





University of Antwerp
| Faculty of Applied
Engineering

5-Software Design

Lab Session 1

16/10/2025

Jens Duym

Course Outline

Goal

- **Clean & organised code**

Even bad code can function. But if code isn't clean, it can bring a development organization to its knees. Every year, countless hours and significant resources are lost because of poorly written code. But it doesn't have to be that way

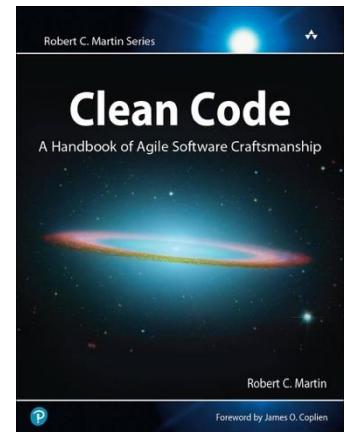
Clean Code – Robert “Uncle Bob” Martin

- **Many aspects to writing clean code**

Summary: <https://gist.github.com/wojteklu/73c6914cc446146b8b533c0988cf8d29>

- **Focus on diagrams & design patterns**

- How can code be structured in diagrams and vice versa?
- How do we make use of design patterns, such that our code maintains clean, structured and reusable?



Outline labs

- **Part A: UML diagrams**
Sessions 1 – 2
- **Part B: Design Patterns**
Session 3 – 5
- **Part C: Projects in groups of 2**
Session 6 – 9
- **Evaluation:**
 - Entire portfolio: zip containing code, UML diagrams, AI usage
 - Submit before 7th lab at defined date
 - Oral defence
 - Defence of projects

Scoring

Distribution of points

- Theory: 50% of total points
 - Written and closed-book
- Practicum: 50% of total points
 - Points of practicum transferred to second terms
 - cannot be redone in August

Need to pass both to pass course

Evaluation of practicum:

- Presence and cooperation (10%)
- Project (45%)
 - Create, deliver and defend project during examination period
- Portfolio (45%)
 - Create, deliver and defend portfolio during the 7th lab session

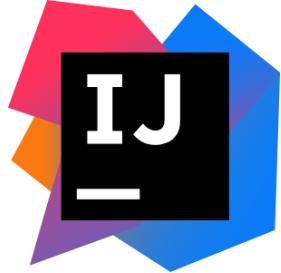
Initialisation

Installation & setup of tools

Environments

- Programming
 - Java (Temurin 21)
 - Maven Plugin framework
 - Using JetBrains IntelliJ IDE

<https://www.jetbrains.com/idea/download/>



- UML Diagrams

- Visual Paradigm (VP)

<https://www.visual-paradigm.com/>

Download the free Community Edition:

<https://www.visual-paradigm.com/download/community.jsp>



Environments

- Code
 - <https://github.com/JensD1/5-software-design.git>

Part A

UML Diagrams

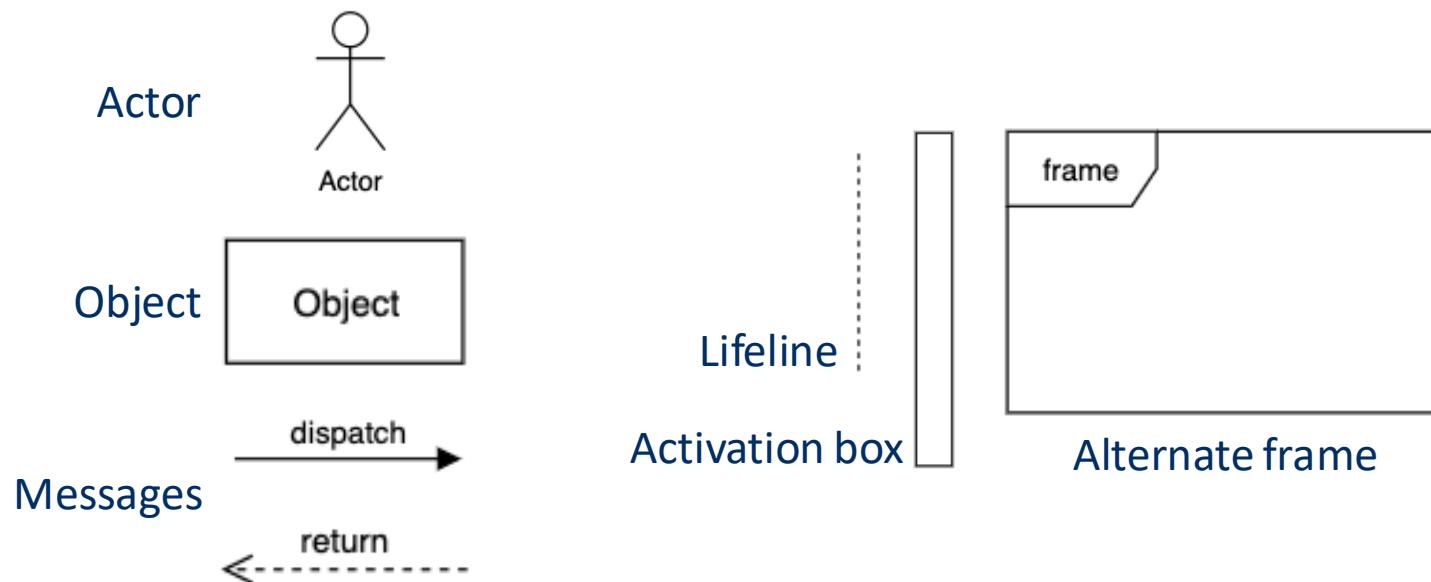
Sequence & Use Case Diagrams

Sequence Diagrams

- **What?**

Shows the interaction between objects/classes/components in a system
Shows the order in which interactions take place

- **How?**



Use Case Diagrams

- **What?**

Shows an overview of relations between the user and functionality

- **How?**



Actor



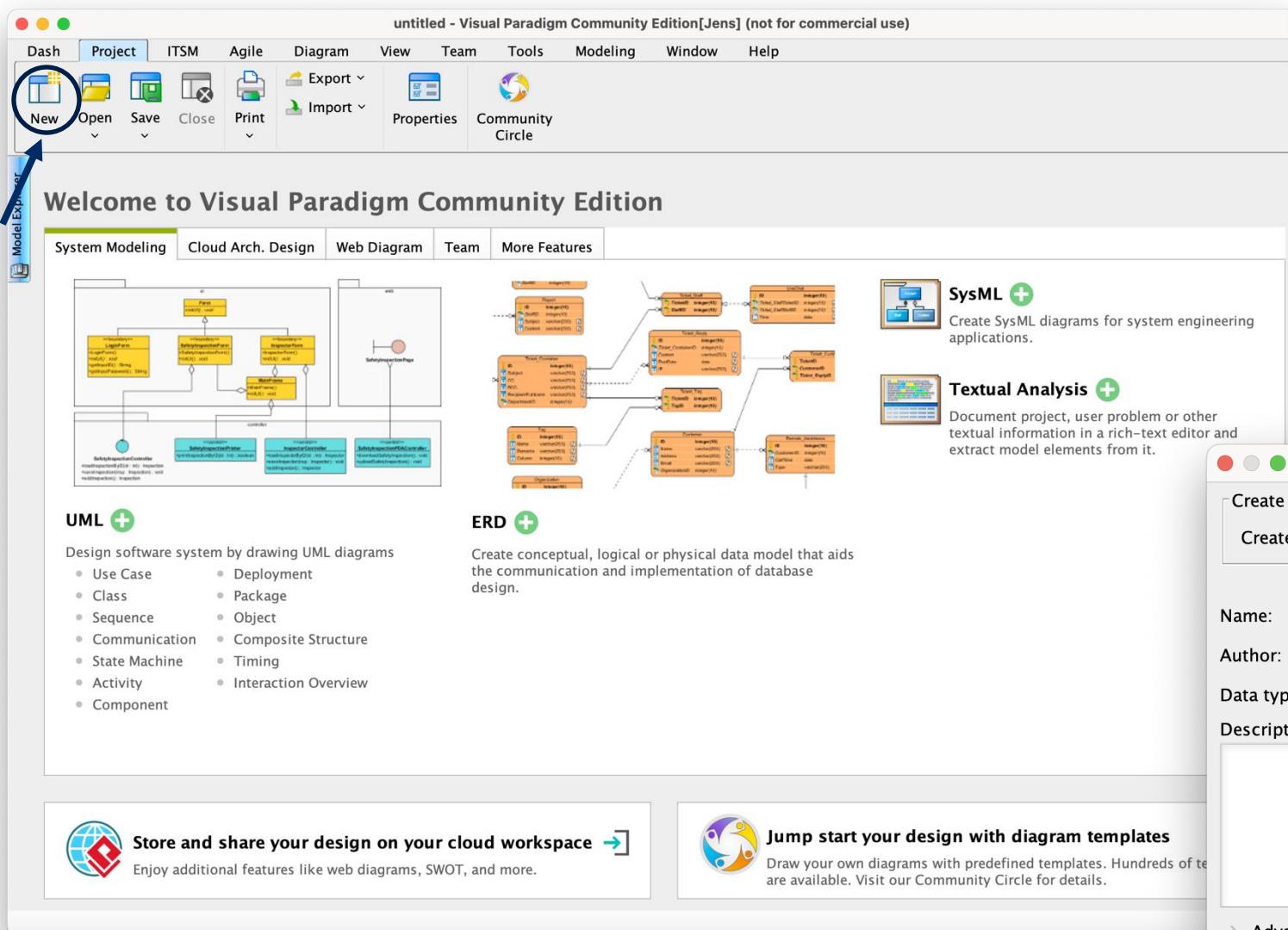
Relationships

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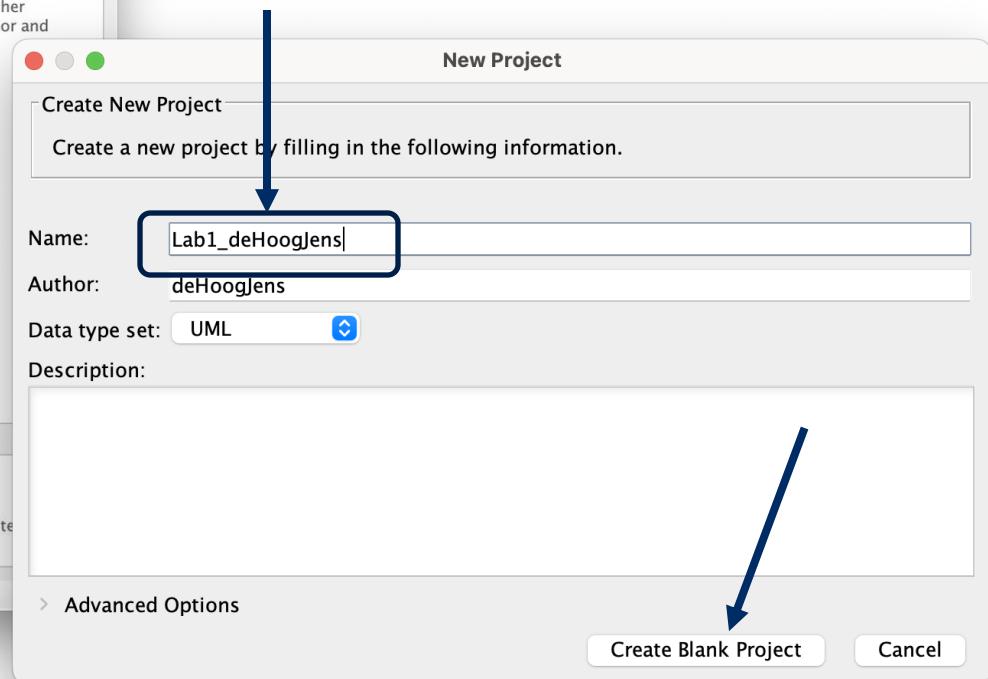
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Usage of Visual Paradigm



Pick a clear project name
LabX_LastnameFirstname



Usage of Visual Paradigm

The screenshot shows the Visual Paradigm Community Edition interface. At the top, the menu bar includes Dash, Project, ITSM, Agile, Diagram (highlighted with a blue circle), View, Team, Tools, Modeling, Window, and Help. Below the menu is a toolbar with various icons for operations like Undo, Redo, Copy, Paste, Select All, Format, Search, Group, Ungroup, Link, Jump, and Bookmarks. A large blue arrow points from the left towards the 'New' button in the toolbar. On the far left, there's a vertical sidebar labeled 'Modeler' with tabs for System Modeling, Cloud Arch. Design, Web Diagram, Team, and More Features. The 'System Modeling' tab is active, displaying two UML class diagrams. The left diagram shows classes like 'Farm', 'Inspector', 'InspectorPage', and 'SafetyInspectorController'. The right diagram shows 'Task', 'TaskList', 'TaskListController', and 'TaskPage'. Below these diagrams are sections for UML, ERD, SysML, and Textual Analysis, each with a brief description and a green plus sign icon. At the bottom, there are two call-to-action boxes: 'Store and share your design on your cloud workspace' with a red arrow icon, and 'Jump start your design with diagram templates' with a blue arrow icon. The University of Antwerp Faculty of Applied Engineering logo is in the bottom left corner, and the page number 14 is in the bottom right.

Lab1_deHoogJens - Visual Paradigm Community Edition[Jens] (not for commercial use)

Diagram

New

Welcome to Visual Paradigm Community Edition

System Modeling Cloud Arch. Design Web Diagram Team More Features

UML +

Design software system by drawing UML diagrams

- Use Case
- Class
- Sequence
- Communication
- State Machine
- Activity
- Component
- Deployment
- Package
- Object
- Composite Structure
- Timing
- Interaction Overview

ERD +

Create conceptual, logical or physical data model that aids the communication and implementation of database design.

SysML +

Create SysML diagrams for system engineering applications.

Textual Analysis +

Document project, user problem or other textual information in a rich-text editor and extract model elements from it.

Store and share your design on your cloud workspace →

Enjoy additional features like web diagrams, SWOT, and more.

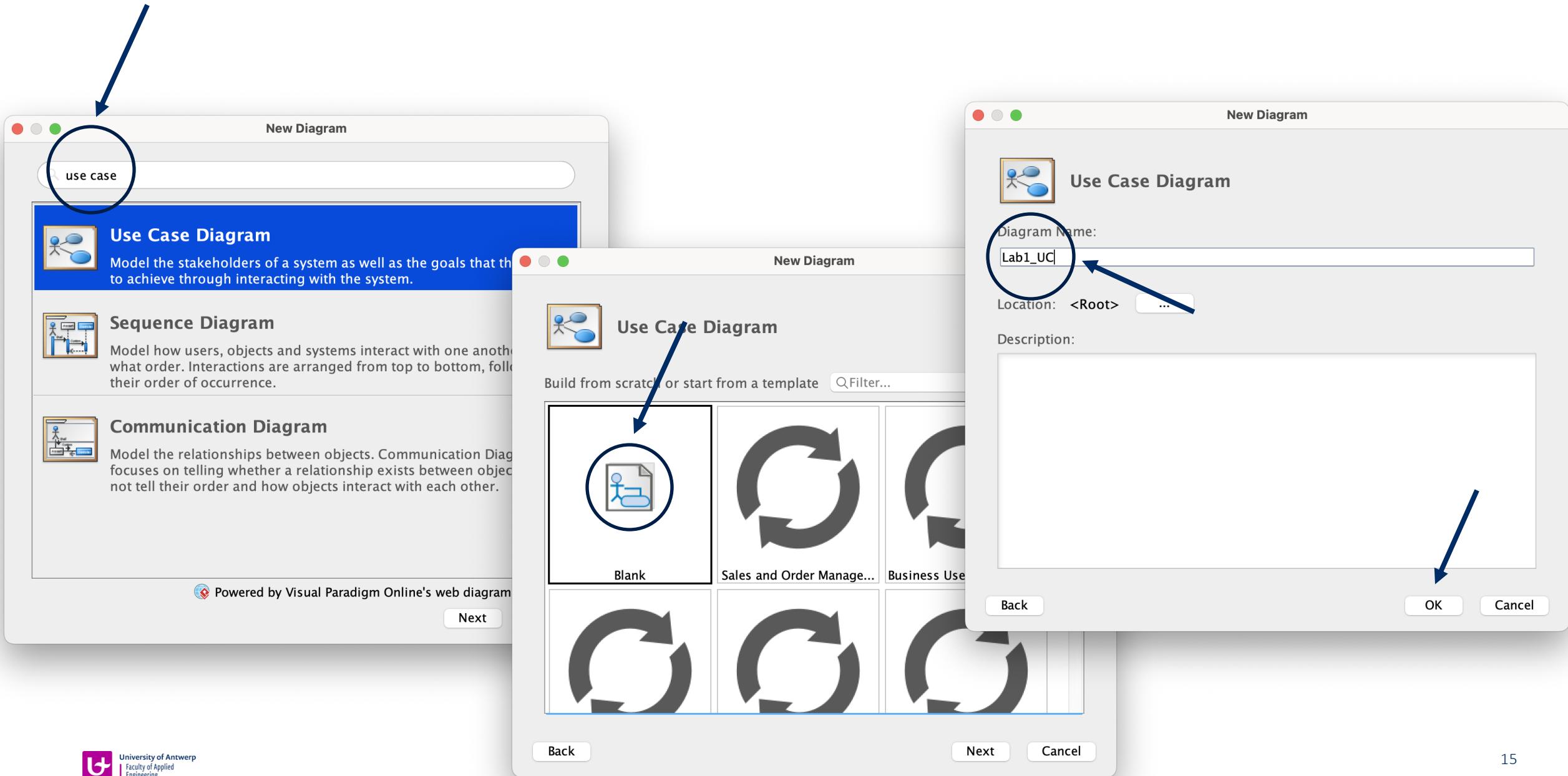
Jump start your design with diagram templates →

Draw your own diagrams with predefined templates. Hundreds of templates are available. Visit our Community Circle for details.

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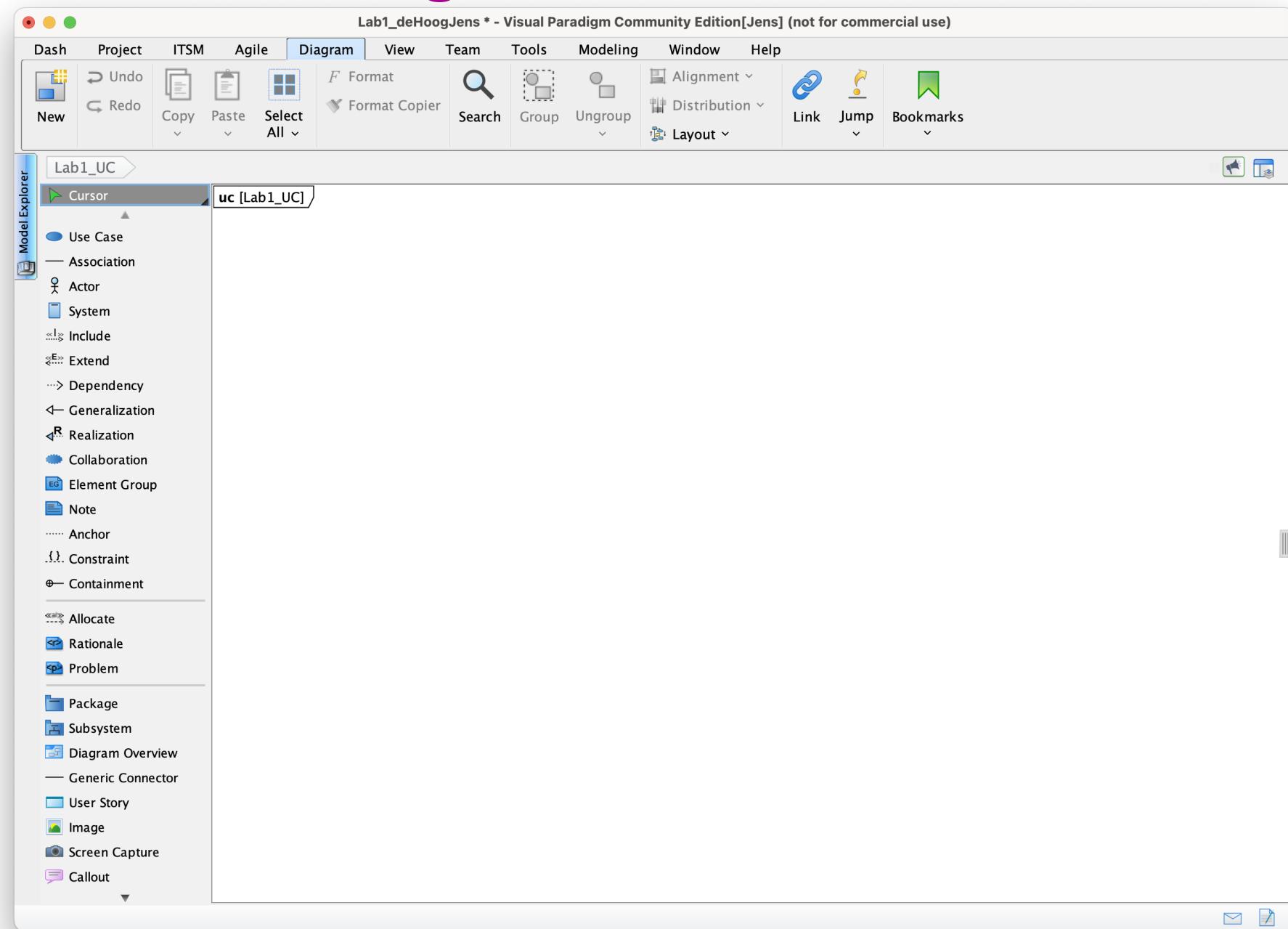
14

Usage of Visual Paradigm



Usage of Visual Paradigm

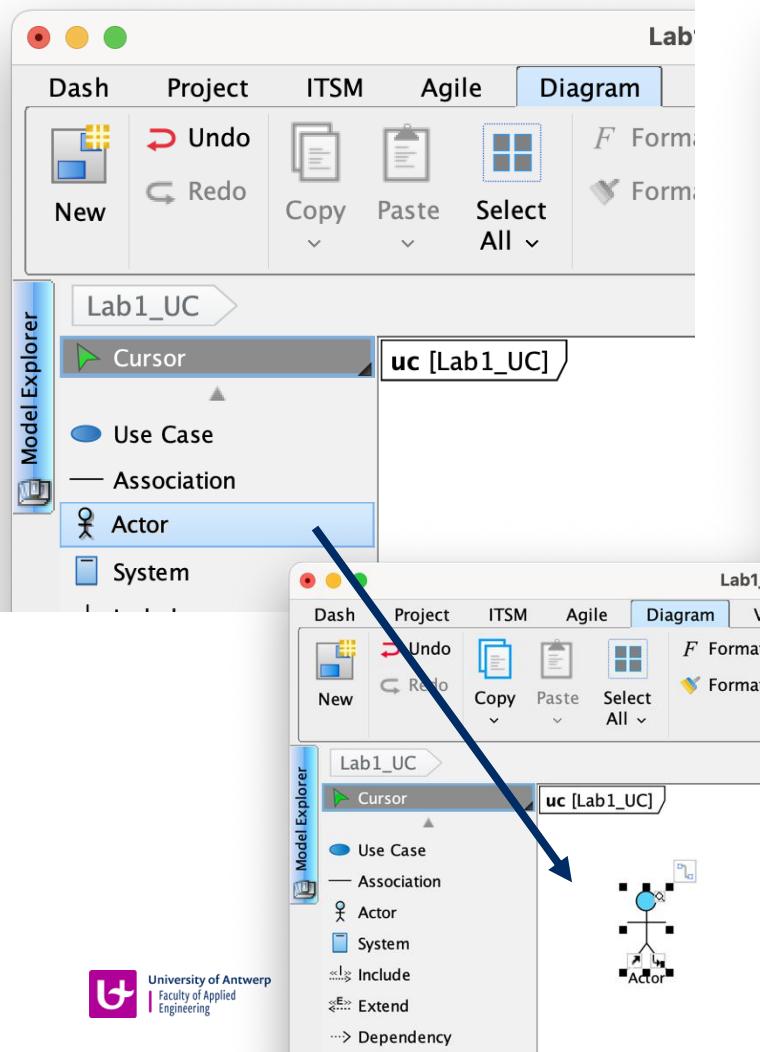
Use case diagram



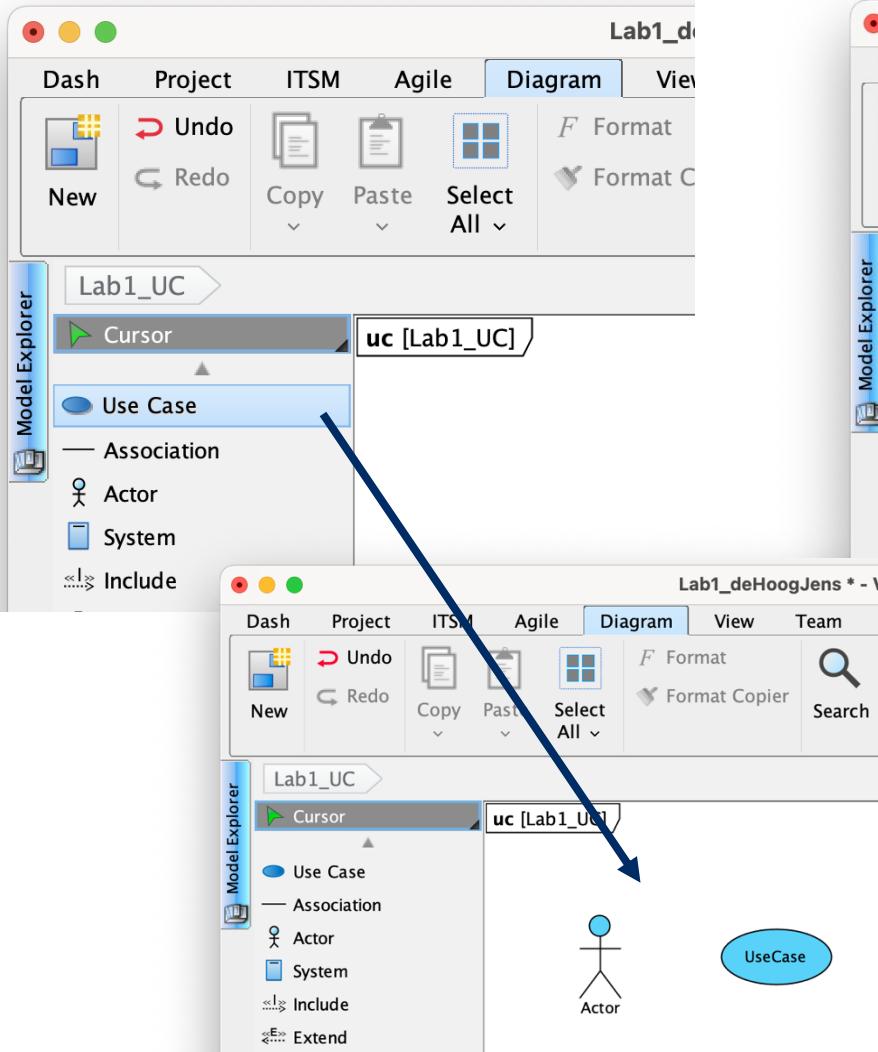
Usage of Visual Paradigm

Use case diagram

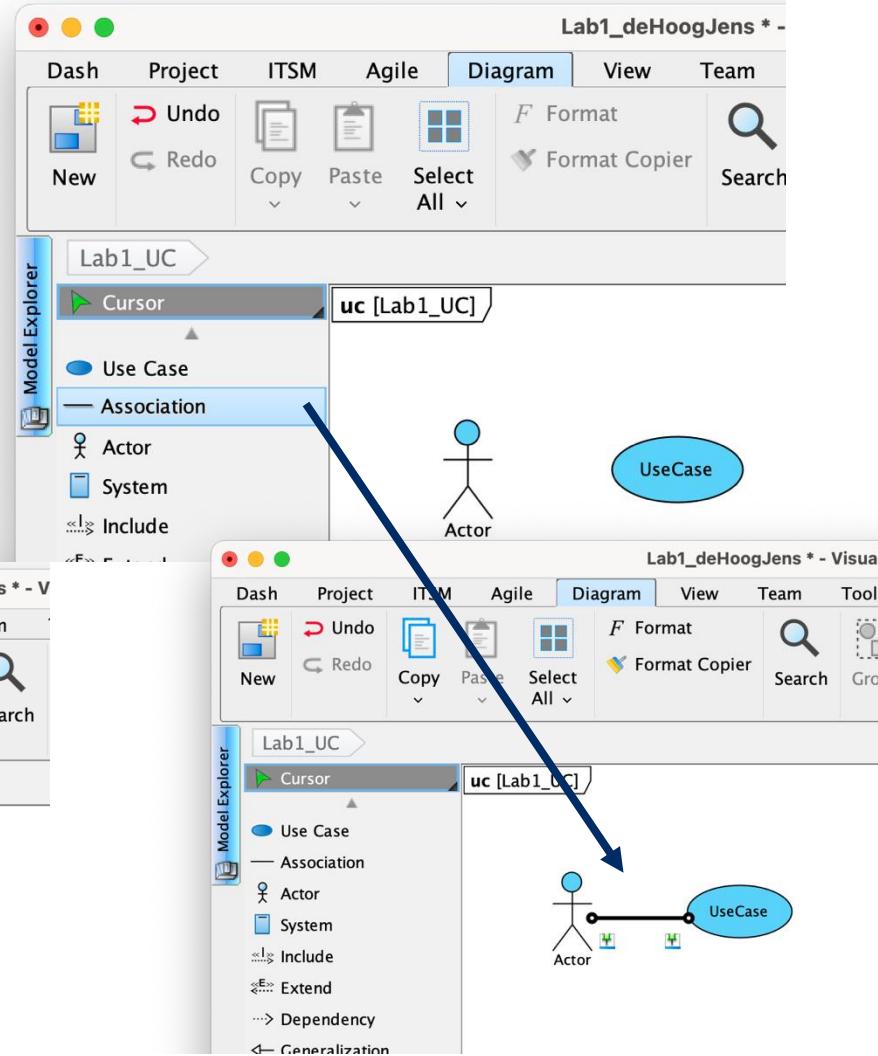
Add an actor



Add a use case



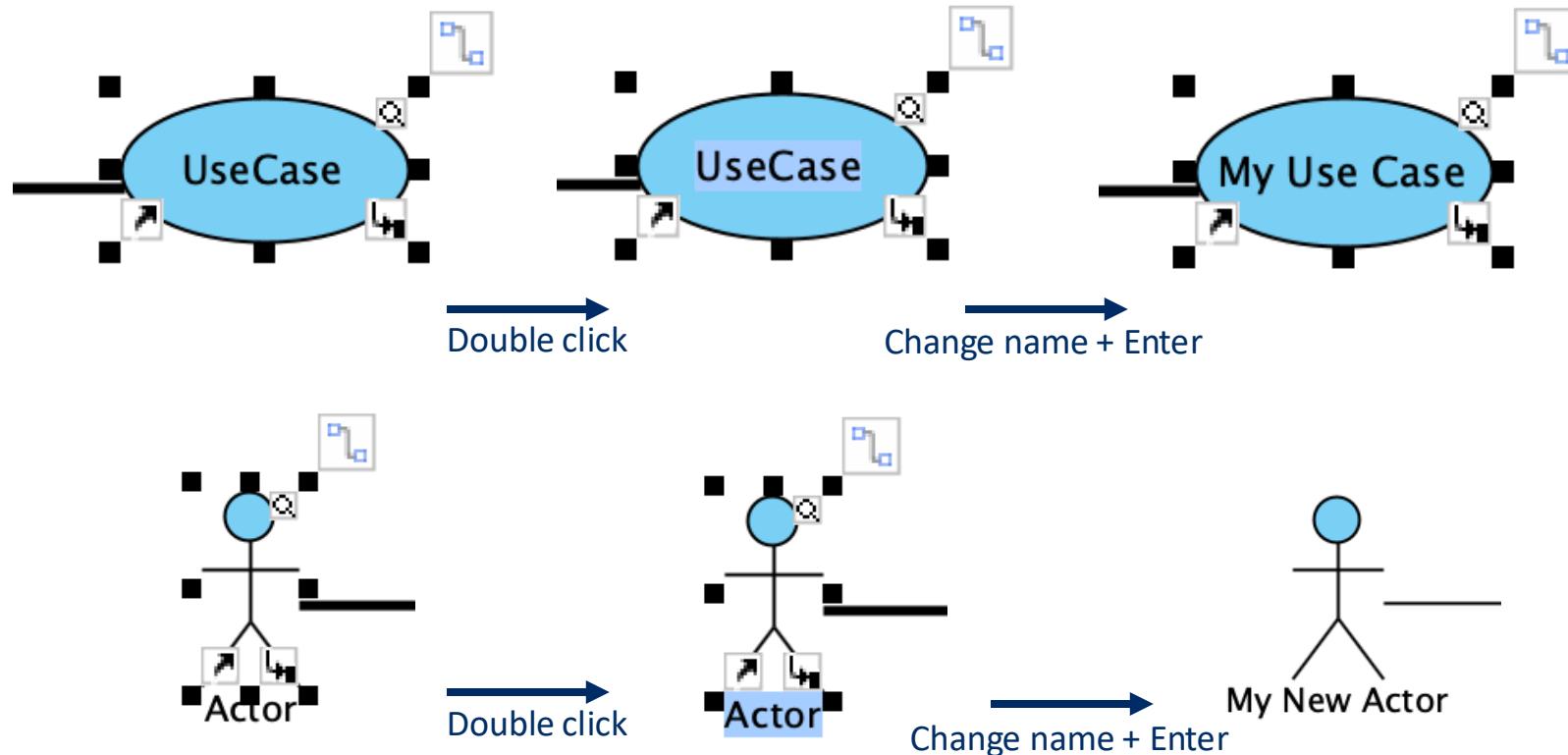
Add a relation



Usage of Visual Paradigm

Use case diagram

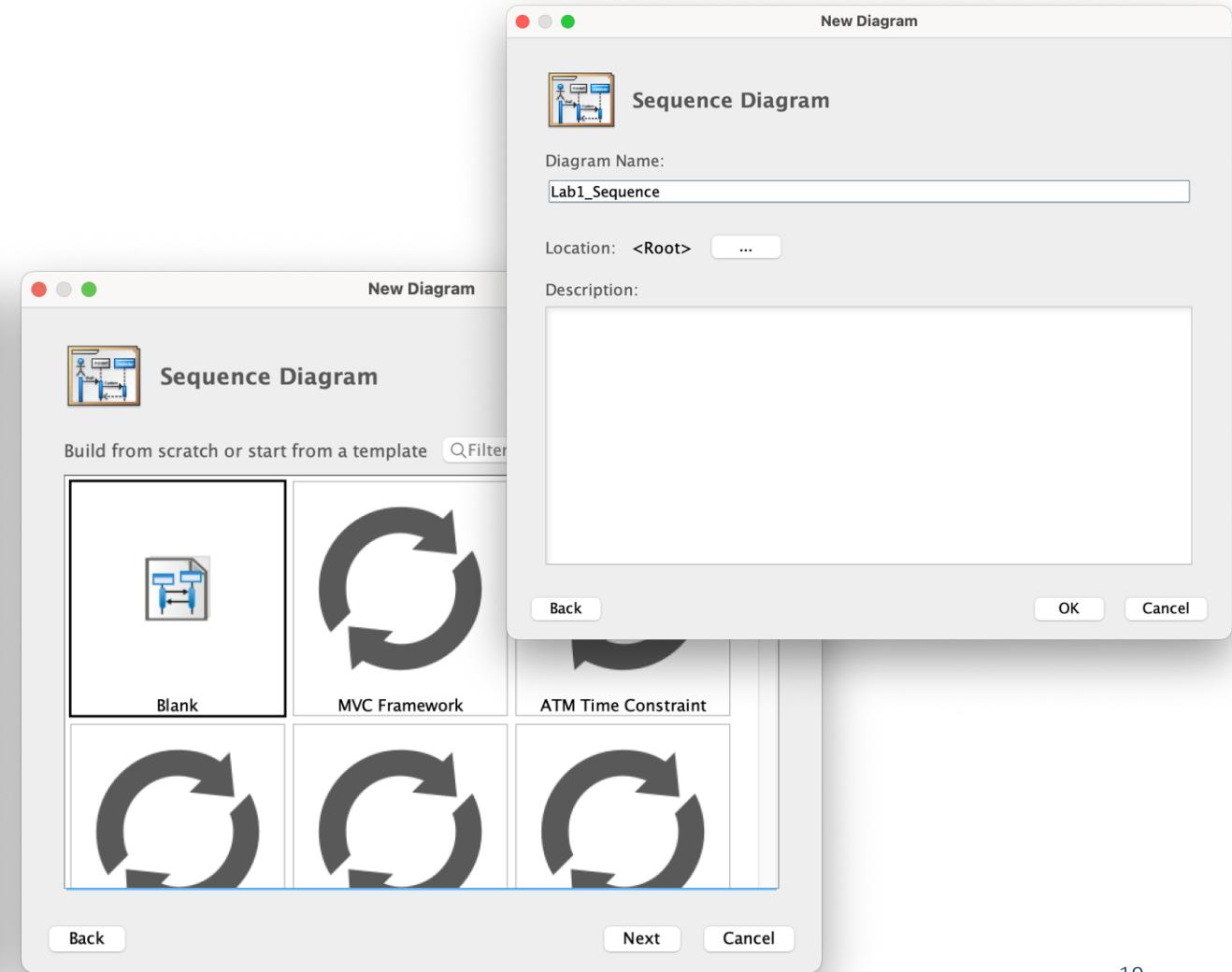
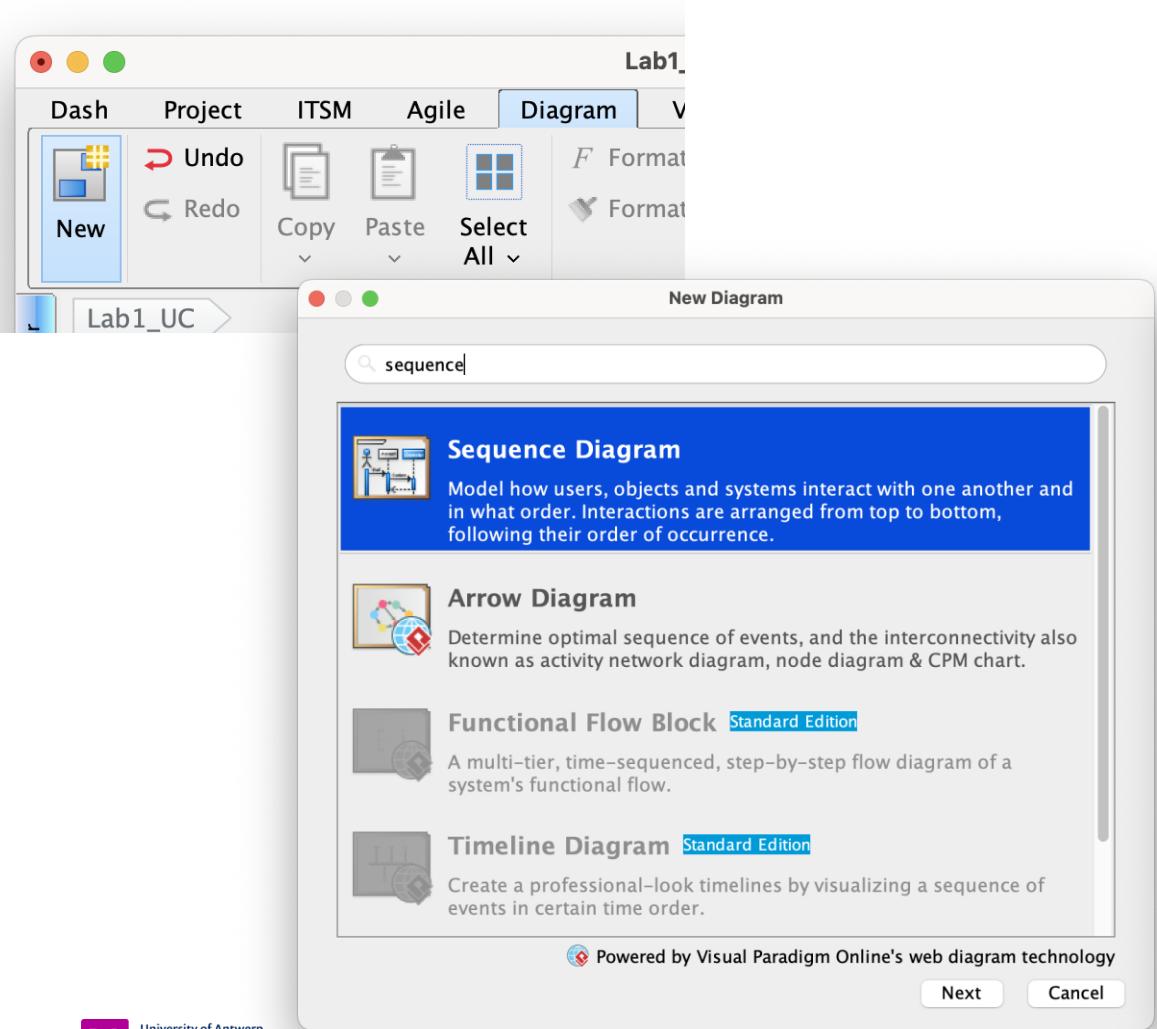
Changing names & parameters



Usage of Visual Paradigm

Sequence diagram

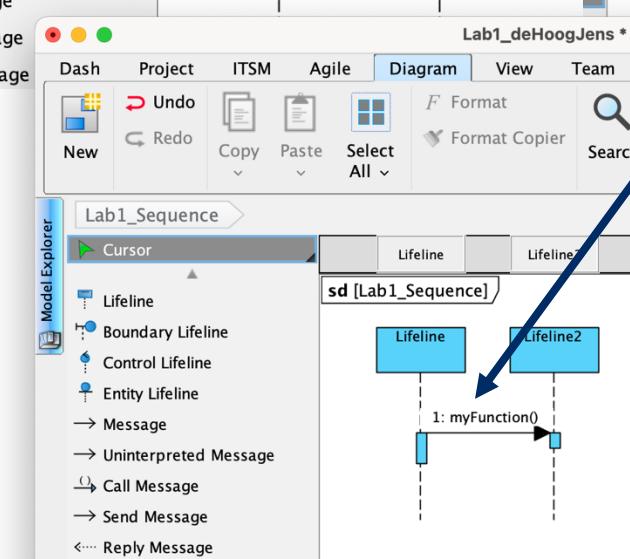
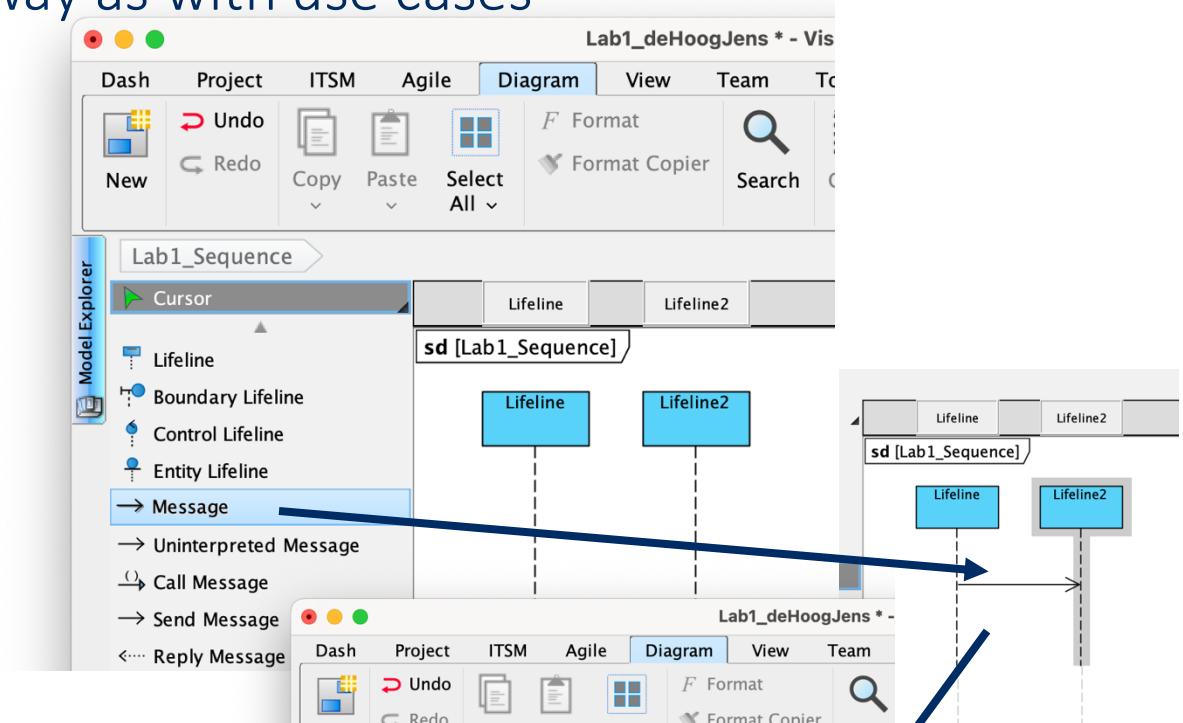
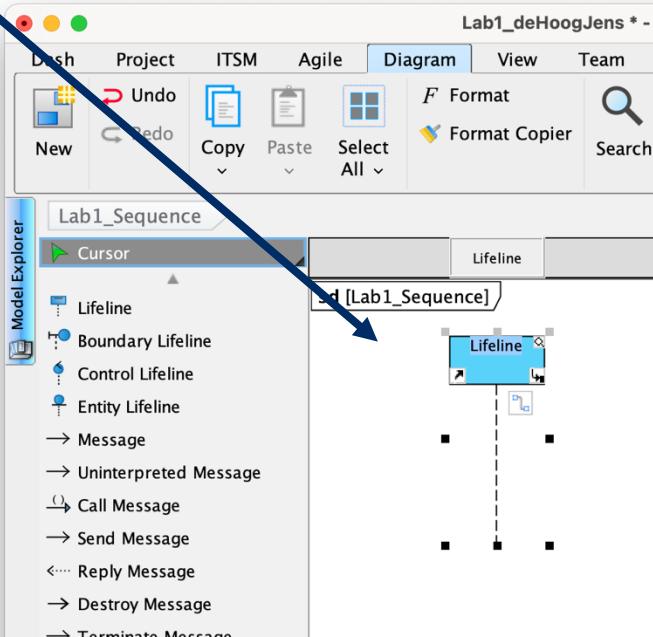
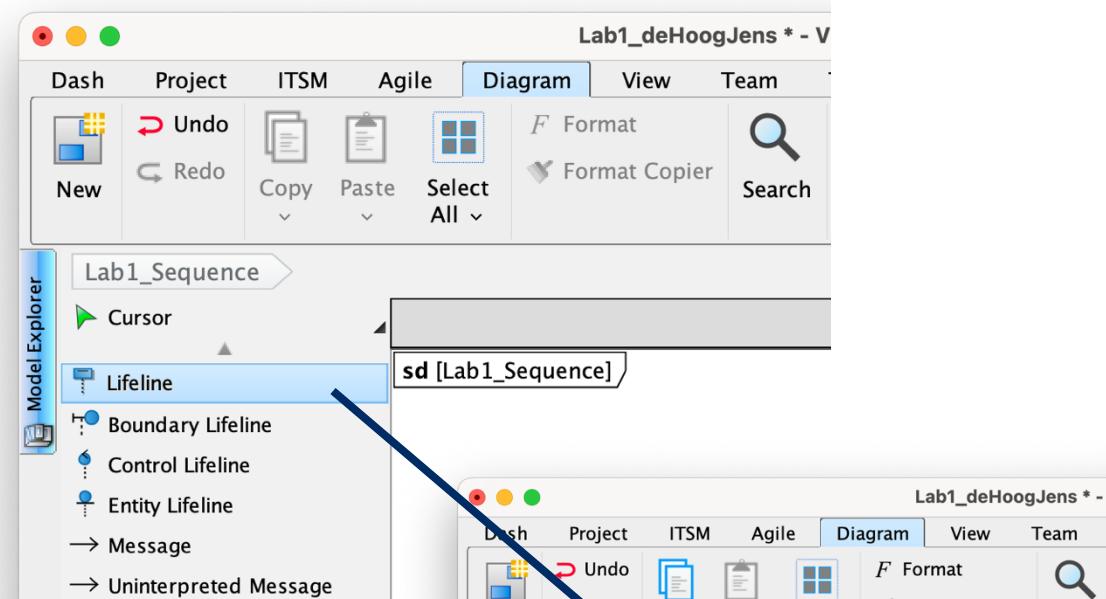
Adding and changing components in same way as with use cases



Usage of Visual Paradigm

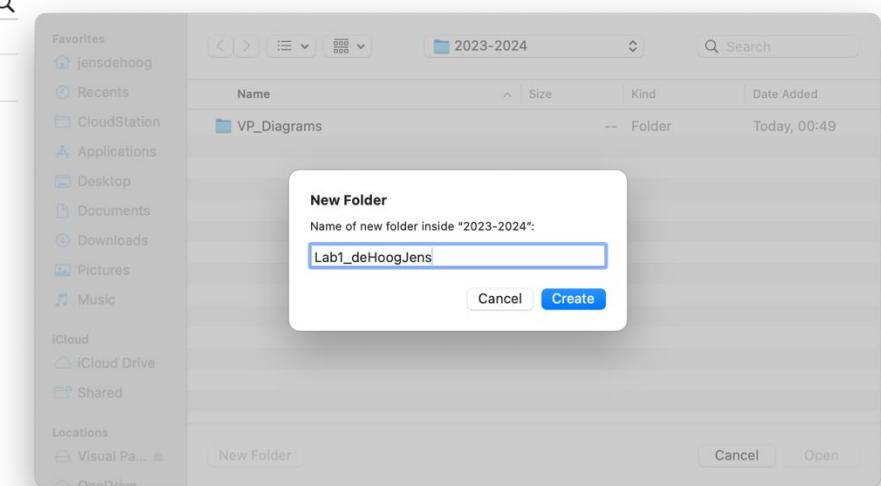
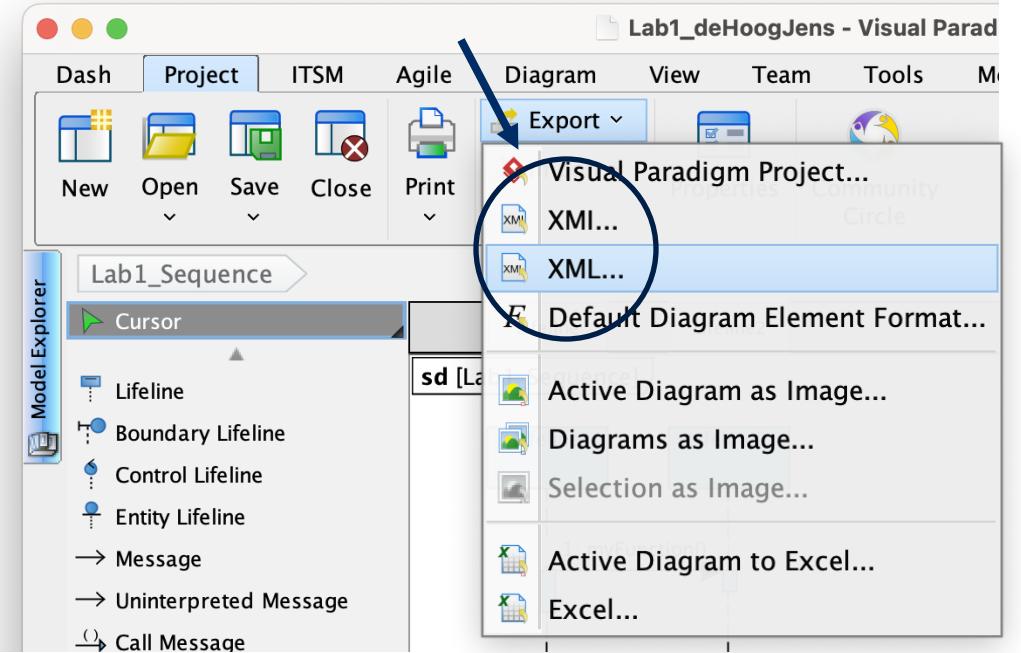
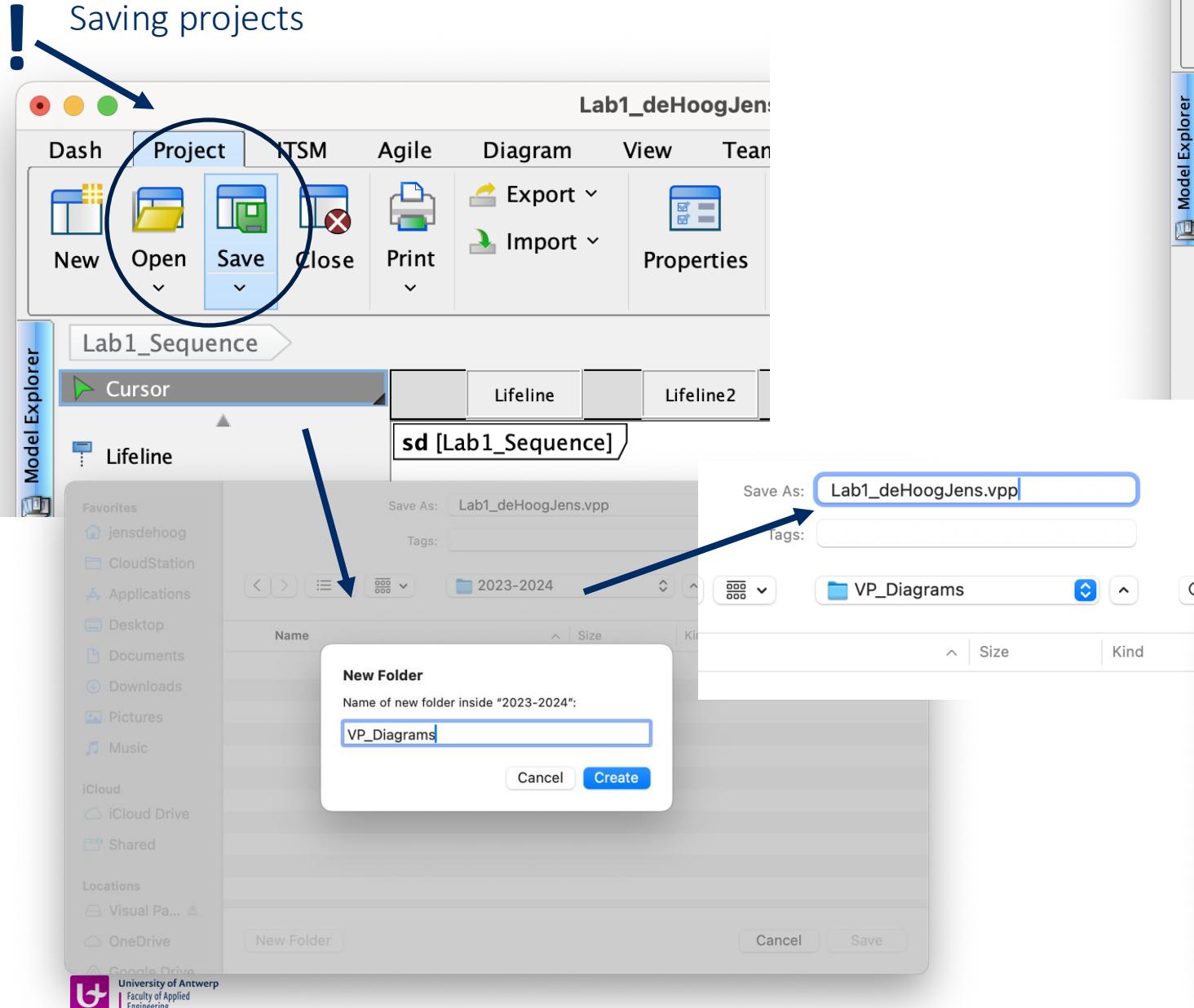
Sequence diagram

Adding and changing components in same way as with use cases



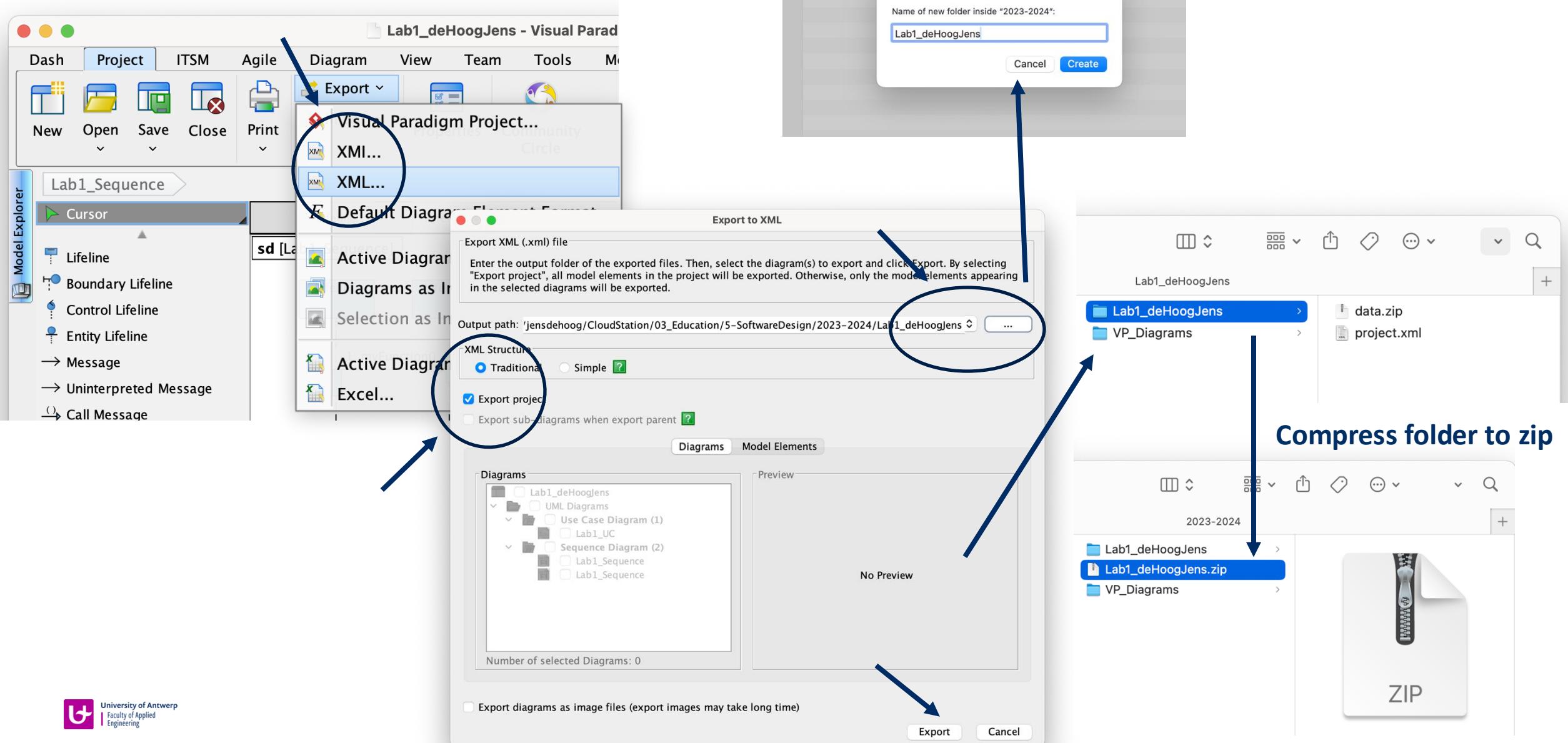
Usage of Visual Paradigm

Saving projects



Usage of Visual Paradigm

Exporting projects



Usage of Visual Paradigm

Importing projects

The screenshot illustrates the process of importing a project into Visual Paradigm. It shows the main application window with the 'Project' tab selected, and the 'Import' submenu open, highlighting the 'XML...' option. A large blue arrow points from this option to the 'File path' field in the 'Import XML' dialog box. The dialog box also contains several configuration options: 'Matching: By Internal ID (default)', two unchecked checkboxes ('Generate new ID for elements that don't exist in current project' and 'Maintain mapping for multiple imports'), and a checked checkbox ('Import project properties and project options'). A second blue arrow points from the 'Import' button in the dialog to a file browser window on the right. The file browser shows a folder named 'Lab1_deHoogJens' containing a file named 'project.xml'. The 'Import' button is highlighted with a red box.

untitled - Visual Paradigm Community Edition[Jens] (r)

Project ITSM Agile Diagram View Team Tools Modeling Window Help

New Open Save Close Print Export Import Properties Community

Visual Paradigm Project... Rose Project... Enterprise Architect... XML... XML... Default Diagram Element Format... ERwin Project (XML)... Rational Rhapsody Project... Rational System Architect... Rational Model... Rational DNX... PowerDesigner DataArchitect... Visual UML... Text Based Sequence Diagram... Excel... Visio... NetBeans UML Project... Web Diagram Files...

Welcome to Visual Paradigm

System Modeling Cloud Archi...

UML +

Design software system by drawing:

- Use Case
- Class
- Sequence
- Communication
- State Machine
- Activity
- Component
- Deploy
- Package
- Object
- Compo...
- Timing
- Interact...

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Jump start your design with diagram templates

Draw your own diagrams with predefined templates. Hundreds of templates are available. Visit our Community Circle for details.

Import XML

Import XML (.xml) file

Import XML exported from Visual Paradigm.

File path: /2023-2024/Lab1_deHoogJens/project.xml ...

Matching: By Internal ID (default)

Generate new ID for elements that don't exist in current project

Maintain mapping for multiple imports

Import project properties and project options

Import Cancel

Favorites jensdehoog

Recents

CloudStation

Applications

Desktop

Documents

Downloads

Pictures

Music

iCloud

iCloud Drive

Shared

Locations Visual Pa... OneDrive

Name

data.zip 4 KB ZIP archive Today, 00:57

project.xml 1,6 MB XML Today, 00:57

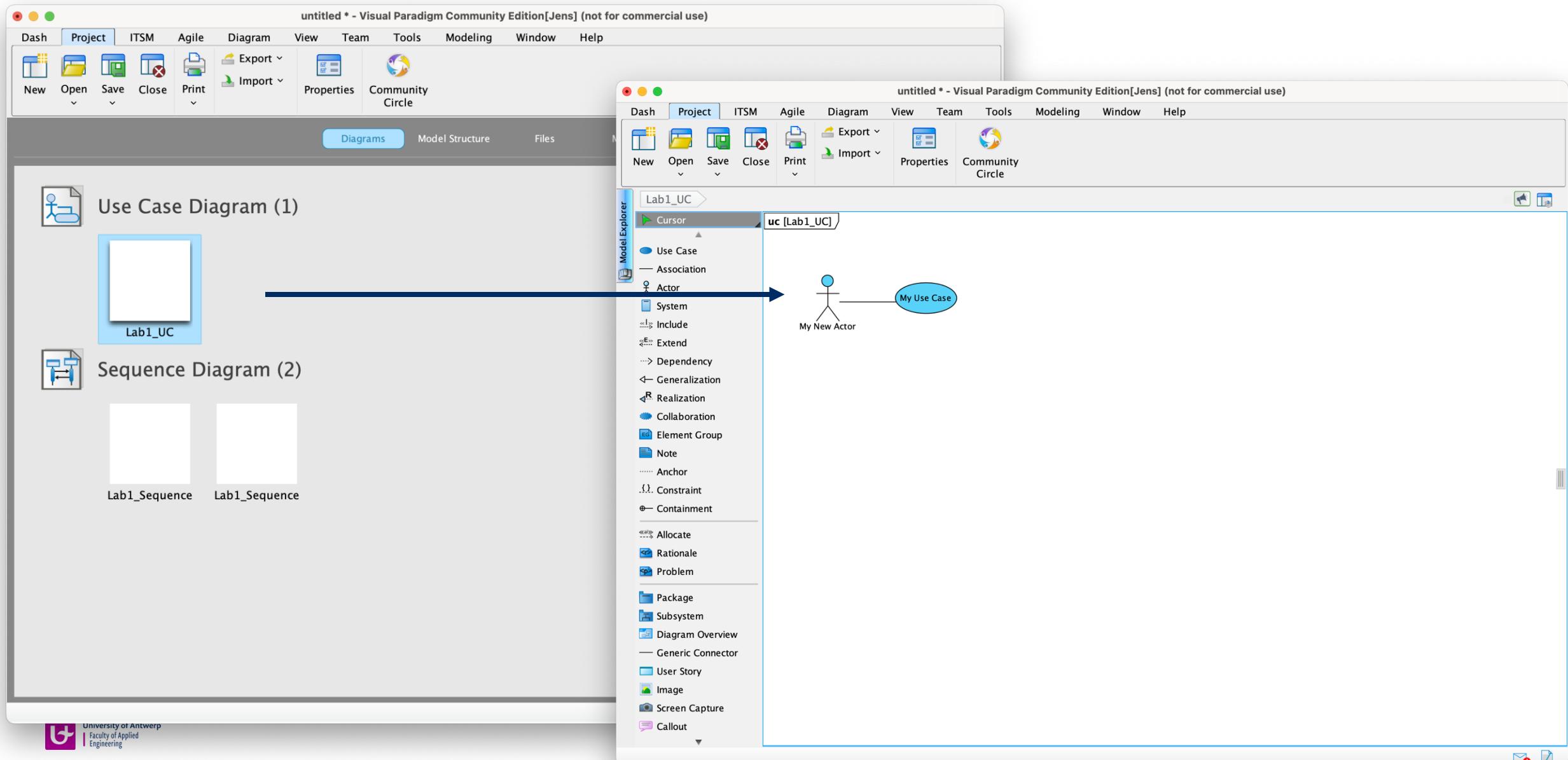
Search

Cancel Open

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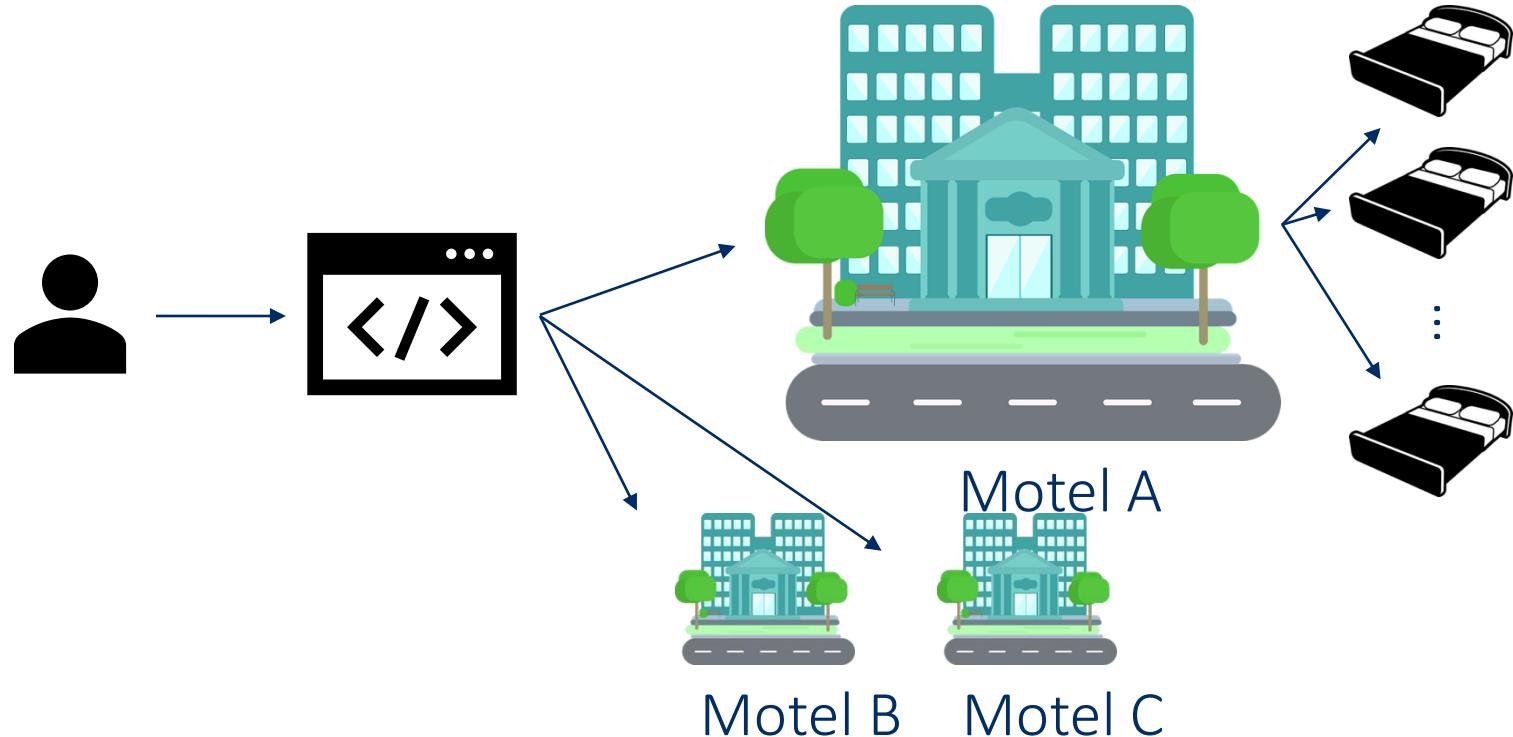
Usage of Visual Paradigm

Importing projects



Assignment

Simple motel booking system



- **Main features:**

- Find cheapest room in a hotel for a given date
- Book a room in a hotel on a given date
- Book a room in a hotel for a range of dates
- Book a room in the cheapest hotel for the range of dates

Assignment

Simple motel booking system

- **Goal**

- Given the code for finding the cheapest hotel (single date)
→ create sequence diagram
- Given the diagram for booking a room (single date)
→ fill in the necessary code
- Code and Diagrams for:
 - Booking room in hotel (range of dates)
 - Booking room in cheapest hotel (range of dates)
- Use Case Diagram of the features (see previous slide)

- **Note the following extras:**

- **Tests** (both unit & integration)
- Usage of **Maven** framework

Assignment

Simple motel booking system

■ Portfolio:

- 5SD_Portfolio_FirstnameLastname.zip
 - Code repository (all labs):
 - Filled in version of the student git repository
 - Exported Visual Paradigm project
 - Zip export of Visual Paradigm project, with all your diagrams in it (sequences & use cases)
 - AI Usage Document → for all labs

■ Feedback opportunity:

- Hand in intermediate portfolio on Blackboard
- Not evaluated; only for getting feedback
- Deadline: 06/11/2025 at 23:59

