



ID2207 - Modern Methods in Software Engineering

Homework 1

September 2025

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Problem Description:

An IT company would like to automate the communication between the developers and their managers through an internal system that can be used to manage the communication workflow. A functionality required for this system is to manage the **salary raise requests**. Developers can send a salary raise request to the manager who checks the performance reports of the developers and the priorities of giving raises among the colleagues. If everything is okay, the manager sends this request to the Financial Manager who will be responsible for evaluating if the budget allows for a raise to this developer at the current time. The figure illustrates the described functionality.

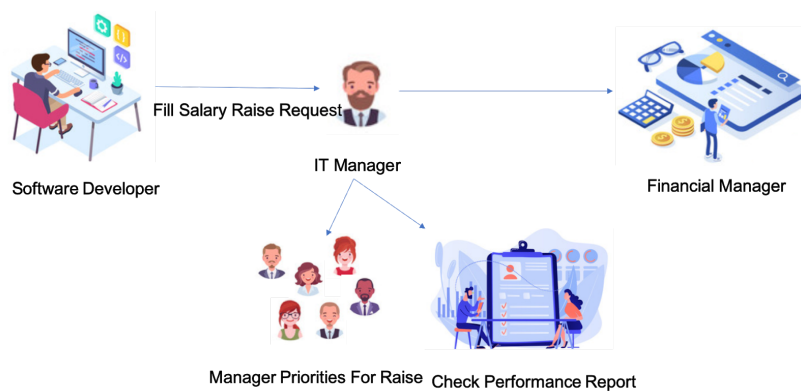


Figure 2: Manage Salary Raise requests

Please notice that the objective from these figures is to give you a general idea about the functionality in the system. For more details, please refer to the detailed description in each question.

Question 1: Use Case Diagrams

Write a **use case description** and draw a **use case diagram** for the **Manage Salary Raise Request**, taking into consideration the following details:

- ❑ Both developer, manager and financial manager should be registered in the new system and should be able to login and access the system. Ignore the registration use case for this question.
- ❑ The manager checks if there are no problems with the performance report of the developer and checks if there are no conflicts in priorities for raise between the team members. The application might be rejected if there are conflicts in any or both of the points.
- ❑ If the application was approved, the Financial manager will be responsible for checking if the budget allows for approving the raise at the current time. Sometimes, Financial manager might need to make the raise effective at a later date depending on the budget.



- ❑ Both <include>, <extend> and generalization must be used in your diagrams.

Question Two: Class Diagrams

In cases when the manager finds that there is a conflict (problem in performance, insufficient budget (Finance) or priority among colleagues) for salary raise requests, he/she can create a negotiation template where the system lists the conflicts, and possibly list the other submitted raise requests from other team members to show the priorities. This template means that the manager is explaining the reasons for not approving the request and giving a chance to the developer to negotiate.

Draw a **class diagram** that presents the negotiation template. Here are more details:

- ❑ Performance report summary can be presented as a separate class with the following fields: developer name, a collection of (task id - completion percentage - task performance score).
- ❑ Priority can be presented as a separate class with the following fields: requester name, requester application date and application priority.
- ❑ Aggregation and/or composition relationships must be used.
- ❑ Negotiation template has an id, date, requester name, negotiator name, status and suggested reschedule date.
- ❑ History of negotiation can be presented as a collection of date of return and reason of return.
- ❑ The manager can optionally add the priority parts.

Question Three: Sequence Diagrams

In emergency cases, doctors can use the system to request nurses to arrive immediately to a certain room. The doctor can enter the room number in a form and he/she may choose to send the request to a group of nurses by SMS.

Draw a **sequence diagram** for the following scenario:

scenario name	RequestNursesForEmergency
Participating actor instances	<u>James</u> : Doctor <u>John, Sam</u> : Nurses
Flow of events	<ol style="list-style-type: none">1. James logs in to the system and chooses to create a new emergency request.2. James selects names of nurses, enters the room number and chooses to send the application.3. System activates the SMS function and lookups the contact details of the requested nurses.4. System sends sms messages to the selected nurses.5. John and Sam receive a message notification on their mobile phones.6. John and Sam go directly to the room number mentioned in the SMS message.



Question Four: Activity Diagrams

A hospital has a main branch which has medical materials in its local store. Sometimes, when there is a need to request some resources, a specific employee uses the system to request items from the main branch (as you have seen in the tutorial). If the items are available, the employee sends an order to the delivery department to deliver the package to its branch. Otherwise, they request the items online, and change the status of the request to be in the waiting list (Pending). In the tutorial you worked on an activity diagram that visualizes the described procedures.

Draw an **activity diagram** that visualizes the process of **online ordering of the materials** in case they are not available locally. Consider using an **online system**, **payment gateway**, **delivery department** and an **employee** in the main branch. Consider the following special cases:

- a. The requested materials are not available in online systems.
- b. The wrong materials were ordered (wrong package delivered)
- c. The delivery man didn't reach the address and he/she returned the package.
- d. Use parallel flows where possible.

The business of this homework is not based on real case, so use your imagination in the solutions to develop your skills in UML !