# University of Pisa

*Artificial Intelligence and Data Engineering*

# Distributed Systems and Middleware Technologies

*FLconsole documentation*

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# Contents

# Introduction and Project Overview

## Context and Project Objective

In this section, the context and objective of the project are described.

## Application Highlights

In this section, the highlights of the application are presented.

# Analysis

## Requirements

In this section, the requirements of the project are presented.

### Functional Requirements

The functional requirements of the project are described in this subsection.

### Non-Functional Requirements

The non-functional requirements of the project are described in this subsection.

### Constraints/Other Requirements

Any constraints or other requirements on the project are described in this subsection.

## Actors

The actors who can interact with the web console system consist of the following:

- **User:** The user is the actor who can browse the system to view running and completed experiments and their results.
- **Admin:** The admin is the actor who can manage the system, including creating and deleting configurations and experiments, and viewing the results of experiments.

## Use Case Modeling

### Use Case Diagram

### Scenarios

### Analysis Class Diagram

The analysis class diagram of the project is presented in this subsection.

### Sequence Diagrams

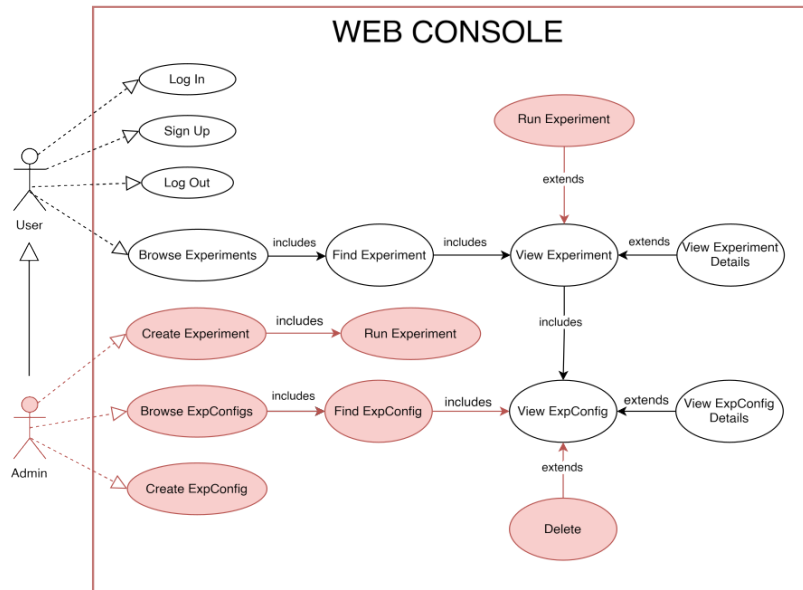The sequence diagrams of the project are presented in this subsection.

Figure 2.1: Use Case Diagram

Table 2.1: Use Case: Find Recipes

| Use Case | Find Recipes |
|---|---|
| **Primary Actor** | User |
| **Secondary Actor** | - |
| **Description** | Allows the user to find a specific recipe |
| **Pre-Conditions** | User must be logged i |
| **Main event steps** | 1) The user navigates to the "Search" feature |
| | 2) The user enters a string |
| | 3) The system searches the recipe database for matching results (title, keywords, description) |
| | 4) Upon finding matching posts, the system displays the search results |
| **Post-Conditions** | The user views a list of recipes matching the search criteria if there are any |
| **Correlated Use cases** | View Recipe, Browse Recipes |
| **Alternative event steps** | - |

# Design

## Software Architecture

The software architecture of the project is described in this section.

## Database Design

In this section, the database design of the project is presented.

# MongoDB

## Collections

**ExpConfig document example:**

```json
{
    "id": "example_id",
    "name": "Example Experiment",
    "algorithm": "example_algorithm",
    "strategy": "example_strategy",
    "numClients": 10,
    "stopCondition": "example_condition",
    "threshold": 0.5,
    "parameters": {
        "param1": "value1",
        "param2": "value2",
        "param3": "value3"
    },
    "creationDate": "2024-03-14T00:00:00Z",
    "lastUpdate": "2024-03-14T12:00:00Z"
}
```

**Experiment document example:**

```json
{
    "id": "example_id",
    "name": "Example Experiment",
    "expConfigSummary": {
        "id": "exp_config_id",
        "name": "Example Configuration",
        "algorithm": "example_algorithm"
    },
    "creationDate": "2024-03-14T00:00:00Z",
    "lastUpdate": "2024-03-14T12:00:00Z",
    "progressList": [
        {
        "creationDate": "2024-03-14T06:00:00Z",
        "parameters": {
            "param1": "value1",
            "param2": "value2"
        },
        "status": "In progress"
        },
        {
        "creationDate": "2024-03-14T09:00:00Z",
        "parameters": {
            "param1": "value1",
            "param2": "value2",
            "param3": "value3"
        },
        "status": "Completed"
        }
    ]
}
```

**User document example:**

```
{
"id": "example_user_id",
"email": "user@example.com",
"password": "example_password",
"creationDate": "2024-03-14T00:00:00Z",
"configurations": ["config_id1", "config_id2"],
"experiments": [
    {
    "id": "experiment_summary_id1",
    "name": "Experiment 1",
    "configName": "Configuration 1",
    "creationDate": "2024-03-14T06:00:00Z",
    },
    {
    "id": "experiment_summary_id2",
    "name": "Experiment 2",
    "configName": "Configuration 2",
    "creationDate": "2024-03-14T09:00:00Z",
    "lastUpdate": "2024-03-14T12:00:00Z"
    }
],
"role": "example_role"
}
```

## Erlang Message Handler

The Erlang message handler design is described in this subsection.

### Message structure

- Error message

```
{
    "type": "error",
    "cause": "error_in_collecting_data",
    "timestamp": "2024-03-13T12:34:56"
}
```

- Stop message

```
{
    "type": "stop",
    "cause": "experiment_finished",
    "timestamp": "2024-03-13T12:34:56"
}
```

- Data message

```
{
    "type": "data",
    "parameters": {
        "param1": "value1",
        "param2": "value2"
    },
    "timestamp": "2024-03-13T12:34:56",
    "status": "running"
}
```

# Implementation

## Development Environment

The development environment used for the project is described in this section.

## Main Modules

The main modules of the project are described in this section.

## Configuration

The configuration of the project is described in this section.

## Data Access

The data access layer of the project is described in this section.

## Data Transfer

The data transfer mechanisms used in the project are described in this section.

## Service

The services provided by the project are described in this section.

## User Interface

The user interface of the project is described in this section.

## Adopted Patterns and Techniques

The patterns and techniques adopted in the project are described in this section.

# Testing

## Structural Testing

The structural testing performed on the project is described in this section.

## JUnit Testing

The JUnit testing performed on the project is described in this section.

## Functional Testing

The functional testing performed on the project is described in this section.

## Test Cases

The test cases used for the project are presented in this section.

# Conclusion

In this chapter, we summarize the key points of the document and discuss possible future directions for the project.