Problem statement for the 2nd SE 2020/2021 project

Project Management System (PMS)

There is a need for a new Project Management System for a university. The software system shall allow the management of all the university research projects. The system shall be used by the research office of the university, the finance office of the university and the researchers involved in each project. The whole lifecycle of research projects shall be supported. Research projects can be created, described in terms of overall definition and objectives, financial aspects, people involved, and tasks to be executed.

The researchers can request money for expenses. They can either travel for project-related activities (conferences, research visits, training) or can buy equipment. The research project leader approves requests from the researchers. Note, that the project leader can approve travel and equipment, but not directly the payment of project staff. Staff members assigned to projects and paid by project funds will be entered by research office or personnel office staff since this information needs to be consistent with records in the personnel database and the connected account management system (for salaries).

A project description consists of a project title, the start and end date, and a description of its objectives. It includes a set of tasks to be executed during the project, each with a description of activities, start and end date and the people working on it. The people associated to the project are to be listed together with a role (e.g. software developer, administrator, researcher, project leader). The project leader is responsible for all activities. There are also project researchers. Each project will also have an account associated (called a cost centre), which is related to information stored in an external account management system. There will be a total amount of money, split into staff, equipment and travel budgets.

Projects shall be supported at different stages: draft proposals can be worked on by researchers, these can then be submitted for internal approval and external funding. Funded proposals become active and will be archived at the end of the project duration. A workflow feature shall support this. This is an important use case for researchers to simplify the management of projects for them. Researchers should be able to search for their project by name and stage. The workflow feature shall guide them through the lifecycle of a project, e.g. to prepare a project proposal for internal approval or to create an annual summary report at the end of each year.

A number of systems can be identified. The PMS system needs to connect to the finances account management to retrieve up-to-date financial information. This is an external accounting system that the

PMS needs to interface with to obtain financial status information, such as total budget and total budget and available budget for the categories ‘staff’, ‘equipment’ and ‘travel’.

Furthermore, there shall be two versions of the core PMS system.
- Firstly, a Web access version for the two categories of researchers involved (with a restricted set of functions).
- Secondly, a standalone desktop version for the research office with all functions.

The functions that the system is meant to provide for the research project manager include:
- export summary reports (progress and finances) for a single project to funding agencies
- capture progress and results for the individual tasks
- financial reporting on monies requested and monies already paid out per project

The research office staff members are allowed to carry out all functions. In addition to the researcher functions, they should have a number of analysis features available, for example for all projects:
- General project progress (e.g. the stages at which each project is, which tasks have been started/completed etc))
- Financial summaries (total expenditure per project, with details on staff, equipment and travel expenses)

These analysis reports shall be available on request by research office staff. They shall also be automatically generated during the night, and made accessible to staff through a link in their system user interface.

A backup feature shall be included that backs up all data at the end of business hours each day to a separate storage location.

In addition, the deployment shall develop a scenario for cloud deployment that should at least include cloud storage of all data to enable remote, possibly mobile access to data for researchers. Full deployment of all software shall also be considered. Two deployment scenarios shall be proposed.

What you need to do:

Develop a set of models that describe the PMS system with its external system components (as far as the latter is relevant):

- The models should cover the views on software modelling: Logical, Development, Process, Physical
- For this, use the following **UML diagram types**
    - Use case, class, sequence, activity, statechart, component, deployment
- Arrange your models into a **3-stage development schedule** (i.e. use the diagram types at the right stages) that should be reflected by your sprint schedule (see below)
    - Requirements Analysis
    - System Architecture and Design
    - Software Construction and Deployment
- At the end, it should be clear in your models that this is meant to be implemented following a selected **architecture pattern.** The use of presentation (P), control (C) and entity/storage (E) classes, maybe also other class categories if applicable, might help to indicate the class prupose.
    - The three class types would also correspond to the Model-View-Controller paradigm (M=E, V=P, C=C).
    - Note: there will be more input on architectural pattern and design patters over the next weeks.
- All diagrams need to be **documented**, i.e. described in text. For this, produce a final report with all models and their explanation, arranged according to view and stage.
- Please note that ***not* all system features should be modelled in full detail**. So, select appropriate ones for detailing, which we can then discuss.

What you need to produce (submit and present):

- **Weekly reports** (organized around the 'sprints' idea from Scrum-based project management – 1 page, bullet points) that reflect your progress (backlog and to-do). These should have the following structure:
    - Backlog: Achievements during the last week (what is done and what is NOT done)
    - [Optional] Possible questions and issues to be discussed arising from the Achievements part
    - To-Do: Plan for the next week
- A **final PDF report** (see above) with all models and discussions/explanations.
- A **short presentation** of the main outcomes (10 min), which will then be **discussed** for up to 30 min, depending on your presence and discussions with us during the semester labs.