RAMDE - Engenharia Orientada a Requisitos e Modelos

Project - Assignment 5
Integrative Assignment

Paulo Maio
(pam@isep.ipp.pt)

Mestrado em Engenharia de Sistemas Computacionais Críticos (MESCC)

Instituto Superior de Engenharia do Porto (ISEP)
Politécnico do Porto (P.PORTO)

2024-2025

isep Instituto Superior de Engenharia do Porto

P.PORTO

Outline

Outline

Required: Team and Project Repository

It is the same team and repository for all the assignments.

1. Have you already formed a team (2 students) to develop the project?
   - NO!!! What are you waiting for...
2. Have you already informed the teacher by email of your team?
   - NO!!! Do it ASAP to "pam@isep.ipp.pt"
   - Do not forget to had your team mate(s) in "cc"
3. Did you receive the link/invitation to the assigned team project repository?
   - NO!!! Please, contact the teacher reporting this issue (if necessary)
4. Did you check that you have read/write access to the assigned team project repository?
   - NO!!! Do it ASAP
   - Please, contact the teacher in case you do not have read/write access to it

When you answer "Yes" to all these questions, then you are ready to proceed.

Software and Tools

Before proceeding to the assignment tasks, ensure that you have the tools required on previous assignments (P1 to P4) installed and properly operational.

The required tools include:

- **Eclipse Papyrus**
- **Eclipse Modeling Tools**
  - With **OCL Support** features
  - With **Acceleo** features
- Maven and Maven Plugin for Eclipse
- Java IDE (e.g.: Eclipse) and a (recent) Java Virtual Machine (e.g.: >=17)
- Git
- Bitbucket account registered with ISEP email

Outline

General Purpose

The general purpose of this assignment is to **apply the knowledge acquired** during the previous assignments **to a larger problem**.

As so, it is important that you have completed previous assignments (P1 to P4) before proceeding to this one.

Assignment Tasks

1. Propose / select a problem to be modelled using SysML
2. Model the Problem, including:
   a. Initial set of **requirements** (e.g.: stakeholder needs, mission statements)
   b. **Black-box** and **White-box** perspectives
   c. **Measure of Effectiveness**
   d. Requirements **Traceability**
3. Model the Solution, including:
   a. **(Sub-)System requirements** resulting from the modelled problem
   b. **High level architecture(s)**
   c. Some **behaviour** using at least one state machine
   d. **Measure of Effectiveness**
   e. Requirements **Traceability**
4. Analyze Safety and Reliability
   - Considering possible hazards/failures and mitigations actions
   - Reflecting analysis output while modelling the problem and the solution
5. Generate/Implement code for the state machine(s) modelled in the solution
6. Write automatic tests for your code
7. Report your work
8. Commit the work (all the developed artifacts) into your repository

Assignment Tasks: Other Requirements

1. Define a common **glossary**
2. Use **EARS** to write the requirements
3. Model requirements using different perspectives (i.e.: functional, behavioural and data)
4. Make sure that your requirements (models) meet **standard quality criteria**
5. Adopt design, code and testing **best practices and principles**
6. As possible, apply / use well-known standards / practices
7. Reporting:
   a. Explain the process followed to develop the model and the diagrams
   b. Include images of the main diagrams and explain them
   c. Describe some modelling and implementation (i.e. code and tests) alternatives
   d. Explain how tasks were divided by the team members

Team Work - Alert!

Have in mind that:

- **Every team member** should know about **all** aspects of the assignment
- **Recommendation:** every team member **must have** activities in all assignment tasks / concerns
- Commits are **evidences** of the developed work
- The team must **report** about **how the tasks were assigned** to the team members
- Each team member must **report about his/her tasks**

Problem Proposal / Selection - Some References

For proposing / selecting the problem to be addressed on this assignment, **the team should search for possible examples of problems in bibliography**.

For instance, the problem examples mentioned on:

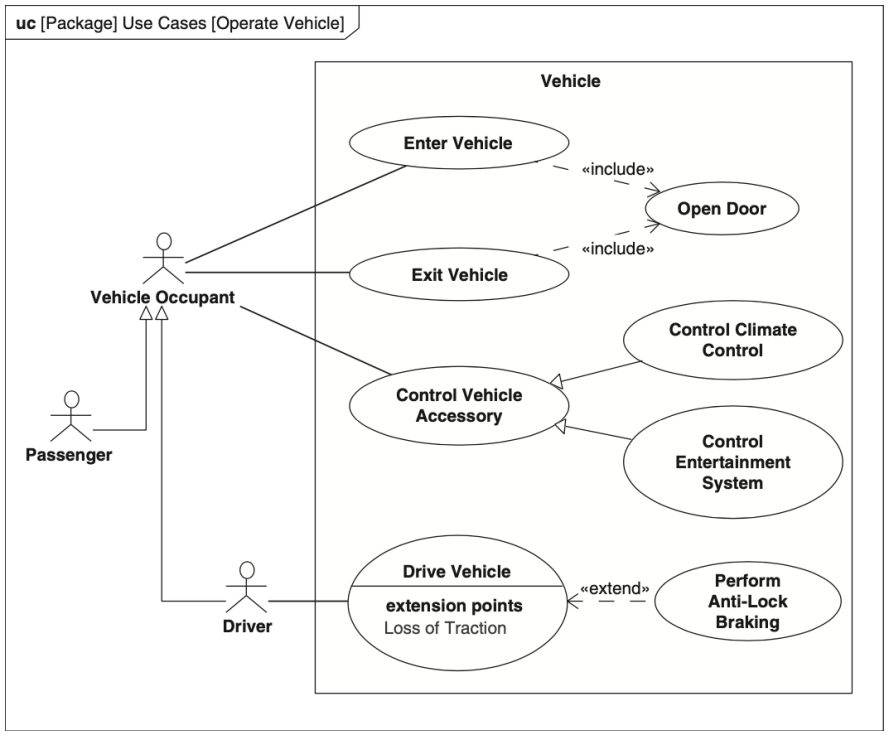
- The book **"A Practical Guide to SysML - The Systems Modeling Language"** [2]
  - Sanford Friedenthal, Alan Moore, and Rick Steiner. 3rd Edition. MK/OMG Press, 2015. ISBN: 978-0-12-800202-5. DOI: https://doi.org/10.1016/C2013-0-14457-1.
- The SysMLForum on `https://sysmlforum.com/examples/`

- When in doubt, check with the teacher if the problem is feasible/acceptable
- Next slides briefly present a few examples extracted from [2]

Problem Example - Automobile System

From [2], chapter 4:

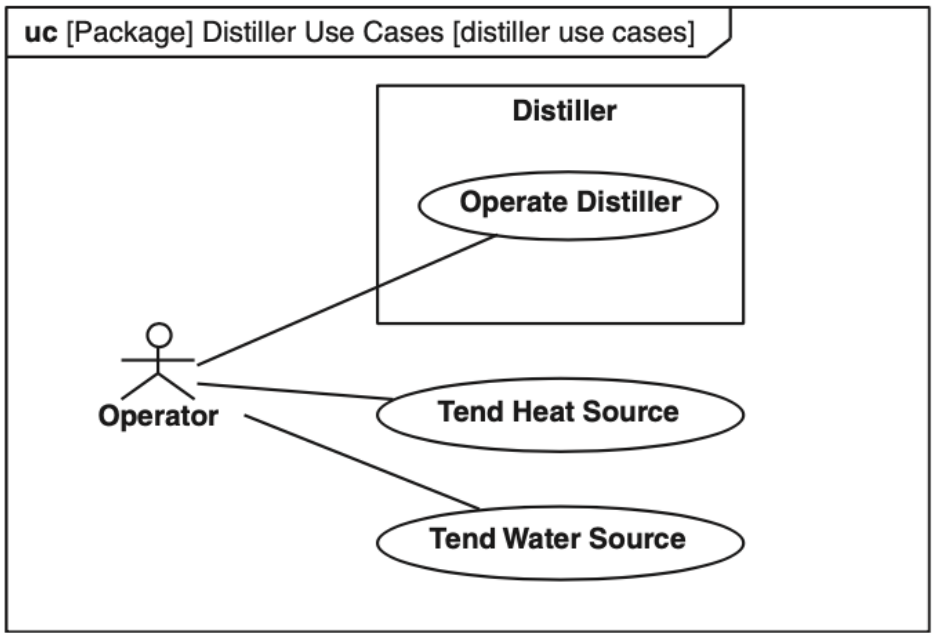
> *[...] the need to increase the automobile's acceleration and fuel efficiency from its current capability. [...] selected aspects [...] are considered to support an initial trade-off analysis. [...] included evaluation of alternative vehicle configurations that included a 4-cylinder engine and a 6-cylinder engine to determine whether they can satisfy the acceleration and fuel efficiency requirement.*



Problem Example - Water Distiller

From [2], chapter 16:

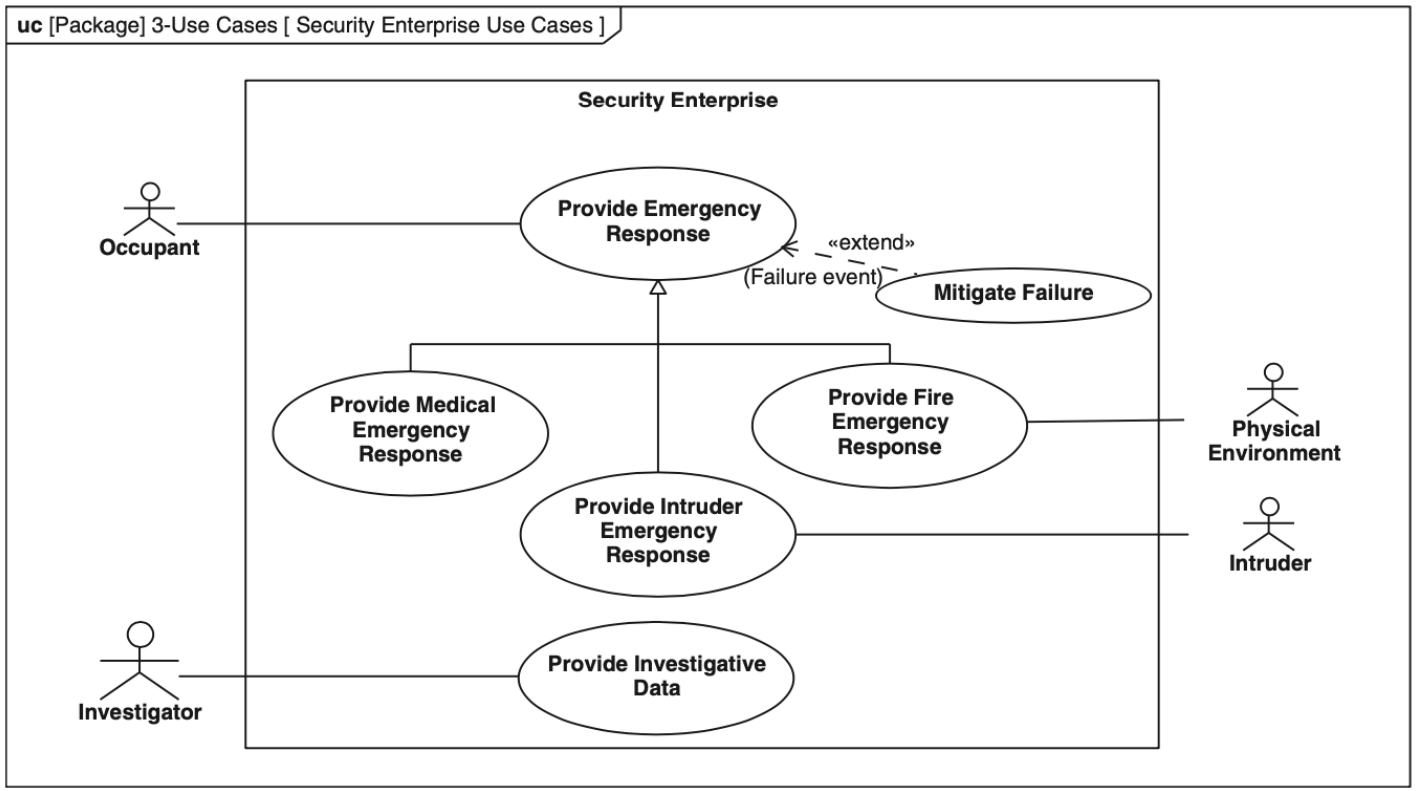
> *[...] needs of a humanitarian organization [...] providing safe drinking water [...] in impoverished parts of the world. [... It] would like explore the viability of developing and deploying a large number of extremely simple water distillers, of a common design which is both economical to build, and adaptable to use the variety of energy sources anticipated in remote areas.*



Problem Example - Residential Security System

From [2], chapter 17:

> *A company [...] has been providing residential security systems [...] intended to detect potential intruders. [...] however, their sales have significantly dropped and [...] has become evident [...] their current system is becoming obsolete [...] they have decided to launch a major initiative to develop an enhanced security system (ESS) that is intended to help regain their market share.*



Outline

Project Assignment(s) Deadline(s)

Project assignments are drawn up to be developed by students in a sequential order, i.e., first students develop assignment P1, then assignment P2 and so on...

The foreseen project assignments schedule is depicted in the following table:

Part	Assignment	Release Date	Deadline
1	P1	2024/09/23 (W2)	2024/11/03 (W7)
	P2	2024/09/30 (W3)	2024/11/03 (W7)
	P3	2024/10/14 (W5)	2024/11/03 (W7)
	P4	2024/10/28 (W7)	2024/11/03 (W7)
2	P5	2024/11/04 (W8)	2024/11/24 (W10)

Unless stated otherwise, these deadlines must be honoured.

References & Bibliography I

[1] Alexandre Bragança. *Lectures Handouts on Requirements and Model-driven Engineering (RAMDE) 2023/24*. 2023.

[2] Sanford Friedenthal, Alan Moore, and Rick Steiner. *A Practical Guide to SysML - The Systems Modeling Language*. 3rd Edition. MK/OMG Press, 2015. ISBN: 978-0-12-800202-5. DOI: https://doi.org/10.1016/C2013-0-14457-1.

Q&A

Questions?

Q&A

Questions?

Thank You!