LAB 01
Introduction to UML

Introduction:

The software needs the architectural design to represent the design of software. It is done through the construction of a model. The model abstracts the essential details of the underlying problem from its usually complicated real world. Several modeling tools are wrapped under the heading of the UML, which stands for Unified Modeling Language. The purpose of this lab is to present important highlights of the UML.

Tool Used in the Lab:

Software Design and Architecture lab is one of the most important labs for a software engineer. Developing a complete software application requires from each of you a good level of know-how of various tools.

In this lab we will learn to use Star UML.

Lab Objectives:

i. Study the benefits of visual modeling.
ii. Understanding UML
iii. Installing StarUML
iv. Understanding Flow Chart Diagram

Visual Modeling

Visual modeling, also known as graphical modeling, refers to the process of representing information and systems using visual elements, such as diagrams and charts, instead of traditional textual descriptions. Visual modeling is often used in software engineering, where it is used to represent the design of software systems using diagrams that depict the various components and their relationships. In this way, it improves communication in the team as the design is formed and reviewed, allowing the reader to reason about the design, and it provides an unambiguous basis for implementation.

A model is a simplified view of a system. It shows the essential detail of the system from a particular perspective and hides the nonessential details. Visual models help you:

- Increase understanding of complex systems
- Explore and compare design alternatives at a low cost
- Form a foundation for implementation
- Capture requirements precisely
- Communicate decisions unambiguously

Using Flow chart for problem solving:

Flow charts are a useful tool as they make a process easy to understand at a glance. Using just a few words and some simple symbols, they show clearly what happens at each stage and how this affects other decisions and actions. This tool's simplicity makes communicating and documenting a process quick and clear, so that the process will more likely be understood and applied correctly and consistently.

Flow Chart Diagram:

A flowchart is a picture of the separate steps of a process in sequential order. It was originated from computer science as a tool for representing algorithms and programming logic but had extended to use in all other kinds of processes.

Steps used in flowchart diagram

1. Define the problem
2. Identify the steps
3. Determine the order
4. Draw the flowchart
5. Test the flowchart
6. Implement the flowchart

Flowchart main components:

i. **Flow:** Lines represent the flow of the sequence and direction of a process.

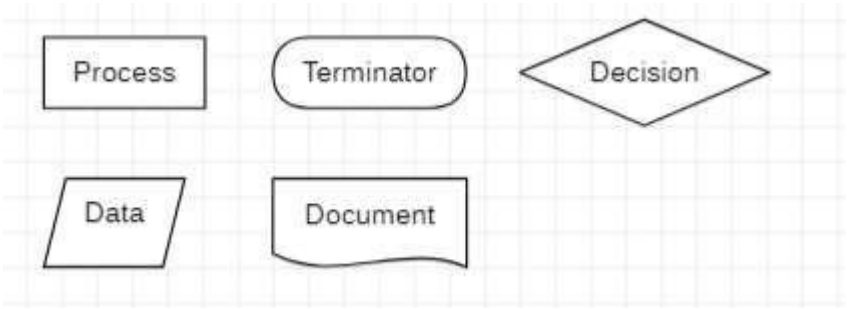
ii. **Terminator:** The terminator symbol represents the starting or ending point of the system.

iii. **Process:** A box indicates some particular operation.

iv. **Decision:** A diamond represents a decision or branching point. Lines coming out from the diamond indicates different possible situations, leading to different sub-processes.

v. **Document:** This represents a printout, such as a document or a report.

vi. **Data or Input/Output:** It represents information entering or leaving the system. An input might be an order from a customer. Output can be a product to be delivered.



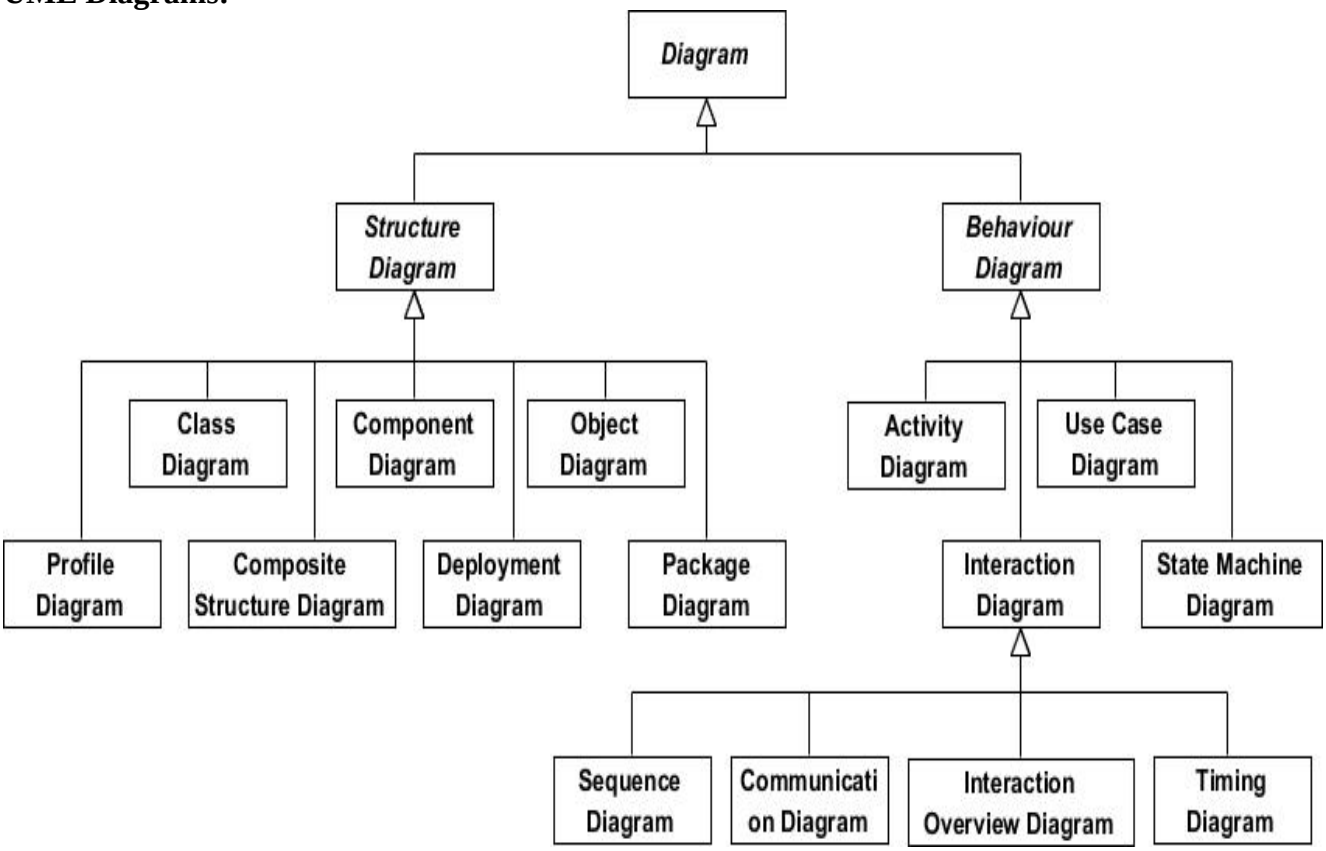
What is UML?

UML is a standard language for specifying, visualizing, constructing, and documenting for large software systems, as well as for business modeling and other non-software systems. UML uses graphical notations to express design of software projects and its requirements.

Components of the UML:

The UML consists of a number of graphical elements that combine to form diagrams. UML is a language; it has rules for combining these elements. The purpose of the diagrams is to present multiple views of a system; this set of multiple views is called a model. A UML model tells what a system is supposed to do.

UML Diagrams:



I. **Structure diagrams** show the static structure of the system and its parts on different abstraction and implementation levels and how they are related to each other. The elements in a structure diagram represent the meaningful concepts of a system, and may include abstract, real world and implementation concepts.

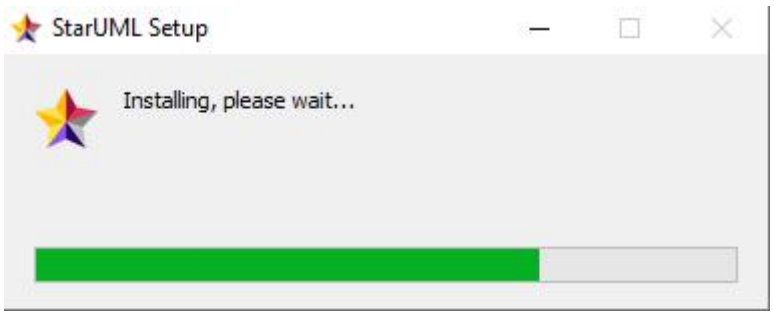
II. **Behavior diagrams** show the dynamic behavior of the objects in a system, which can be described as a series of changes to the system over time.

What is StarUML

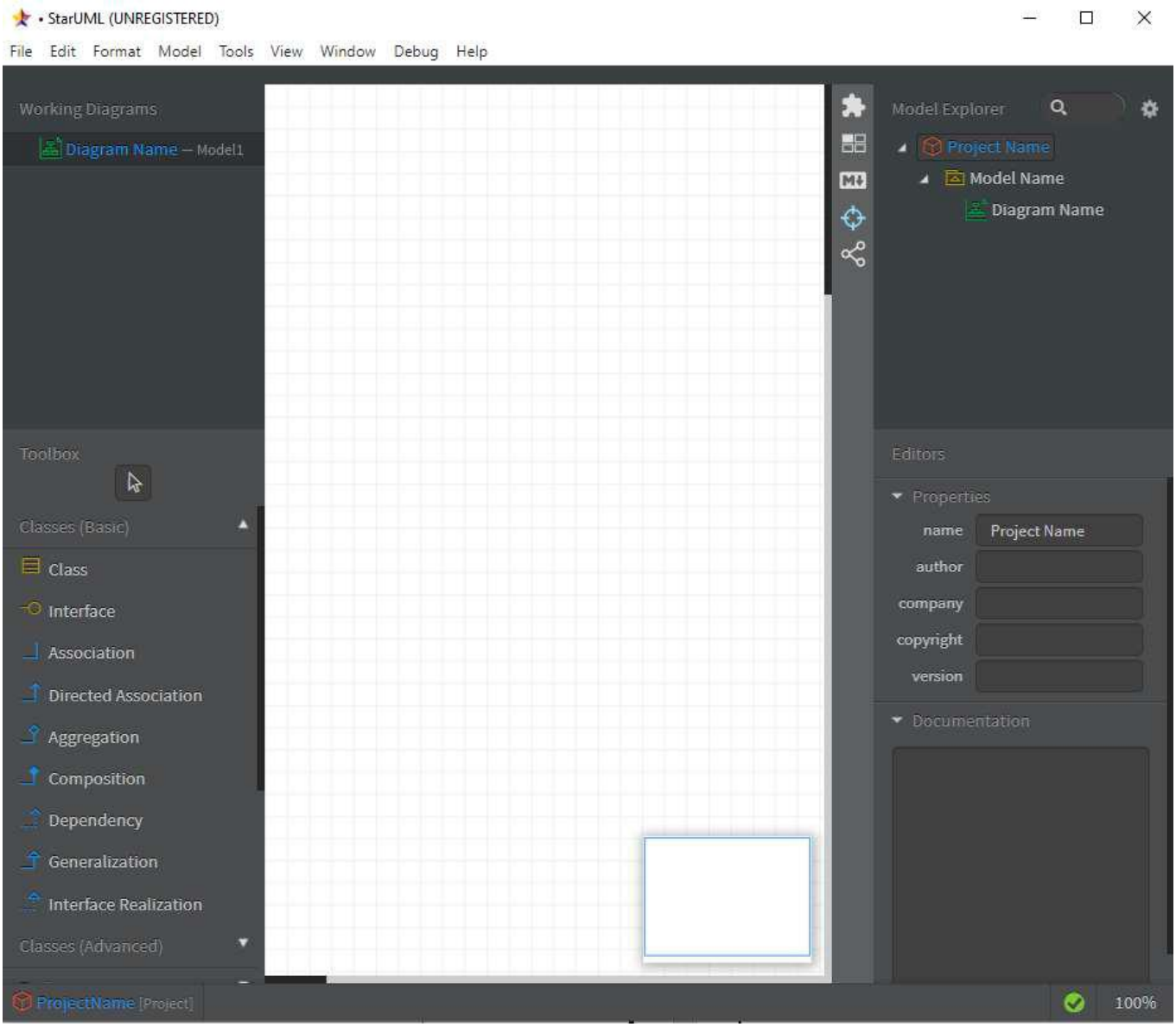
StarUML™ is a software modeling platform that supports UML (Unified Modeling Language).

Downloading StarUML: Download StarUML from the website .

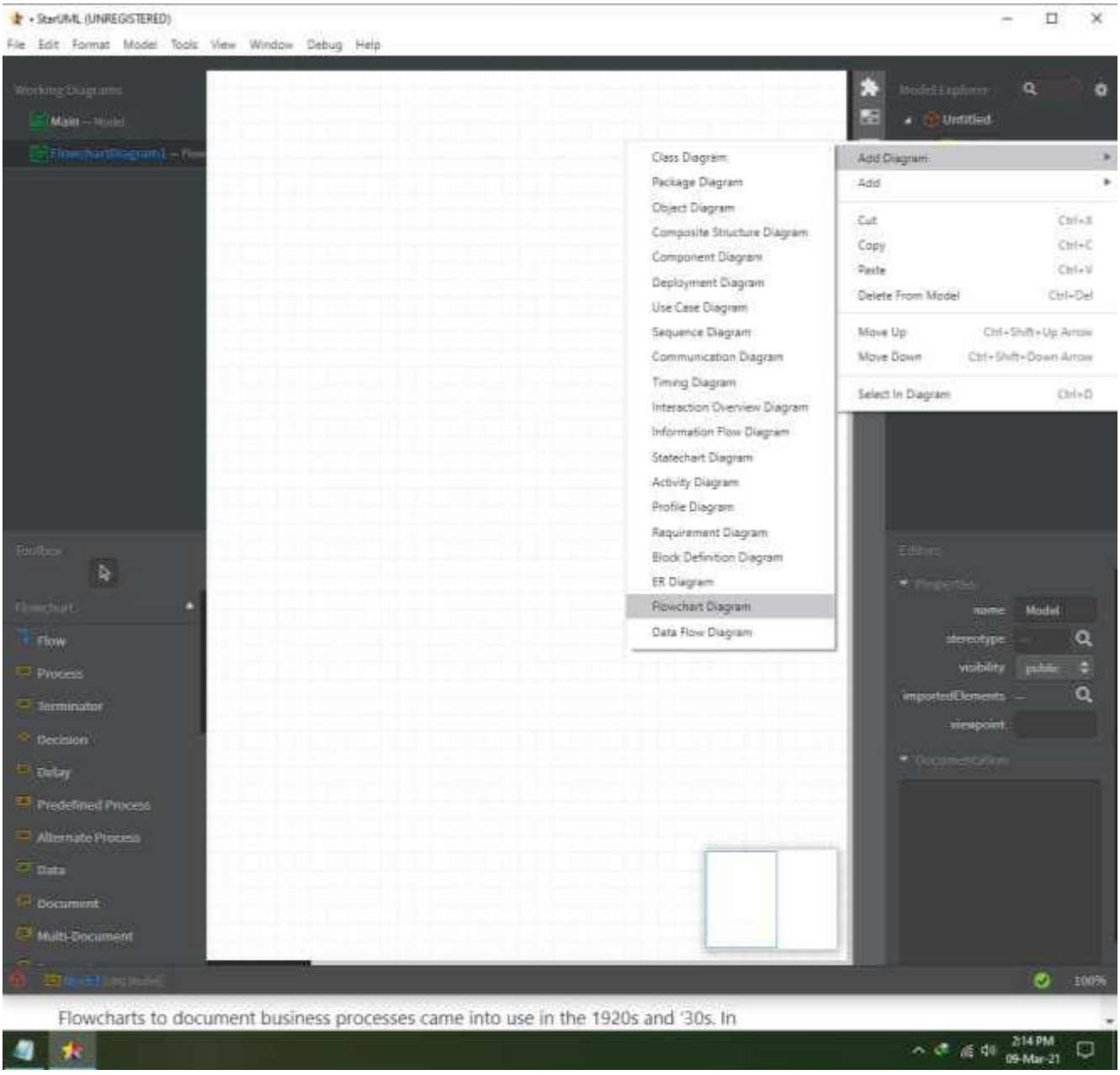
Installing StarUML: Run the setup to install StarUML



StarUML Interface:



Star UML: Adding Flow Chart diagram:



Exercises

Install StarUML.

Form groups of 4 students.

Brainstorm and list 2 suitable project titles.

Choose one of the projects from your list.

Try to write (a hypothetical) project definition for it.

Present it to the instructor.

Flowchart Exercise 1:

Sarah, a business traveler, needed a chauffeur service for her trip from the airport to her hotel. She visited MyChauffeur.com, entered her pickup and drop-off locations, and selected her preferred vehicle. However, after entering her details, she received a message stating that the service was not available in her selected area. The website did not provide any alternative options, leaving her frustrated. She tried another location and managed to proceed, but upon selecting her preferred vehicle, she was informed that it was unavailable. Again, no alternative suggestions were provided, forcing her to start over.

Determined to complete her booking, she finally found an available car and moved to the payment step. Unfortunately, her payment failed due to a technical issue, and the system did not guide her on how to resolve it or try another method. Frustrated by the repeated issues, Sarah abandoned her booking and opted for a competitor's service instead.

Flowchart Exercise 2:

Emma is craving her favorite Mexican dish and decides to order from an online food delivery app. She browses the menu, adds items to her cart, and proceeds to checkout. However, after entering her delivery address, she receives a message stating that delivery is unavailable in her area. Confused and frustrated, she checks other restaurants but faces the same issue. Eventually, she finds one that delivers to her location, but upon payment, her transaction fails due to a technical error. The app does not offer an alternative payment method or guidance, causing Emma to abandon her order.

"Create a flowchart that represents the food ordering process. Identify where Emma faced issues and suggest improvements to enhance the customer experience."

Flowchart Exercise 3:

Jake wants to watch a newly released movie at his local cinema. He visits the cinema's website, selects his preferred movie, showtime, and seat. However, after proceeding to payment, he finds that the seat he selected has already been booked by someone else. The system does not automatically refresh seat availability, forcing him to go back and select a different seat manually. After completing the payment, he does not receive a confirmation email or ticket QR code, making him unsure if his booking was successful.

Question:
Design a flowchart representing the movie ticket booking process. Identify key problem areas in Jake's experience and suggest improvements to enhance the ticket booking system.

Flowchart Exercise 4:

Sophia, an employee at a corporate firm, needs to apply for a week of leave. She submits her request through the company's HR portal. After submission, she does not receive any confirmation that her request was received. Days pass, and her manager has not reviewed the request, causing a delay. When she follows up, she learns that her request was never forwarded to the manager due to a system error. As a result, her leave is not approved on time, and she has to cancel her travel plans.

Question:
Create a flowchart illustrating the employee leave request process. Identify the flaws in the current system and propose solutions to improve efficiency and communication.