

SOFTWARE & PROCESSES

Systems Analysis

Author: Eng. Carlos Andrés Sierra, M.Sc.
carlos.andres.sierra.v@gmail.com

Lecturer
Computer Engineer
School of Engineering
Universidad Distrital Francisco José de Caldas

2024-I



UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

Outline

- 1 Software
- 2 Processes
- 3 Information Systems



Outline

- 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

DAI \Rightarrow expert systems



Software Applications

edge-AI

claro
estp
ed
data to

- 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

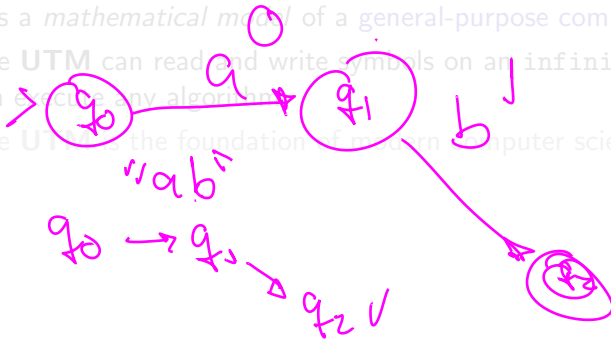
words english
eat if hungry = True
else to eat



Universal Turing Machine

Alan Turing → 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 an infinite tape, and can execute any algorithm.
- The **UTM** is the foundation of modern computer science.



Universal Turing Machine

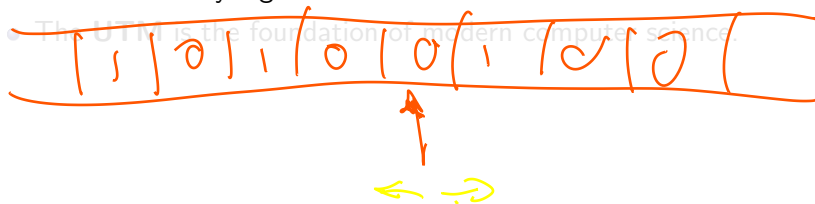
- The **Universal Turing Machine** is a theoretical machine that can simulate any Turing machine.
- It is a *mathematical model* of a general-purpose computer.

- The UTM can read and write symbols on an infinite tape, and can execute any algorithm.
 - The UTM is the foundation of modern computer science.
-



Universal Turing Machine

- 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 an infinite tape, and can execute any algorithm.



Universal Turing Machine

- 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 an infinite tape, and can execute any algorithm.
- The **UTM** is the foundation of modern computer science.

CAPTCHA \Rightarrow Test Turing

Algo \rightarrow code \rightarrow binary \rightarrow ~~Comp~~ ^{CPL}



Programming Paradigms

- Terraform
Functionality write
PERL
- SQL
↑
(25)
 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.
- Camel
Snake
- myVariable
my_variable



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.



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.



Outline

- 1 Software
- 2 Processes
- 3 Information Systems



Information Systems

- 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 systems, 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

- A **Data System** is a system that collects, processes, stores, and retrieve 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.



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.



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.



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.



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.



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.



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.



Outline

- 1 Software
- 2 Processes
- 3 Information Systems



Thanks!

Questions?



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

