**Outside systems with which this system interfaces.**

The user

Final Fantasy XIV – A Realm Reborn (files)

**Input Data and its source**

All of the following input data is provided by the users that interact with the system.

* Profile install location (default OS locations offered)
* Profile configuration settings

**Sub-Systems:**

* Manager
* Profile
* UI Layout
* Hotbar Layout
* Gearset
* Keybind

Based on the input and output data and the data processing needs we break the system down into a

Front End, Challenge File/Systems, and Firebase Database. Figure 1 shows the user interaction with

the system by means of http requests and responses.

Project Analysis CTF

Platform 4

Subsystem breakdown

Figure 2 shows the subsystem breakdown for the CTF system. Each subsystem is described

below.

Front End

The front end is a web based application that provides the primary source of interaction with

the user. This is where the user creates an account, creates or joins a team, gets challenge

information, views challenge status, submits challenge flags, and manages profile settings.

Firebase

Firebase is a web service that provides authentication and data storage. Data input by users is

pushed to the service and required data is pulled down using an industry standard data

format.

Challenges

Challenges are text based, downloadable files, or system connection information that contain

a hidden flag that the user must find. Challenges do not depend on the Front End or Firebase

subsystems to function.

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Requirement # Subsystem

1 Front End

2 Front End, Firebase

3 Front End, Firebase

4 Front End, Firebase

5 Front End, Firebase

6 Front End, Firebase

7 Front End, Challenges

8 Front End, Challenges

9 Front End

10 Front End, Firebase, Challenges

11 Front End, Firebase

12 Firebase

13 Front End, Firebase

Possible Enhancements

Add clues that users can spend their earned points to view. For instance, if a user is stuck on a

challenge, they could spend 100 points to view a clue that should get them on the right track to solve

the challenge.

Add player and team achievements that are based upon the inputs, such as user information

submission, flag submission, etc. These achievements are recorded in firebase and can be displayed

on the user profile page. Achievements can give additional points to the user and can be considered a

gamification element.

Add a level mechanism for both the players and teams. The level will be based on a calculation that

uses the number of points the player or team has accrued. Since the level is calculated based on the

number of points earned, it would be an additional data processing function whose result is stored in

firebase. The level information will be displayed on the user front end on individual player profile

Project Analysis CTF

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pages, leaderboards and could also be included in the challenge board; basically, wherever user data

is displayed. It is considered a gamification element.

Possible risks and risk mitigation

It is not uncommon for teams to play dirty while participating in a CTF. Some teams may launch a

denial of service (DoS) attack to deny other teams access to the challenge files and hamper their

ability to submit flags. To mitigate this risk we deploy a virtual machine instance for each team in the

competition. The team will access the board and challenge files with their own unique IP address.

This allows the team to “hide” from other, not so friendly, teams. Attacks on a team’s game instance

will only impact that same team who is initiating the attack.

There is also the risk of tampering with the leaderboards, individual player and team statistics to

manipulate standings. This risk is mitigated using the same method, by deploying virtual machine

instances for each teams. This will segregate the play field from the platform and its database, and

prevent access to sensitive data.