

**01**

RASD&DD | JAN 2024

# Code Kata Battle

**Software Engineering 2 Project**

**Mehmet Emre Akbulut  
Yavuz Samet Topcuoglu**

ACADEMIC YEAR 2023-2024

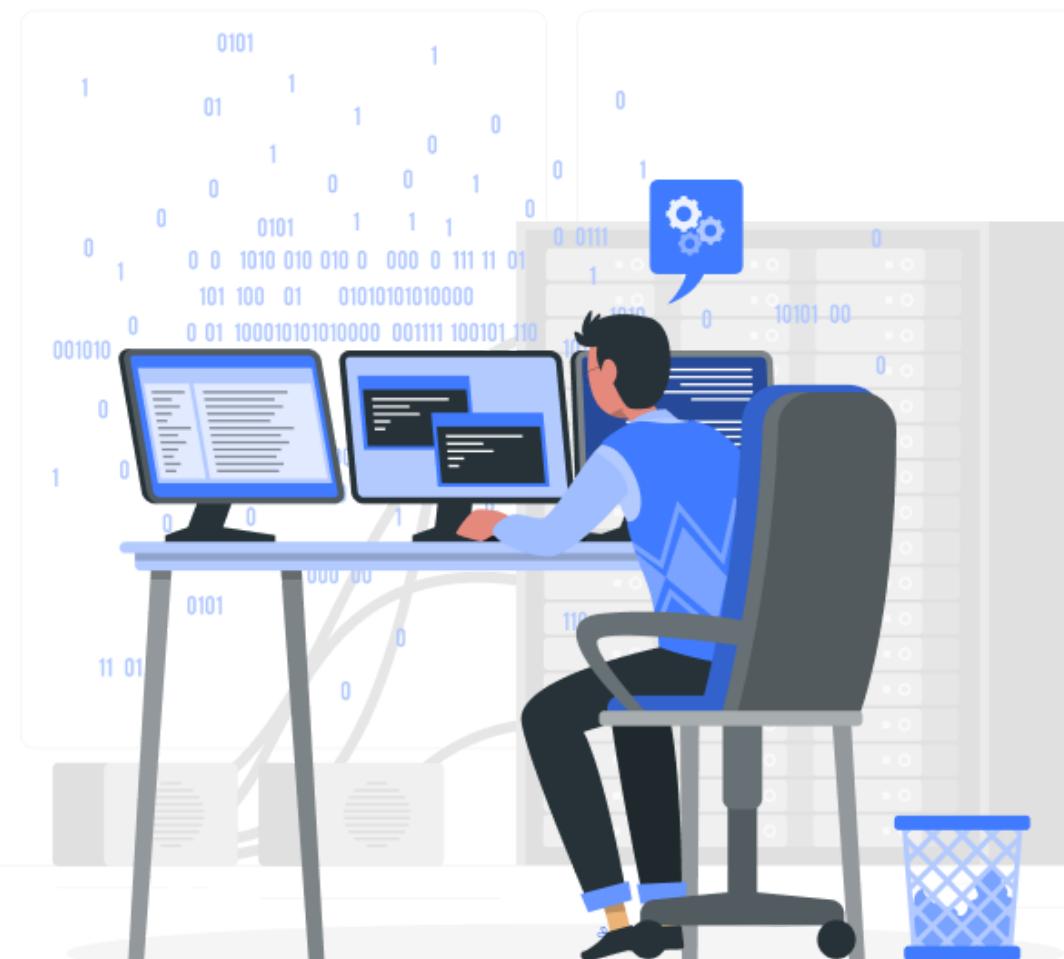
# 02

# Goals

EDUCATORS ARE ABLE TO PREPARE AND MANAGE PROGRAMMING EXERCISES.

EDUCATORS ARE ABLE TO WORK COLLABORATIVELY TO CREATE CODING EXERCISES.

STUDENTS ARE ABLE TO PARTICIPATE IN PROGRAMMING EXERCISES INDIVIDUALLY OR WITH A TEAM.



STUDENTS ARE ABLE TO GET EVALUATIONS FOR THEIR CODING SOLUTIONS, ENHANCING THEIR LEARNING EXPERIENCE.

EDUCATORS ARE ABLE TO COMPARE STUDENTS' PERFORMANCE BASED ON CERTAIN PROGRAMMING EXERCISES.

**03**

# World and Shared Phenomena

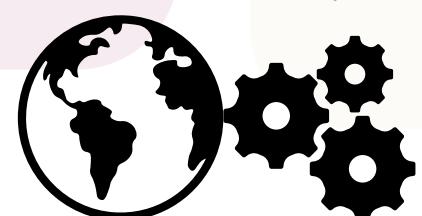
1. Educators prepare and manage programming exercises to assess students.
2. Educators prepare test cases and build scripts related to their programming exercises.
3. Educators can work collaboratively to provide exercises to the students.
4. Students participate in programming exercises to improve their programming skills.
5. Students will compare themselves on coding challenges.
6. Students can work collaboratively to provide solutions to exercises.
7. Students fork the code repositories.
8. Students set up an automated workflow.
9. Students write code on their devices.
10. Educators evaluate students based on their solutions to the programming exercises.
11. Educators decide on some quality aspects to assess students.
12. Educators compare students based on their success in certain coding exercises.
13. Students get evaluations for their solutions to the coding exercises.

## **World Controlled**

1. Educators create coding challenges, including descriptions and test cases, for the platform.
2. Educators create tournaments and give permission to their colleagues to create battles for that tournament.
3. Educators set specific rules and criteria such as deadlines, number of team members, and additional configurations for scoring for code kata battles.
4. Educators decide on the inclusion of manual scoring components for battles and score manually.
5. Students invite peers to form teams within the platform or join individually in the battles.
6. Students submit their code solutions by pushing the code via GitHub.

## **Machine Controlled**

7. The CKB platform sends notifications to students about new battles and tournaments, invitations, final battle ranks, and final tournament ranks.
8. The platform generates and manages GitHub repositories for each battle and sends links to students that are participating.
9. The CKB platform automatically evaluates code submissions against test cases, timeliness, and quality aspects.
10. The platform updates battle scores and battle rankings in real-time.
11. The platform displays leaderboards (i.e. the rank of the sum of all battle scores received in that tournament).



# Domain Assumptions

04



Educators and students have basic proficiency in using web-based platforms and are familiar with basic operations such as account creation, logging in, and navigating through a digital interface.



Educators have the necessary skills to create and manage coding challenges, including the ability to correctly write problem descriptions, test cases, and understand code quality metrics.



Students have familiarity with GitHub operations such as forking a repository, setting up GitHub Actions, and committing and pushing their codes.



The coding problems and challenges provided by educators are free from errors and ambiguities.



Students' submissions to the platform are their original work



# Requirements

✓ The system shall allow educators to create tournaments by providing a title, a description, and a registration deadline.

✓ The system shall allow educators to create battles by providing a title, a description, a registration deadline, a submission deadline, the allowed languages, test cases, build scripts, minimum & maximum group size, and the scoring criteria.

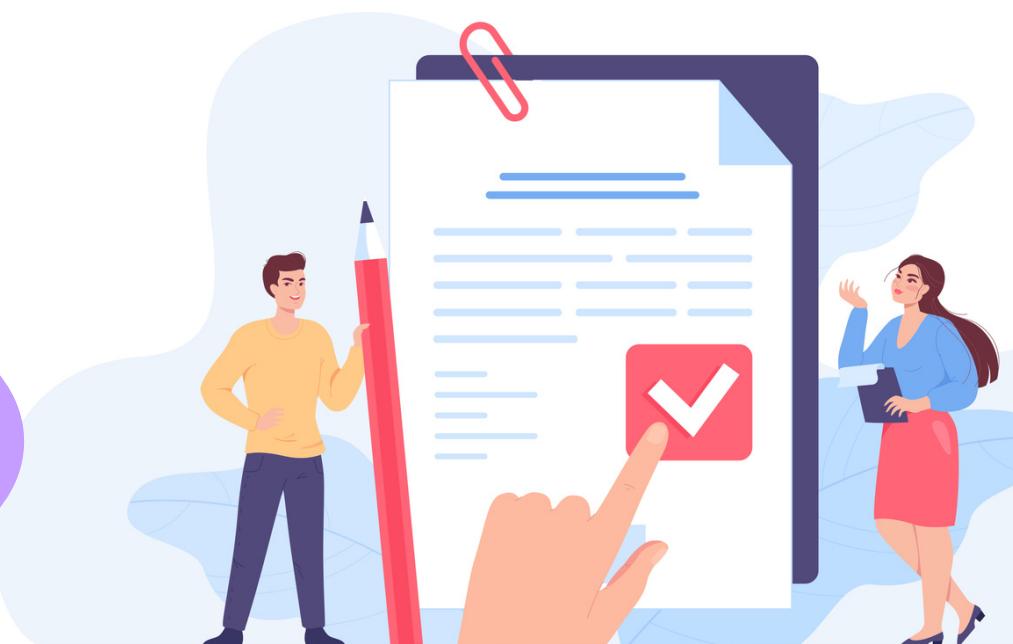
✓ The system shall allow students to register for battles in which the tournaments that they have registered for.

✓ The system shall create a repository for a battle after the registration deadline for that battle has passed.

✓ The system shall pull the repository of a team following a trigger from GitHub Actions.

✓ The system shall automatically evaluate submissions by scoring criteria.

⋮



# Use Cases





## Introduction to Programming Fall'23 Tournament

End  
Tournament

Luca Mottola  
Politecnico di Milano

Fall'23 Tournament

Dashboard

Profile

Tournaments

Settings

Log Out

Battles

Educators

Battle Name	Allowed Languages	# Of Participants	Status
FizzBuzz	Python, Java	59	Ongoing
Tree Search	Python	20	Ongoing
Find Palindromes	Python, Java	29	Ongoing
Find Palindromes	Python, Java	29	Ongoing
Find Palindromes	Python, Java	29	Ongoing
Find Palindromes	Python, Java	29	Ongoing
Find Palindromes	Python, Java	29	Registration Open
Minimum Path	C++	1	Closed

## Filter by

Min Group Size

2

Max Group Size

3

Start Date - End Date

2023-12-23 → 2023-12-28

Politecnico di  
Milano

## Languages



## Educators



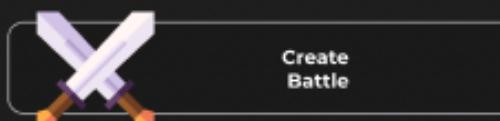
Search

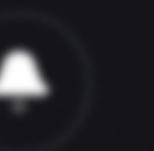
Minimum Path

C++

1

Closed





## ← Introduction to Programming Fall'23 Tournament

Loco Mottola

Politecnico di Milano

This tournament is created to test student's skills and sufficiency in Object Oriented

Pr

Please give a title to your battle

Please give a description to your battle

Registration Deadline

2023-12-28



Next

Find Palindromes

Python, Java



Educators



Find Palindromes

Python, Java



Find Palindromes

Python, Java



Find Palindromes

Python, Java



Minimum Path

C



## Filter by

Min Group Size



Max Group Size



Start Date - End Date

2023-12-23 → 2023-12-26

Politecnico di  
Milano

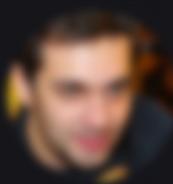
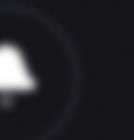
## Languages



Search



Close



## ← Introduction to Programming Fall'23 Tournament

Loca Mottola

Politecnico di Milano

This tournament is created to test student's skills and sufficiency in Object Oriented

Program

ing



## ← Introduction to Programming Fall'23 Tournament

Loca Montola

Politecnico di Milano

This tournament is created to test student's skills and sufficiency in Object Oriented

Dashboard

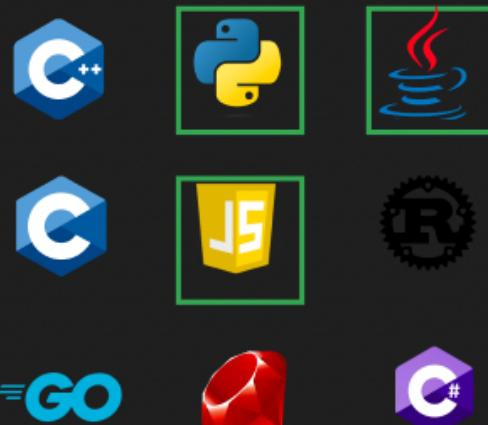
Profile

Tournaments

Settings

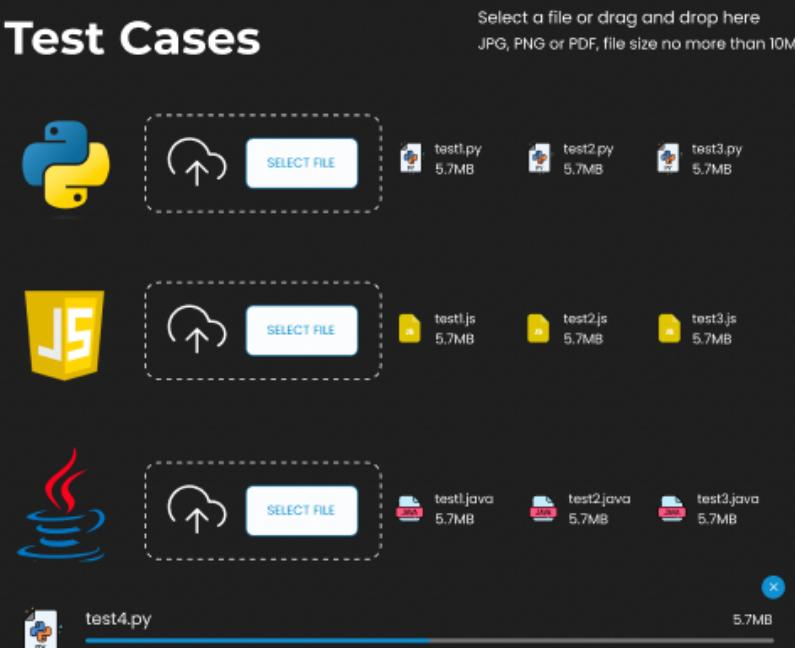
Log Out

## Languages



Next

## Test Cases



## Filter by

Min Group Size

2

Max Group Size

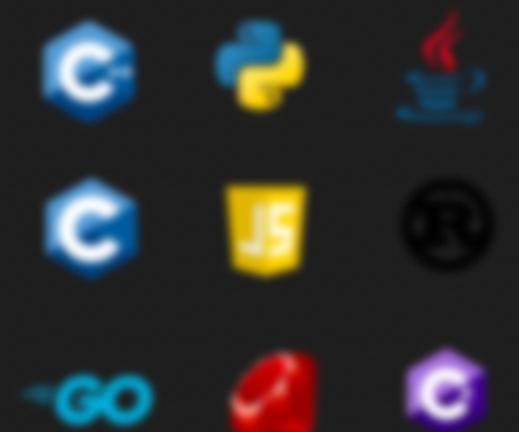
3

Start Date - End Date

2023-12-23 → 2023-12-28

Politecnico di  
Milano

## Languages



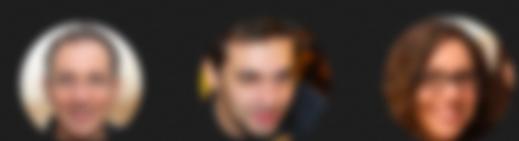
Find Palindromes

Python, Java



Solve

Educators



Find Palindromes

Python, Java



Solve

Find Palindromes

Python, Java



Solve

Find Palindromes

Python, Java



Solve

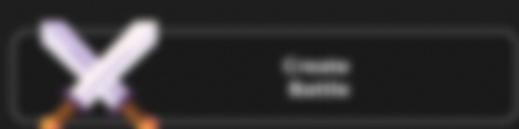
Minimum Path

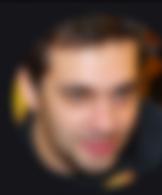
C++



Solve

Search





## ← Introduction to Programming Fall'23 Tournament

Loca Mottola

Politecnico di Milano

This tournament is created to test student's skills and sufficiency in Object Oriented

## Build

 SELECT FILErequirements.txt  
5.7MB SELECT FILEpackage.json  
5.7MB SELECT FILEbuild.gradle  
5.7MB

## Min Group Size

 2

## Max Group Size

 3

Next

Find Palindromes

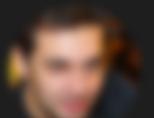
Python, Java

10



CODE

## Educators



Find Palindromes

Python, Java

10



CODE

Find Palindromes

Python, Java

10



CODE

Find Palindromes

Python, Java

10



CODE

Minimum Path

C++

1



CODE

## Filter by

Min Group Size

 2

Max Group Size

 3

Start Date - End Date

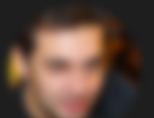
2023-12-23 → 2023-12-28

Politecnico di  
Milano

## Languages

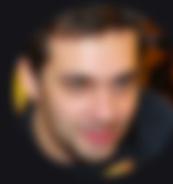
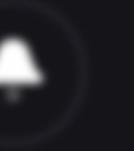


## Educators



Search

Create  
Tournament



## Introduction to Programming Fall'23 Tournament

Loca Mottola

Politecnico di Milano

This tournament is created to test student's skills and sufficiency in Object Oriented

### Scoring Criteria

Test Case Score Percentage

80 %

Quality Score Percentage

10 %

Timeliness Score Percentage

10 %

Enable Manual Scoring

**Create**

Dashboard

Profile

Tournaments

Settings

Log Out

**Filter by**

Min Group Size

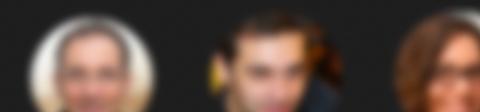
2

Max Group Size

3

Start Date - End Date

2023-12-23 → 2023-12-26

Politecnico di  
Milano**Languages****Educators****Search**

Find Palindromes

Python, Java

...



Create

Find Palindromes

Python, Java

...



Create

Find Palindromes

Python, Java

...



Create

Find Palindromes

Python, Java

...



Create

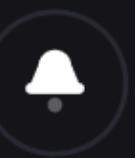
Minimum Path

C++

...



Create



## Tree Search

di Notto Elisabetta

Politecnico di Milano

 Dashboard Profile Tournaments Settings Log Out

It is all about recursion. We aim to teach recursion.

 2-3 Students

Python, Java, Javascript

 Instructions Scores

Link of the repository was sent to team member's mail addresses.

Please fork the repository.

Create a GitHub Action flow in order to send API call every time a new commit is pushed to your repository.

Endpoint for this is shared with you via mail. Please use /GET method. Use the competitor id for /{competitor\_id} in the API URL.

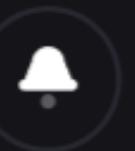
Automated workflow is important to notify system about your work. Please test it before start by push a test commit.

Good luck!

Registration Deadline is Dec 28'23

Submission Deadline is Jan 15'24

 Registration  
Open



## Introduction to Programming Fall'23 Tournament

Loca Mottola

Politecnico di Milano

This tournament is created to test student's skills and sufficiency in Object Oriented Programming.

Mainly focused on encapsulation, inheritance, polymorphism, and abstraction

Dashboard

Profile

Tournaments

Settings

Log Out

Battles

Leaderboard

Battle Name	Allowed Languages	# Of Participants	Registered
-------------	-------------------	-------------------	------------

FizzBuzz	Python, Java	59	
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Tree Search	Python	20	
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Find Palindromes	Python, Java	29	
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Find Palindromes	Python, Java	29	
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Find Palindromes	Python, Java	29	
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Find Palindromes	Python, Java	29	
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Find Palindromes	Python, Java	29	
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Minimum Path	C++	1	
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## Filter by

Min Group Size

2

Max Group Size

3

Start Date - End Date

2023-12-23 → 2023-12-28

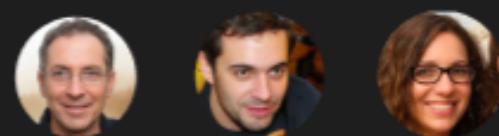
Not Registered

Politecnico di  
Milano

## Languages



## Educators



Search



## Introduction to Programming Fall'23 Tournament

Loco Mortola

Politecnico di Milano

This tournament is created to test student's skills and sufficiency in Object Oriented

Programm

### Tree Search

Di Nitto Elisabetta

Min Group Size: 2

Registration Deadline is Dec 25'23

Max Group Size: 3

20 Participants

Register

### Filter by

Min Group Size

2 ▾

Max Group Size

3 ▾

Start Date - End Date

2023-12-23 → 2023-12-26

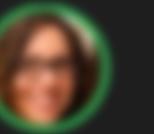
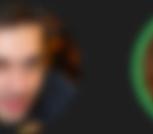
Not Registered

Politecnico di  
Milano

### Languages



### Educators



Search



## ← Introduction to Programming Fall'23 Tournament

Loco Mottola

Politecnico di Milano

This tournament is created to test student's skills and sufficiency in Object Oriented

Prog



Dashboard



Profile



Tournaments



Settings



Log Out

Form a Team?

Yes

No

Min Group Size:2

You can not register individually

## Filter by

Min Group Size

2

Max Group Size

3

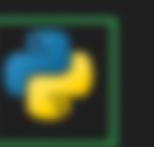
Start Date - End Date

2023-12-23 → 2023-12-28

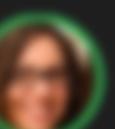
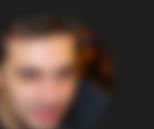
Not Registered

Politecnico di  
Milano

## Languages



## Educators





## ← Introduction to Programming Fall'23 Tournament

Loco Mottola

Politecnico di Milano

Dashboard

Profile

Tournaments

Settings

Log Out

Team Name: **Warriors**

Search

**Yavuz Samet Topcuoglu**

Invite

**Ivan Toney**

Invited

**Skip****Complete**

## Filter by

Min Group Size

2

Max Group Size

3

Start Date - End Date

2023-12-23 → 2023-12-26

Not Registered

Politecnico di  
Milano

## Languages



## Educators



Search



## Tree Search

Not Registered

Di Nitto Elisabetta

Politecnico di Milano

Battle description...

2-3 Students

Python

Registration Deadline is Dec 25'23

Submission Deadline is Jan 25'24

 Registration  
Open

Warriors

Profile	Name	Status
	Yavuz Samet Topcuoglu	Accepted
	Ivan Toney	Waiting
	Alan Turing	Rejected

Finalize Decline

Dashboard

Profile

Tournaments

Settings

Log Out

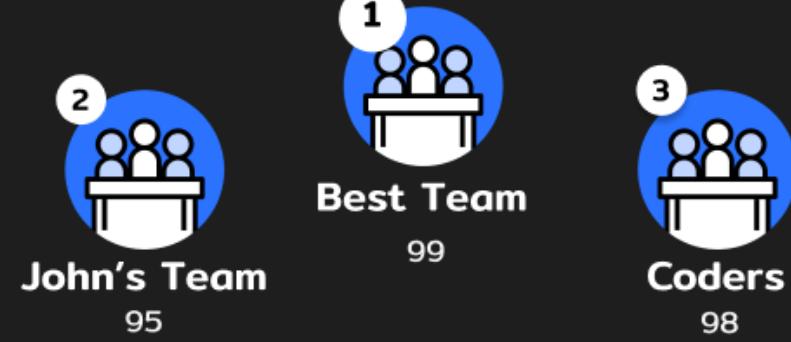
**Tree Search**

di Notto Elisabetta

Politecnico di Milano

 Dashboard Profile Tournaments Settings Log Out

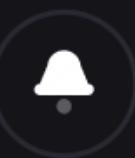
It is all about recursion. We aim to teach recursion.

 2-3 Students Python, Java, Javascript**Instructions****Scores**

Registration Deadline is Dec 28'23

Submission Deadline is Jan 15'24

 Closed Battle



Tree Search  
Warriors

 Dashboard Profile Tournaments Settings Log Out

Warriors



Yavuz Samet Topcuoglu



Mehmet Emre Akbulut

Team ID: 543

Team Score

64 (8/10)

Test Cases

8

Static Analysis

9

Timeliness

Add Scoring

Manual Score

Registration Deadline is Dec 28'23

Submission Deadline is Jan 15'24

Closed  
Battle



Dec 28'23

Jan 15'24

## Warriors Solution

Add Scoring



Dashboard



Profile



Tournaments



Settings



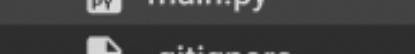
Log Out

Code Viewer

main.py README.md .gitignore



main.py

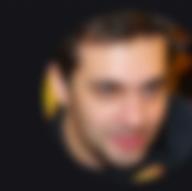


.gitignore



README.md

```
1  # function to check string is
2  # palindrome or not
3  def isPalindrome(str):
4      # Run loop from 0 to len/2
5      for i in range(0, int(len(str)/2)):
6          if str[i] != str[len(str)-i-1]:
7              return False
8      return True
9
10
11
12
13
14
15
16
17
18
19
20
21
```



## Warriors Solution

 Dashboard Profile Tournament Settings Log Out

Please give your bonus points up to 5

Add Scoring

Dec 28'23

Jan 15'24

 Add  
Scoring



Registration Deadline is Dec 28'23  
Submission Deadline is Jan 15'24

 Closed  
Battle

Tree Search  
Warriors

 Dashboard

 Profile

 Tournaments

 Settings

 Log Out

Warriors



Yavuz Samet Topcuoglu



Mehmet Emre Akbulut

Team ID: 543

Team Score

64 (8/10)

Test Cases

8

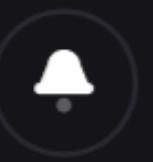
Static Analysis

9

Timeliness

4

Manual Score



## Tree Search

Registered

Di Nitto Elisabetta

Politecnico di Milano

Battle description...

2-3 Students

Python

Instructions

Scores

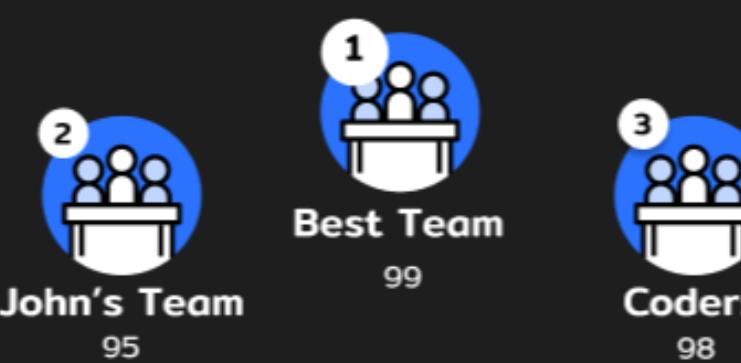
Dashboard

Profile

Tournaments

Settings

Log Out



Registration Closed on Dec 25'23

Submission Deadline is Jan 25'24

Closed  
Battle

Warriors

Yavuz Samet Topcuoglu

Emre Akbulut (Me)

Team ID: 543

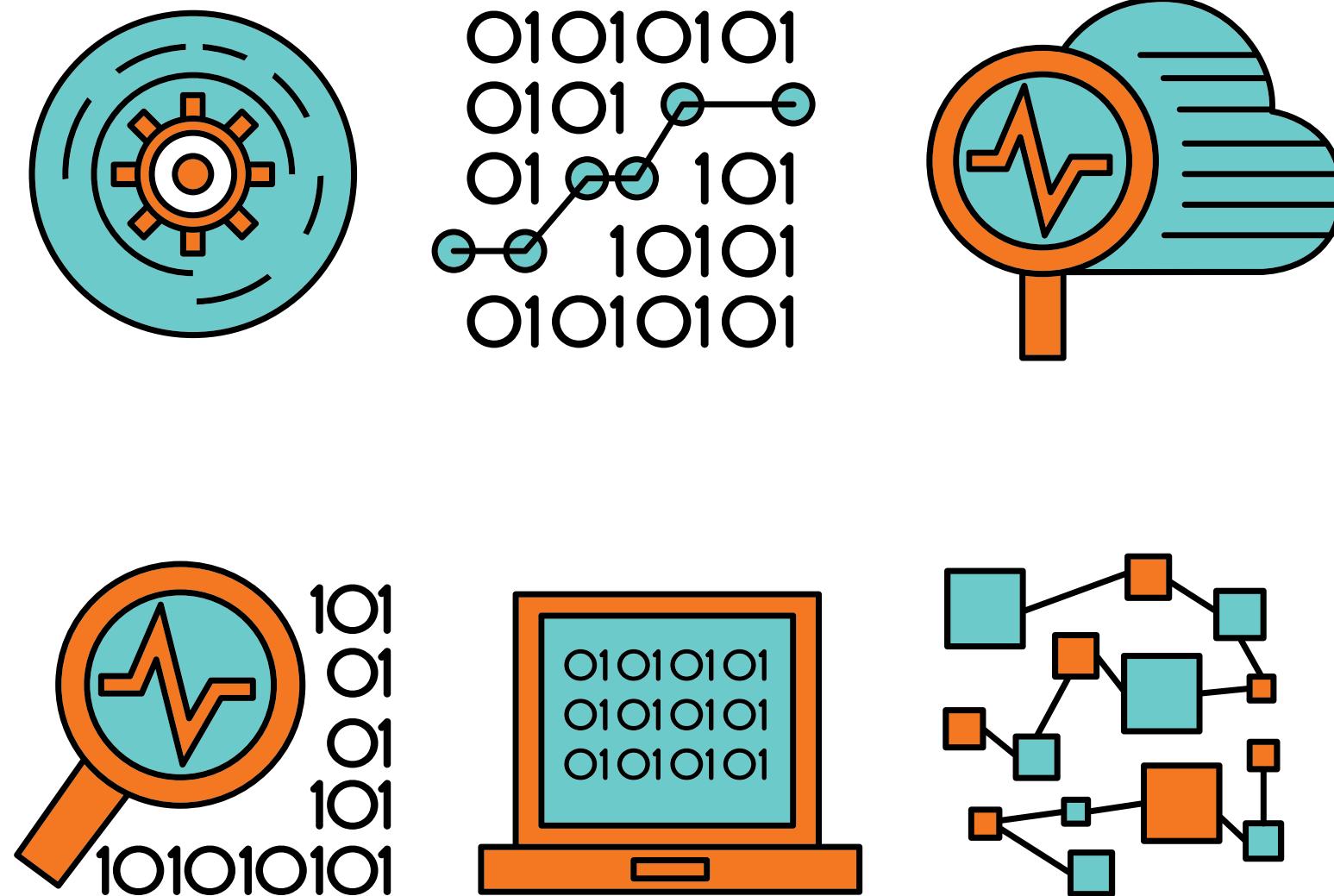
Team Score

Test Cases 64 (8/10)

Static Analysis 8

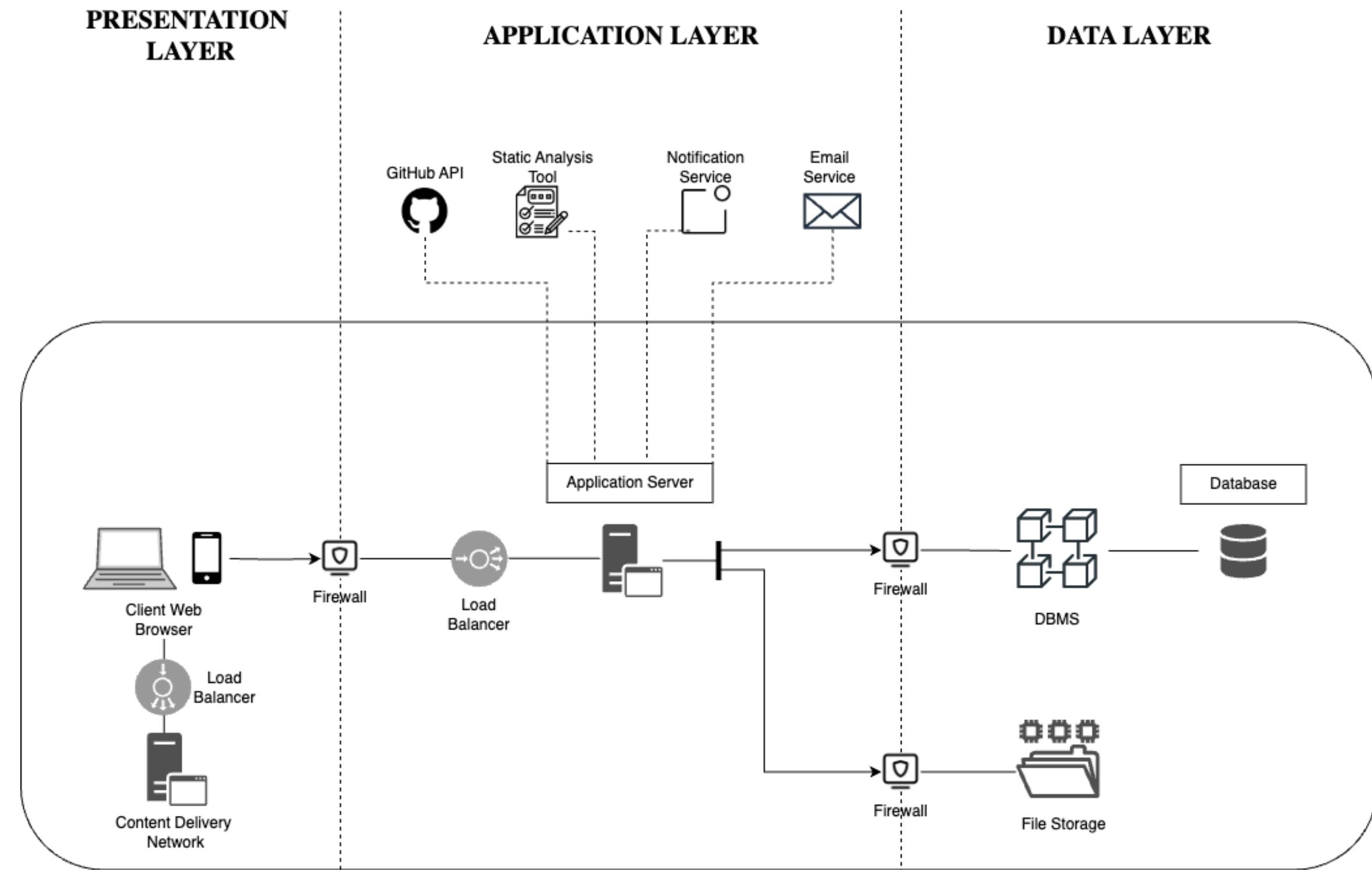
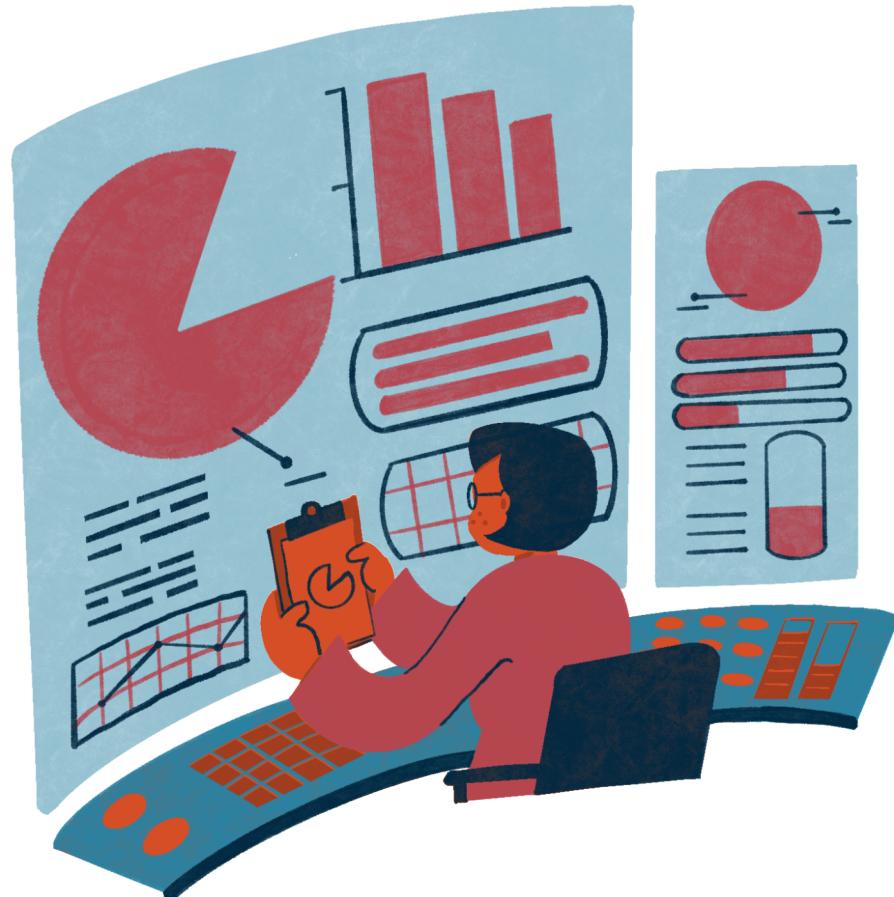
Timeliness 9

Manual Score 4



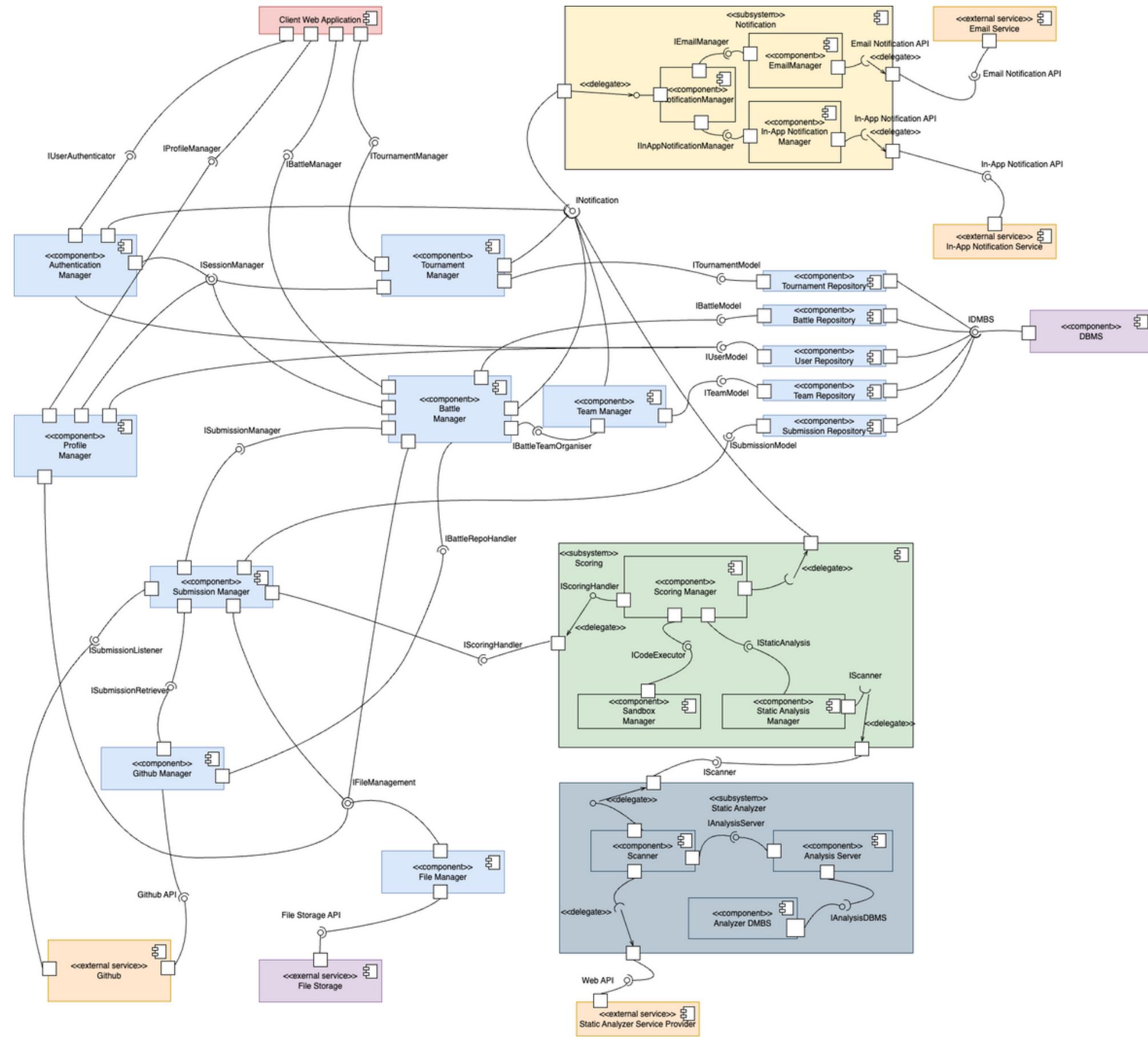
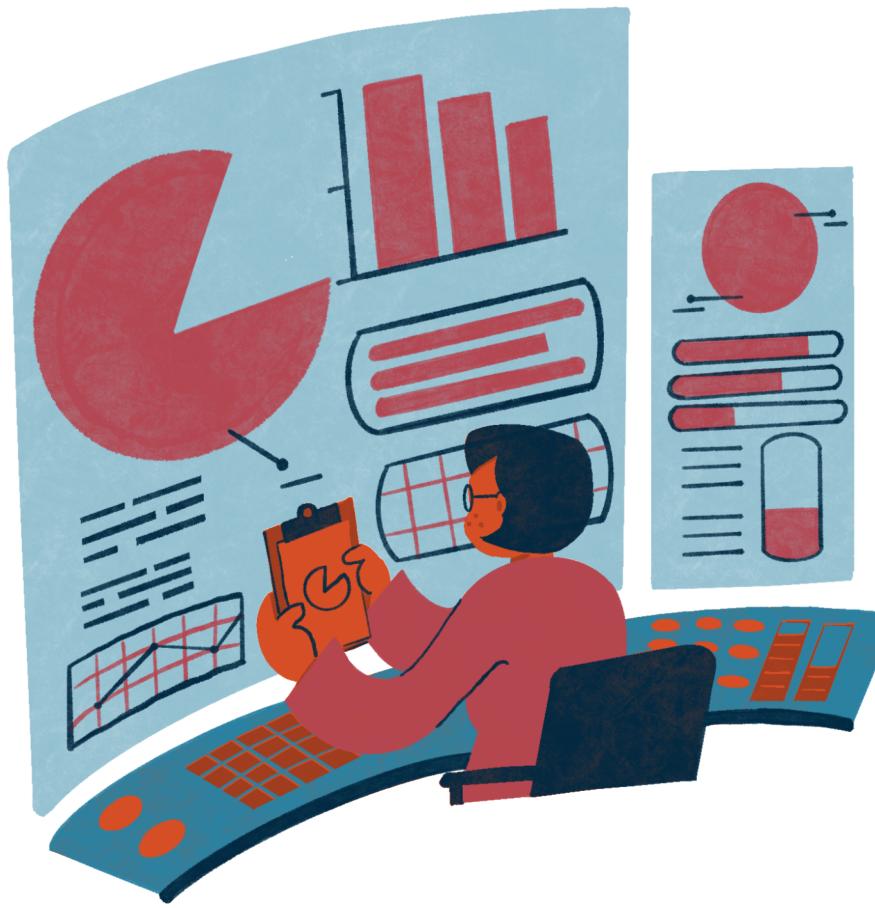
# Formal Analysis with Alloy.

# High Level Architecture



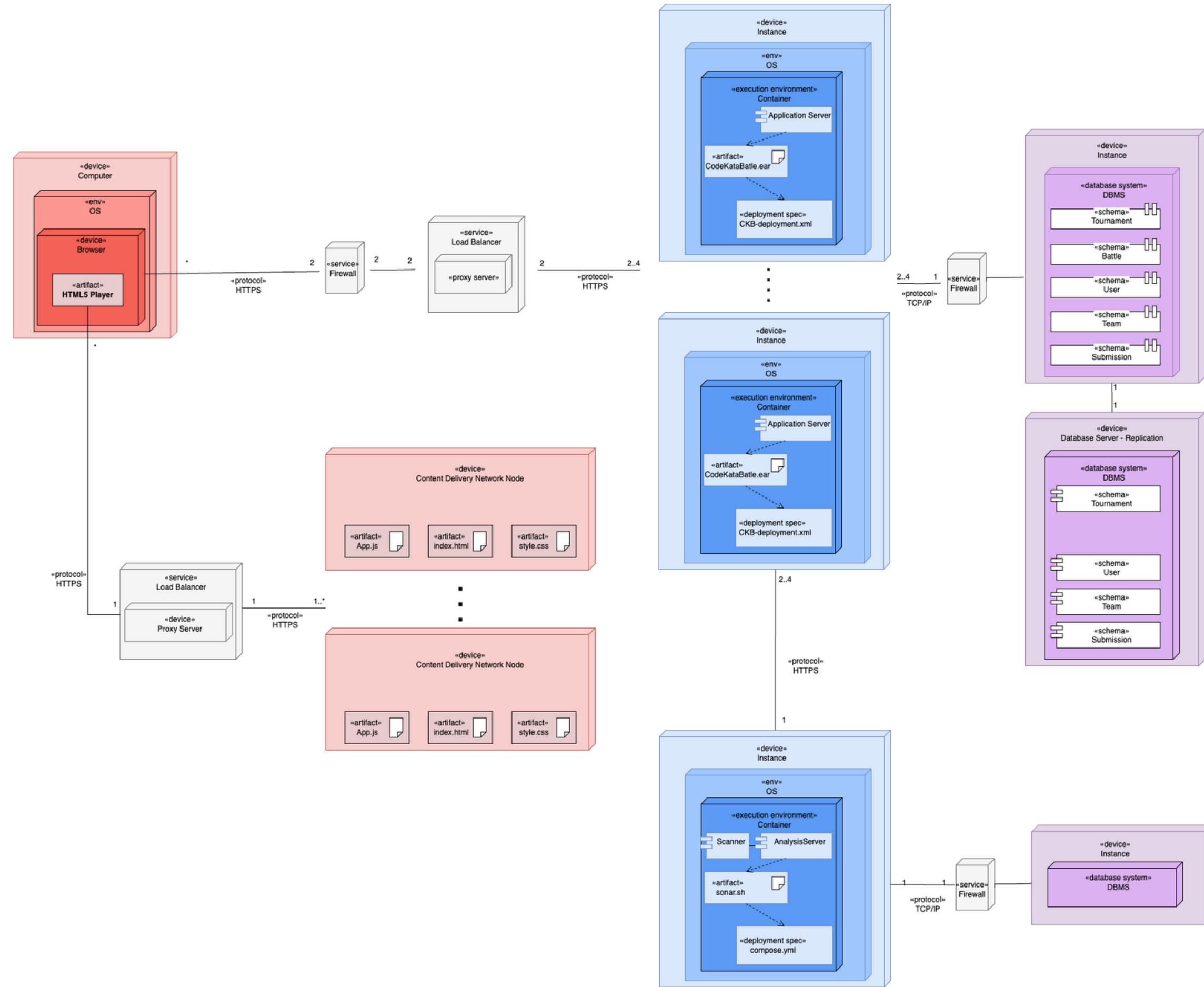
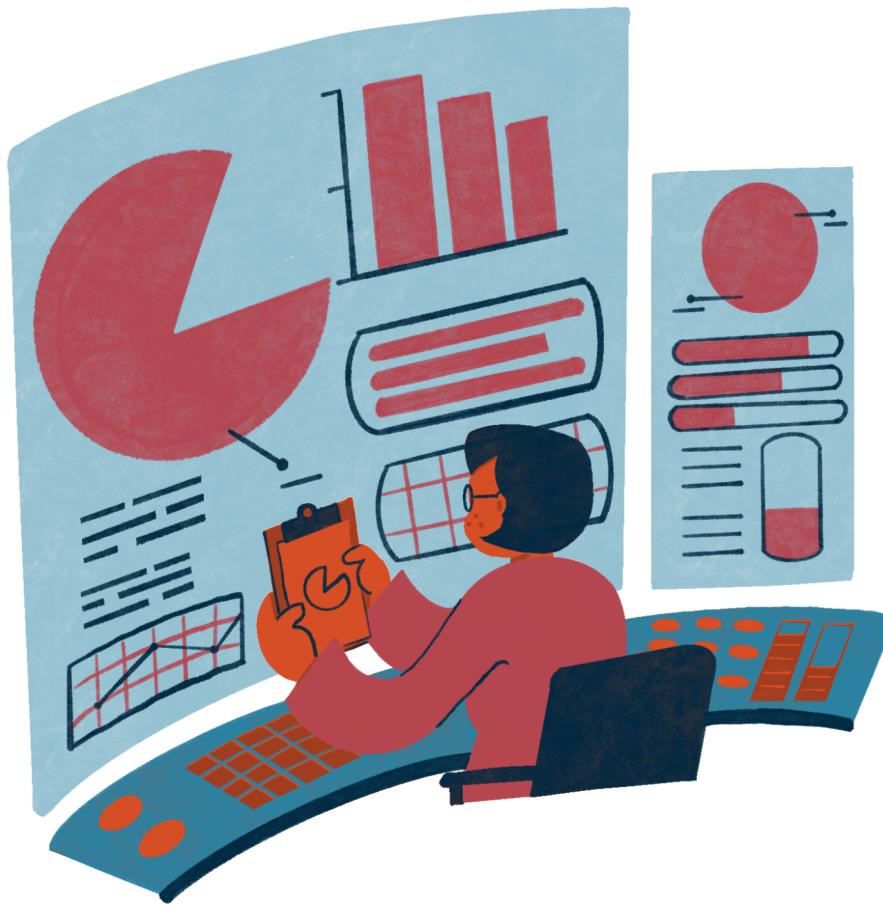
# Component Diagram

09



# Deployment Diagram

10



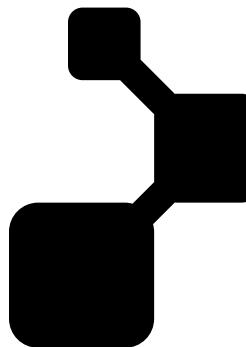
# Architectural Styles

11

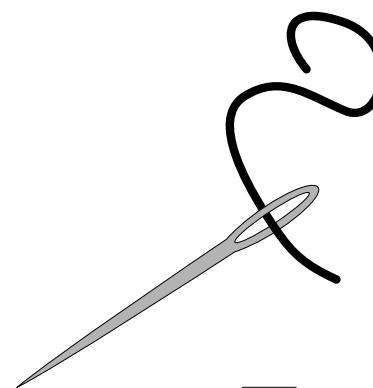
- ✓ 3-Tier Architecture
- ✓ Layered Architecture
- ✓ Facade
- ✓ Mediators
- ✓ Static Analysis Tool



# Implementation & Integration & Test Plan



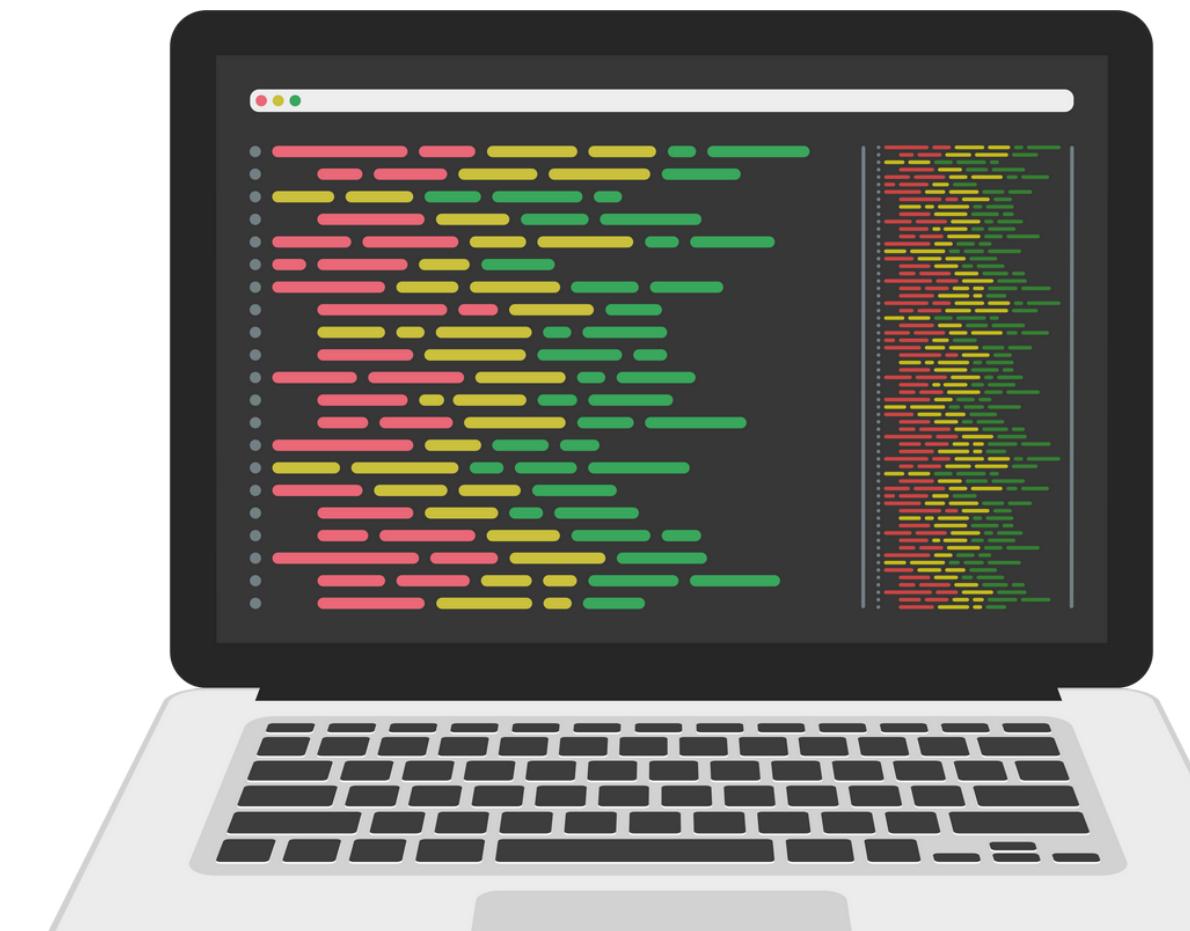
Bottom-Up Approach



Thread Approach



Testing



Thank You  
For Listening!

13

Mehmet Emre Akbulut  
Yavuz Samet Topcuoglu

