

SYSTEMS DESIGN

Systems Analysis & Design

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Outline

1 Requirements Engineering



2 Design & Process



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2 Design & Process



Stakeholders Vs . Shareholders

- Stakeholders are individuals or groups who have an interest in the success of a project.
- Stakeholders can be internal or external to a company. For example, customers, employees, suppliers, and regulators are external stakeholders
- Shareholders are individuals or groups who have an ownership interest in a company.
devs legal sales
- Shareholders are internal to a company. For example, investors, owners, and managers are internal stakeholders.



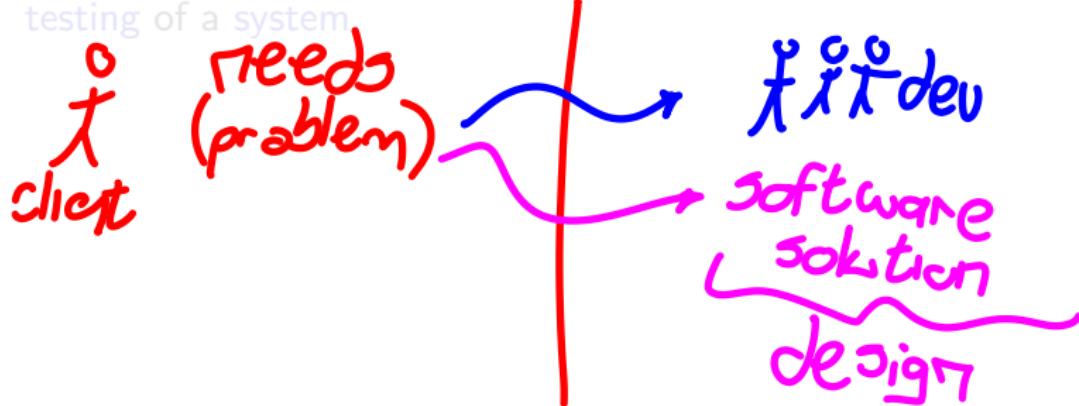
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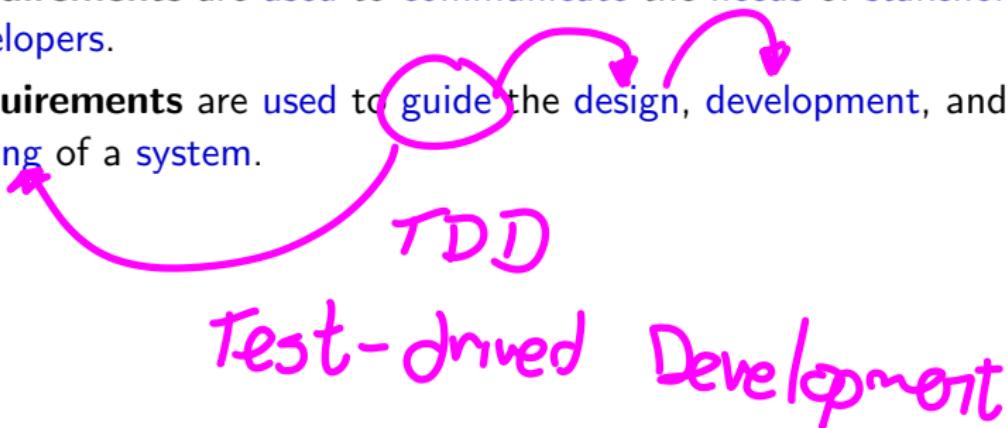
Requirements

- Requirements are statements that describe the features, functions, and constraints of a system.
- Requirements are used to communicate the needs of stakeholders to developers.
- Requirements are used to guide the design, development, and testing of a system



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User Stories

W₁₇ understanding

- User stories are short, simple descriptions of a feature or function of a system.
- They are written from the perspective of the user and describe what the user wants to achieve.
- They are used to capture the requirements of a system in a simple and understandable way.



User Stories: Format Example

Z-Pre-neg.

Title:	Priority:	Estimate:
User Story:		
As a [description of user], I want [functionality] so that [benefit].	6	Hours Effort
Acceptance Criteria:		
Given [how things begin] When [action taken] Then [outcome of taking action]	→ impact scenario	

test

 ProductPlan


What is Requirements Engineering?

- Requirements engineering is the process of eliciting, analyzing, specifying, validating, and managing the requirements of a system.
 - It is a critical activity in the systems development lifecycle that ensures that the system meets the needs of its users.
 - It is a collaborative process that involves stakeholders from different backgrounds and perspectives.
- some page*
- details*



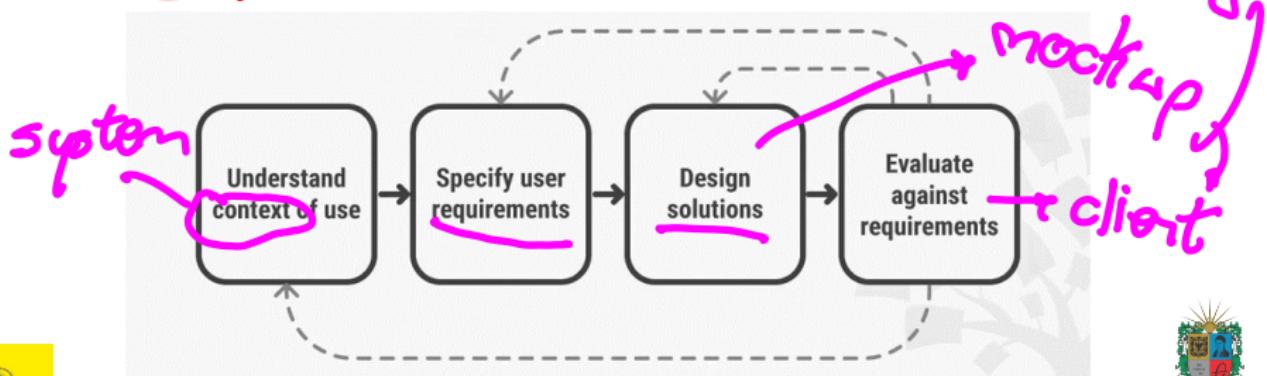
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User-Centered Design (UCD)

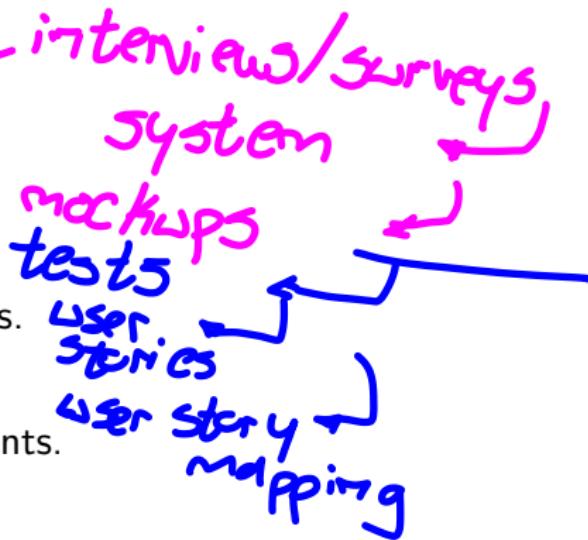
- User-centered design (UCD) is an iterative design process that focuses on understanding the needs, preferences, and behaviors of users. *problem*
- UCD is a collaborative process that involves users in the design and development of a system.
- UCD is used to create systems that are usable, efficient, and satisfying to users.



Requirements Engineering Process

The **requirements engineering** process consists of the following activities:

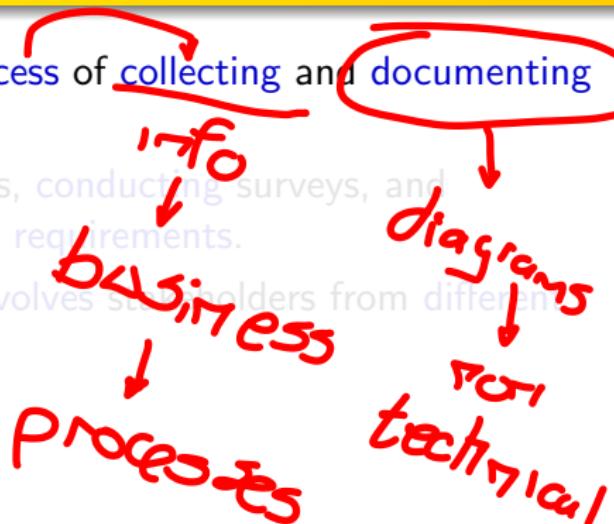
- **Gathering** requirements.
- **Analyzing** requirements.
- **Validating** requirements.
- **Verifying** requirements.
- **Documenting** requirements.
- **Managing** requirements.
- **Communicating** requirements.



Gathering Requirements

- **Gathering** requirements is the process of **collecting** and **documenting** the **needs** of stakeholders.
- It involves interviewing stakeholders, conducting surveys, and observing users to understand their requirements.
- It is a collaborative process that involves stakeholders from different backgrounds and perspectives.

problem
↓
engineering



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Final users



Gathering Requirements

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- It involves **interviewing** stakeholders, **conducting** surveys, and **observing** users to understand their **requirements**.
- It is a **collaborative process** that **involves** stakeholders from different **backgrounds** and **perspectives**.

align expectations



Clients are not always right

Dear Santa
How are you? I'm good.
Here is what I want for
Christmas.

A <https://www.amazon.com/gp/product/B00032HF60>
Mref=59_hps_bw_g21_ir03?pf_rd_m=ATVPDKIKXODER&pf_rd_s=center-3&pf_rd_d=IXWY42FH2KO3Y78MWQNM8P&pf_rd_t=101&pf_rd_p=1328901542&pf_rd_i=16579



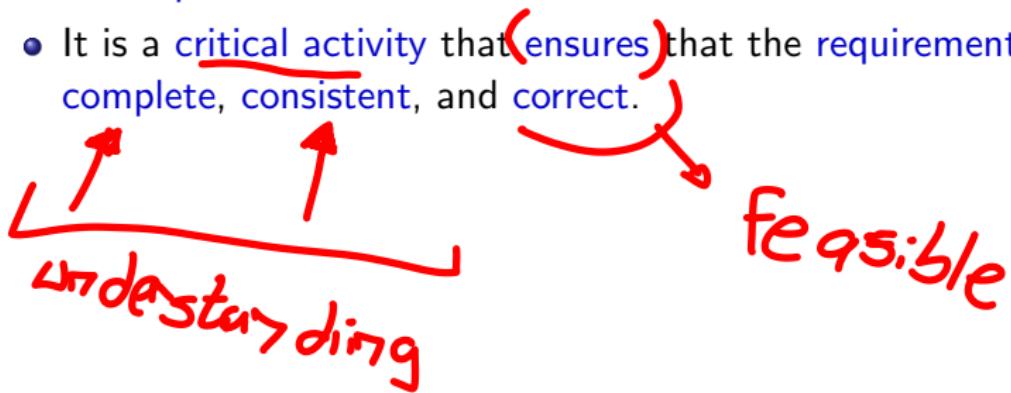
Analyzing Requirements

- **Analyzing** requirements is the process of examining and understanding the requirements of a system.
- It involves identifying dependencies, conflicts, and inconsistencies in the requirements.
- It is a critical activity that ensures that the requirements are complete, consistent, and correct.
System



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Documenting Requirements

classical
tech

modern/agile
Non-tech

- Documenting requirements is the process of writing and organizing the requirements of a system.
- It involves creating documents, diagrams, and models that describe the requirements in a clear and concise way.

.Docx

.md

-Wiki



Atlassian

→ Mockups
→ Validate
→ Tech tasks
processes
→ business

- Priorities
- Assumptions



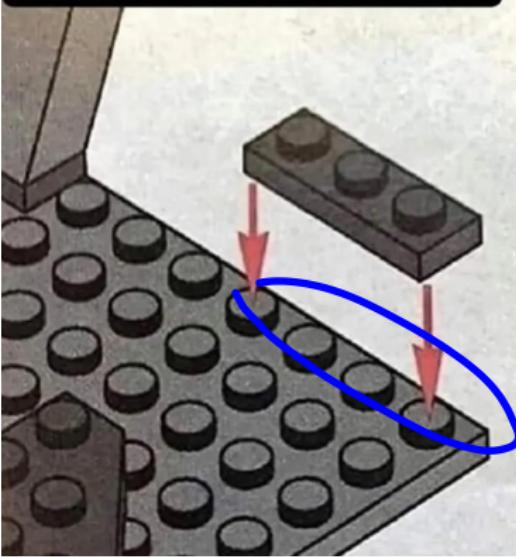
→ Tira
BitBucket
Confluence



Everyone hates to write Documentation

**En la documentación
está todo bien explicado**

La documentación:



Validating Requirements

client

- **Validating** requirements is the process of ensuring that the requirements are **correct** and **complete**.
- It involves **reviewing** the requirements with **stakeholders** to **verify** that they **meet** their **needs**.



NOT Clear Understanding of Requirements



Dad Jokes

@Dadsaysjokes

My dad told me his password is:
MickeyMinnieGoofyDonaldPlutoHuey
LouieDeweyDublin.

Because he was told his password
had to contain 8 characters and at
least one Capital.

Non
expectation



Verifying Requirements → Some sprints

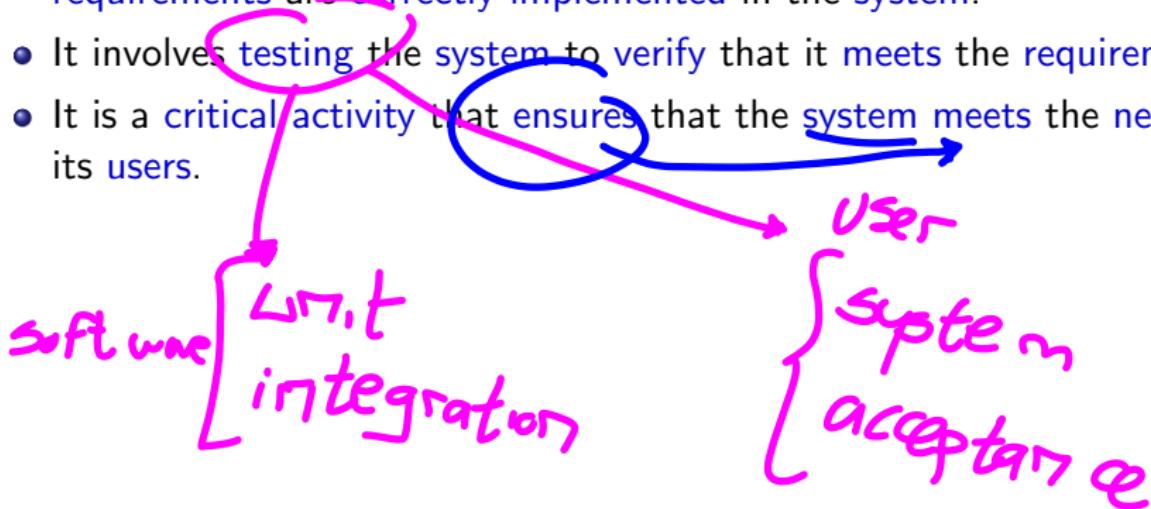
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- It involves testing the system to verify that it meets the requirements.
- It is a critical activity that ensures that the system meets the needs of its users.

Testing engineering



Verifying Requirements

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Typical Mistakes when Testing

Disturbing Chinese calorie app...

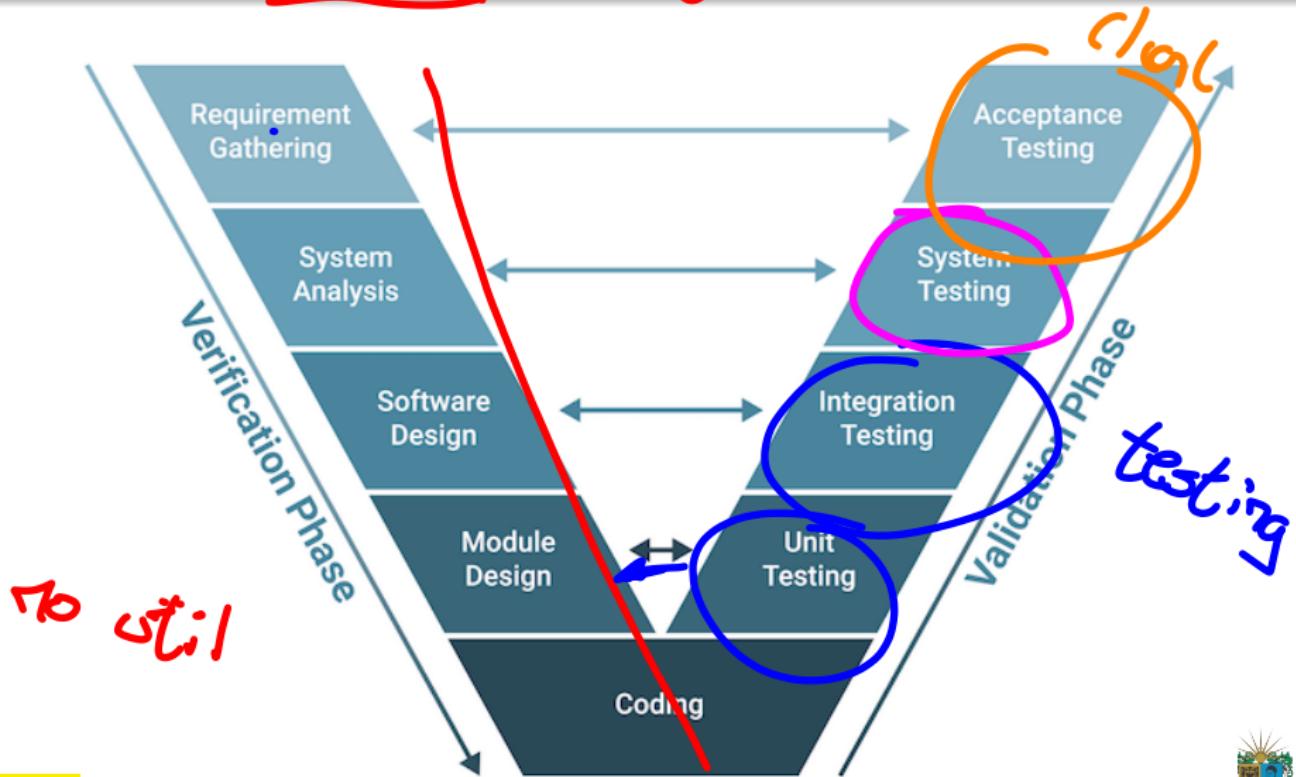


カシューナッツ	(cashew)	1粒	9 kcal
ジャムパン	(Pomeranian)	1個	327 kcal



V-Model in SDLC

- 1979 ~



Outline

1 Requirements Engineering

2 Design & Process



Conceptual Design

- Once the initial set of **requirements** is defined, the next step is to create a **conceptual design** of the system.
 - Conceptual Design** is a **high-level design** that defines the **structure** and **behavior** of the system. It is achieved by the recognition of the appropriate **components**, **connections**, and **responsibilities**.
 - The conceptual design is used to communicate the vision of the system to stakeholders and to guide the development of the system.
- Non-technical*
- all can understand.*
- system*



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Process Definition

- A **Process** is a **series** of steps or actions taken to achieve a particular end.
- **Processes** are used to **organize** and **manage** work.



Workflows

Pipeline

- A **Workflow** is a series of tasks that are performed in a specific order to achieve a goal.
- **Workflows** are used to automate and optimize business processes.
- **Workflows** can be sequential, parallel, conditional, or repetitive.

Flowchart



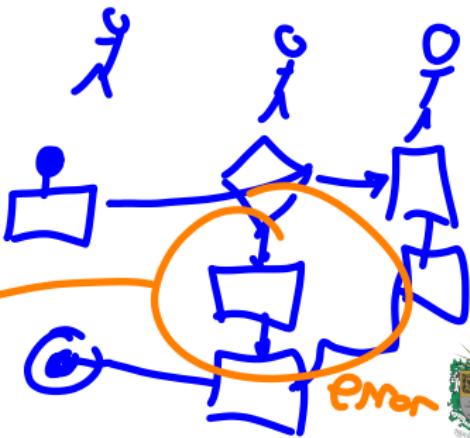
Process Models

dynamical system

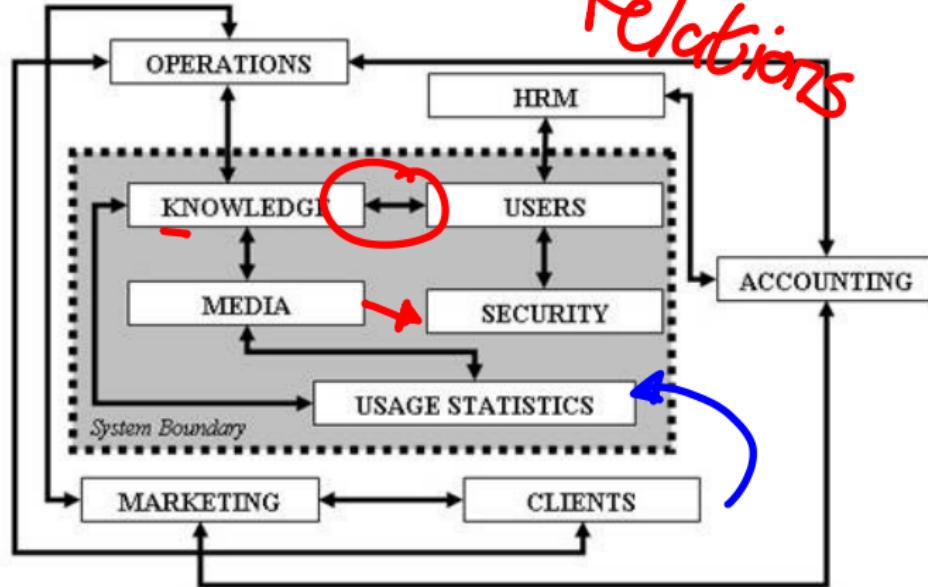
- A Process Model is a representation of a process that shows the sequence of steps and the relationships between them.
- Process models are used to analyze, design, and improve processes.
- Examples of process models include flowcharts, data flow diagrams, activity diagrams, business process model and notation (BPMN), petri nets, state diagrams, among others.

BPMN
activity
sequence

new
project

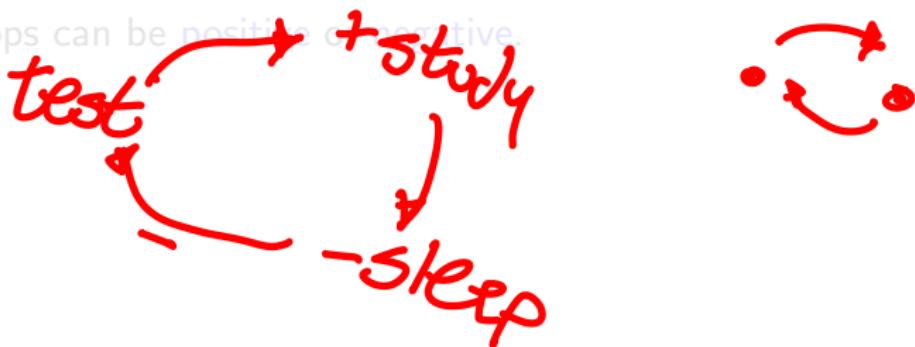


System Schema Example: Company Structure



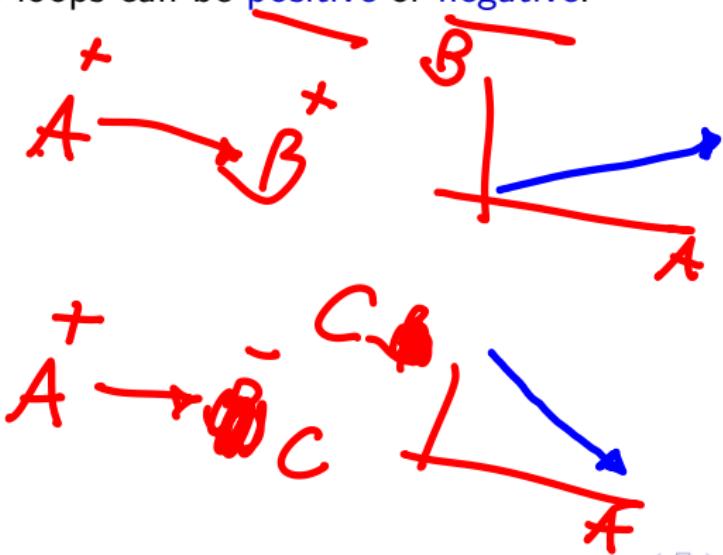
Causal Loops

- A **Causal Loop** is a diagram that shows the relationships between different variables in a system.
- Causal loops are used to analyze and understand the dynamics of a system.
- Causal loops can be positive or negative.

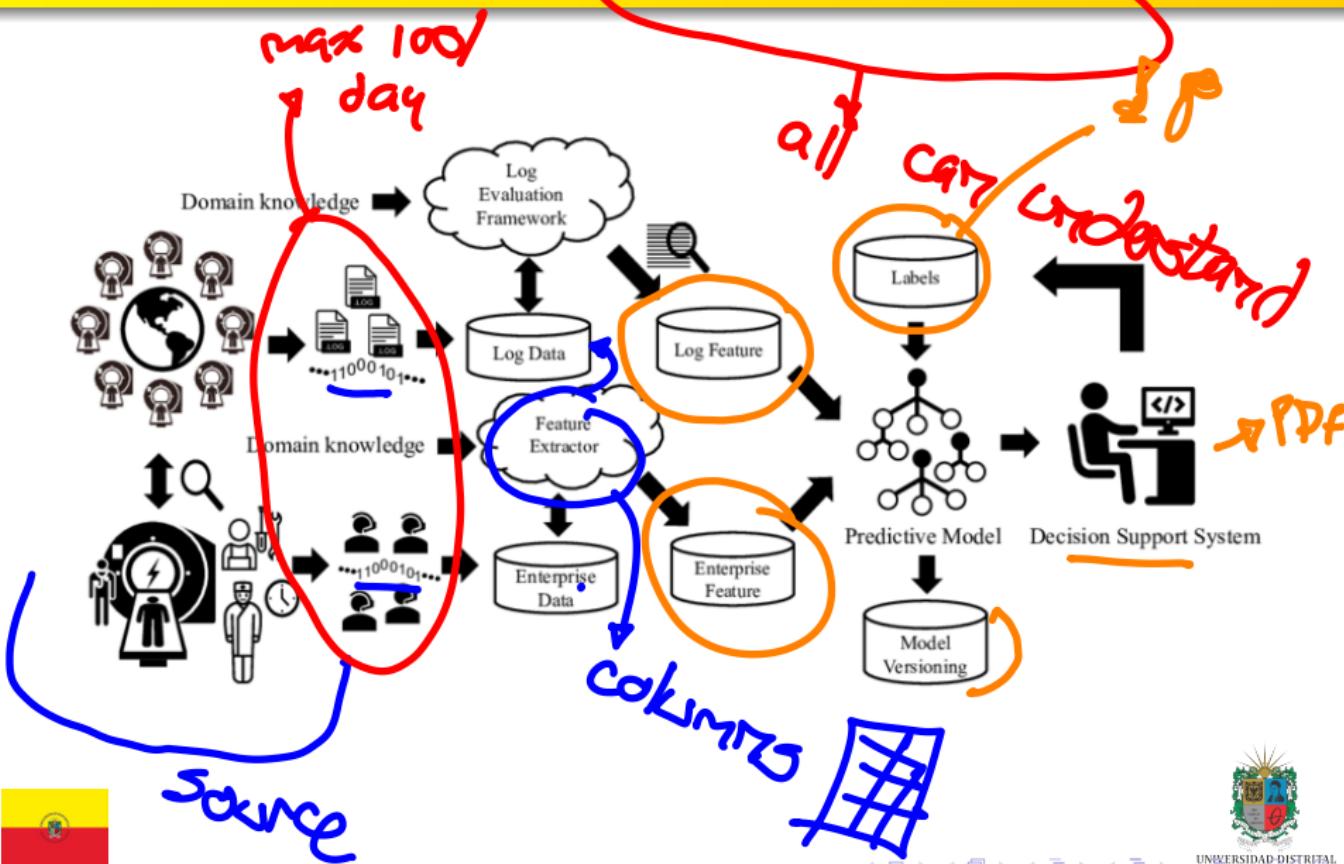


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System Schema Example Processing Pipeline

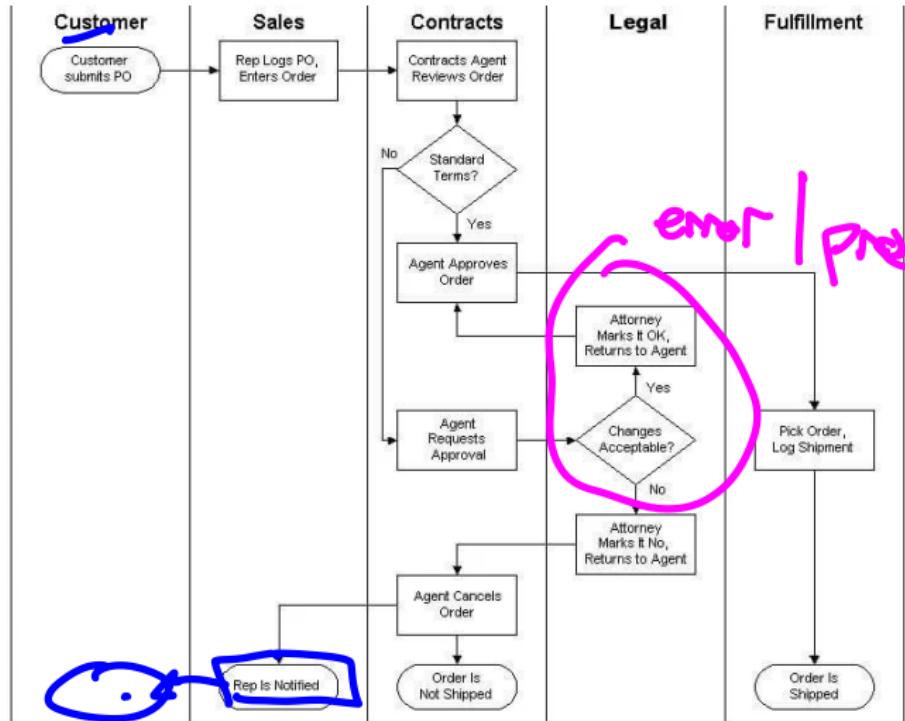


Business Process Model and Notation (BPMN)

*sequence
activity*

Final → Rol 3 Rol 2 Rol 3 Rol 4 Rol 5 activity

*Final users
(stakeh.).*



Technical Design → Solution

- Once the **conceptual design** of the system is defined, the next step is to create a **technical design** of the system.
- Technical Design** is a **detailed design** that defines the **architecture**, **components**, and **interfaces** of the system.
- The technical design is used to guide the development of the system and to communicate the implementation details to **Communication protocols**.

software
↓
reference

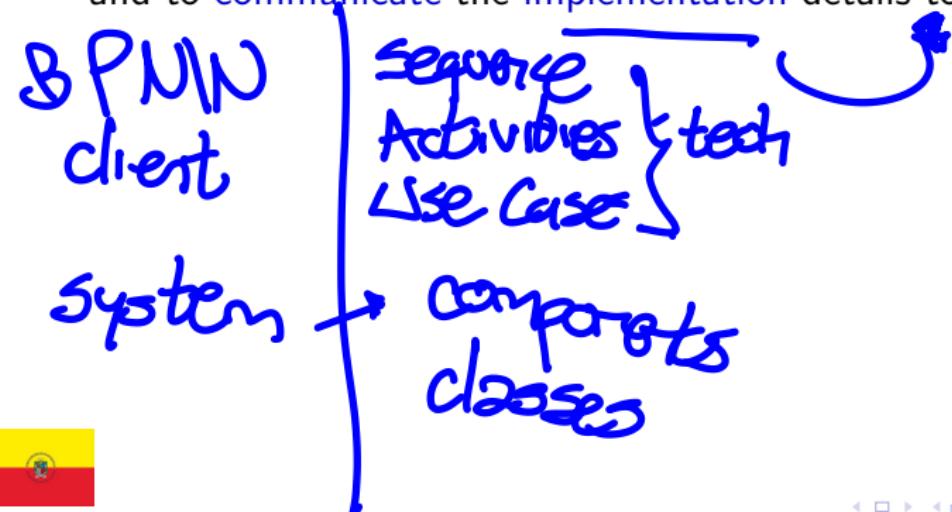
sub-system
↓
micro service

**Communication
protocols**

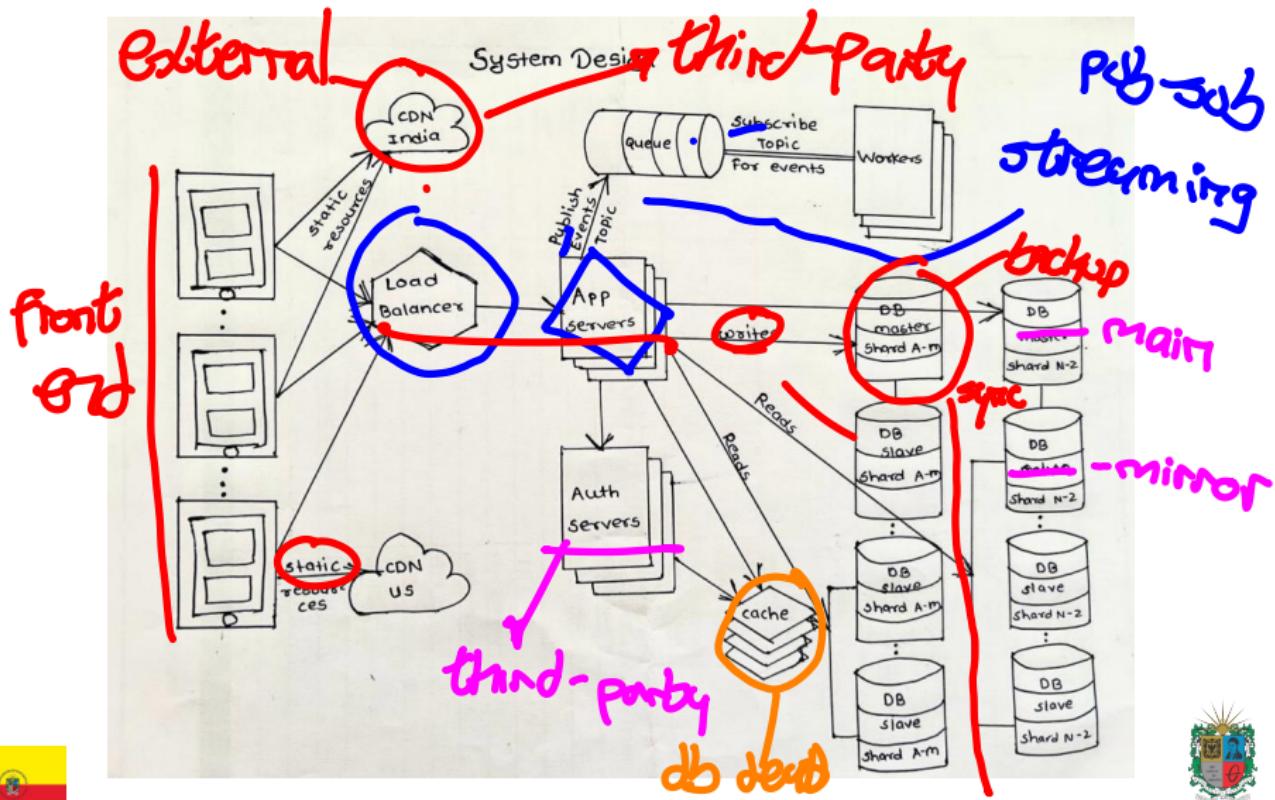


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Systems Design applied to Software Architectures



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Thanks!

Questions?



Repo: <https://github.com/EngAndres/ud-public/tree/main/courses/systems-analysis>

