Integrative Project - Spring Semester 2020/2021

Project Requirements

This document describes the work to be developed by the teams during the semester. Most of the software application features are informally described from an end user's perspective. The Integrative Project will be developed in four sprints:

Sprint A. Integrative Project Analysis

- *Requirements Specification and Analysis*
- *Configure the Bitbucket Repository*

Sprint B: User Stories to develop

- US3: As a receptionist of the laboratory, I want to register a client.
  - **Acceptance Criteria:** The client must become a system user. The "auth" component available on the repository must be reused (without modifications).
- *US7:* As an administrator, I want to register a new employee.
  - **Acceptance Criteria:** Each user must have a single role defined in the system. The "auth" component available on the repository must be reused (without modifications).
- *US8:* As an administrator, I want to register a new clinical analysis laboratory stating which kind of test(s) it operates.
- *US9:* As an administrator, I want to specify a new type of test and its collecting methods.
- *US10:* As an administrator, I want to specify a new parameter and categorize it.
- *US11:* As an administrator, I want to specify a new parameter category.

Sprint C: User Stories to develop

- US4: As a receptionist of the laboratory, I intend to register a test to be performed to a registered client.
  - **Acceptance Criteria:** The receptionist must select the parameters to be analysed from all possible parameters in accordance with the test type.
- US5: As a medical lab technician, I want to record the samples collected in the scope of a given test.
  - **Acceptance Criteria:** The system should support several barcode APIs. The API to use is defined by configuration.
- US12: As a clinical chemistry technologist, I intend to record the results of a given test.
  - **Acceptance Criteria:** The application should use an external module that is responsible for providing the test reference values. The application can use an external module for each type of test. For instance, when the results are for blood tests parameters, the external module BloodReferenceValues1API can be used. When the results are for Covid-19 tests parameters, the external module CovidReferenceValues1API can be used. In any case, the API request should

include, at most: (i) a key to access the module (e.g.: "KEY1234"); (ii) a parameter identifier; (iii) the reference date; and (iv) reference measurement unit (e.g. "mg").

- US14: As a specialist doctor, I intend to make the diagnosis and write a report for a given test.
- US15: As a laboratory coordinator, I want to validate the work done by the clinical chemistry technologist and specialist doctor.
    - **Acceptance Criteria:** The system does not show client personal information but shows all dates (test registration date, chemical analysis date and diagnosis date).

Sprint D: User Stories to develop

- US1: As a client, I want to access the application to view the results of the tests I have performed.
    - **Acceptance Criteria:** The client tests must be shown ordered from the most recent to the oldest one. The test results are shown only after the client has selected a test.
- US2: As a client, I want to update my personal data.
- US13: As a clinical chemistry technologist, I intend to consult the historical tests performed by a particular client and to be able to check tests details/results.
    - **Acceptance Criteria:** The application must allow ordering the clients by TIN and by name to help the clinical chemistry technologist choose the target client. The ordering algorithm to be used by the application must be defined through a configuration file. At least two sorting algorithms should be available.
- US16: As a laboratory coordinator, I want to have an overview of all the tests performed by Many Labs and analyse the overall performance of the company (for instance, check the sub-intervals in which there were more samples waiting for the result). To facilitate overall analysis, the application should also display statistics and graphs.
    - **Acceptance Criteria:** While evaluating the performance the laboratory coordinator should have the ability to dynamically select the algorithm to be applied from the ones available on the system (the benchmark algorithm provided in moodle and the brute-force algorithm to be developed). Support for easily adding other similar algorithms is required.
- US17: As a laboratory coordinator, I want to import clinical tests from a CSV file.
    - **Acceptance Criteria:** If the file contains invalid data (e.g., a parameter not defined in the system), that data should not be load into the system. An exception should be thrown.
- *US18: As an Administrator I want to send the Covid-19 report to the NHS at any time. I want to define the interval of dates to fit the regression model, the number of historical points (number of days or number of weeks) that must be sent to the NHS, the regression model to use and select the independent variables to use.*
    - **Acceptance Criteria:** The system should allow the Administrator to select between a simple linear and multilinear regression model to fit the data. Moreover, the Administrator should be able to choose the independent variable to use with the simple linear regression model (*either the number of tests realized or*

the mean age). The system should send the report using the NHS API (available in moodle).

- US19: The Many Labs company wants to send to the NHS daily reports of Covid-19 data, including the number of observed values and estimated values. Reports should be generated automatically with historical data and must be sent every day at 6:00 am.
    - **Acceptance Criteria:** The report should include day and week (observed and estimated) values, the regression model used to estimate each value, R(SLR), R2 and R2 adjusted for SLR and MLR, hypothesis tests for regression coefficients significance model with Anova. Simple linear and multilinear regression models can be used to compute the estimates and corresponding confidence intervals. When the system is configured to use the simple linear regression model, the performance of each model should be used to select the best model (the one that uses *the number of tests realized or the one that uses the mean age as independent variable). The best model* will be used to make the estimated/expected values that will be send to NHS. The interval of dates to fit the regression model and the number of historical points *(number of days and number of weeks)* must be defined through a configuration file. The system should send the report using the NHS API (available in moodle).

Other Requirements:

- *The users should use a graphical user interface to access the features introduced in Sprint D.*
- *The application should use object serialization to ensure persistence of the data between two runs* of the application.