Homework # 2

MTAT.03.229 - Enterprise Systems Integration

In this homework, you will implement a REST API for Rentit's information system. This REST API will later be used in the interaction with one (or several) front-end application(s): the one used by Rentit's employees to process purchase orders, or the one allowing employees to schedule maintenance tasks.

Rentit's Maintenance Plan

An equipment Maintenance Plan is an important management instrument that keeps track of the operational state of the equipment (aka plants), all the performed/scheduled maintenance tasks, the maintenance expenses, among other information. The goal of this plan is to ensure maintenance is consistently done in all the fleet plants.

Overall, the expected benefits of integrating maintenance plans into Rentit's information system are:

- Reduced equipment downtime
- Increased life expectancy
- Circumvention of costly, large-scale repairs by timely routine tasks
- Improved safety and quality-of-service for customers
- Enhanced planning of acquisition/replacement of equipment

Maintenance plan management

In Rentit, planning of maintenance tasks happens at the beginning of the year. For every plant in the fleet, Rentit's engineers design a maintenance plan by analyzing the current equipment's condition and the recommendations provided by the constructors of the machinery. The equipment's condition can be one of the following:

- Serviceable: the plant is fully operational,
- Unserviceable Repairable: the plant is failing and needs repairs,
- Unserviceable Incomplete: the plant is failing, and the maintenance team is waiting for supplies to complete the repair,
- Unserviceable Condemned: the plant suffered significant damage such that it can no longer be used.

With this information, the engineers schedule a series of maintenance tasks. The list of planned tasks represents the initial maintenance plan for the year of action. At the end of every maintenance task, the equipment's condition is updated.

Maintenance tasks can be one of three types: preventive, corrective, and operational maintenance. Preventive maintenance tasks are regularly performed, on serviceable plants, to reduce the likelihood of a plant to fail. Corrective maintenance tasks are performed to identify, isolate, and repair the cause of any failure in a plant. Finally, operational maintenance tasks refer to routine inspection, cleaning, servicing, lubricating, and adjusting of plants as required. This type of maintenance is usually performed by nonspecialized technicians.

In our scenario, every physical plant is associated with a record in the information system that we will refer to as Plant Inventory Item. This record contains at least the serial number of the equipment. Somehow this record is independent of the plant description that one usually shares with customers for consultation in the form of the plant catalog. We will refer to that information as the Plant Inventory Entry. Based on the requirements above, you will perform the following tasks:

Tasks

- Identify the operations implied in the description that should be mapped into REST interactions.
- Summarize the REST API in the form of a table that presents the HTTP verb, URI, and a brief description of the operation. See, for example, the table in slide 18 of Lecture 5.
- Implement the REST API by extending the Spring application used in the lab sessions[1].
- Implement a validation service for scheduling maintenance tasks. The validation is performed every time we are about to schedule or update a maintenance task. Depending on the type of task (i.e., CORRECTIVE), the diagnostic of the problems must be included in the body of the response to the REST interaction (along with the corresponding status code). For this point, you should use the Spring validation framework (cf. validator) as sketched in the slides of the lecture.
- Write tests corresponding to the following scenarios (these tests are very minimal; you should write more tests to verify your application):
  - A recently created maintenance task must have a valid reference to a plant inventory item, and a correct maintenance period (e.g., start < end date, the period must be in the future, and both times must be different from null),
  - Once the maintenance task is stored in the database, this must always have a valid identifier.
  - A PREVENTIVE maintenance task only can be scheduled for SERVICEABLE plants.
  - CORRECTIVE maintenance tasks only can be scheduled for UNSERVICEABLE REPAIRABLE and INCOMPLETE plants.
  - OPERATIONAL maintenance tasks can be scheduled for ANY plant, except for the UNSERVICEABLE CONDEMNED ones.

You must submit the link to your bitbucket or GitHub repository to the course's submission web page. (Use your university account when creating your Bitbucket repository to get an academic account: that account would allow you to add more than 5 members to your repositories). Add the teaching staff as collaborators to your Bitbucket repository. Remember that the homework must be submitted by teams. Add the name of the team members in a file to Git repository (e.g. text file or markdown file). Username: mcamargo85 (email: manuel.camargo@ut.ee), orlenyslp (email: orlenyslp@gmail.com)

---

[1] **NB! to ensure compatibility and stability of the dependencies versions, on this homework will be used version 2.1.2.RELEASE of Spring framework, and version 0.24.0.RELEASE of spring-hateoas provided in the source code of practice 5. If you use a different version than these, support for possible compatibility errors will not be provided.**