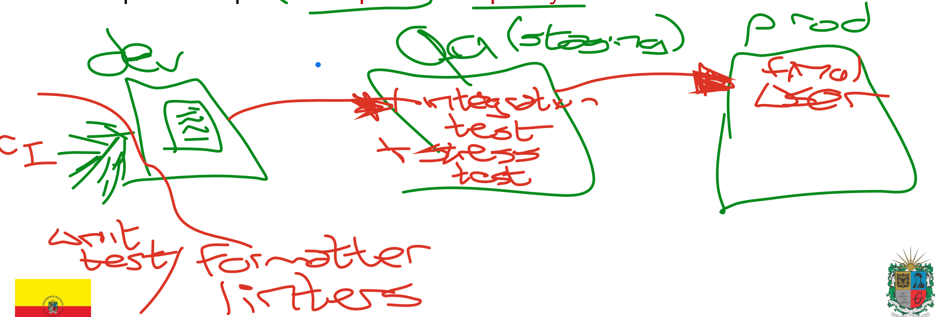
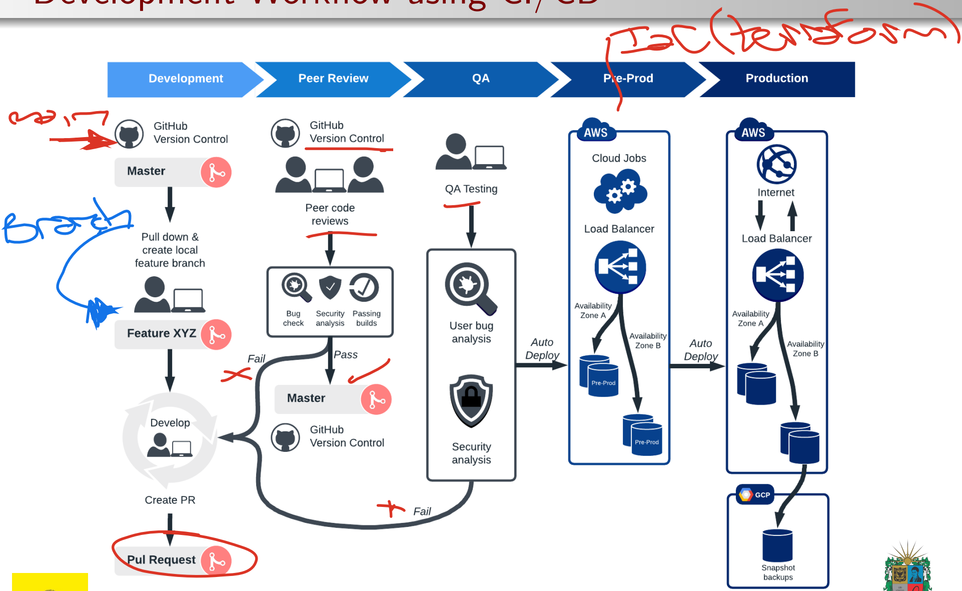


Development Workflow using CI/CD



Containers and Docker

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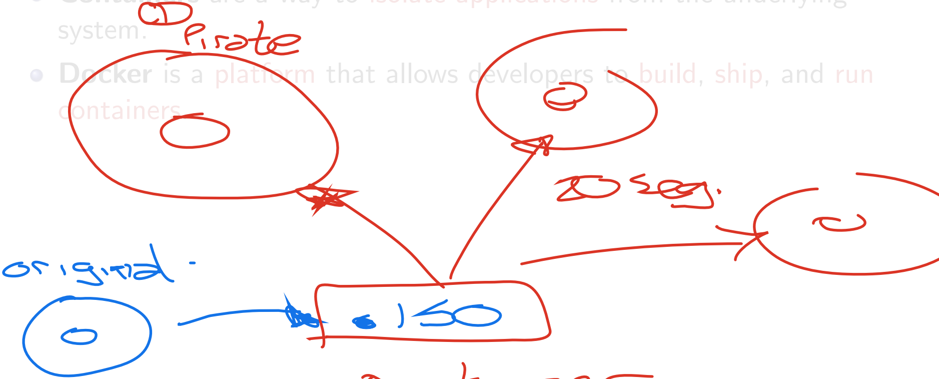
- **Containers** are a way to isolate applications from the underlying system.
- **Docker** is a platform that allows developers to build, ship, and run containers.



Container
→ code
→ libraries/tools

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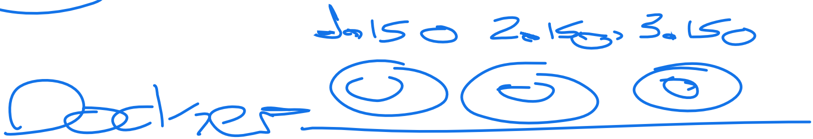
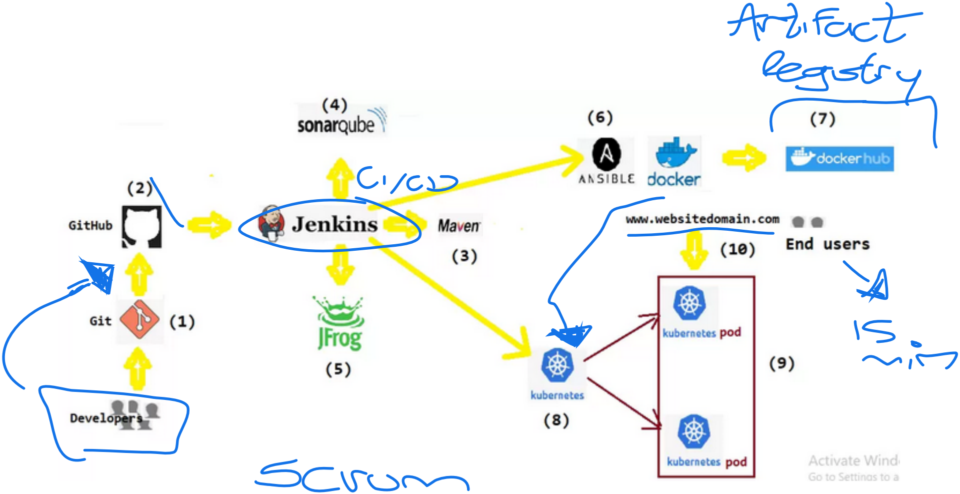
Containers and Docker

- **Containers** are a lightweight and portable way to package software.
- **Containers** are a way to isolate applications from the underlying system.
- **Docker** is a platform that allows developers to build, ship, and run containers.



From Code to Docker



Scrum
(2 weeks)

Outline

1 DataBase Management Systems — DBMS

2 UI: GUI vs. CLI

3 DataBases in the Cloud

4 Local Environment

5 DevOps

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Thanks!

Questions?

Repo: *https://github.com/EngAndres/ud-public/tree/main/courses/databases-foundations*

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