

# SOFTWARE & PROCESSES

## Systems Analysis

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# Outline

1 Software

2 Processes

3 Information Systems



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1 Software

2 Processes

3 Information Systems



# What is Software?

- Software is a collection of data or computer **instructions** that tell the computer how to work.
- This is in contrast to hardware, from which the system is built and actually performs the work.

GAI  $\Rightarrow$  Learn all / solve all

DAT  $\Rightarrow$  Export systems



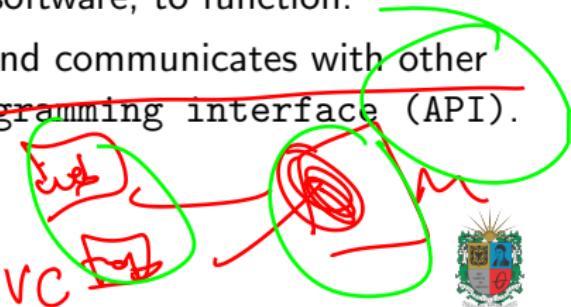
# Software Applications

edge-AI

claro  
es  
el  
dato  
edito

- Software Applications are programs that perform specific tasks for users or for other programs.
- Examples of software applications include word processors, database programs, web browsers, development tools, image editors and communication platforms.
- Applications use the computer's operating system (OS) and other supporting programs, typically system software, to function.
- An application requests services from and communicates with other technologies via an application programming interface (API).

Model -  
Template  
View



# Programming Languages

- Programming Languages are used to create software **programs**, **scripts**, or other sets of instructions for computers to execute.
- Examples of programming languages include Java, C++, Python, JavaScript, Ruby, PHP, SQL, Swift, R, Go, Rust, among others.
- Programming languages are used to create **algorithms** that define the logic of a program.

Assembly

GOTO 0x29

SWAP

ADD

→ High level

words english

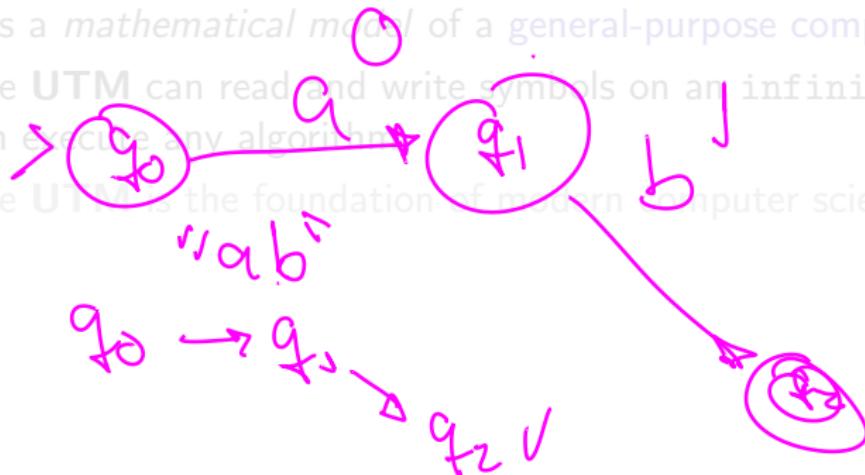
eat if ~~if~~ hungry = True  
else no eat



# Universal Turing Machine

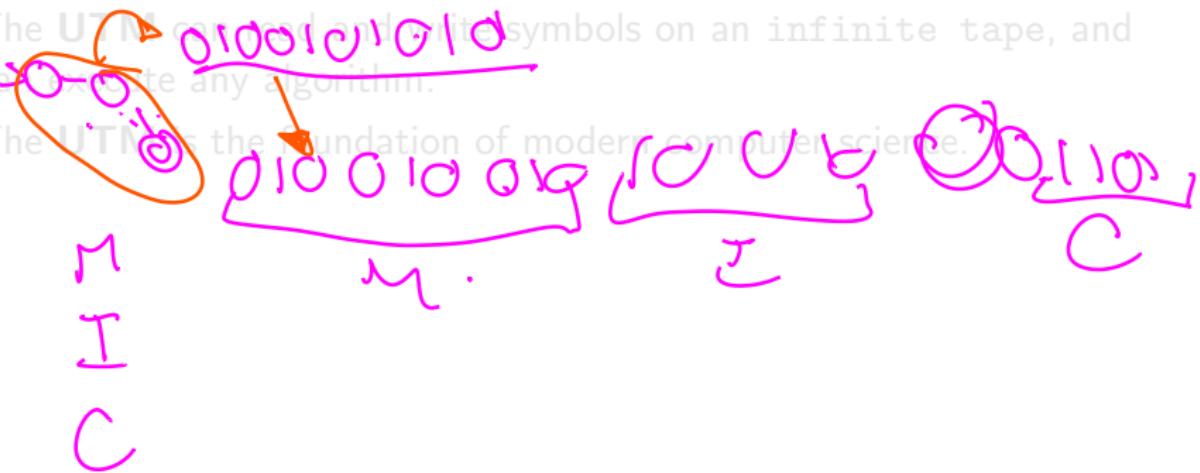
Alan Turing  $\Rightarrow$  1926

- The Universal Turing Machine is a theoretical machine that can simulate any Turing machine.
- It is a *mathematical model* of a general-purpose computer.
- The UTM can read and write symbols on any infinite tape, and can execute any algorithm.
- The UTM is the foundation of modern computer science.



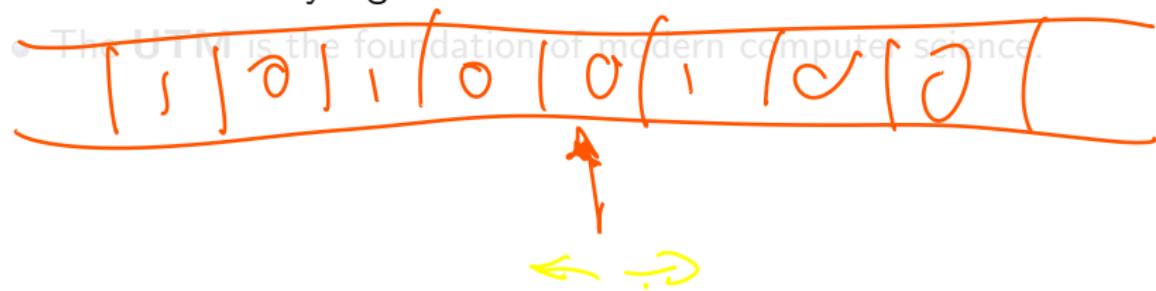
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CAPTCHA  $\Rightarrow$  Test Turing  
Alg o  $\Rightarrow$  code  $\Rightarrow$  binary  $\Rightarrow$  Comp

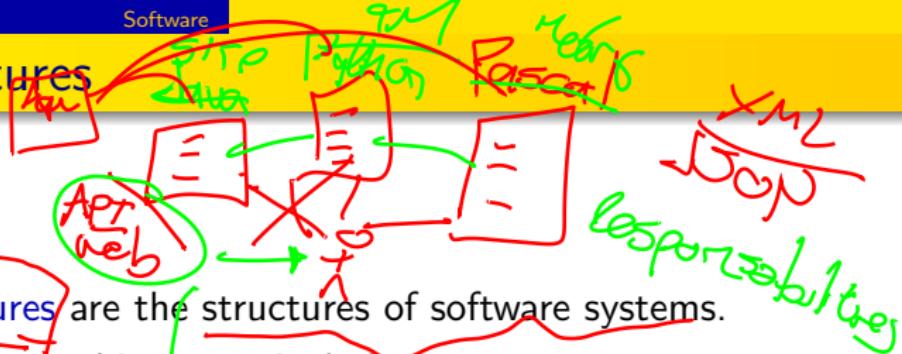


# Programming Paradigms

- Programming Paradigms are a way to classify programming languages based on their features.
  - Examples of programming paradigms include imperative, declarative, functional, object-oriented, procedural, logic, symbolic, concurrent, among others.
  - Programming paradigms are used to define the style of a program.
  - The choice of programming paradigm can affect the structure and performance of a program.
- Terraform**
- SQL**
- Functional**  
write
- PERL**
- Camel**
- myVariable**
- Style**
- myVariable**
- 



# Software Architectures



- Software Architectures are the structures of software systems.
- Examples of software architectures include monolithic, client-server, microservices, event-driven, service-oriented, layered, peer-to-peer, pipe-filter, among others.
- Software architectures are used to define the components and interactions of a system.
- The choice of software architecture can affect the scalability and reliability of a system.

FE - BE - DB



# Outline

1 Software

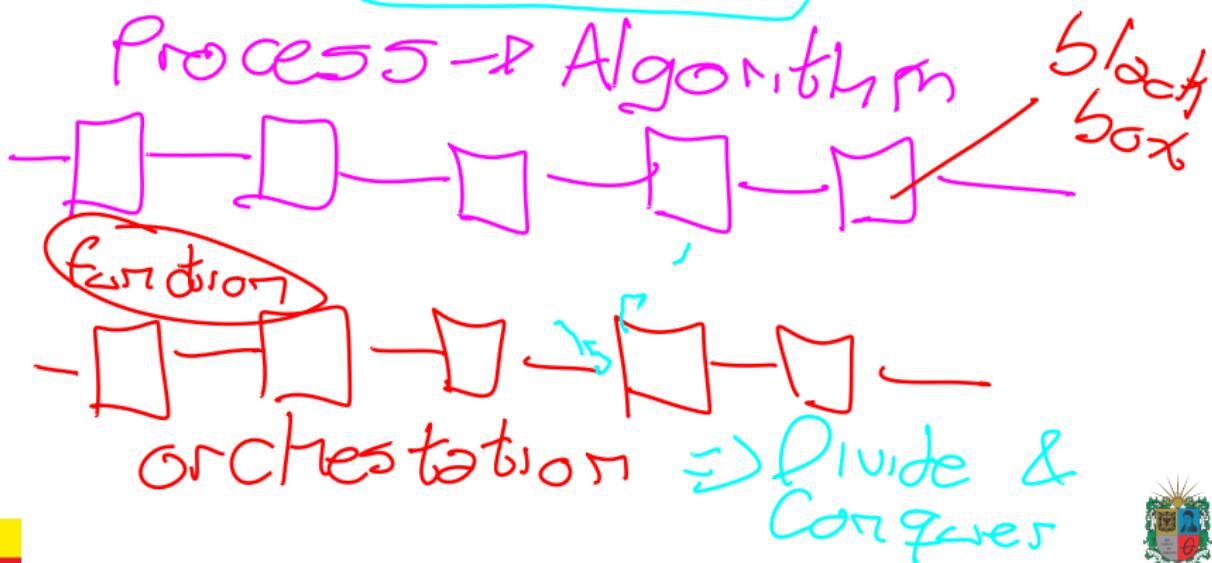
2 Processes

3 Information Systems



# Process Definition

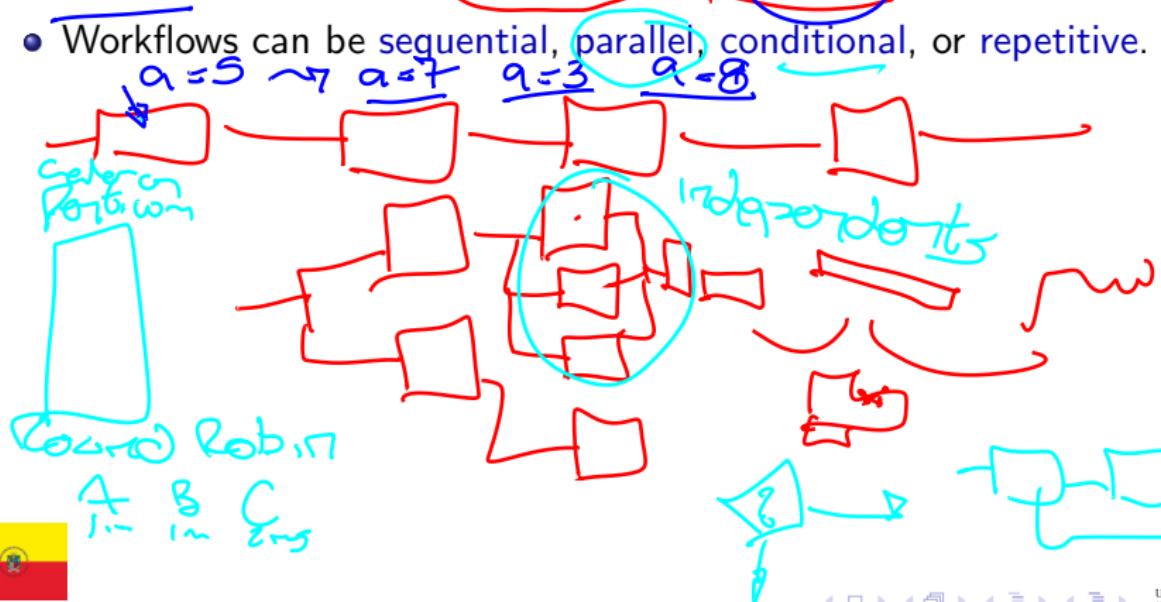
- A Process is a series of steps or actions taken to achieve a particular end.
- Processes are used to organize and manage work.



# Workflows



- 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.

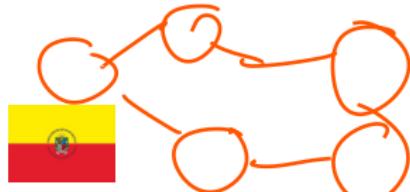
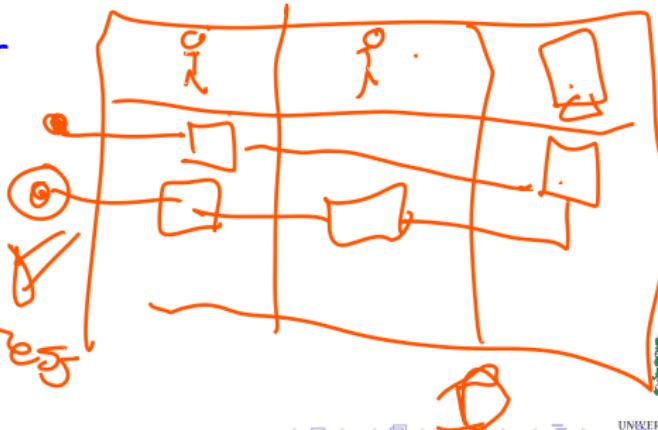


# Process Models



- 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.

UML => flowchart + objects



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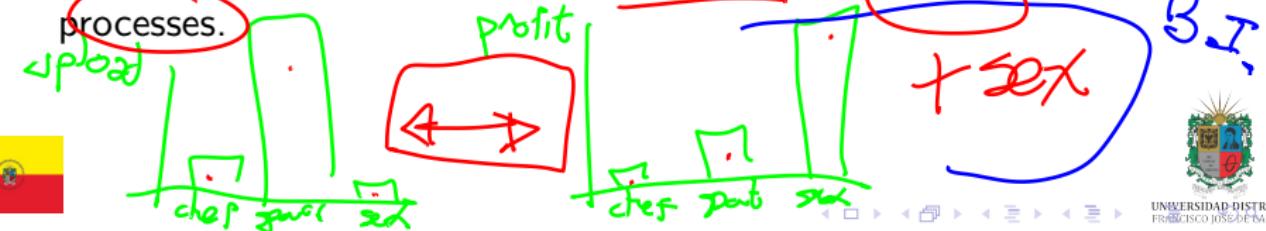


# Information Systems

**Big Data** → **Data Lake (warehouse)**



- An **Information System** is a system that collects, processes, stores, and disseminates information.
- Information systems are used to **support** and **manage** business operations.
- Examples of information systems include **transaction processing**, **management information systems**, **decision support** systems, **executive information systems**, **expert systems**, **data systems**, among others.
- Information systems are used to **automate** and **optimize** business processes.



# Data Systems



*Oracle*

- A **Data System** is a system that collects, processes, stores, and retrieves data.
- Examples of data systems include databases, data warehouses, data lakes, data marts, data cubes, data streams, ~~data lakes~~, among others.
- Data systems are used to store and analyze data.



format dates



*ETL → Extract-Transform - Load*



# Expert Systems

- An Expert System is a system that uses **knowledge** and **reasoning** to solve problems.
- Examples of expert systems include diagnostic systems, predictive systems, prescriptive systems, decision support systems, among others.
- Expert systems are used to automate and optimize decision-making processes.

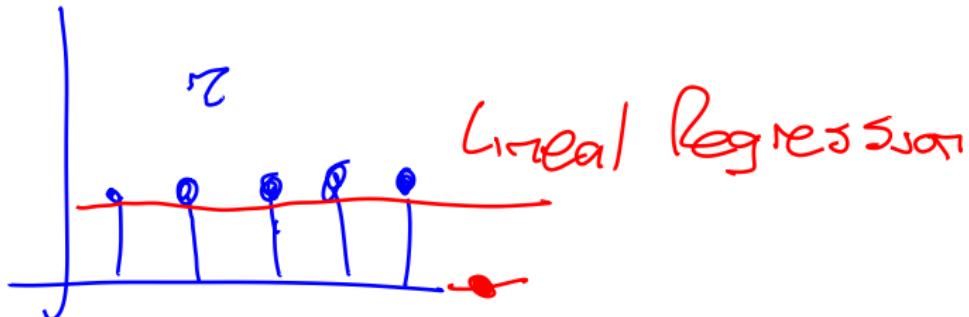


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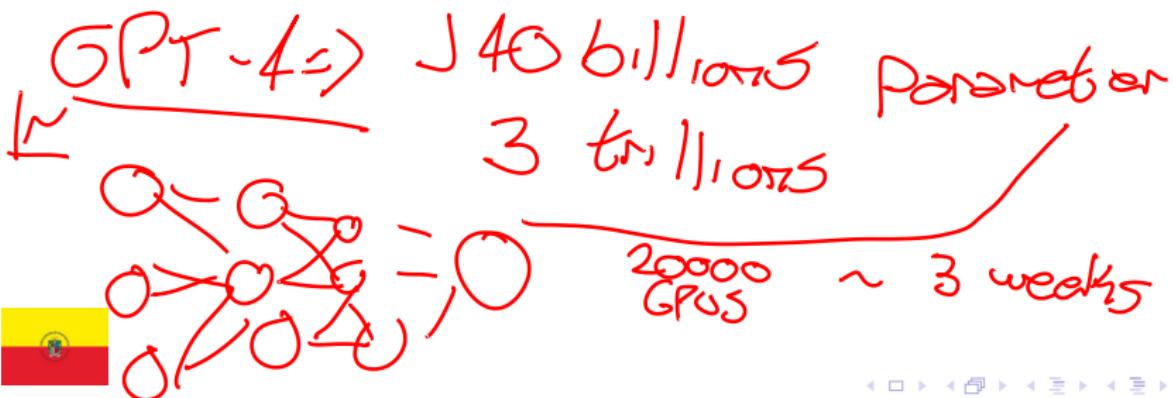
*Forecasting X => x6 Boost LCM.*



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GPT-4 => 140 billion parameters  
 3 trillion  
 20000 GPUs ~ 3 weeks




# Risks and Failures in Information

- Information systems are subject to risks and failures that can impact business operations.
- Examples of risks and failures include security breaches, data loss, system downtime, performance issues, compliance violations, among others.
- Risks and failures can be mitigated through security measures, backup systems, disaster recovery plans, monitoring tools, among others.

Priorities  
Y



# Risks and Failures in Information

→ DELETE TABLE;

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log (cloud)

clock  
git

+ cpa  
+ recovery  
+ access



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# Thanks!

## Questions?



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

