# Projeto de Software

*Licenciatura em Engenharia de Telecomunicações e Informática*

*2023/2024*

**Version 2**

# Assignment

## 1 Objective

Design and implement *the service layer* of a prototype distributed system based on service orientation principles.

## 2 The Problem

**Library Management**

Central City library needs a system to manage their library, readers and book lending. The library consists of thousands of books (no other media formats are available) organized by genre (e.g., Science-fiction, mistery, Law, Medicine, etc.) that the readers can lend, take home and return after a period (typically 15 days). When a reader doesn't return a book on time a fine will be applied per day of delay.

Furthermore, the library wants to know some metrics to manage the business. Namely the library needs to track:

- Top 5
  - readers
  - books lent
  - genres
- Monthly average lending
  - per reader
  - per genre
- Average lending duration
  - Per book
  - Per reader
  - Per genre

**Notes**

- Since the company wants to give freedom to its marketing team to generate the media content best suited to the business it was decided that the frontend of the system will be developed using a low code or CMS solution. As such, the system being procured here is a backend service or set of services that any frontend the company decides in the future can interact to reach its business goals.
- Since generating all the data needed for the dashboard might be a lengthy operation, a technical solution using asynchronous calls and/or a "summary" database updated via events, or a similar approach must be followed.
- Payments are out of scope and can be assumed to always be performed with success by a third-party component
- The fulfilment of the actual lending service is out of scope

# 3 Phase 1

## 3.1 WP #0A - Setup

1. "bootstrap" user credential data for librarians
2. "bootstrap" genre data

## 3.2 WP #1A – Authors

3. As Librarian I want to register an author (name, short bio)
4. As Librarian I want to update an author's data
5. As Librarian or Reader I want to know an author's detail given its author number
6. As Librarian or Reader I want to search authors by name

## 3.3 WP#2A – Books

7. As Librarian, I want to register a book (isbn, title, genre, description, author(s))
8. As Librarian I want to update a book's data
9. As Librarian or Reader I want to know the details of a book given its ISBN
10. As Librarian or Reader I want to search books by genre

## 3.4 WP#3A - Readers

11. As anonymous I want to register as a reader (name, email, date of birth, phone number, GDPR consent). A Reader Number is assigned to me by the library.
12. As Reader I want to update my personal data, e.g., phone number[1]
13. As Librarian I want to know a user's detail given its reader number
14. As Librarian I want to search Readers by name

[1] A reader can only access (read/write) their own details. No reader can access the details of other readers.

### 3.5 WP#4A – Lendings

15. As Librarian I want to lend a book to a reader. The lending can only be done if the reader has no overdue books and the reader can have at most 3 books lent. The return date must be presented to the Librarian
16. As Reader I want to return a book. If the return is overdue I'm fined by the library.
17. As Reader or Librarian I want to know the details of a lending given its lending number

### 3.6 Non-functional requirements

18. Provide Links in the resource representation
19. All authenticated requests must use JWT
20. OpenAPI specification
21. Sample requests and responses, e.g., POSTMAN collection
22. Automated tests, e.g., POSTMAN collection

## 4 Phase 2

### WP #0B – Setup

1. "bootstrap" author and book data with meaningful data and volume for the data exploration use cases (e.g., Top 5 books)
2. "bootstrap" lending data with meaningful data and volume for the data exploration use cases (e.g., Top 5 books)

### 4.1 WP #1B - Authors

3. As Librarian I want to register an author with an optional photo[2]
4. As Reader I want to know the books of an Author
5. As Reader I want to know the co-authors of an author and their respective books
6. As Reader I want to know the Top 5 authors (which have the most lent books)

### 4.2 WP#2B - Books

7. As Librarian, I want to register a book with a book cover photo[3]
8. As Reader I want to search books by title
9. As Librarian I want to know the Top 5 books lent
10. As Librarian I want to know the Top 5 genres

### 4.3 WP#3B - Readers

11. As Librarian I want to know the Top 5 readers
12. As anonymous I want to register as a reader with an optional photo, and optional list of interest (i.e., the genre I'm interested in)[4].
13. As Reader I want a list of book suggestions based on my interest list

[2] Refinement of use case from phase 1
[3] idem
[4] idem

### 4.4 WP #4B - Lending

23. As Librarian I want to list overdue lending sorted by their tardiness
14. As Librarian I want to know the average number of lending per genre of a certain month
15. As Librarian I want to know the Average lending duration

### 4.5 WP #5 - Reporting

16. As Librarian I want to know the number of lendings per month for the last 12 months, broken down by genre
17. As Librarian I want to know the Top 5 readers per genre of a certain period
18. As Librarian I want to know the Monthly lending per reader of a certain period
19. As Librarian I want to know the Average lending duration Per genre per month for a certain period

### 4.6 Non-functional requirements

20. Provide Links in the resource representation
21. All authenticated requests must use JWT
22. OpenAPI specification
23. Sample requests and responses, e.g., POSTMAN collection
24. Automated tests, e.g., POSTMAN collection
25. Long result lists must support pagination

### 4.7 Bonus use cases/requirements

26. Augment the reader profile with a funny quote based on the date of birth of the reader
27. As Reader I want to search books by author
28. As Librarian I want to search Readers by phone number
29. As Librarian I want to search Readers by email
30. As Librarian I want to know the Average lending duration Per book

## 5 User story acceptance criteria

All user stories have the following acceptance criteria:

- Analysis and design documentation
    - Domain model
    - Design justification
    - Sequence diagrams (when necessary)
    - Unit test
- OpenAPI specification
- POSTMAN collection with sample requests for all the use cases with tests
- Proper handling of concurrent access

## 6 Working mode

1. Each team will represent a company developing the solution to a customer.
2. The professor of Theoretical classes will work as the customer

3. The professor of the Lab classes will help the team in setting up the team environment and solve technical difficulties
4. Even though the assessment is individual, this is a joint project. From the customer's perspective there is just one project and not individual projects (one from each student). As such the team mentality should be "one for all, all for one," either you all win or you all lose. Nonetheless, to simplify the assessment of the work you may divide the work packages among team members in the following way:
    a. Work package 0 is of the responsibility of the whole team
    b. Each work package 1, 2, 3 and 4 are the responsibility of one team member
    c. Work package 5 is the responsibility of the whole team
    d. Note that even if you are responsible for one work package you should help your team members in the other work packages if they are struggling with it. Remember, "one for all, all for one"
    e. Optional features are the responsibility of the whole team
    f. Groups of 3 elements must design and implement work packages 2, 3 and 4. Assume that there is only one author per book as an embedded value of the book.
    g. Groups of 4 elements must design and implement work packages 1, 2, 3 and 4.
5. The project development must follow the software engineering process as explained in ESOFT and as such, the team must:
    a. Work iteratively.
    b. Analise the requirements and engage with the customer for clarifications (do not assume anything; always ask the customer what he really wants)
    c. Design the overall system architecture prior to starting the development.
    d. For each use case,
        i. start by detailing the analysis and elaborate the design of the use case justifying your decisions.
        ii. Implement the use case taking into consideration all the best practices learnt throughout the course (not just this course unit) and the acceptance criteria.
        iii. Automate the test of the use case (e.g., junit, POSTMAN tests)
6. Third party libraries may be used freely but their use must be justified.
7. Code extracts obtained from other sources (e.g., stack exchange) must be clearly marked through comments in the code indicating its origin.

# 7 Logistics

1. The assignment is to be made in groups of three or four students.
2. PL classes will be devoted to help the students in carrying out the assignment.
3. Presentation and assessment of the assignment will be carried out in PL classes following the due date.
4. Delivery of the assignment will be done thru moodle in a single ZIP file (not RAR) with
    a. Analysis and design documentation
    b. Source code tarball

c. Provide your self-assessment and peer assessment

# 8 Assessment

- Assessment will be done according to the criteria table in a scale of 0 to 4 (with one decimal place) for each criterion, then converted to a scale of 0 to 20.
- Assessment grade may be given with one decimal place.
- Grades are individual, as each student may have a different grade from the other group members.