Software Engineering

Requirements for the SmartUniversity platform

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1 Purpose of this document

Below you will find a fictional requirements specification for an online learning platform for the University of Antwerp, similar to SisA and Blackboard. You will have to read and refer to this document while completing the different assignments of the Software Engineering course.

Certain parts of the document are made detailed or vague on purpose, as needed for the exercises. In case anything is unclear or confusing, please contact the teaching assistant.

2 Introduction

Because the Blackboard and SisA platforms have been in use since many years and have started to age, the University of Antwerp has decided to acquire a new online learning platform. In order to support the local economy and make use of government subsidies, the university has decided to ask the AnSyMo research group to develop the platform together with the Flemish start-up SmartUniversity. The learning platform will replace both SisA and Blackboard, as well as other internal platforms, and will thus be all-encompassing: enrolment, lectures, assignments, grading, administrative processes, etc.

The system has to be developed using the state-of-the-art of software engineering, making use of the most recent technologies. Examples of these are the use of artificial intelligence, and compatibility with mobile platforms such as smartphones and smartwatches. Attention should be paid to the security and safety of the platform. Examples are the financial transactions, two-factor authentication, the privacy of the students, confidentiality of the grades, GDPR requirements, etc. The system will be a major investment and will thus have to remain in use for the foreseeable future. It should be possible to modify the system later on so that it can evolve as needed. Finally, the system should be compatible with the existing IT-infrastructure of the university, such as the single-signon system, Microsoft Outlook, etc.

3 Description of the system

At the beginning of the academic year the students can enrol in a program of their choice as well has the different courses that are part of the program. Once the student has submitted their application for enrolment, this will be sent to an administrative aid for processing. If the deadline has passed, students can only enrol with the prior approval of an administrative aid.

Once the student has been accepted into a program, they can start enrolling in one or more courses. While selecting courses, the student can see the necessary requirements for the course such as study credits, prerequisites, etc. After confirming a list of courses, this is once again sent to an administrative aid for approval. After the final approval, the student will get a notification via e-mail. The student will then also be informed of the tuition they have to pay. Periodic reminders for unpaid tuition will be sent to the students.

Before choosing a program, the student will answer a series of questions and receive a number of recommended programs. Similar suggestions will be provided when enrolling in courses. The suggestions are personalised and generated using artificial intelligence. The university wishes to make use of ChatGPT for this purpose. A central database will be used to collect big data about the students, such as grades and interests, with the aim of providing accurate suggestions. The database will make use of Blockchain technology in order to ensure security and privacy.

The professor of a course can upload lecture recordings and lectures can be livestreamed as well. It is important that a 99.99% uptime is guaranteed. Quality wise both the recordings and the live broadcasts need to support at least 720p. The amount of viewers for a lecture, as well the number of downloads at any given moment, can fluctuate greatly both throughout the day as well as the semester. In order to support the uptime and quality constraints, and also to ensure no capacity is wasted, a flexible video streaming infrastructure needs to be built. The scalability of such infrastructure is key.

Aside from video material, the professor can also upload course texts, slides, and other supporting materials, as well as public announcements. It needs to be possible to interact with students during the lecture, for example by letting students use their microphone. A mobile application with which the students can answer polls would be interesting. The professors, assistants, and students need to be able to synchronise the lecture schedule with their digital calendars.

In order to ensure that the students properly grasp the course material, the assistant needs to be able to create assignments, both obligatory and optional ones. The assistant also should be able to provide extra material that is necessary for making the assignments. The students can view the assignment, and upload a solution as long as the deadline has not expired. The students will get periodic reminders that they have unsolved assignments. If a student misses a deadline, they receive a grade equal to zero. An automatic plagiarism detection tool should be provided. This tool needs to indicate whether a student made use of ChatGPT to complete the assignment. After all assignments have been handed in, the assistant can view a plagiarism report.

A page with an overview of the total score, as well as scores for each assignment, needs to be available to the students. After the assistant has graded an assignment, they can upload the scores so that the students can see them. The same functionality needs to be provided to the professors for when they grade the exams. The scores, as well as the assignments and exams on which the scores are based, should be stored in a secure and reliable manner up until 10 years after graduation.

The university will review the different programs and adjust them as necessary. The platform should provide the option to adjust the courses, add new programs, etc. Especially important is the availability of statistical reports: the rate of students who pass the courses, the number of students who graduate on time, the workload of the professors and assistants, etc. The IT-department has a number of developers, they should be able to easily and quickly add new types of reports.