Exercises for Advanced Topics of Software Engineering
Winter Term 2016
Prof. Dr. Alexander Pretschner, Mohsen Ahmadvand, Amjad Ibrahim, Severin Kacianka
01.12.2016

Technische Universität München
Fakultät für Informatik

Project Requirements and Architecture

Exercise 1: Project

To prepare for the project phase of this course (which will start in the week before the Christmas vacation), you will need to get familiar with the problems that university/college teaching assistants face when managing exercise sessions.

Student's attendance in the tutorial sessions is optional, however, those who attend a certain number of sessions (say all except for 2) and meet some other conditions (say present at least once) will be eligible to receive a bonus of X for their final exam grade. Currently, to keep track of the attendances, the tutors print out an attendance sheet for every session. The students in turn have to sign the sheet. To keep track of other events, for example presentations, the tutor adds an additional mark to the attendance sheet. At the end of the day or semester, in order to see which students are eligible to get the bonus, the (poor) tutor has to manually go through all the sheets and count the signatures and other events (e.g. those who presented). Sounds familiar, doesn't it?

Recently, the number of entry batches in the university has expanded and double-digit growth in the number of students is expected. The current manual process does not scale and will thus be rendered impractical.

You and your team are asked to help to improve this situation by introducing an Automated Attendance Tracking (AAT) system. The AAT is an e-Attendance system that will address the aforementioned problem. It is supposed to support tutorial group selection, attendance tracking, and bonus calculation.

The requirements for the AAT have not been elicited yet, so you are in charge of specifying requirements and later implementing them accordingly. All we have are the following points that we collected in a meeting with the tutors:

- People should be able to sign up for an exercise group (from a list of available ones) via a web interface.
- In class, every tutor can carry a small embedded device, for example a RaspberryPi, with them to record the presence or absence of a student.
- It is crucial that the attendances cannot be forged! So, the students should get personalized attendance tokens in the form of QR codes on their (android) phones before each session. These QR codes should be generated on the server side.
- The Pi should be able to scan QR codes and mark attendances.
- The Pi should be able to mark students who presented.
- There should be an off-line mode for the Pi, in case no WiFi net available.
- At the end of the semester, the students should get a notification indicating whether they get the bonus or not.

In case these requirements are unclear, the tutors have agreed to answer questions and clarify requirements in a Moodle forum.

For the project phase you should form small groups of 3-5 students that work together on the project. Although you can distribute the work among the different group members, **each member must be able to report on all aspects of all tasks**!

Phase 1: Requirement Elicitation

Task

Based on the high-level system goals, please find solutions for the following tasks:

- Define use cases that capture the different system requirements and identify all stake holders. Use http://alistair.cockburn.us/Basic+use+case+template as the template for your use cases.
- What are the potential functional requirements? Specify at least 10 requirements.
- What non-functional requirements can you think of? Specify at least three security and privacy requirements.
- Which quality requirements can you specify and how would you validate them?
- And the **main point**: How do you architect the system? What are the main system components and how do they interact? Justify your architectural decisions!
-

Now that you specified the system requirements it is about time to spin up your agile process engine! Conduct the following tasks to get your scrum process going:

- Create a git repository (on Github) for your project; invite all your teammates as collaborators.
- Together with your teammates decide upon the duration, the number of sprints and the planned outcomes. Consider the deadlines when you plan your sprints (milestones) and packages. Remember your sprint outcomes should be deliverable programs with working features. In the real world, this is normally the job for product owner, however, we would also like that all of you get a taste of project management.
- Add all the requirements that you elicited earlier as user stories to your project's backlog (You may use github issues tab as your backlog). At the beginning of each sprint, conduct grooming sessions and split user stories into tasks and collectively assign tasks to your team members.

Deliverable

After completing the aforementioned tasks, please deliver the following:

- prepare a 6 min (sharp) presentation (5 slides strictly) in which you cover:

Slide 1. your team members' names,

Slide 2. system requirements including functional, non-functional (security and privacy), quality requirements, and evaluation criteria,

Slide 3. system architecture and short justification (bullet points!),

Slide 4. your product backlog (in table format), and finally

Slide 5. milestones and planned deliverables.

- Upload your slides in PDF format to the dedicated moodle upload area.
- Deadline: Sunday, December 11th at 23:59, CET