



ID2207 - Modern Methods in Software Engineering

Tutorial 1 (Solutions)

September 2025

Tutorial 1

Problem Description:

In an IT company, software developers usually have to manage their vacations with their direct manager. There might be possible schedule conflicts for important project deliveries and priorities among the colleagues. The 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. The system should be able to retrieve schedules of all projects deadlines and order the vacation requests according to date of request and priorities. Figure 1 illustrates the usual communication process.

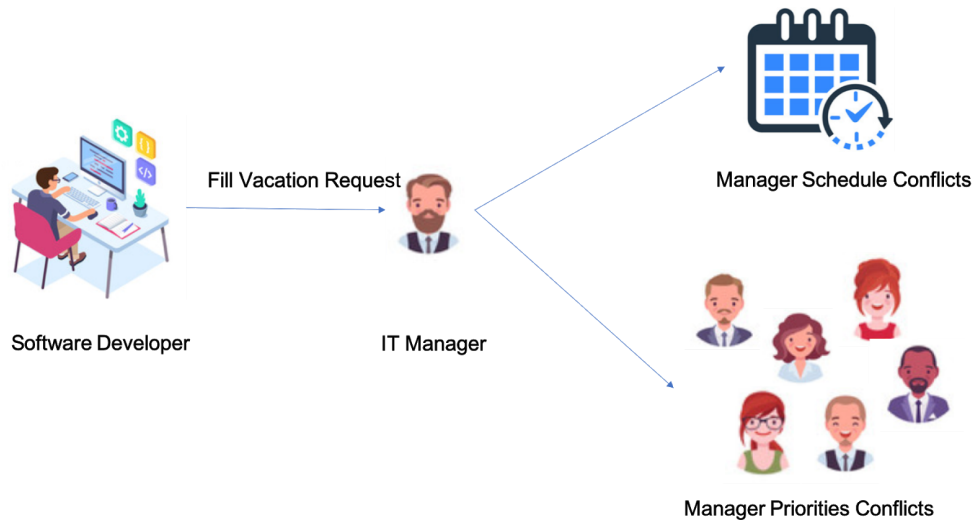


Figure 1: Manage vacation requests

Another 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. Then 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. Figure 2 illustrates the described functionality.

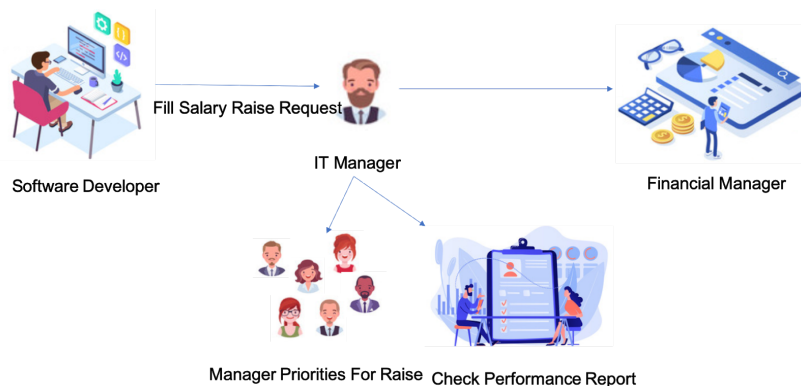


Figure 2: Manage Salary Raise requests



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.

The homework questions are based on the described business case with some additional details in each particular question.

Question 1: Use Case Diagrams

Tutorial Part:

Write a use case description and draw a use case diagram for the “Vacation Request” case, taking into consideration the following details:

- ☐ Both software developer and the 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 example.
- ☐ The application can be approved or rejected. In some cases, it can be suspended for further negotiation.

Solution:

Identified roles in this business are:

| Role | Responsibilities |
|-----------|---|
| Developer | a. Filling vacation requests with required details |
| Manager | a. Reviewing, approving or rejecting applications b. Negotiating the application when possible |

Identified use cases in this business:

- a. Login
- b. ValidateUser
- c. CreateVacationRequest
- d. ReviewApplication
- e. CheckSchedule
- f. CheckPriority
- g. FinalizeApplication

Some exceptional use cases:

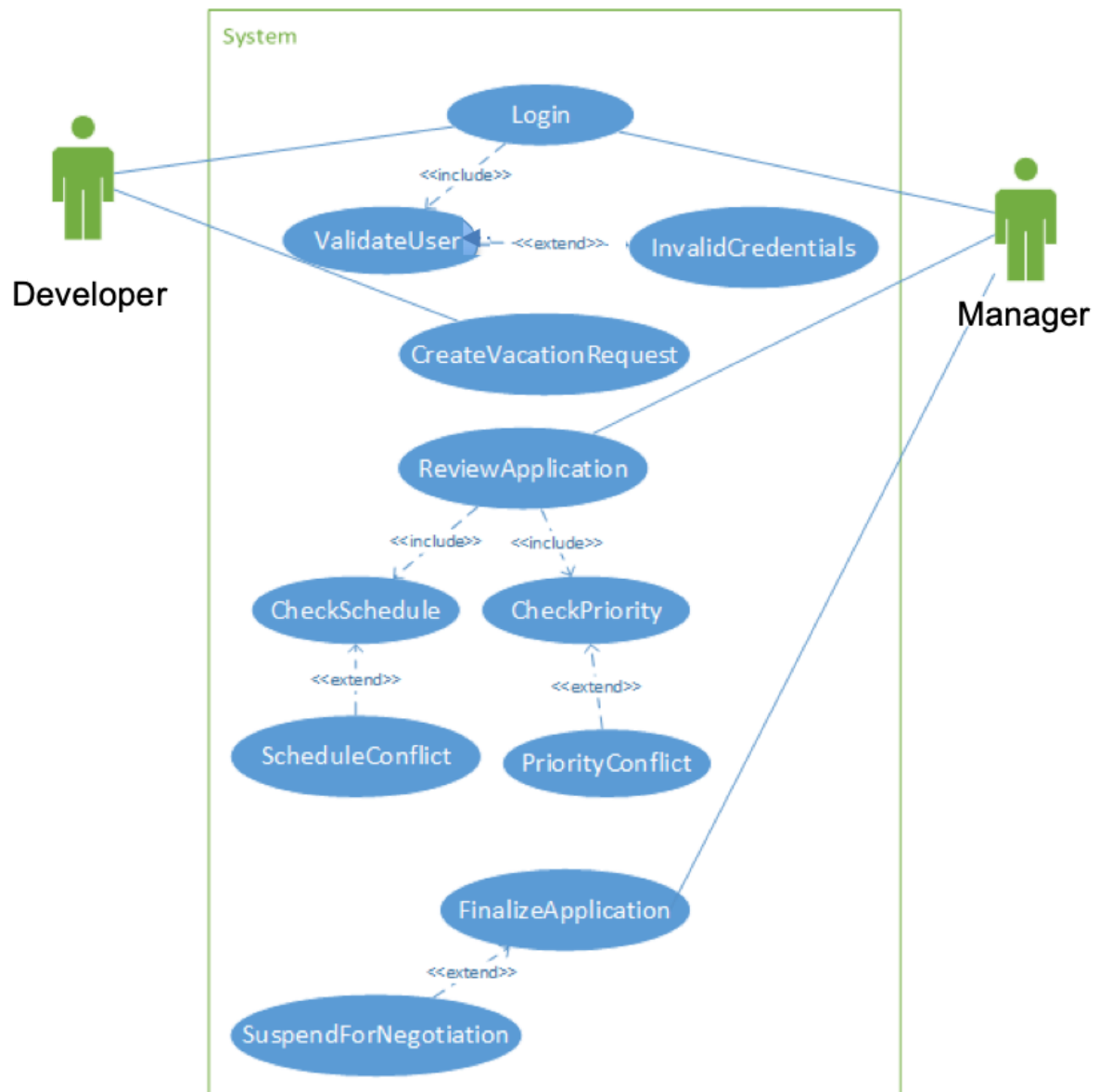
- a. InvalidCredentials
- b. ScheduleConflict
- c. PriorityConflict
- d. SuspendForNegotiation



Use case description:

| |
|--|
| Name: ManageVacationRequests |
| Participating actor(s): Developer (Initiator) Manager |
| Entry Conditions: <ol style="list-style-type: none">1. Developer logs in to the system.2. System validates the developer credentials.3. Developer accesses the create vacation request functionality <p>This use case extends InvalidCredentials, ScheduleConflict, PriorityConflict, and SuspendForNegotiation use cases. They are initiated when the login credentials are invalid, or when there is a conflict in the schedule for the requested period vacation, or when there are other developers who requested vacation in the same period and the developer has no priority, or when the application needs to be suspended for further negotiation.</p> |
| Exit Condition: Developer and Manager have agreed whether to approve, cancel or negotiate the vacation request. |
| Quality Conditions: The system should be available and functioning without unexpected interruptions. |
| Event Flow: <ol style="list-style-type: none">1. Developer chooses to create a new vacation request application.2. System displays the requested form.3. Developer fills the application with the required date, and reason for vacation.4. Developer chooses to send the application to the manager.5. System displays the new request to the manager.6. Manager reviews the application and chooses to review the schedule.7. System displays the schedule to the manager.8. Manager chooses to review the vacation priorities for the other developers.9. System displays the list of vacation requests to the manager.10. Manager reviews the application and chooses to approve, reject or suspend the application.11. System displays the result of the request to the initiator developer. |

Use Case Diagram:

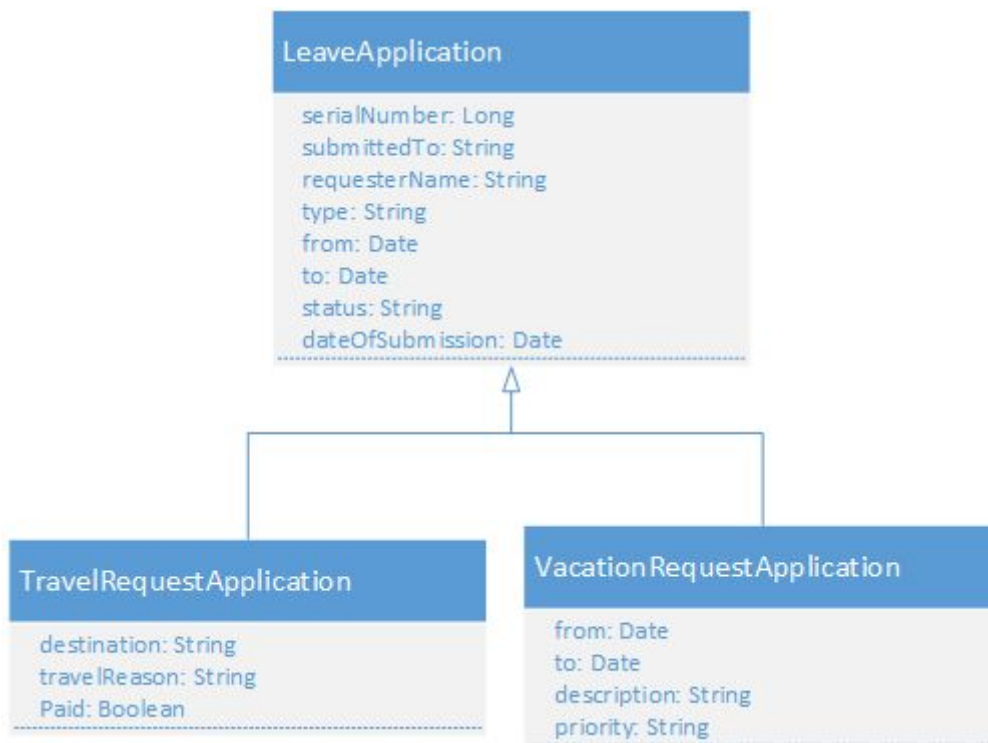


Question Two: Class Diagrams

Tutorial Part:

In the first question, you have seen that the developed system has a request which might be a vacation request. Additionally, there is also a travel request functionality in the system. Both the vacation and the travel requests have a serial number, name of requester, name of the person to whom it is submitted, request type (vacation or travel request), and date of submission. Vacation request has other specific fields such as: vacation reason, priority, duration of vacation (From - To). Travel request has destination, travel reason, (From -To), and information whether it is paid by the inviting organization or not. Each request has a status (initiated, approved, rejected, under negotiation).

Draw a class diagram that presents the applications in the system.



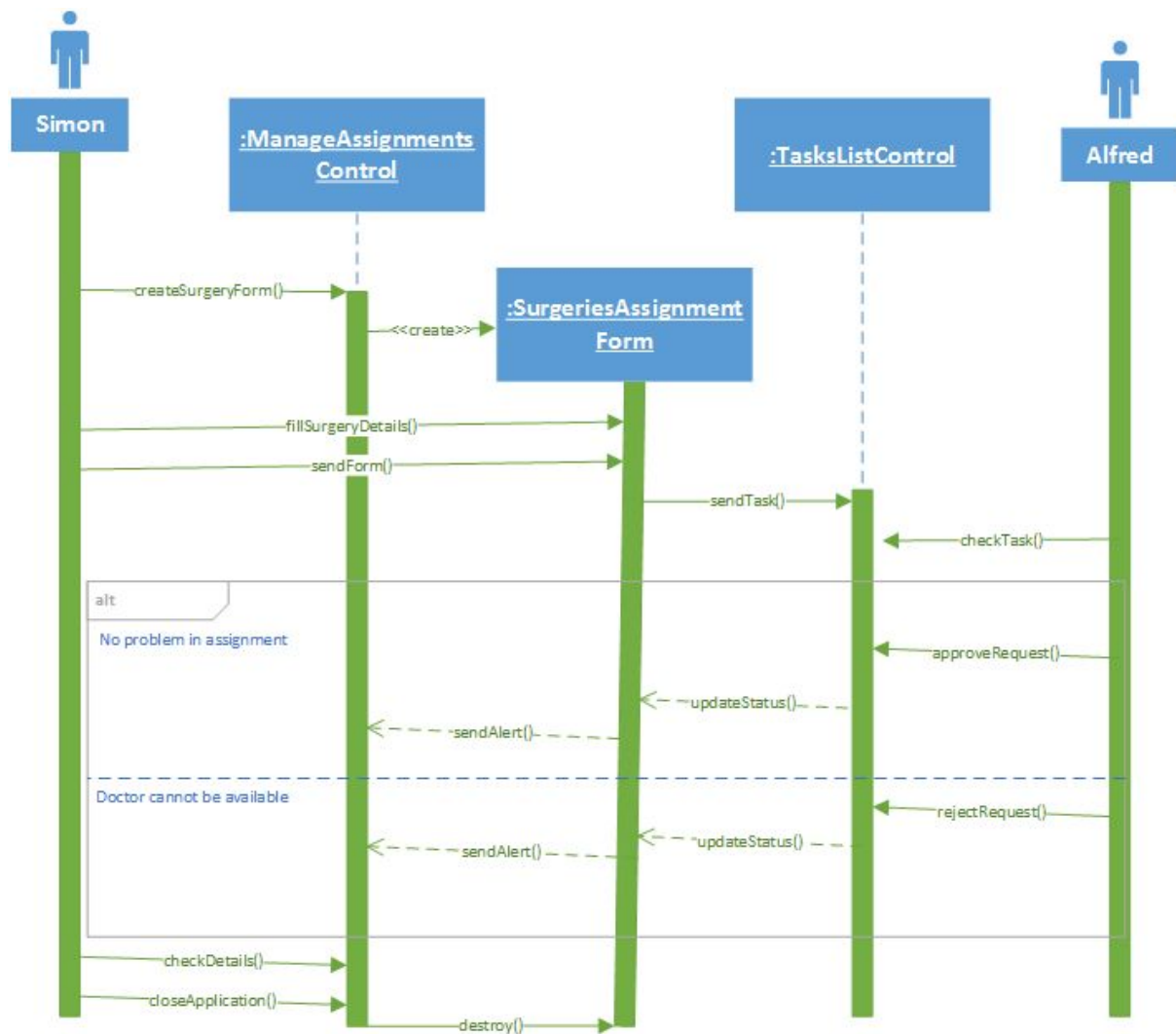


Question Three: Sequence Diagrams

Tutorial Part:

Draw a sequence diagram for the following scenario of the “**Assign doctor to a surgery**” use case:

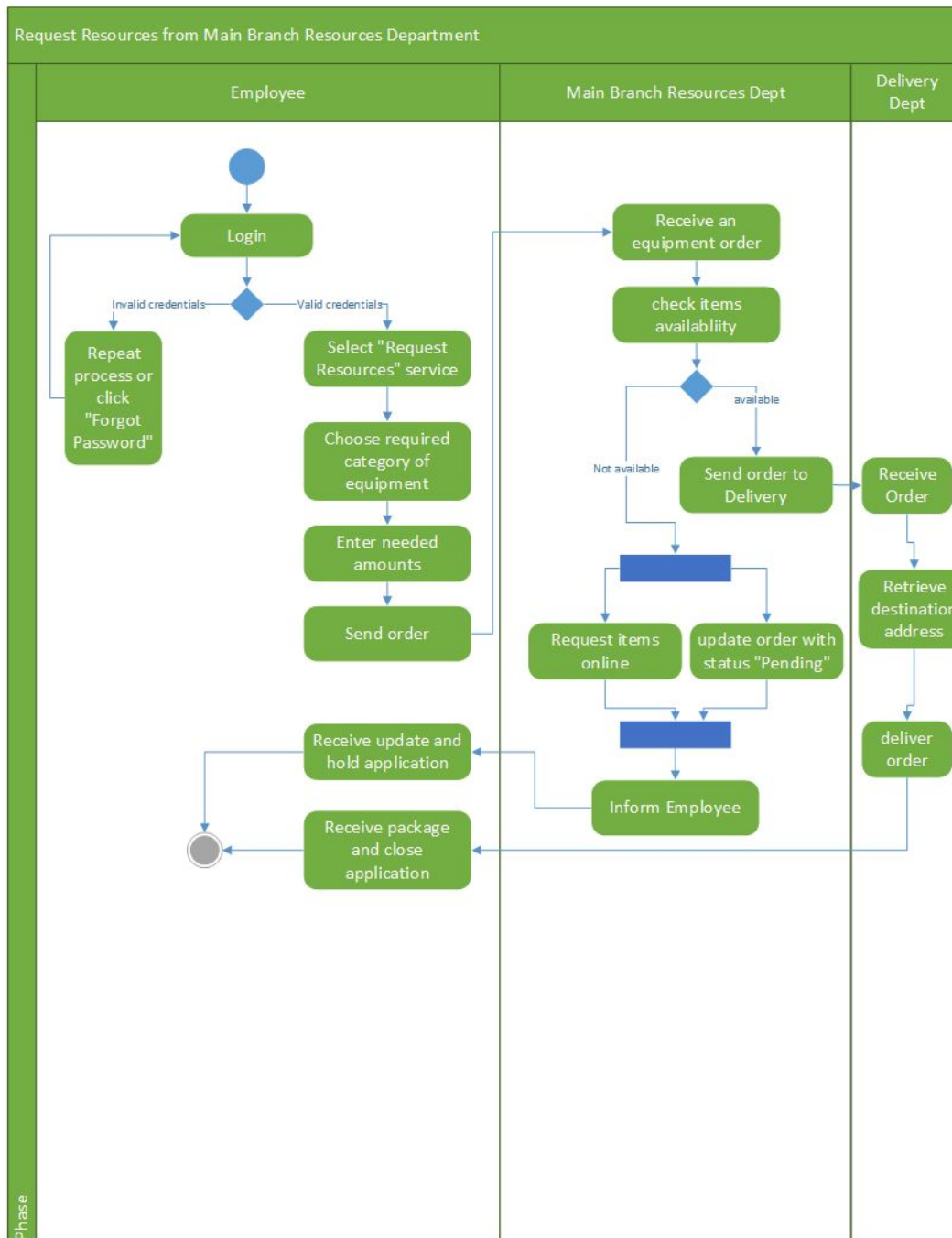
| | |
|--------------------------------------|--|
| scenario name | AssignDoctorToASurgery |
| Participating actor instances | <u>Alfred</u> : Doctor <u>Simon</u> : HeadOfUnit |
| Flow of events | <ol style="list-style-type: none">1. Simon logs in to the system and chooses to create a new surgery assignment request.2. Simon selects “Alfred” to be assigned to the surgery, and he fills the other required details in the assignment form and chooses to send the application.3. System displays the new task in Alfred tasks list.4. Alfred checks if he can be available for the surgery and approves the application if it is okay. Otherwise, Alfred rejects the assignment with description of the reasons.5. System updates the status of the form to be approved or rejected and sends the update to Simon.6. Simon opens the application and checks Alfred feedback.7. Simon closes the application. |



Question Four: Activity Diagrams

Tutorial Part:

A hospital in this example has a main branch which has more 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. 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 this part, draw an activity diagram that visualizes the described procedures. 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 !