



**School of
Engineering**

COLLABORATIVE PLATFORM

Course: Data Pipeline 1

Cohort: S24

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Introduction

Project Overview

This project develops a collaborative platform for managing social and medical care for the disabled and elderly. It integrates various services like personal assistance, medical services, and caregiver support, serving as a central hub for users to coordinate care and manage daily activities. Beyond the scope of this project, we have also compiled extensive documentation and code explanations, which can be explored through the following links:

- [Complete Code and Documentation](#)
- [Scenarios and XSLT Solutions Documentation](#)

Project Objectives

The main objectives of this project are as follows:

- **Data Modeling:** Establish a data model that captures all key relationships and entities within the platform, such as care recipients and service details.
- **XML Schema Creation:** Craft a detailed XML Schema to structure the data and support system integration.
- **XML Data Creation:** Create a representative XML database that follows the defined schema, containing realistic data extracts to simulate the platform's operations.
- **XSLT Transformations:** Develop XSLT stylesheets for data manipulation and to convert XML into formats like HTML and JSON for various uses.

Project Scope

The project focuses on developing a data management system for a collaborative platform that includes:

- **Information Management:** Manages essential data for individuals needing assistance, services, activities, and service providers.
- **Service and Activity Scheduling:** Facilitates the scheduling of services and activities for efficient coordination.

- **Integration Capabilities:** Ensures data flexibility for export in various formats compatible with other systems.

Group Work Distribution

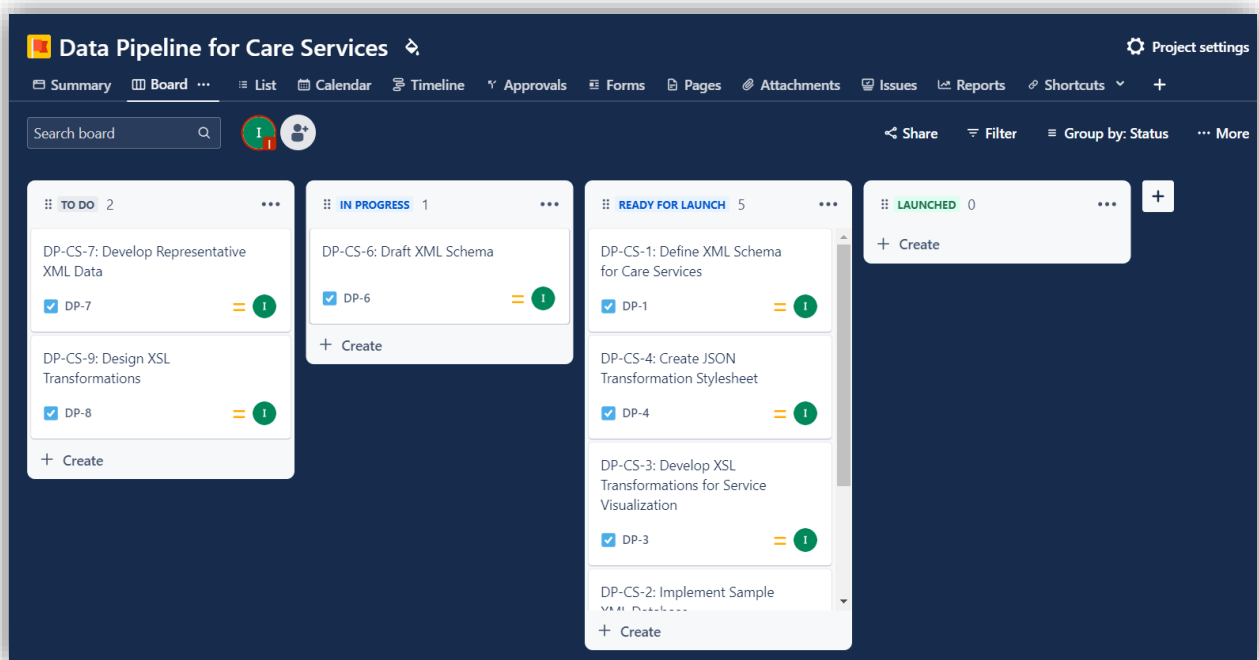
Contribution Summary

The table below summarizes the contribution percentage for each group member, reflecting the overall workload distribution throughout the project:

Group Member	Contribution Percentage
Ismail Ben Abdelkader	40%
Antoine Theillac	30%
Omar Nader	30%

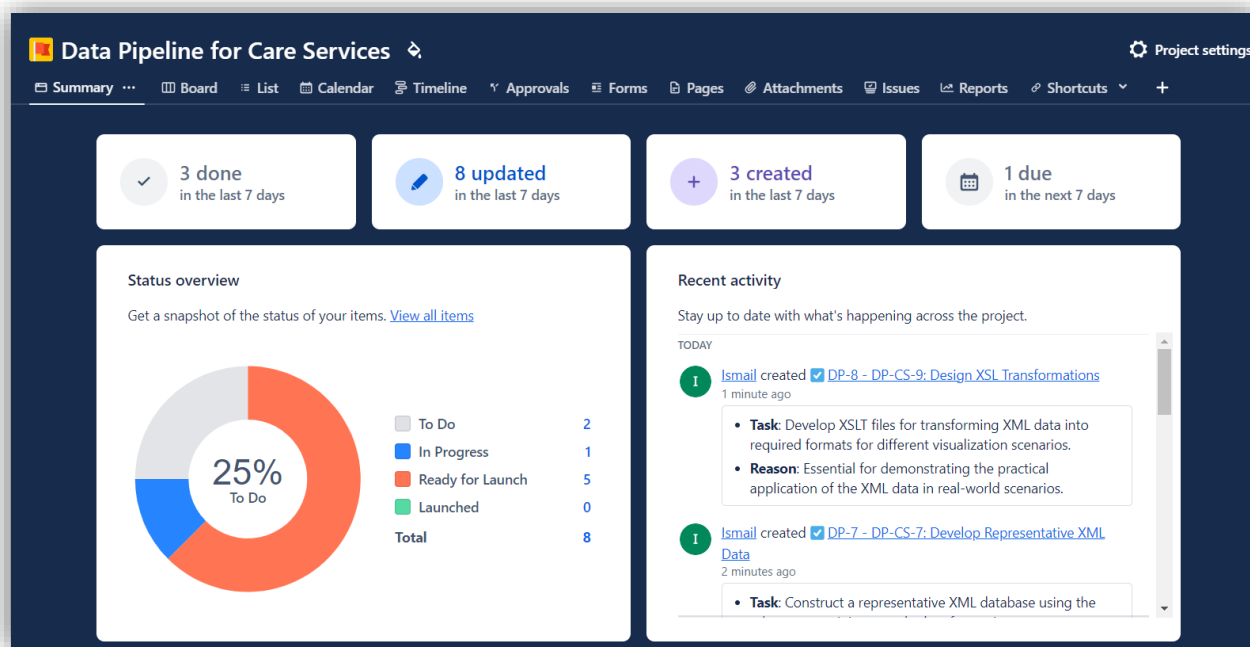
Task Assignment

We managed tasks and tracked our project progress through JIRA tickets, ensuring increased transparency and efficiency in our collaboration. For more details, please visit our JIRA dashboard at this link: [JIRA Dashboard](#).



JIRA Board View of Project Tasks

The second screenshot presents the summary dashboard of our JIRA project.



JIRA Project Summary Dashboard

Group Member	Tasks	Responsibilities
Ismail Ben Abdelkader	Data Modeling, XML Schema Creation	Led data model design and developed XML Schema to define structure and ensure data integrity.
Antoine Theillac	XSLT Development, Scenario Implementation	Created XSLT stylesheets for data visualization and implemented scenarios for data filtering.
Omar Nadar	XML Data Creation, Integration with External Systems	Built XML database per schema specifications and converted XML data into various formats for integration.

Working Environment and Tools

Development Environment

Below is a detailed overview of the tools and technologies utilized in our project, highlighting their specific functions and providing direct links for further reference:

Category	Tool/Service	Description and Link
XML Editors and IDEs	Visual Studio Code	Used for XML editing, schema validation, and programming with extensions and debugging tools.
Version Control	GitHub	Manages version control and project collaboration, hosting all project files and supporting concurrent work. View Repository
Communication and File Sharing	Microsoft Teams	Main tool for project communication, update discussions, and code sharing.
	Microsoft OneDrive	Shares and stores large files, serving as a backup location for project documents.
Project Management	Jira	Manages tasks, tracks project progress, and organizes deadlines. Access JIRA Dashboard

Data Modeling

Modeling Principles

Our data modeling emphasizes modularity and precise type definitions for robustness and flexibility:

- **Modularity:** The model is segmented into discrete components for managing entities like persons, services, and activities, enhancing maintenance and scalability.
- **Fine-Grained Type Definitions:** Detailed type definitions improve data integrity and precision by enforcing specific validation patterns for IDs and emails.

XML Data Structure

The structured XML data supports the collaborative platform's processes effectively, comprising:

- **CarePlatform (Root Element):** Encapsulates and represents the entire data model.

- **Persons:** Aggregates all individuals on the platform, with details like ID, FirstName, LastName, DOB, Email, and Address.
- **Services:** Lists services offered, with each service including details like ServiceID, ServiceName, Description, Provider, and Schedule, utilizing modularity to manage complex provider information.
- **Activities:** Enumerates all activities, each defined by elements like ActivityID, ActivityName, Description, Participants, and Schedule, showcasing the reusable 'PersonType' in Participants.

Modeling Challenges and Solutions

Efficient Data Access One challenge was structuring the XML schema to enable efficient access and querying of data, especially for retrieving specific service details and related participant information.

Solution: Strategic Element Organization To simplify data access:

- **Indexed Elements:** We introduced specific ID attributes for critical elements like services and participants, which allowed quicker lookup and retrieval operations.
- **Structured Relationships:** Instead of deep nesting, we maintained a shallow hierarchy where possible, enhancing the performance of XPath queries.

Scenarios and XSLT Solutions

Scenario Descriptions

In our project, we implemented several scenarios to demonstrate the capabilities of XSLT for transforming and visualizing XML data within the collaborative platform. The scenarios include:

1. **Display All Services and Their Providers:** Lists all services along with details of the providers.
2. **Display Activities Along with Their Participants:** Shows a list of all activities with their participants.
3. **Display Services Scheduled on a Specific Date:** Filters and displays services scheduled on a specific date.

4. **Display the Full Contact Information of All Providers:** Lists full contact details for all service providers.
5. **Display Upcoming Activities for a Specific Participant:** Displays upcoming activities for a participant identified by their ID.
6. **Conversion to Another XML Format:** Simplifies the XML structure for integration with an external system.
7. **Conversion to JSON Format:** Converts XML data related to activities into JSON format for web application integration.

Complex Scenario Analysis:

We selected the third scenario, "Display Services Scheduled on a Specific Date," as it involved filtering XML data based on a dynamic date input, ensuring that only relevant services were displayed. This required the use of `xsl:param` to dynamically accept a date input and `XPath` filtering to match the specified date. The solution effectively outputs an HTML table listing the services scheduled on that date, including service names, provider details, and timing.

AI Assistance Documentation

AI Tools and Prompts Used

Throughout the project, we used AI tools, notably Google's Bard, to boost productivity and quality. Bard was instrumental in data modeling, XML Schema creation, XSLT development, and drafting technical documentation.

Prompts and Results:

- **Prompt:** "Write an XML Schema for a collaborative platform managing care for disabled and elderly people."
- **Result:** Bard generated a detailed XML Schema, including elements for persons, services, providers, and activities.
- **Corrections:** We made minor modifications to the schema to meet specific project needs, like adding simple types and refining complex types for better representation of entity relationships.

Reflection on AI Usage

Using AI, especially Bard, greatly enhanced our project development:

- **Efficiency and Speed:** Bard expedited content creation for the initial draft stages, enhancing productivity and allowing for deeper focus on refining the final outputs.
- **Quality of Output:** Bard delivered high-quality suggestions, especially in XML Schema design and XSLT development, enriching the final product with best practices.

Technical Issues and Unresolved Problems

Technical Challenges Encountered

The project team faced several technical challenges:

1. Data Validation and Error Handling:

- **Challenge:** Ensuring XML data conformed to the schema, particularly with optional elements, and managing error handling in XSLT.
- **Solution:** Implemented comprehensive schema validation and error-checking within XSLT, though some runtime errors necessitated further debugging.

Unresolved Problems

Despite our best efforts, a few issues remained unresolved by the end of the project:

1. Incomplete Handling of Edge Cases:

- **Issue:** Checks and validations did not fully cover edge cases like missing or malformed data, leading to occasional incomplete outputs or data formatting errors.
- **Impact:** These issues could compromise data accuracy and system reliability in a production setting, necessitating further development to address these gaps.

Conclusion

Summary of Achievements

This project successfully established a robust data management system for a social and medical care platform aiding disabled and elderly individuals. Major achievements include:

- **Effective Data Transformation:** We utilized various XSLT stylesheets to adapt XML data across different scenarios, allowing for diverse data presentations in formats like HTML and JSON.

- **Seamless Collaboration:** Through effective team collaboration, we fulfilled project goals timely, resulting in a functional and comprehensive system.

To further explore our documentation and code explanations, please refer to the following links:

- [Complete Code and Documentation](#)
- [Scenarios and XSLT Solutions Documentation](#)

Lessons Learned

The project enhanced our technical proficiency, particularly with XML and XSLT, emphasizing the importance of detailed data model planning and tool capabilities. We recognized the critical need for rigorous error-checking mechanisms to ensure data integrity and system reliability.

References

Citations and References

The following sources and references were used throughout the project to support various aspects of the development, including technical documentation, XML Schema design, XSLT transformations, and project management:

1. W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures:

- **Reference:** W3C Recommendation. (2012). *XML Schema Definition Language (XSD) 1.1 Part 1: Structures*. Retrieved from <https://www.w3.org/TR/xmlschema11-1/>
- **Usage:** Used as a primary reference for understanding and implementing XML Schema definitions and ensuring compliance with standards.

2. JIRA for Project Management:

- **Reference:** Atlassian. (2024). JIRA Software Documentation. Retrieved from <https://www.atlassian.com/software/jira>
- **Usage:** Utilized for task management, project tracking, and collaboration among team members. Our project's JIRA board can be accessed here: [Data Pipeline for Care Services Project Board](#)