Integrative Project - Spring Semester 2022/2023
Real Estate USA System

1. Introduction
The Degree in Informatics Engineering (LEI) adopts a teaching-learning process based on the development of a single project that fosters the integration and coordinated application of the knowledge and competencies covered by all the courses (UC) taught throughout the 2nd semester: ESOFT, PPROG, MDISC, MATCP, and LAPR2.

The project is to be carried out by teams of four students. These teams remain the same across all the UCs (ESOFT, PPROG, MDISC, MATCP and LAPR2). It must be clear that this is a single project - not 5 separate projects!

At the end, each team should come out with an integrated solution, an application, encompassing several interconnected modules.

The set of rules provided in this document cover the main existing scenarios. Situations other than those mentioned in this document should be reported to the LAPR2 course's coordinator (RUC), who will decide how to proceed together with the other RUCs.

Although this project adopts a Project-Based Learning (PBL) model, comprising the 2nd semester UCs, it is important to highlight that the project development must adopt all the best practices introduced both throughout the 1st semester and the 2nd semester - the adequate application of those best practices is part of the evaluation criteria of the project.

2. Application to be Developed
Real Estate USA is a company from the United States of America that has a network of real estate agencies and wants an application to manage the business (lease and sale) of real estate.

2.1 Business Context
Real Estate USA needs an application that enables buyers who visit its stores/agencies to access the properties available for lease or sale, as well as the company's employees to carry out a set of operations related to the real estate business. Among these operations are the publication of rental and sale advertisements, the registration of a business (lease or sale) and the scheduling and registration of visits to the property.

From time to time, property owners contact Real Estate USA with the aim of selling or renting their properties. Owners go to one of the company's branches and meet with a real estate agent to sell or rent one or more properties, or they can use the company's application for the same purposes. The owner provides property characteristics and the requested price and sends the request to an agent. Upon receiving the order, the agent sets the commission and publishes the offer in the system. The commission can be a fixed amount or a percentage. In the case of a request for the sale of a property, the owner must provide information on: the type of property (apartment, house or land), the area in m2, the location, the distance from the city centre, the requested price and one or more photographs. If the property is an apartment or a house, the owner also provides: the number of bedrooms, the number of bathrooms, the number of parking spaces and the available equipment, such as central heating and/or air conditioning. In case the property is a house, the existence of a basement, an inhabitable loft, and sun exposure must be registered as well.

The real estate agent reviews advertisement requests, registers the information in the system and publishes the offer so that it is visible to all clients who visit the agency and use the application. All registered information, except the agency commission, can be accessed by the client who intends to buy or rent the property; the client is, then, responsible for being able to consult the properties by type, number of rooms, and sort by criteria such as price or the parish where the property is located.

After consulting a list of properties, the client can request to schedule a visit to the real estate agent for a specific property to verify its conditions. The agent receives the request, checks the availability and sends the response. If the customer accepts the order, it is automatically scheduled in the system.

After carrying out the visit, the agent records the visit and an indication of whether or not he thinks the deal will take place.

When the client decides to buy/rent the property, he sends a request for the purchase/lease of the property to the agent. After being appreciated by the agent, he accepts or rejects the order. If the request is accepted, the offer will not be shown again to clients using the application.

Each store in the network has a store manager and the set of stores is managed by a store network manager. The main functions of a store manager are to monitor and streamline the branch with the aim of getting to know better the business carried out and to analyse and evaluate the performance of employees.

The manager of the network intends to analyse the performance of each of the branches and the global behaviour of the network on a daily basis.

The company's systems administrator will be responsible for registering all employees (specifying the name, the citizen's card number, the tax number, the address, the email address, the contact telephone number and the agency to which it is assigned) and branches of the network (specifying the designation, location and local manager) as well as preparing the system in order to facilitate the insertion of advertisements and facilitate the use of the application. The application to be developed in this project will replace an application that was already in operation in some agencies and will be replaced in July 2023.

2.2 Technological Requirements

The application must be developed in Java language using the IntelliJ IDE or NetBeans. The application graphical interface is to be developed in JavaFX 11. All those who wish to use the application must be authenticated with a password of seven alphanumeric characters, including three capital letters and two digits. The application must support the English language.

During the system development, **the team must:** (i) adopt best practices for identifying requirements, and for OO software analysis and design; (ii) adopt recognized coding conventions and standards (e.g., CamelCase); (iii) use Javadoc to generate useful documentation for Java code.

The development team must implement unit tests for all methods, except for methods that implement Input/Output operations. The unit tests should be implemented using the JUnit 5 framework. The JaCoCo plugin should be used to generate the coverage report.

All the images/figures produced during the software development process should be recorded in SVG format.

The application should use object serialization to ensure data persistence between two runs of the application.

3. Project Operating Mode

It must be clear that it is not intended at the end of the Integrative Project to obtain 5 separate projects but rather an integrated solution, an application, encompassing several modules. The focus should always be on the project as a whole and not on each UC individually.

3.1 Work Teams

Students are organized in teams of 4 members. The teams are the same in all the UCs of the 2nd semester. Each team will work as an independent company to compete in the development of the required application.

The project takes place during the semester in a subset of classes of each UC. Each UC introduces concepts and helps students in the development of the project, giving support to, focusing on specific areas as follows:

- ESOFT - Software development process;
- PPROG - Java OO programming;
- MDISC - Worst-case time complexity of sorting and Balanced Partition algorithm;
- MATCP - Linear regression and prediction tasks;
- LAPR2 - Team management, working methodology, integration of the different modules, English written skills.

3.2 Sprints

The semester is divided according to Table 1. The detailed requirements of each sprint will be presented in a separate document, just before the sprint.

Table 1: Timetable of the semester

Sprint	Start (week)	End (week)	General objective	UCs
-	1	3	• Group formation process	LAPR2
A	4	6	• Acquisition of basic skills of ER, AOO. • Introduce concepts of Software Testing, Continuous Integration and Code Quality. • Introduce Agile working methodology. • Prepare students for writing technical documentation in English.	ESOFT, LAPR2
B	7	9	• Acquisition and application of more advanced skills of ER, AOO, DOO and COO. • Practice of programming in JAVA language. Develop a subset of USs. Implement a console user interface. • Prepare students for writing technical documentation in English.	ESOFT, PPROG, LAPR2

Table 1: Timetable of the semester

Sprint	Start (week)	End (week)	General objective	UCs

C	10	12	• Acquisition and application of more advanced skills of ER, AOO, DOO and COO. • Practice of programming in JAVA language. Develop a subset of USs and update (if needed) the USs developed in Sprint B. Implement a console user interface. • Prepare students for writing technical documentation in English.	ESOFT, PPROG, LAPR2
D	13	15	• Acquisition and application of more advanced skills of ER, AOO, DOO and COO. • Study computational complexity and linear regression. • Practice of programming in JAVA language. Develop all USs not addressed in Sprints B and C and, if needed, update the USs previously developed. Implement a Graphical User Interface (GUI) using JavaFX. • Prepare students for writing technical documentation in English.	ESOFT, PPROG, MATCP, MDISC, LAPR2
Evaluation	16	16	• Evaluate the work developed during the semester (project documentation, code and work methodology). The evaluation of each UC is independent, with its own criteria.	ESOFT, PPROG, MATCP, MDISC, LAPR2

4. Revision History

Date	Description