

Putting it all together

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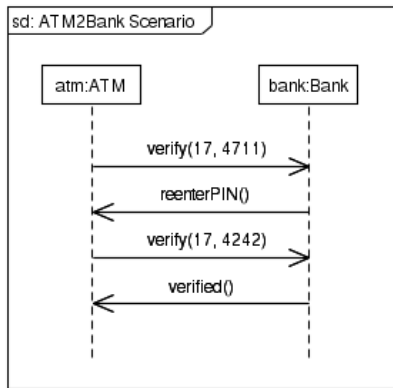
partially based on the book “UML@Classroom”

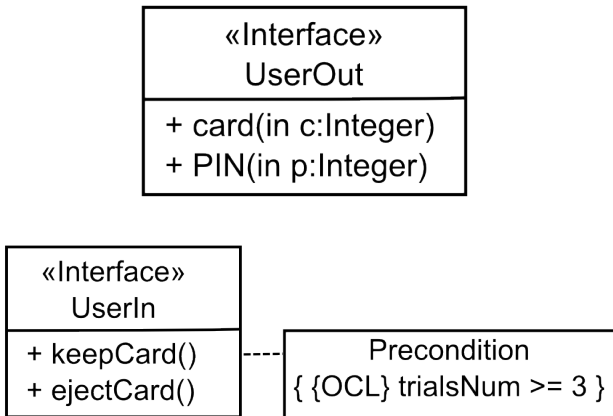
<http://www.uml.ac.at/en/>

An Automated Teller Machine (ATM)

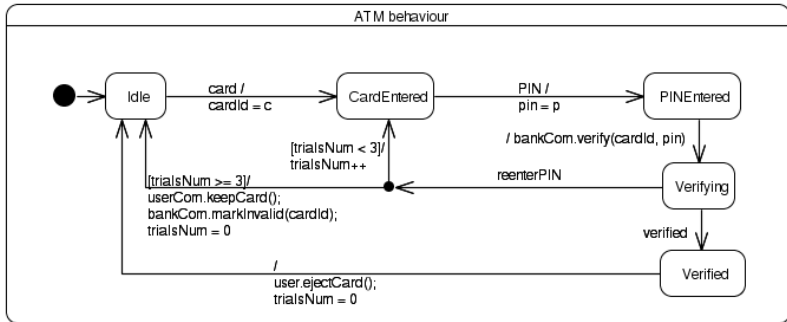
The user inserts a card and then enters a PIN. The PIN is verified by the bank. After three unsuccessful trials, the card is kept. Otherwise, the card is ejected again.

ATM — Sequence Diagram





ATM — State Machine for Class ATM

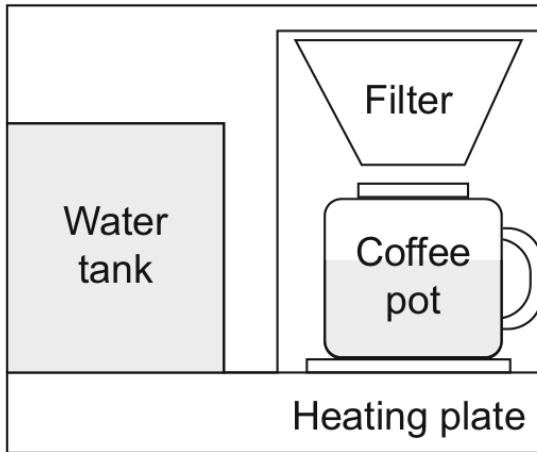


A Coffee Machine

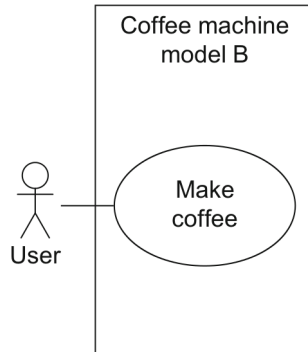
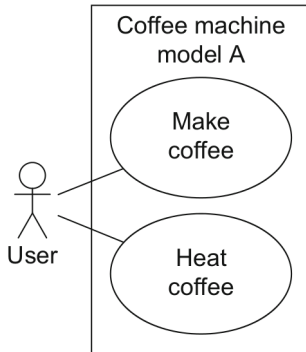
The coffee machine consists of a water tank, a heating plate, a coffee pot, and a water pipe that leads from the water container to the filter. When there is water in the tank and the coffee machine is switched on, the water is heated. The pressure pushes the water upwards through the pipe into the filter 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.

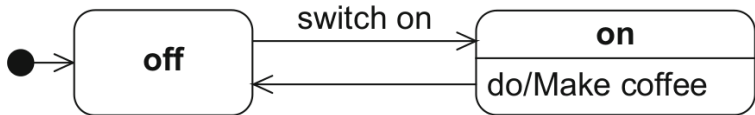
A Coffee Machine



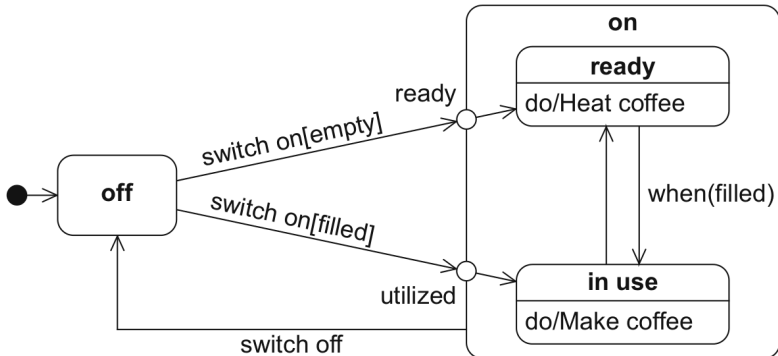
Coffee Machine — Use Cases



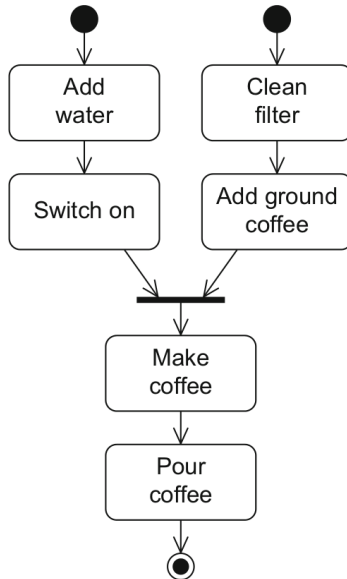
Coffee Machine B — State Machine



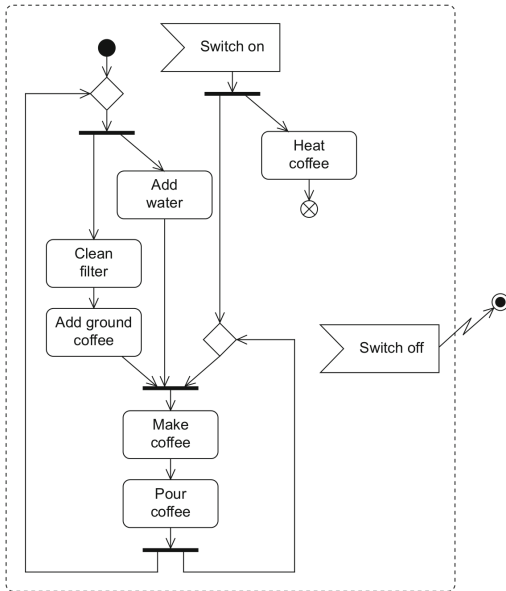
Coffee Machine A — State Machine



Coffee Machine B — Activity Diagram



Coffee Machine A — Activity Diagram



Submission System at a University

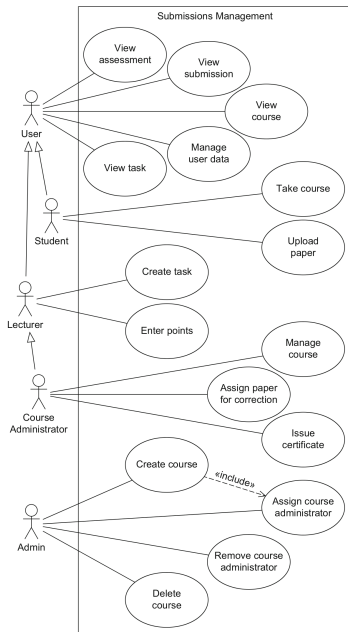
The submission system for managing submissions (students' papers for assignment tasks). Requirements are:

- 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.

Submission System at a University (cont'd)

- 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.
- 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 functions can only be used by persons who are logged in.

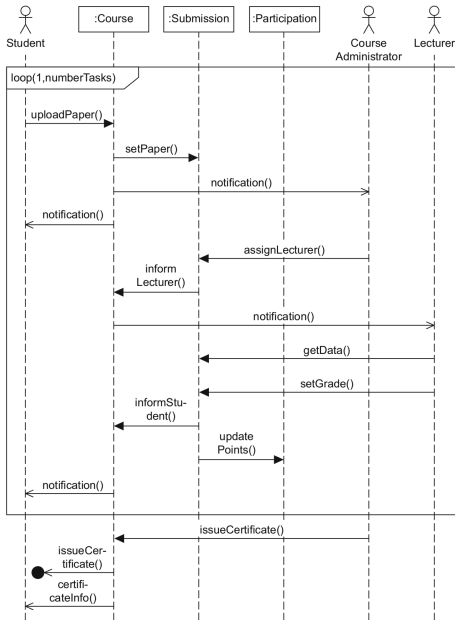
Submission System — Use Case



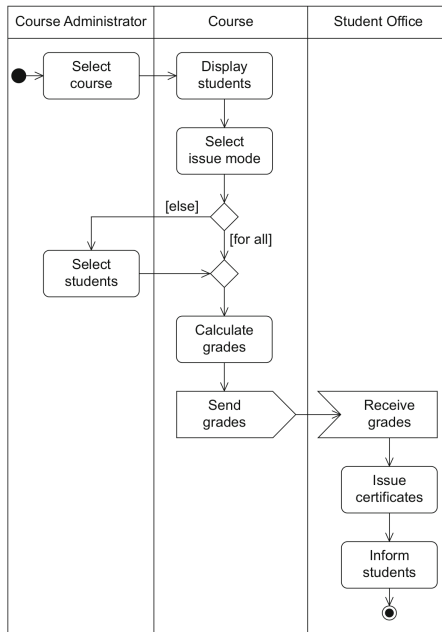
A lecturer can only assess tasks of a course in which this lecturer is involved:

```
context Lecturer :
  submissions.task.course ->forAll(c: Course |
    gives ->includes(c) or
    participates ->includes(c) )
```

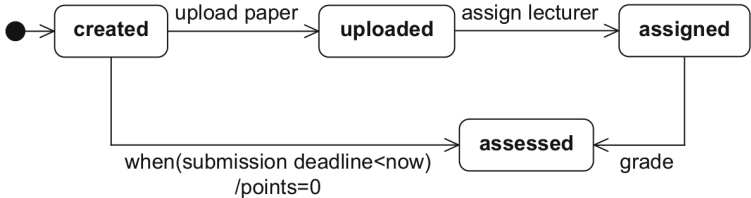
Submission System — Sequence Diagram



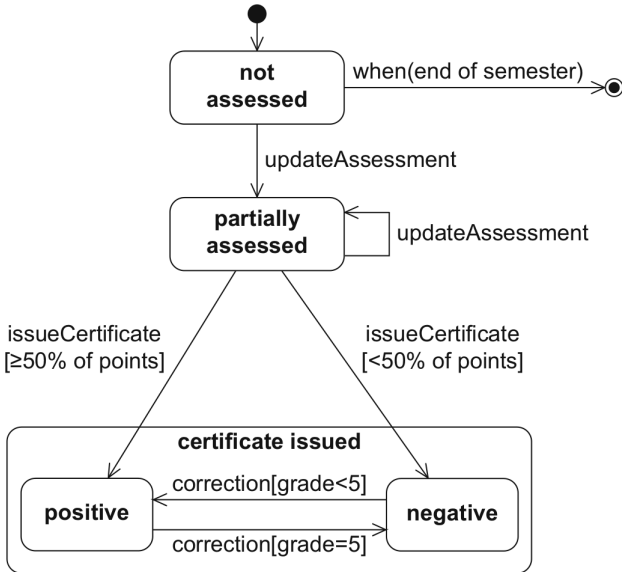
Submission System — Activity Diagram



Submission System — State Machine for Class Submission



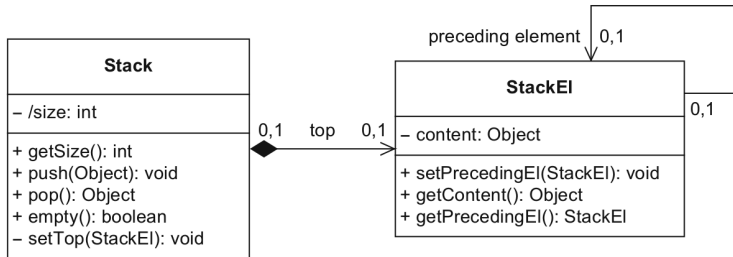
State Machine for Class Participation



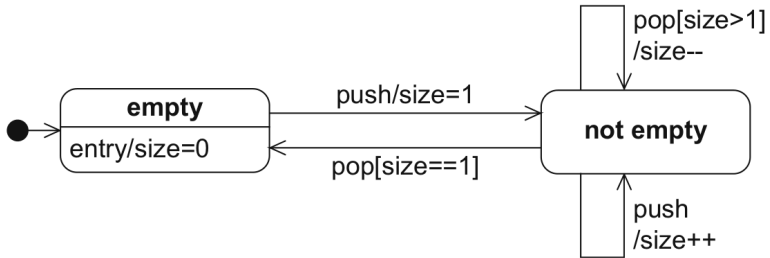
Requirements for the data structure Stack:

- Elements can be placed on the stack using the push function and removed from the stack using the pop function.
- The order in which elements are removed follows the LIFO principle (Last In, First Out), which means that pop always delivers the element that was last placed on the stack with push and removes it from the stack.
- Further functions that the class Stack should support are the determination of the actual size of the stack, that is, the number of elements on the stack, and the query about whether an element is on the stack at all.

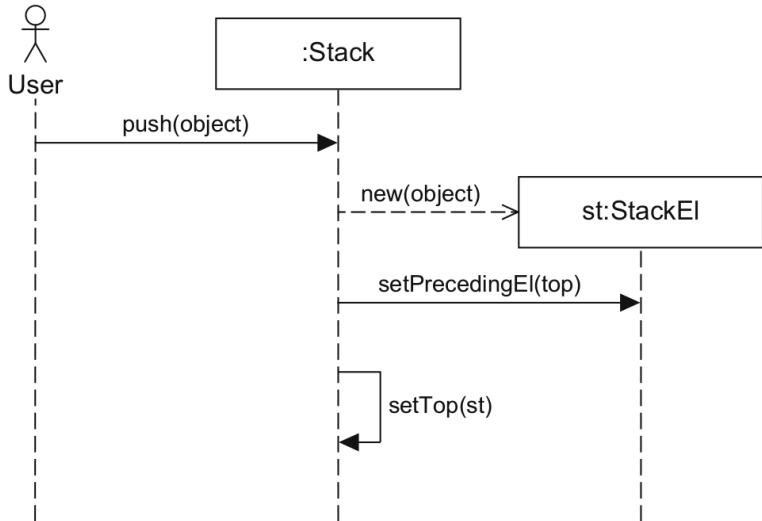
A Stack — Class Diagram



A Stack — State Machine



A Stack — Sequence Diagram for Push



A Stack — Sequence Diagram for Pop

