Next Lecture

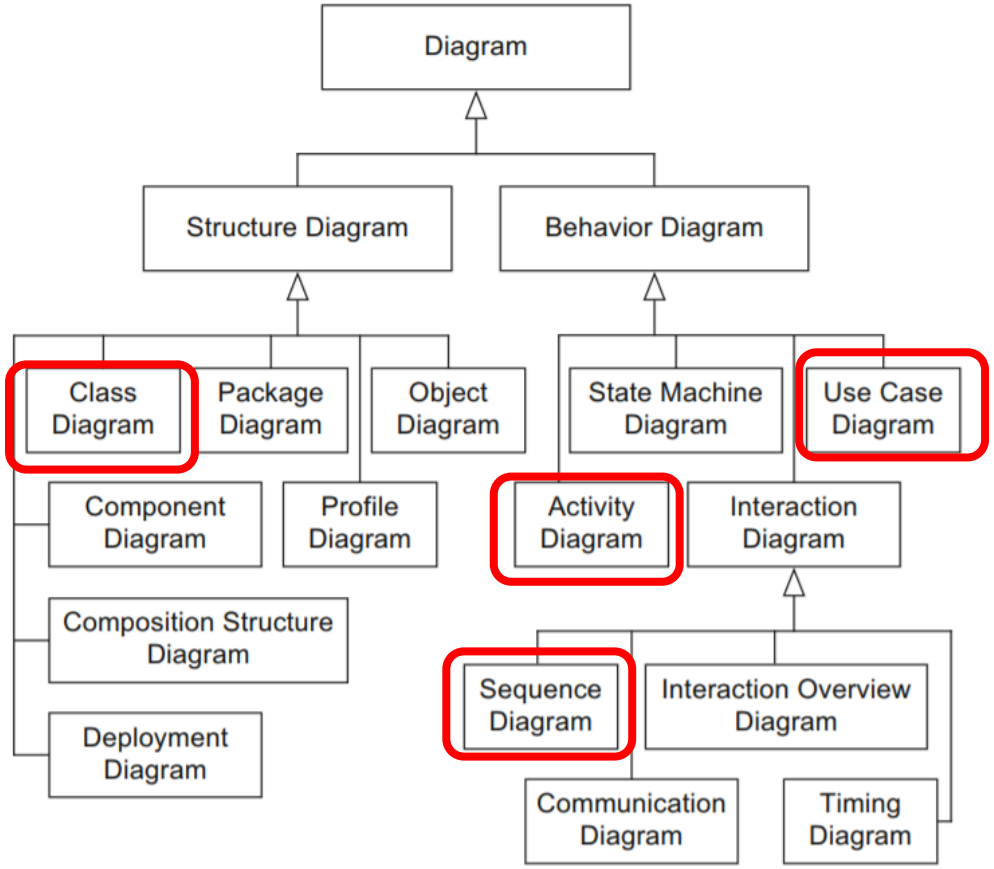
- Matlab Onramp
  - https://www.mathworks.com/learn/tutorials/matlab-onramp.html
  - Tutorial on basic Matlab programming
- Next Lecture
  - OOP in Matlab
  - Matlab APP
- Installation: Matlab 2019b and above (preferrably 2020a/b)
  - http://software.lib.shanghaitech.edu.cn/MatLab/
- Required Toolboxes: Matlab, Simulink, Stateflow

Homework 1

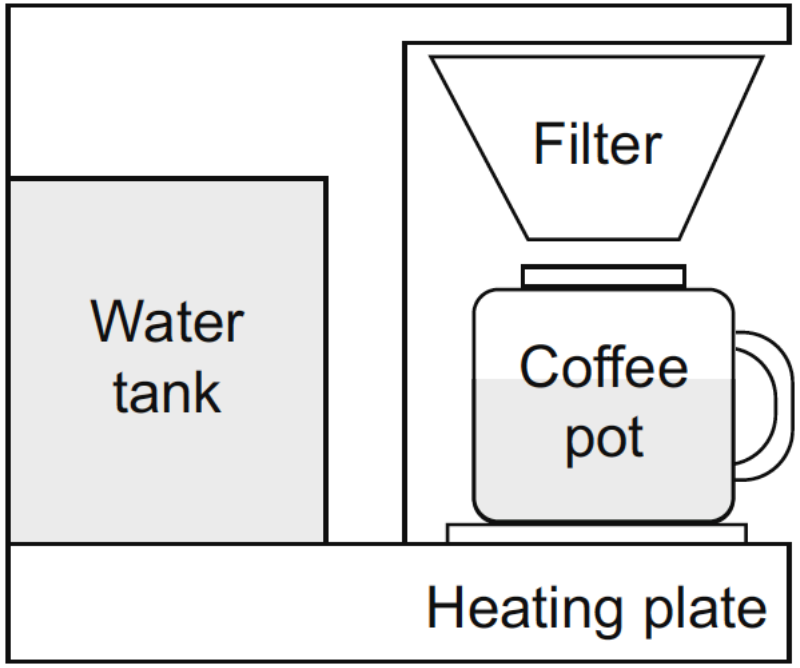
- Blackboard System;
- DDL: March 31, 11:59;
- Points: 5;
- Content: UML Diagram;

Lecture 11: Applications of UML

UML Diagrams



Example 1: Coffee Machine



Example 1: Coffee Machine (2)

- The coffee machine consists of a water tank, a heating plate, a coffee pot, and a water pipe that leads from the water container to the filter.
- When there is water in the tank and the coffee machine is switched on, the water is heated. The pressure pushes the water up-wards through the pipe into the filter which contains the ground coffee. Finally, the brewed coffee flows out of the filter into the coffee pot.
- The coffee machine is available in two different versions, one with a “keep warm” function (model A) and one without (model B). If the water tank is empty and the coffee machine is switched on, in model A the “keep warm” function is activated. In the same situation, model B simply switches off.

Use Case Diagram

- When there is water in the tank and the coffee machine is switched on, the water is heated. The pressure pushes the water up-wards through the pipe into the filter which contains the ground coffee. Finally, the brewed coffee flows out of the filter into the coffee pot.

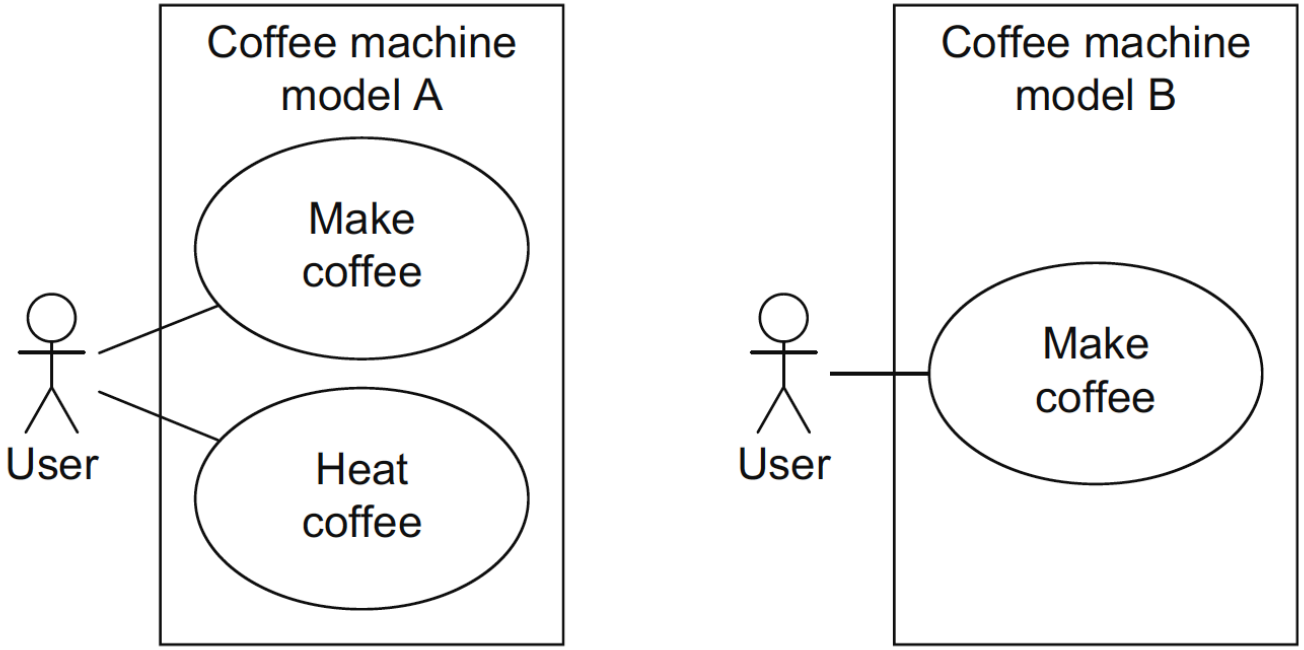
- The coffee machine is available in two different versions, one with a "keep warm" function (model A) and one without (model B). If the water tank is empty and the coffee machine is switched on, in model A the "keep warm" function is activated. In the same situation, model B simply switches off.

Use Case Diagram (2)

- The coffee machine is available in two different versions, one with a "keep warm" function (model A) and one without (model B).
- Model A offers the two functions Heat Coffee and Make Coffee
- Model B can only be used to make coffee.

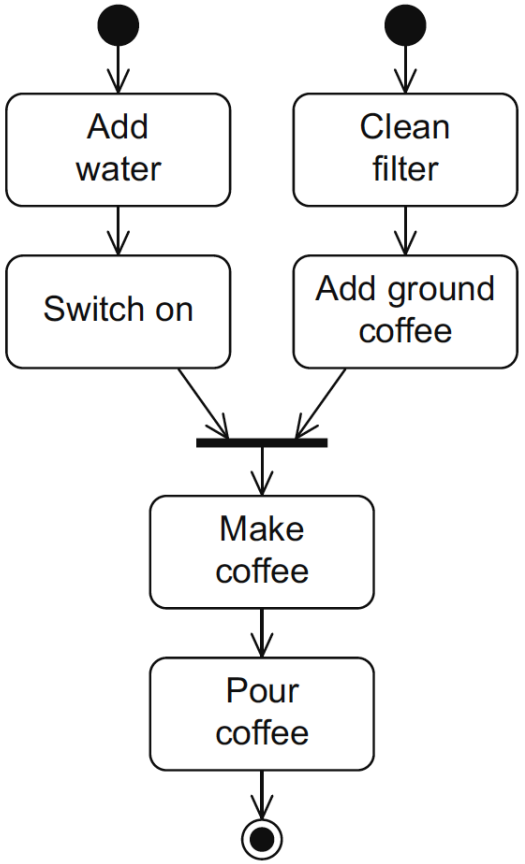
Use Case Diagram (3)

- Model A offers the two functions Heat Coffee and Make Coffee
- Model B can only be used to make coffee.

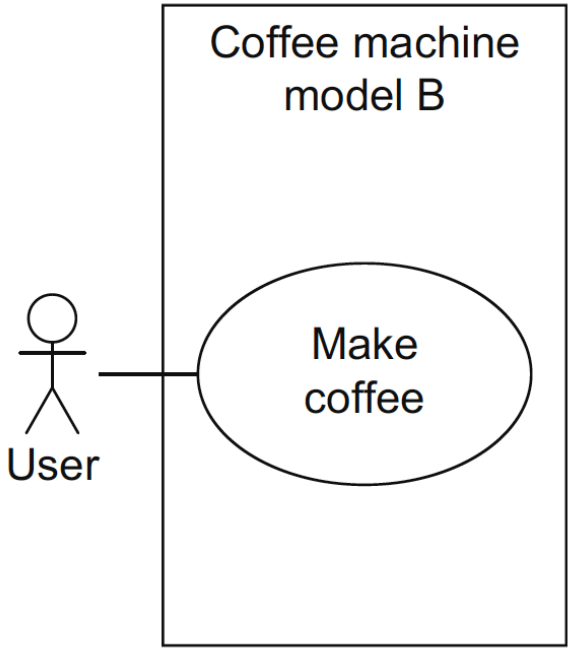


Activity Diagram – for Model B

Activity Diagram

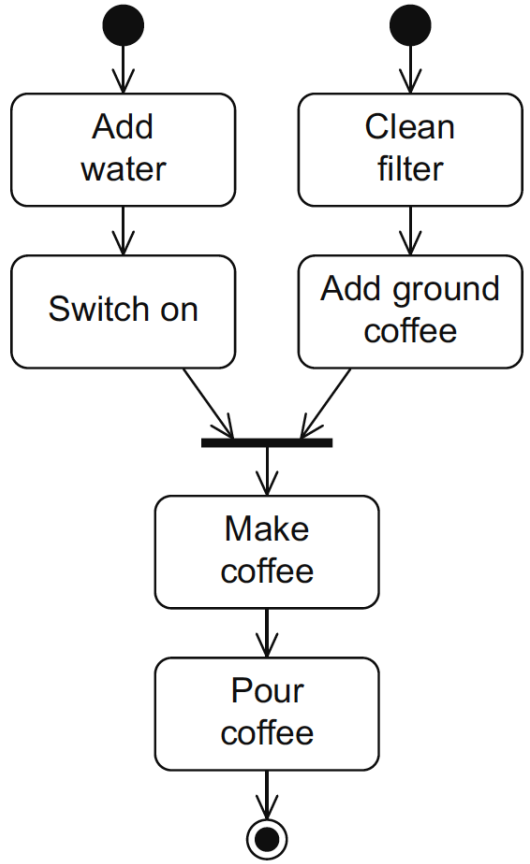


Use Case



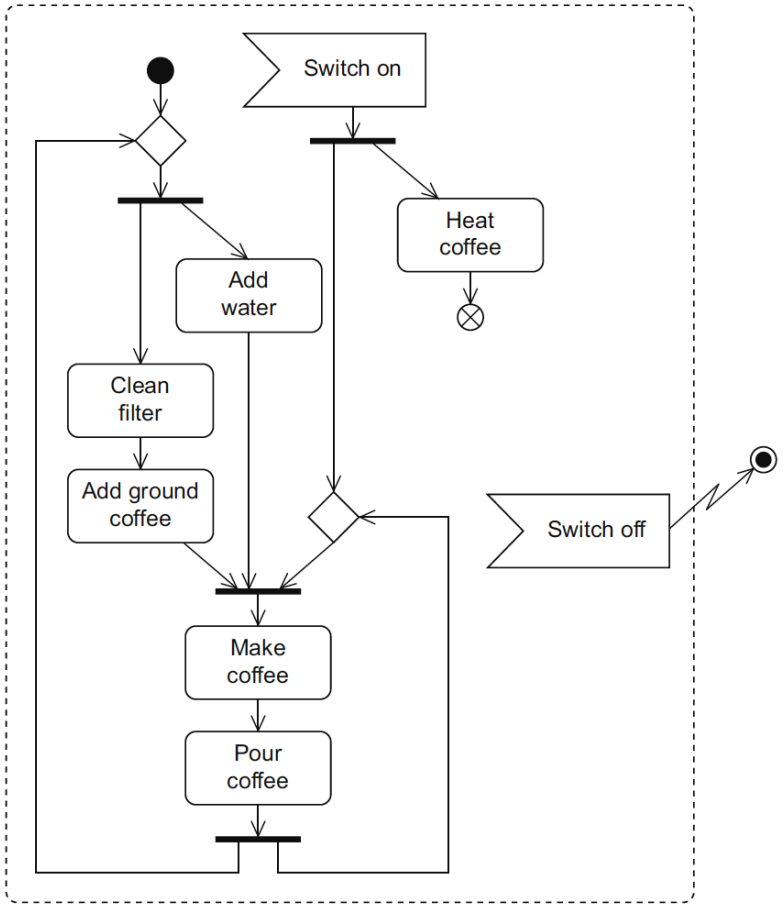
Activity Diagram – for Model B (2)

- Make Coffee:
  - (1) Filling the machine with water and switching the machine on;
  - (2) Cleaning the filter, filling the machine with ground coffee;
- Pour Coffee

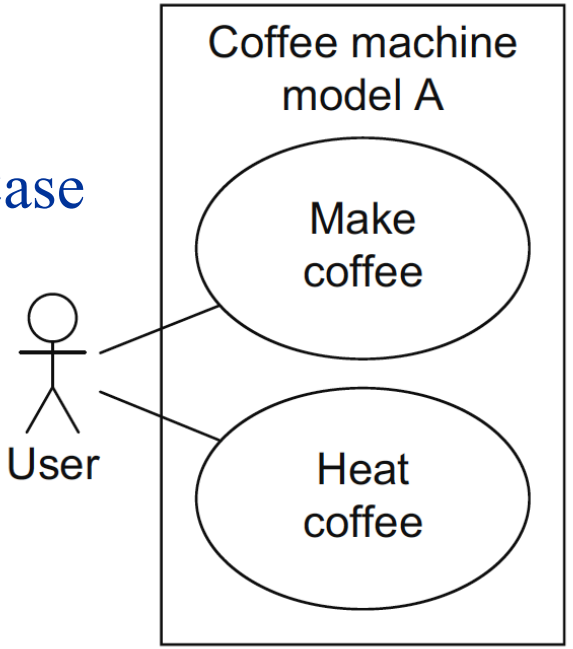


Activity Diagram – for Model A

Activity Diagram

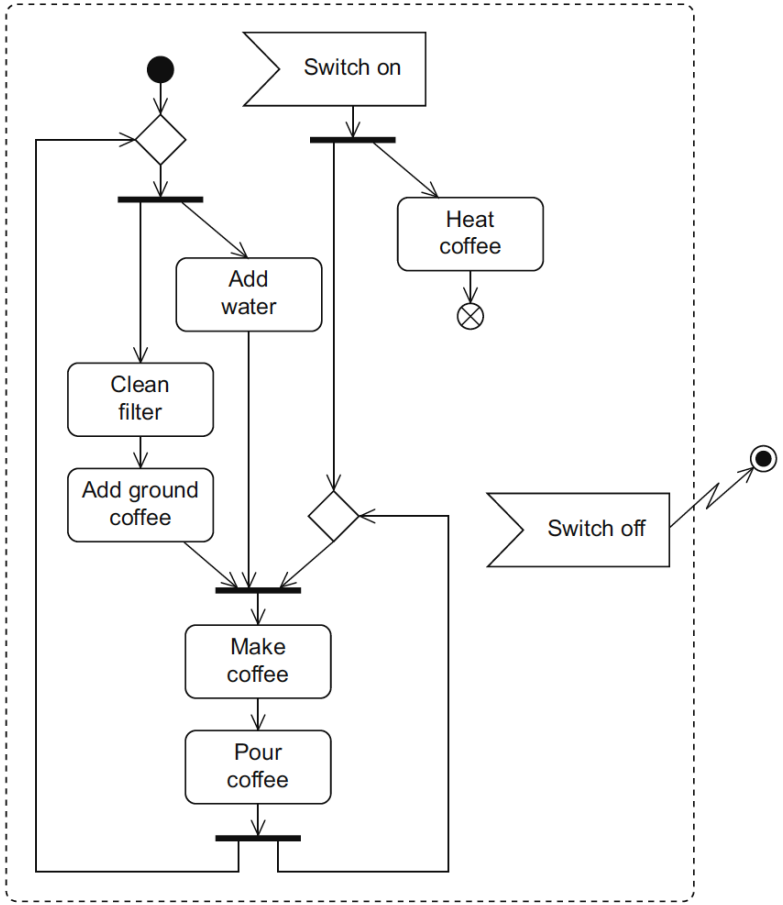


Use Case



Activity Diagram – for Model A (2)

- As soon as the coffee machine is switched on, it executes the action Heat coffee. When the coffee machine has been fully prepared for making coffee, that is, when ground coffee and water have been added, the keep warm function is switched off and coffee is made.
- The signal Switch off ends the entire process.



Example 2: Submission System

- Every course in the system has lecturers assigned to it. This is done by one of the course administrators, who is also a lecturer. As part of a course, lecturers may create tasks and assess papers submitted by students. Therefore, the lecturers award points and give feedback.
- The course administrator defines which lecturer assesses which papers. At the end of the course, the course administrator also arranges for certificates to be issued. A student's grade is calculated based on the total number of points achieved for the submissions handed in.
- Students can take courses and upload papers.
- All users—students and lecturers—can manage their user data, view the courses and the tasks set for the courses (provided the respective user is involved in the course), and view submitted papers as well as grade points. However, students can only view their own papers and the related grades. Lecturers can only view the papers assigned to them and the grades they have given. The course administrator has access rights for all data.

Example 2: Submission System (2)

- A course is created and deleted by an administrator.
- When a course is created, at least one administrator must be assigned to it. Further course administrators can be assigned at a later point in time or assignments to courses can be deleted. The administrator can also delete whole courses.
- Information about users and administrators is automatically transferred from another system. Therefore, functions that allow the creation of user data are not necessary.
- All of the system functions can only be used by persons who are logged in.

Use Case Diagram -- Actors

- Every course in the system has lecturers assigned to it. This is done by one of the course administrators, who is also a lecturer. As part of a course, lecturers may create tasks and assess papers submitted by students. Therefore, the lecturers award points and give feedback.
- The course administrator defines which lecturer assesses which papers. At the end of the course, the course administrator also arranges for certificates to be issued. A student's grade is calculated based on the total number of points achieved for the submissions handed in.
- Students can take courses and upload papers.
- All users—students and lecturers—can manage their user data, view the courses and the tasks set for the courses (provided the respective user is involved in the course), and view submitted papers as well as grade points. However, students can only view their own papers and the related grades. Lecturers can only view the papers assigned to them and the grades they have given. The course administrator has access rights for all data.

Use Case Diagram – Actors (2)

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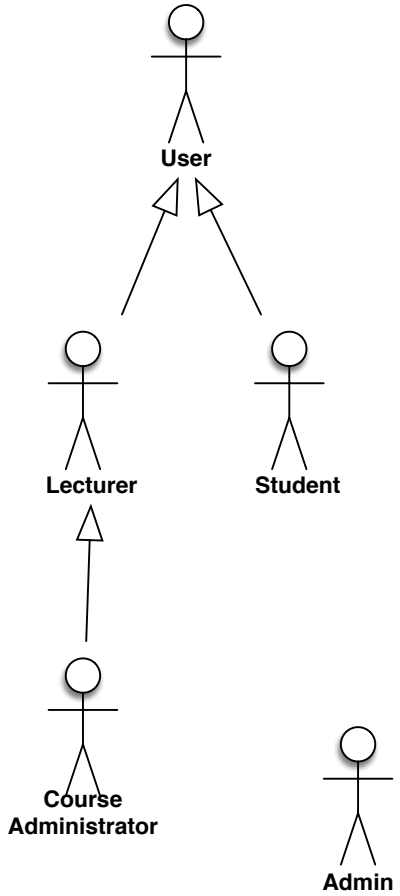
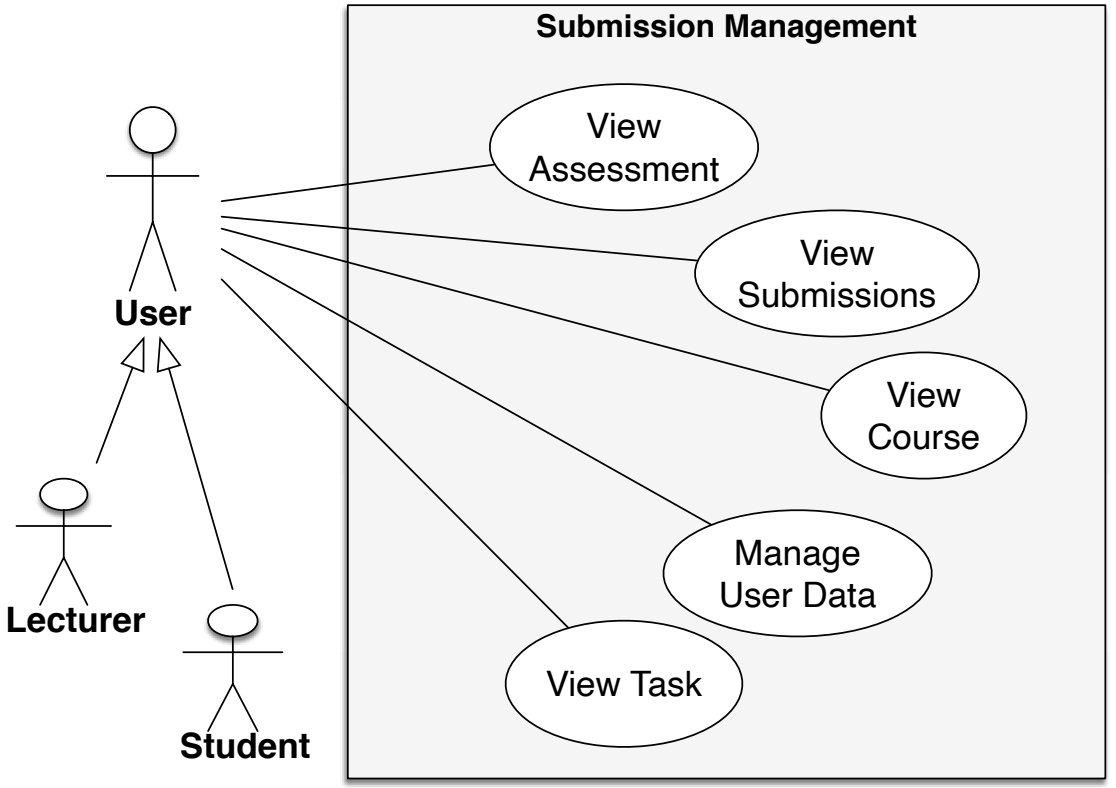
Use Case Diagram – Actors (3)



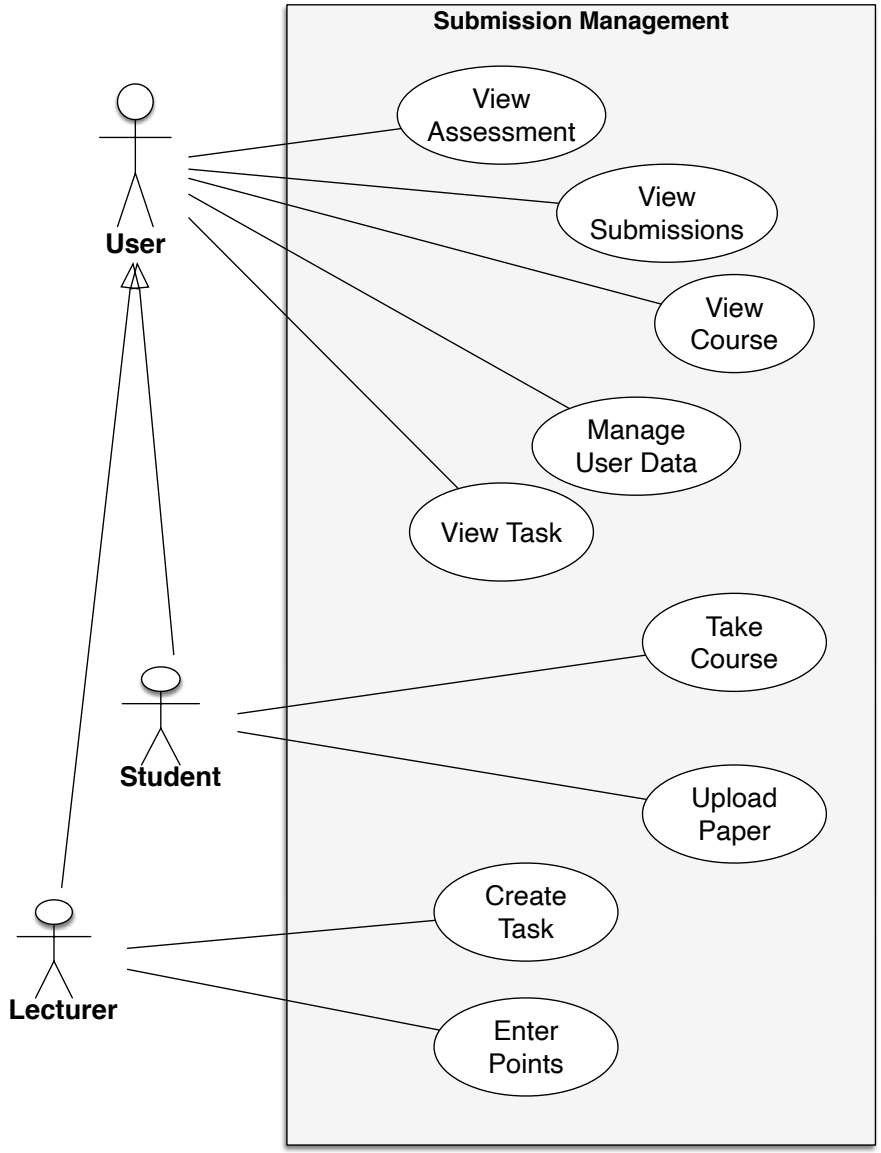
Use Case Diagram – Use Case

- All users—students and lecturers—can manage their user data, view the courses and the tasks set for the courses (provided the respective user is involved in the course), and view submitted papers as well as grade points.



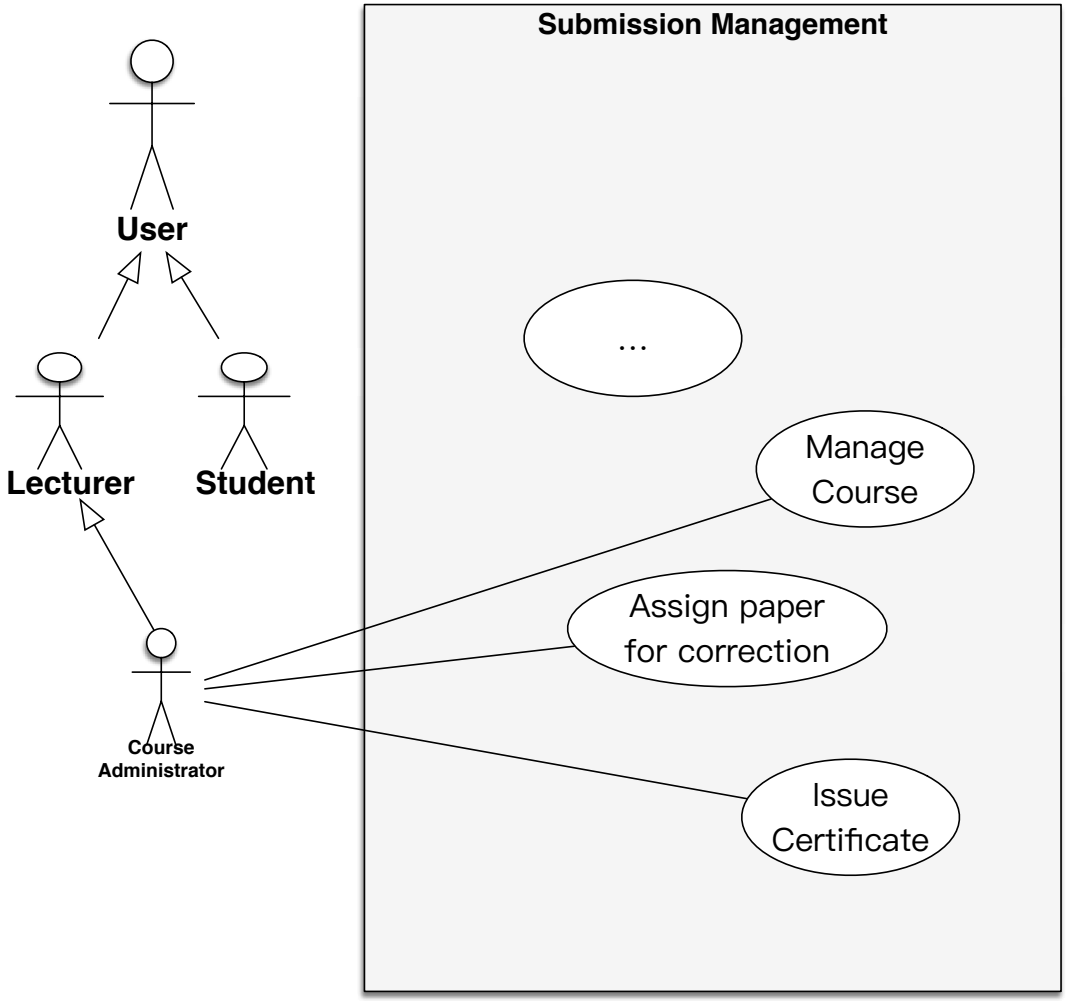
Use Case Diagram – Use Case (2)

- However,
  - students can only view their own papers and the related grades.
  - Lecturers can only view the papers assigned to them and the grades they have given.



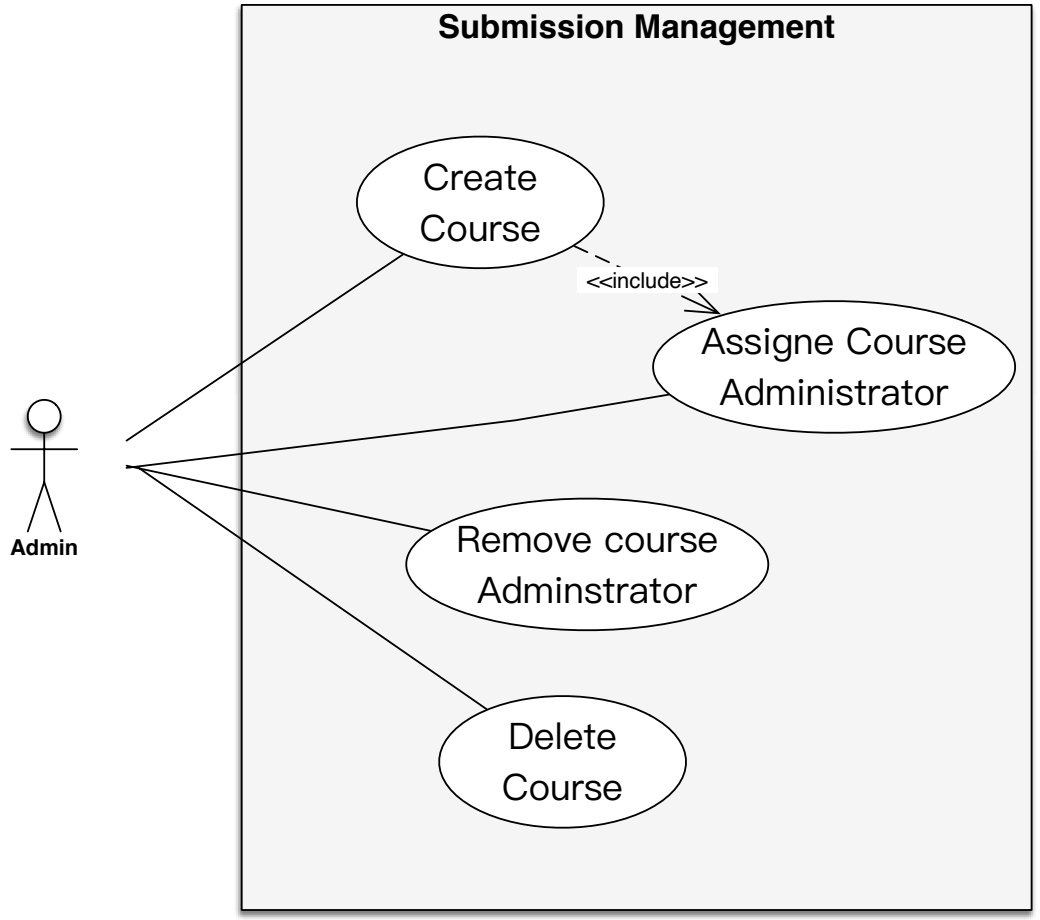
Use Case Diagram – Use Case (3)

- The course administrator
  - defines which lecturer assesses which papers.
  - At the end of the course, the course administrator also arranges for certificates to be issued.
  - Further course administrators can be assigned at a later point in time or assignments to courses can be deleted. The administrator can also delete whole courses.

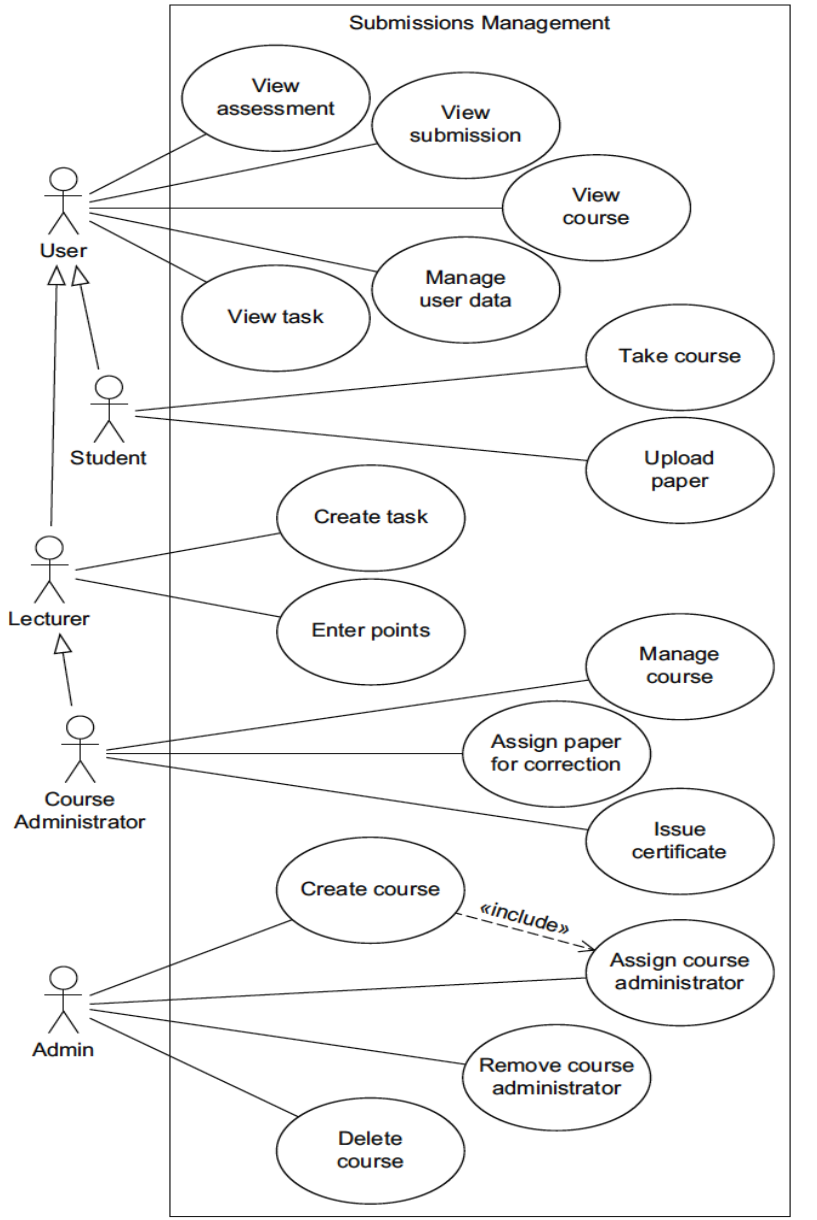


Use Case Diagram – Use Case (4)

- A course is created and deleted by an administrator.
- When a course is created, at least one administrator must be assigned to it. Further course administrators can be assigned at a later point in time or assignments to courses can be deleted. The administrator can also delete whole courses.

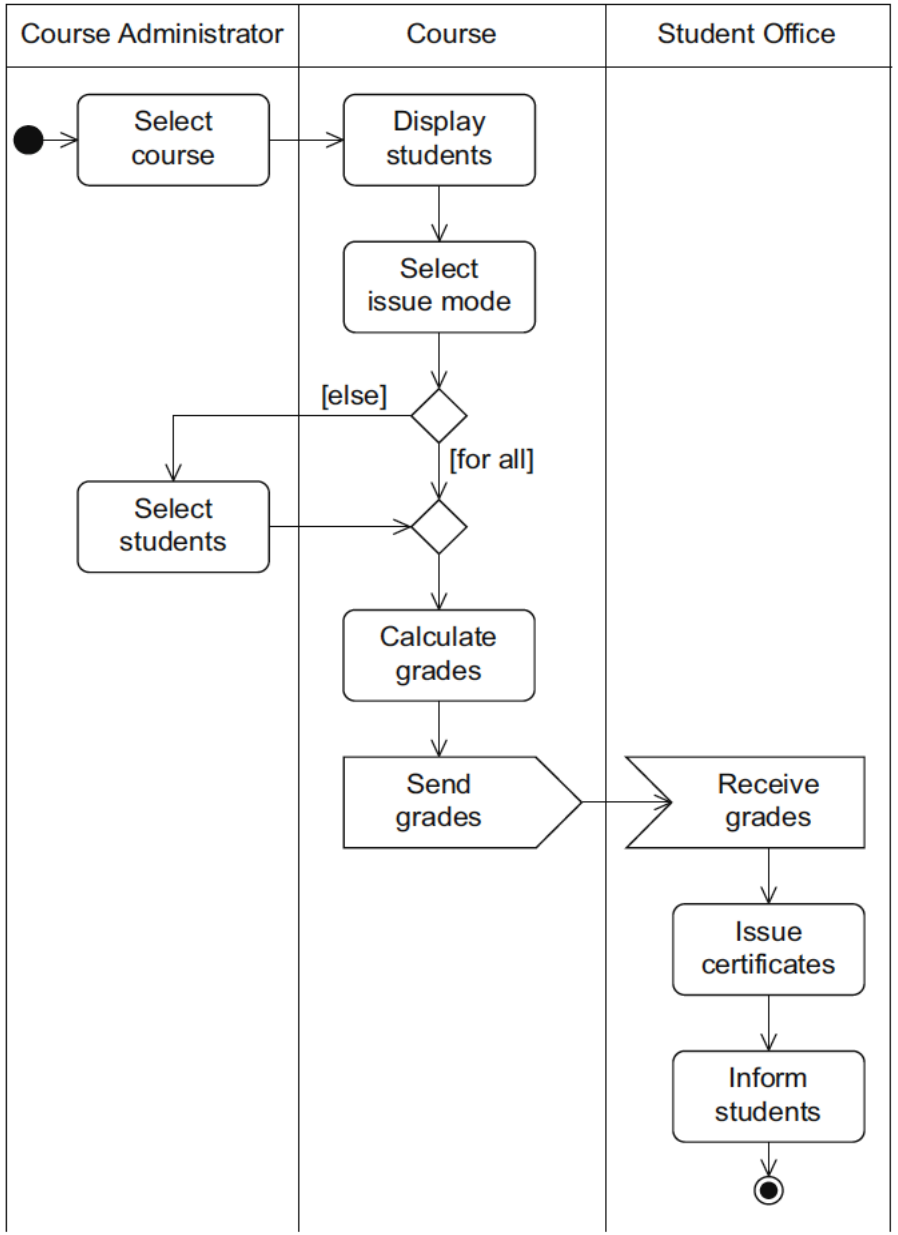


Use Case Diagram – Use Case



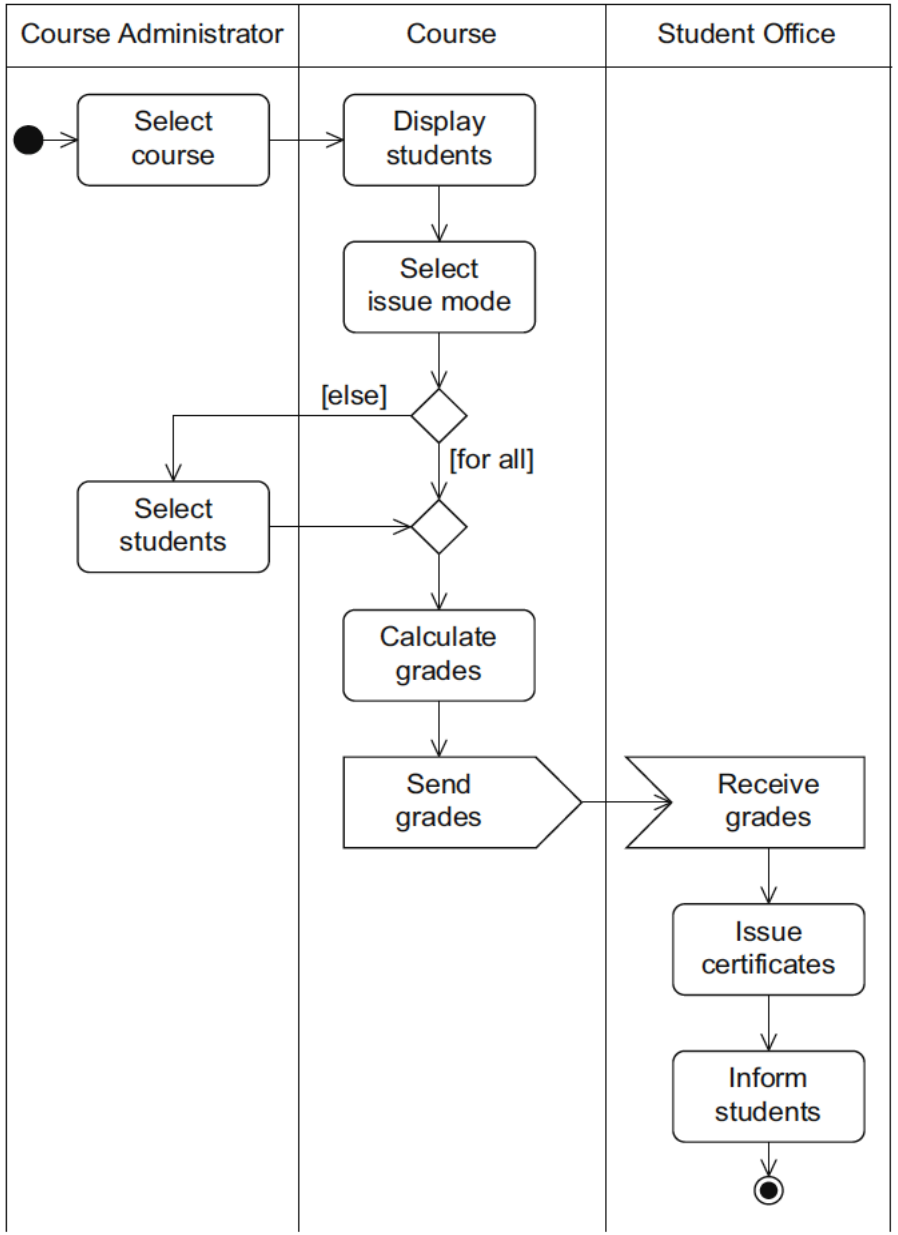
Activity Diagram

- Activity Diagram for “issue certificate”
- (1) Course Administrator select course to issue certificate for;
- (2) Students who take the course are displayed;
- (3) The course administrator can then select whether to issue certificates for all or only for certain students; In the latter case, the administrator must also specify the students who shall obtain certificates.

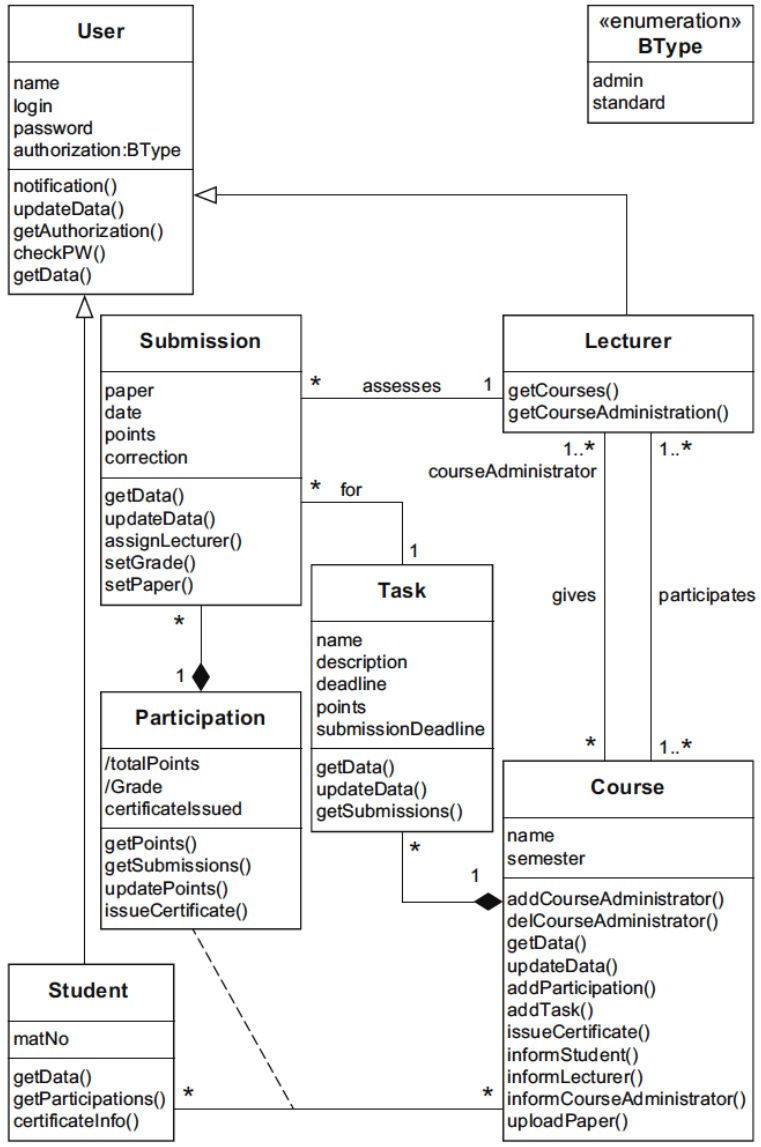


Activity Diagram (2)

- Activity Diagram for “issue certificate”
- (4) The grades are calculated;
- (5) Sent to the student office;
- (6) Each student is informed of the grade;
- (7) Issue certificates
- (8) Inform students

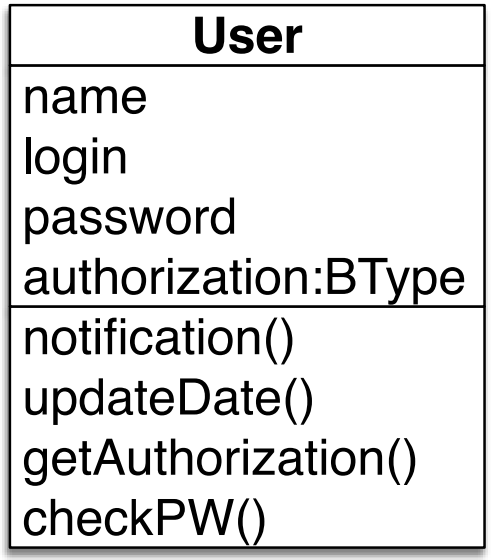


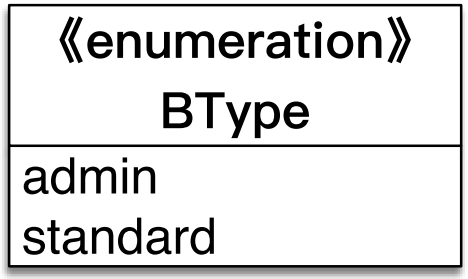
Class Diagram



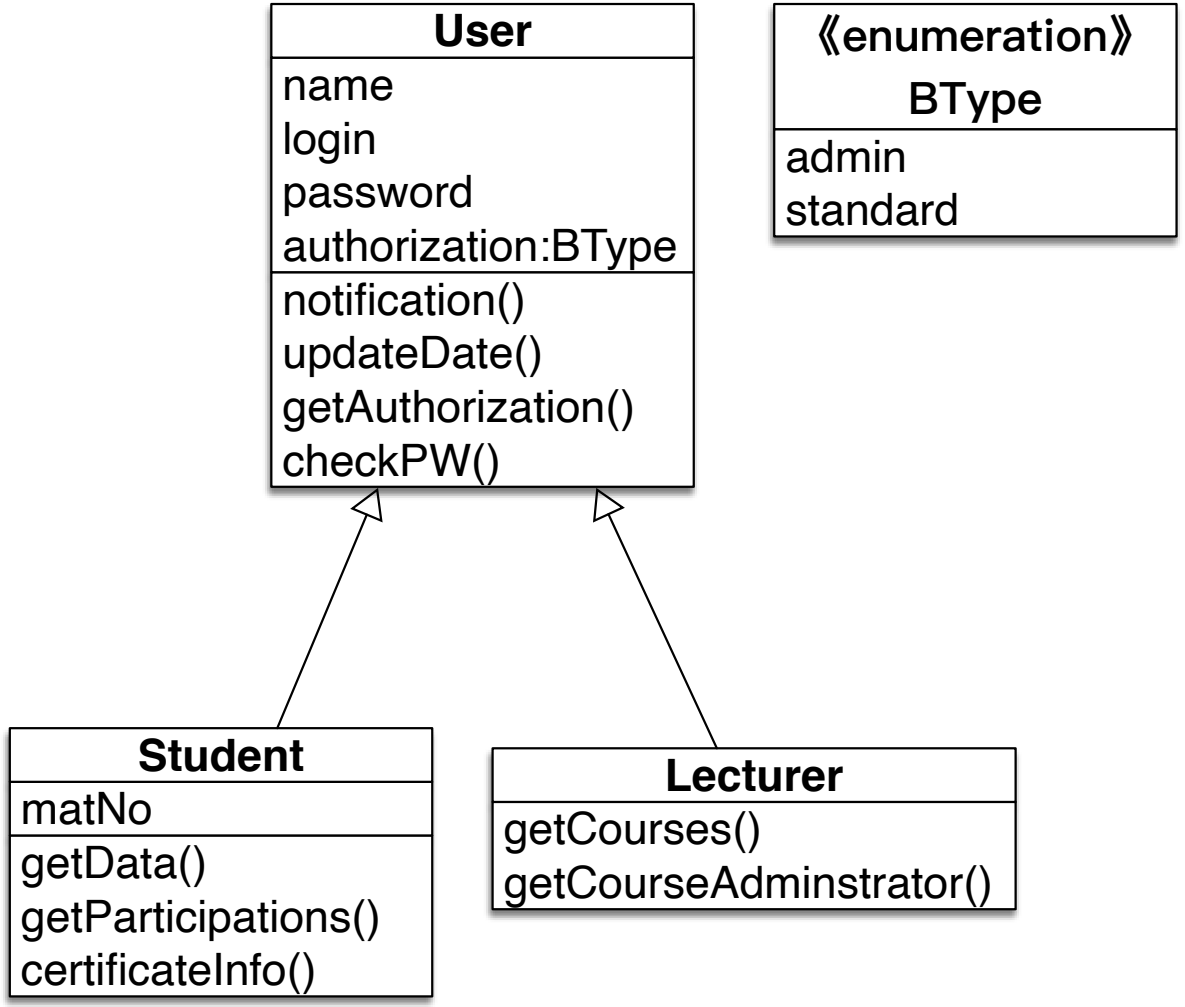
Class Diagram (2)

- All users—students and lecturers—can manage their user data, view the courses and the tasks set for the courses (provided the respective user is involved in the course), and view submitted papers as well as grade points.

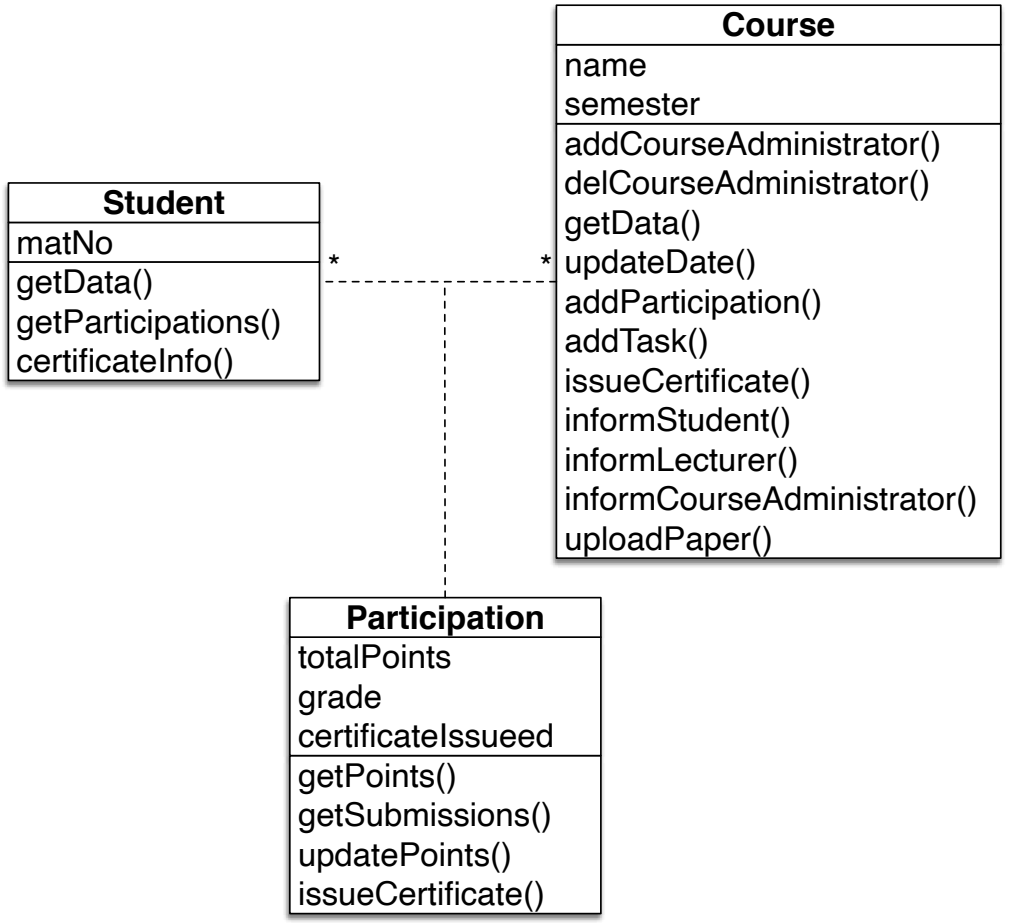




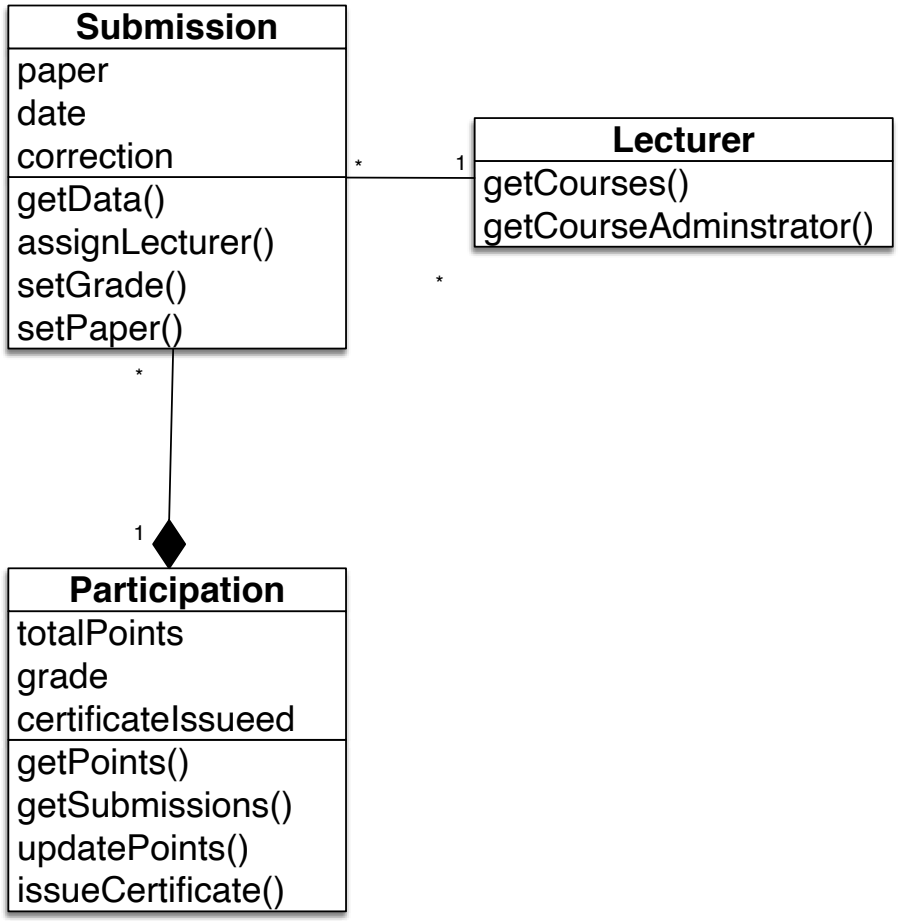
Class Diagram (3)



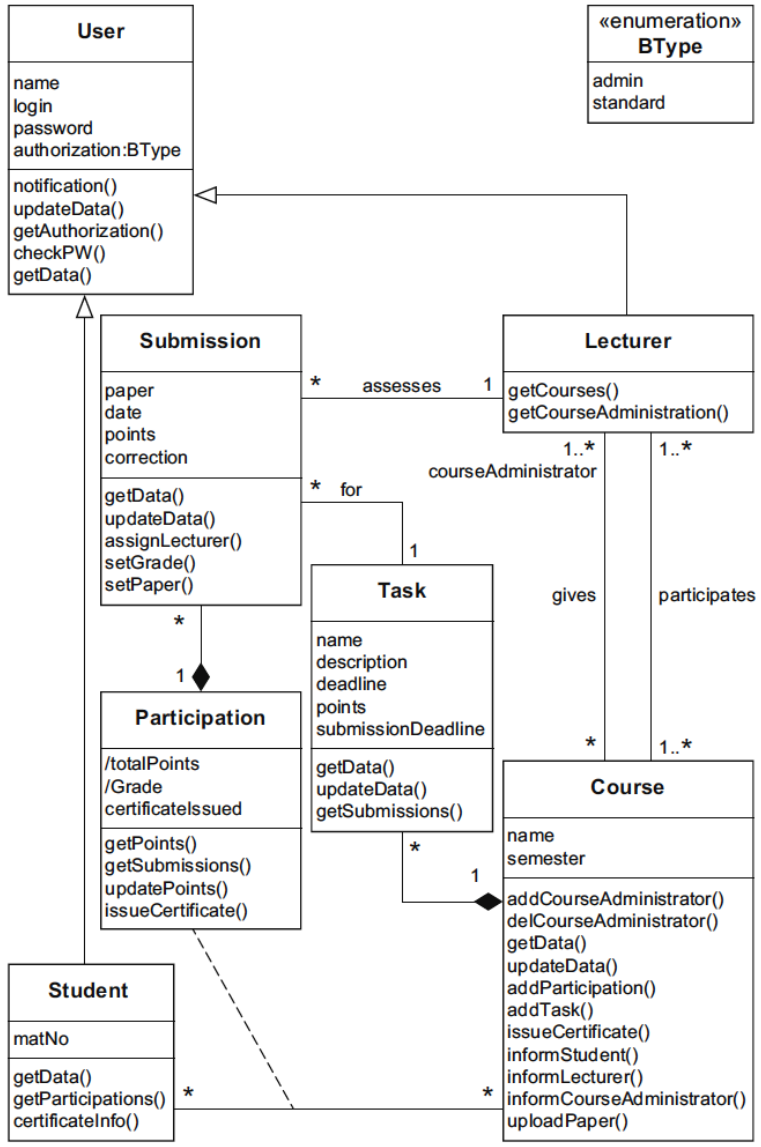
Class Diagram (4)



Class Diagram (5)



Class Diagram (6)



Sequence Diagram