Analiza și Modelarea Sistemelor Software - Lab 1¹

Traian Şerbănuță

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¹Thanking Andrian Babii @ Endava for slide content

Agenda

- ► Get to know
- ► Laboratory structure
- ► General Presentation

Introduction

Subject: Software System Modeling

▶ UML Diagrams, Modeling, Design Patterns, etc.

Requirements:

- ► To be active
- ► Attendance is not mandatory
- Evaluation based on team project

Who we are

About me:

- Traian Serbănuță
- associate professor @ UNIBUC
- research consultant @ Pi Squared Inc.
- I like programming languages. I was paid for using the following
 - regular: Java, C++, Python, Rust, Haskell
 - esoteric: The K Framework, Rocq, Circom

About you:

- Name
- Professional interests
- ► Fun fact

Tools

- PlantUML (also available as VSCode extension)
- Mermaid (works well with Github)
- Lucidchart
- ▶ Web Sequence Diagrams
- ► yUML
- Diagrams.net

UML

- ► UML is **not a process of designing solutions**
- It is a way of communicating designs independent of programming languages
- ▶ UML 2 has many diagram types, divided into:
 - Structural diagrams
 - Behavior diagrams (including interaction aspects)

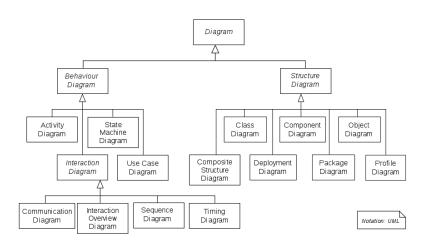


Figure 1: Types of diagrams in UML

Poll

What type of diagram is presented?

- Class
- Package
- ► Interaction
- ▶ Use case

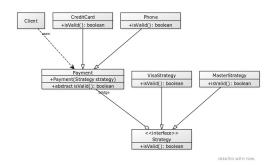


Figure 2: ????

Answer: Class diagram

- Backbone of object-oriented modeling
- ► Shows how different entities relate to each other (static structure)
- Purposes:
 - Analysis and design of static view of an application
 - Describe responsibilities of a system
 - Base for component and deployment diagrams
 - Forward and reverse engineering

Poll

What type of diagram is presented?

- ► State machine
- Interaction
- Component
- Use case

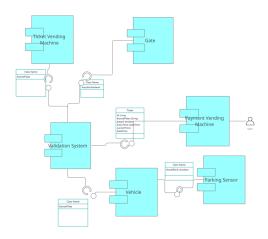


Figure 3: ????

Answer: Component diagram

- ► Focuses on **system's components**
- ► Models static implementation view
- Breaks down system into high-level functionalities
- ► Each component has a clear aim and interacts minimally with others

Exercise: Parking Lot Design

Goal: Design a parking lot using class diagrams.

Steps:

- 1. Gather product requirements (make reasonable assumptions).
- 2. Eliminate confusion and clarify.
- 3. Draw class hierarchy diagram.
- 4. Ignore scalability/performance issues.

Parking Lot Requirements

- Multiple floors for parking cars
- ► Multiple entry and exit points
- Payment options:
 - Automated exit panel
 - Parking attendant
 - ▶ Info portal on each floor (cash & credit cards)
- ▶ If paid at info portal \rightarrow no need to pay at exit
- System should enforce max capacity
- If full \rightarrow show message at entrance + display board on ground floor
- Multiple parking spot types: Compact, Large, Handicapped, Motorcycle, etc.
- ► Electric car spots with charging + payment panel
- ► Support multiple vehicle types: car, truck, van, motorcycle, etc.