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SENG2021 Deliverable 5

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In recent years, the eSports scene has exploded in popularity with eSports athletes competing for prizes and fame in front of crowds of millions. Of the many titles that are played competitively, League of Legends, in recent years has flourished into an industry giant, with the 2019 World Championships boasting 44 million concurrent viewers across the globe and a $2,225,000 prize pool. Furthermore, the game boasts 115 million monthly players as of March 2019 and an award from the 2019 Game Awards for “Best eSport”.

Our web application, ProDiff, aims to serve the segment of the League of Legends player base which actively strives to improve their abilities by studying high level play. ProDiff is not the first League of Legends web-based analytics tool, however, it possesses features that its competitors do not. The current alternatives only provide a subset of features present in our application, and none of the other products boast the convenience of our site. ProDiff fills the gap in the market for a comprehensive comparison tool that is aesthetically pleasing and is easy to use.

Problem Statement

There is no pre-existing analytics tool to compare your League of Legends match statistics to those of another player.

1. There is no League of Legends analytics tool that offers video streams of live professional play.
2. There is no League of Legends analytics tool that shows only relevant and recent data, and thus provides an accurate representation of current skill level.
3. There is no aggregate of professional player statistics.
4. There is no appropriate tool that provides a convenient method to compare one’s own performance to that of a professional player with multiple accounts in multiple regions.
5. There is no League of Legends tool that provides the ability to filter matches by both characters played and role served when searching match statistics in order to accommodate unorthodox playstyles.

Features

The ProDiff homepage features a collection of currently live streams showcasing official tournaments and high-level play. This is intended as an online learning resource for beginner to advanced players, who can view professional players in order to elevate their own understanding of how the game should be played.

The site also provides a quick overview of professional teams in the different regions of the world, which contains information on the players in these teams as well as their roles. This provides users a comprehensive list of players that they should strive to emulate. Furthermore, if a professional player’s profile is clicked, the user can directly access recent games that the corresponding professional player has played.

The site also allows for users to view the unofficial matches of professional players as well as their own. Notably, the site will only display a player’s most recent matches, because as they continue to improve, historical data provides a less accurate representation of their current skill. By providing a

place where users can quickly observe historic data of professional players, users can quickly see an overview of how these advanced players play the game, without having to spend time watching videos which could be used to actually play the game and improve. Moreover, Prodiff includes an efficient filtration system, so users can directly search for games pertaining to specific champions or roles, in order to save time.

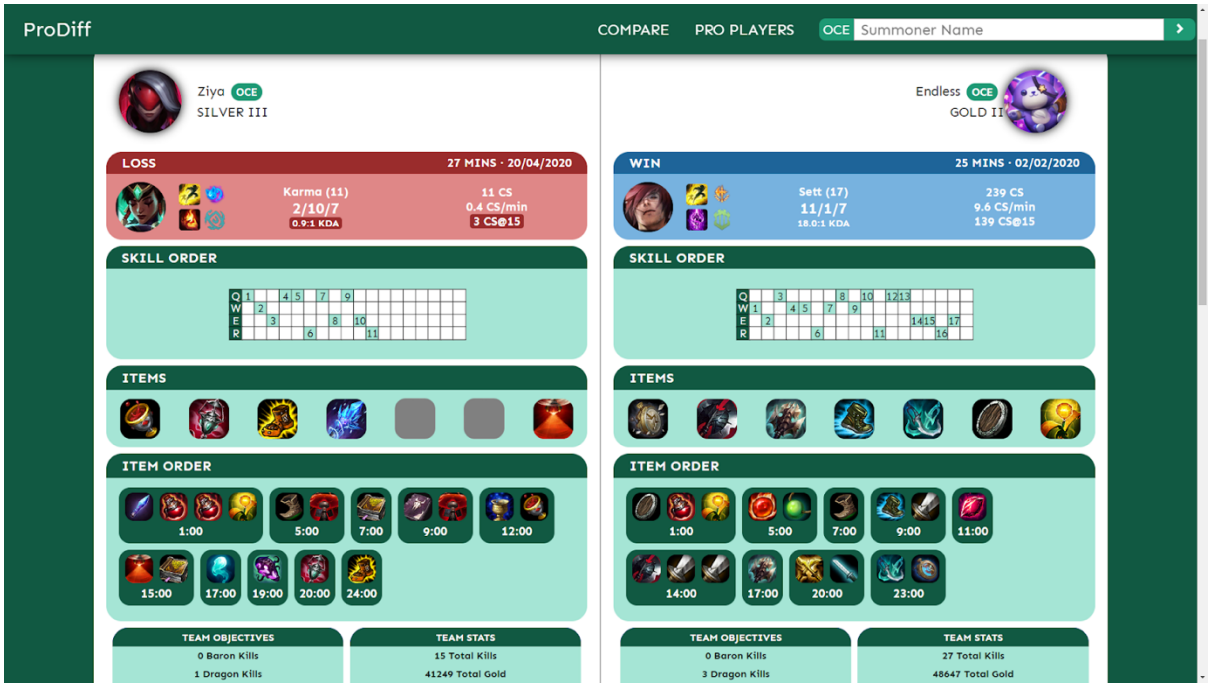
Finally, as its namesake feature, ProDiff allows for the juxtaposition of two matches from two different players enabling comparisons to be made between each player's match performance and statistics. For example, if a player's gold count is significantly lower than the what is recommended, their gold count will be highlighted, so users can understand that this is something that needs to be improved. By providing aesthetically pleasing pie graphs and line graphs to compare statistics such as player participation and gold earned, it is inevitable that players will come to understand their shortcomings, thus improving their overall performance.

User Stories

FEATURE: Comparison of two individual matches.

As a League of Legends novice, I want to be able to conveniently compare two matches on the same page, so that I can easily find differences between my gameplay and that of another player.

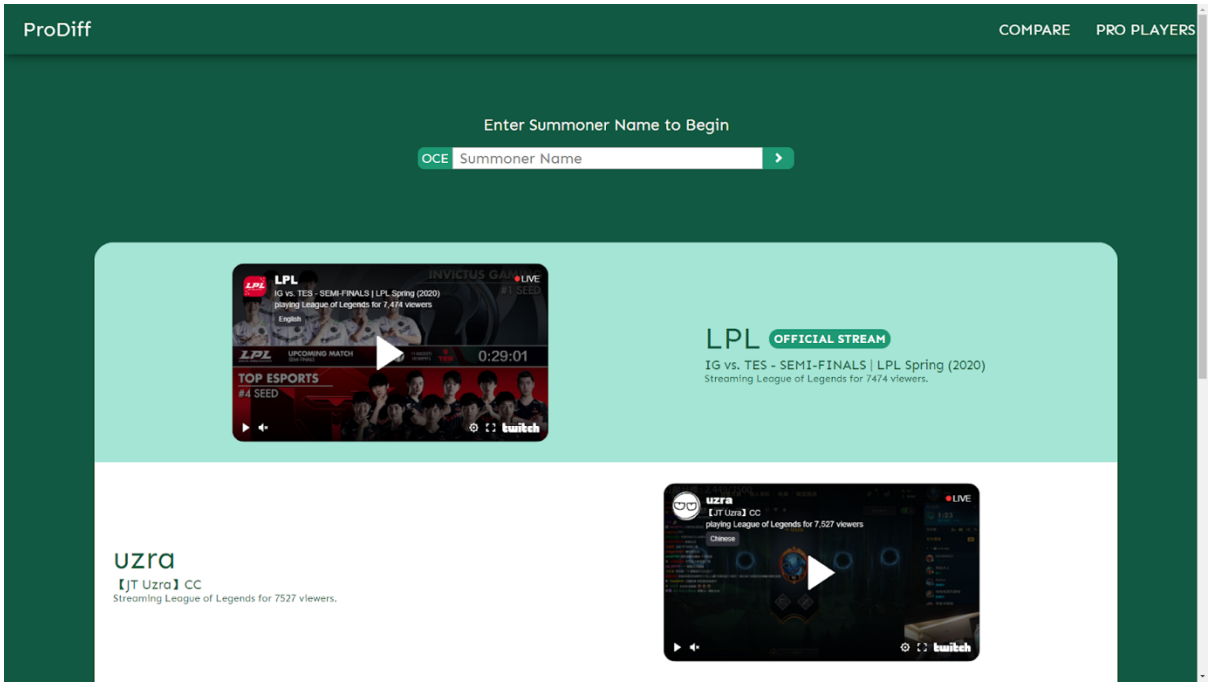
GIVEN I am on the ProDiff website,
WHEN I click on "Compare" in the menu bar,
THEN I should be on the comparison page.
WHEN I input two player names,
AND I press the search button,
THEN I should see their recent games.
WHEN I select two games to compare,
AND I confirm my selection,
THEN I should see detailed statistics comparing the two matches including match outcomes, item builds, item and skill orders as well gold graphs.


ProDiff
COMPARE
PRO PLAYERS
OCE
Summoner Name
Ziya
OCE
SILVER III
LOSS
27 MINS · 20/04/2020
Karma (11)
2/10/7
0.9:1 KDA
11 CS
0.4 CS/min
3 CS@15
SKILL ORDER
ITEMS
ITEM ORDER
1:00
5:00
7:00
9:00
12:00
15:00
17:00
19:00
20:00
24:00
TEAM OBJECTIVES
0 Baron Kills
1 Dragon Kills
TEAM STATS
15 Total Kills
41249 Total Gold
Endless
OCE
GOLD II
WIN
25 MINS · 02/02/2020
Sett (17)
11/1/7
18.0:1 KDA
239 CS
9.6 CS/min
139 CS@15
SKILL ORDER
ITEMS
ITEM ORDER
1:00
5:00
7:00
9:00
11:00
14:00
17:00
20:00
23:00
TEAM OBJECTIVES
0 Baron Kills
3 Dragon Kills
TEAM STATS
27 Total Kills
48647 Total Gold

FEATURE: Featured aggregation of popular live streams of professional play.

As a League of Legends player, I want to be able to view an aggregation of current live streams of professional play, so that I can observe the strategies of professional esports players at any given time.

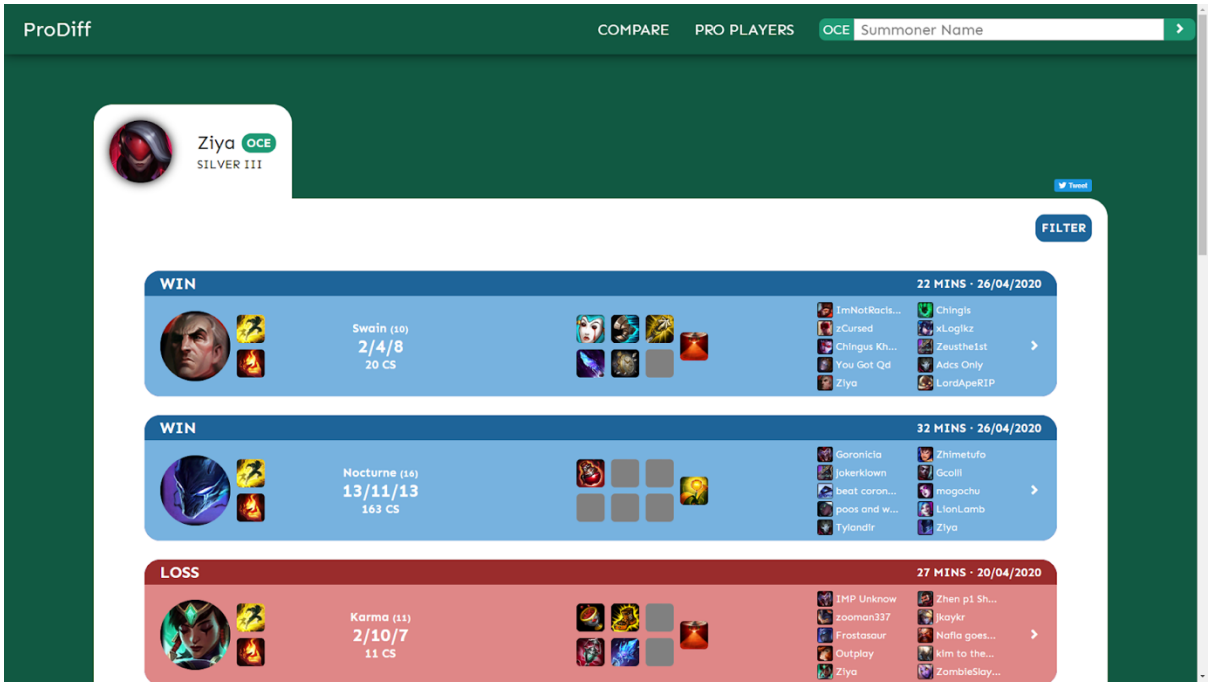
GIVEN I am on the ProDiff homepage,
WHEN I scroll down the page,
THEN I should see any available live streams of professional play, including official streams,
AND I should be able to follow the embedded player to view the stream directly on Twitch.



FEATURE: Provide an overview of a player's recent match history.

As a League of Legends player, I want to be able to search a specific player's data on the home page, so that I can see the specific player's games from the past six months.

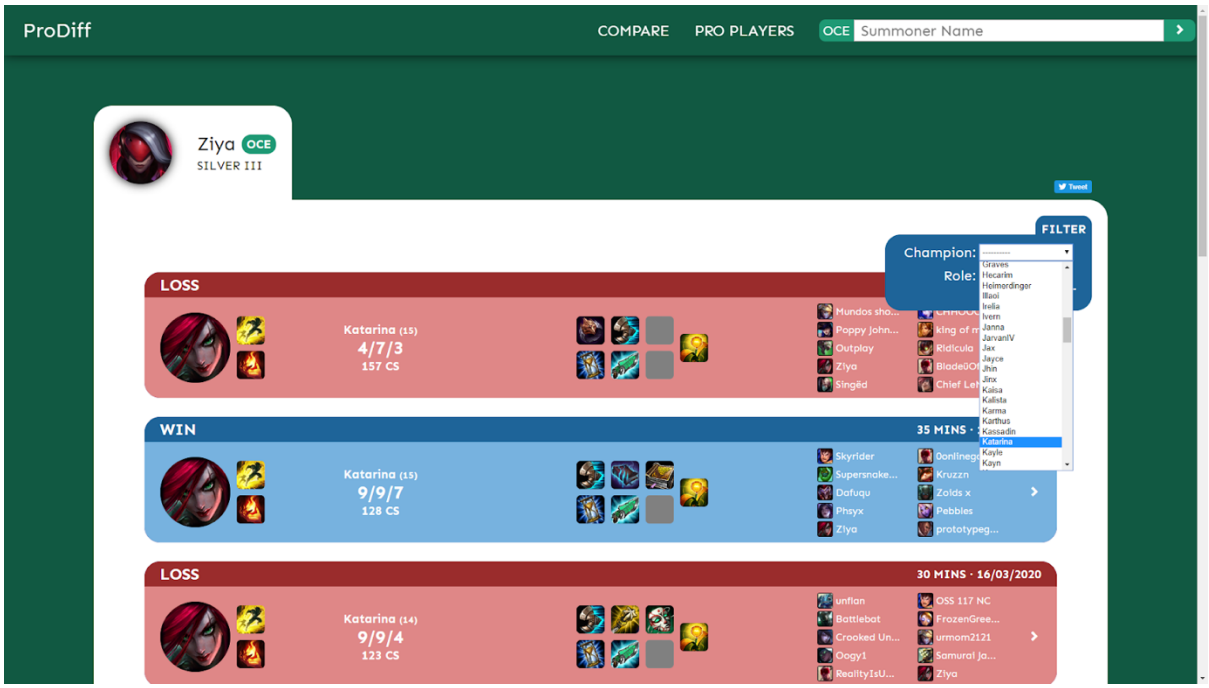
GIVEN I am on the ProDiff website,
WHEN I input a name and region into the search bar,
AND I click the search button,
THEN I should be shown their player profile that has detailed information on their recent games including but not limited to KDA, teammates, and items.



FEATURE: Filter a player's recent matches to show any combination of character and role.

As a League of Legends player, I want to be able to filter a player's matches by character or role played, so that I can see the relevant and recent match history for the given filtration criteria.

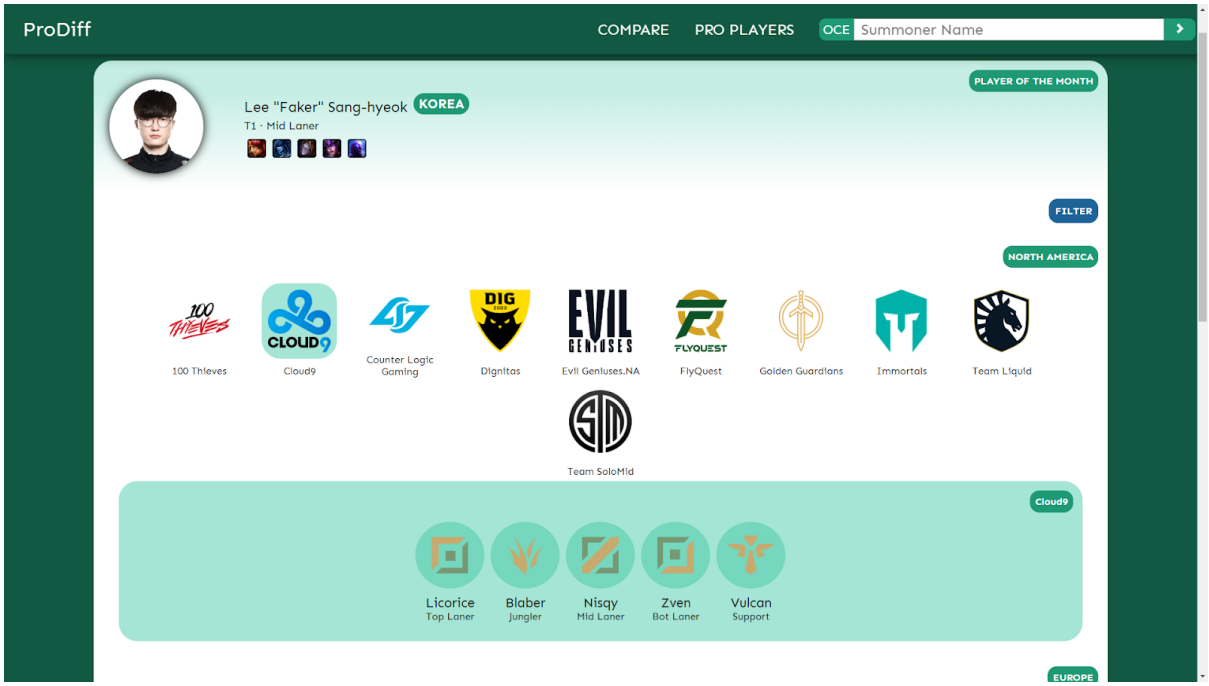
GIVEN I am on the match history for a specific player,
WHEN I navigate to the filter menu,
THEN I should be able to select certain characters or roles as filtration criteria,
AND The page should now only display matches which fill the given criteria.



FEATURE: Display a list of active professional players.

As a League of Legends player, I want to able to see a list of every currently active professional player, as well as what role they play in and what team they belong to.

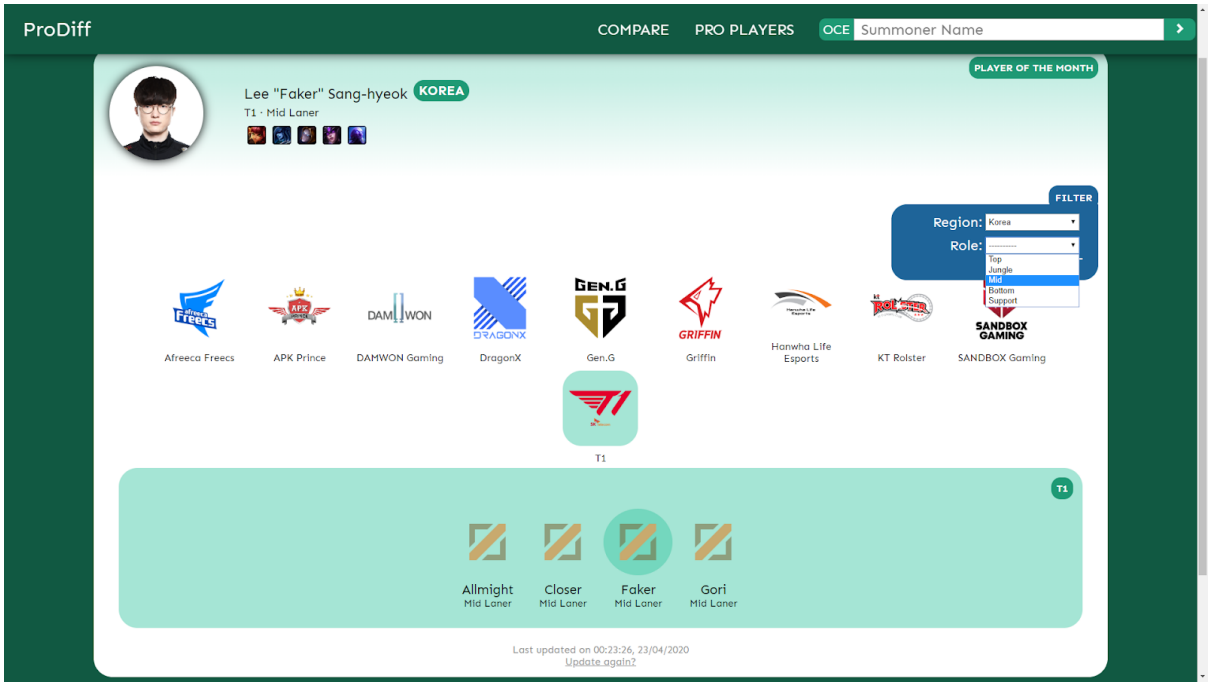
GIVEN I am on the ProDiff website,
WHEN I click on “Pro Players” in the menu bar,
THEN I should be on a page displaying every currently participating team.
WHEN I click on a team,
THEN I should be able to view every active professional that plays for that team.



FEATURE: Filter the list of professional players.

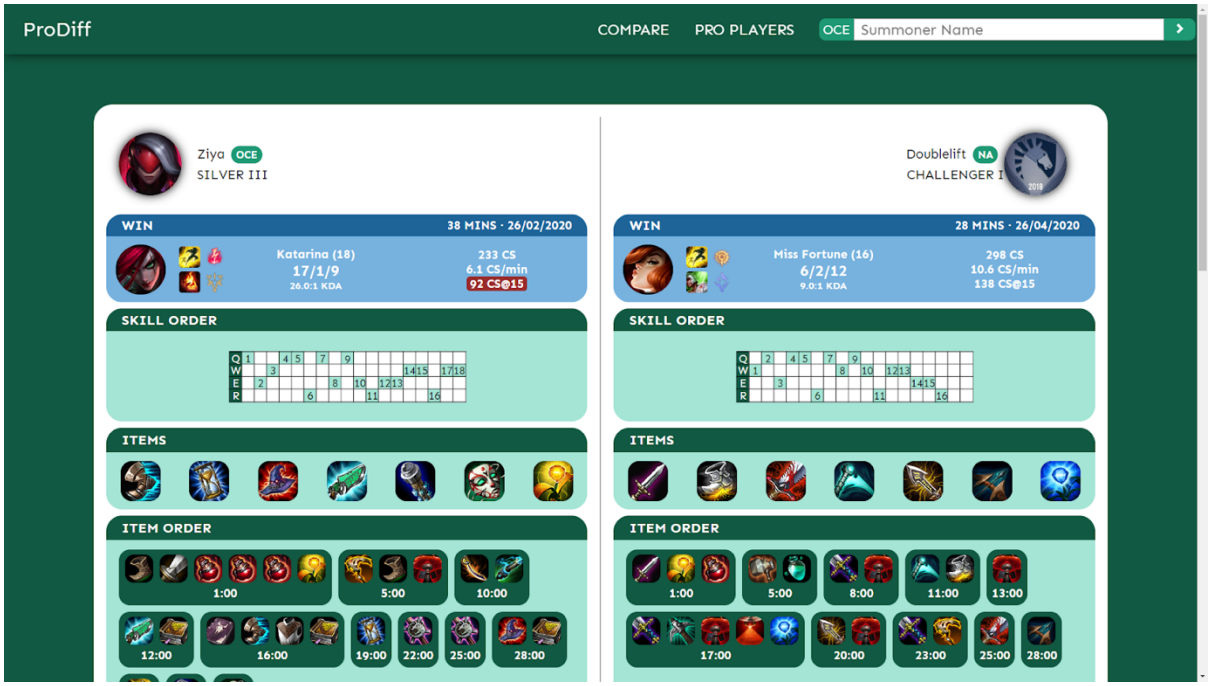
As a League of Legends player, I want to be able to filter the results of my search for professional players by region or role, so that I can retrieve data of players from my region or role of choice.

GIVEN I am on the “Pro Players” page,
WHEN I navigate to the filter menu,
THEN I should be able to select which regions or roles to filter by.
WHEN I confirm my choices,
THEN The page should only display players that match the criteria.



FEATURE: Compare a professional player's statistics to those of another player. As a League of Legends player, I want to be able to compare the statistics of my matches to those of a professional player, including but not limited to gold accumulated over time, items purchased, damage dealt, objectives taken per team, etc.

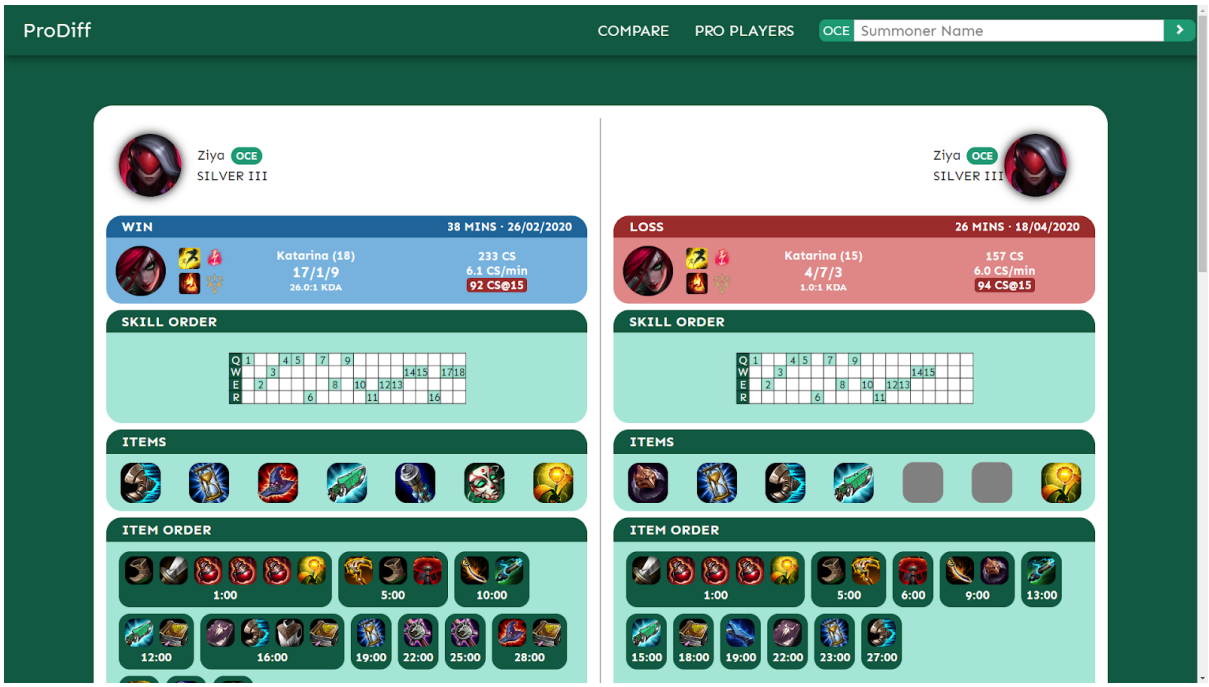
GIVEN I am on the "Pro Players" page,
WHEN I select a team,
THEN I should be able to see each of the five active players for that team.
WHEN I click on a specific player,
THEN I should be taken to their profile.
WHEN I select a recent game of theirs for comparison,
THEN I should be taken to the "Compare" page with the professional player's match preselected.
WHEN I input my own username and region,
AND select a recent match from my history,
THEN the details of each match should be compared.



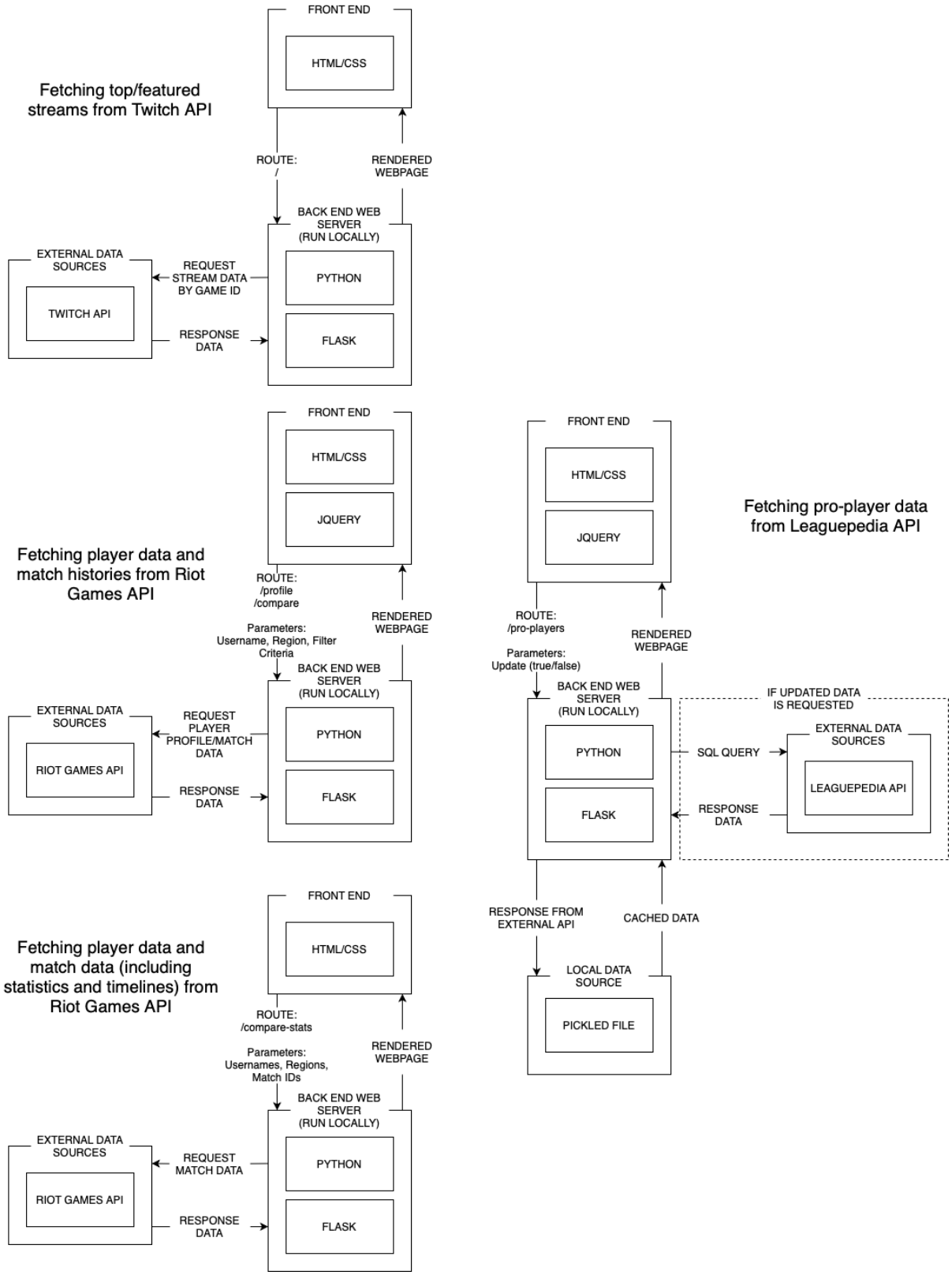
FEATURE: Comparison of two individual matches from the same user.

As a League of Legends novice, I want to be able to conveniently compare two matches of the same champion, on the same page, so that I can easily find differences between two of my own games.

GIVEN I am on the ProDiff website,
WHEN I click on “Compare” in the menu bar,
THEN I should be on the comparison page.
WHEN I input my name,
AND I press the search button,
THEN I should see their recent games.
WHEN I select two games to compare,
AND I confirm my selection,
THEN I should see detailed statistics comparing the two matches.

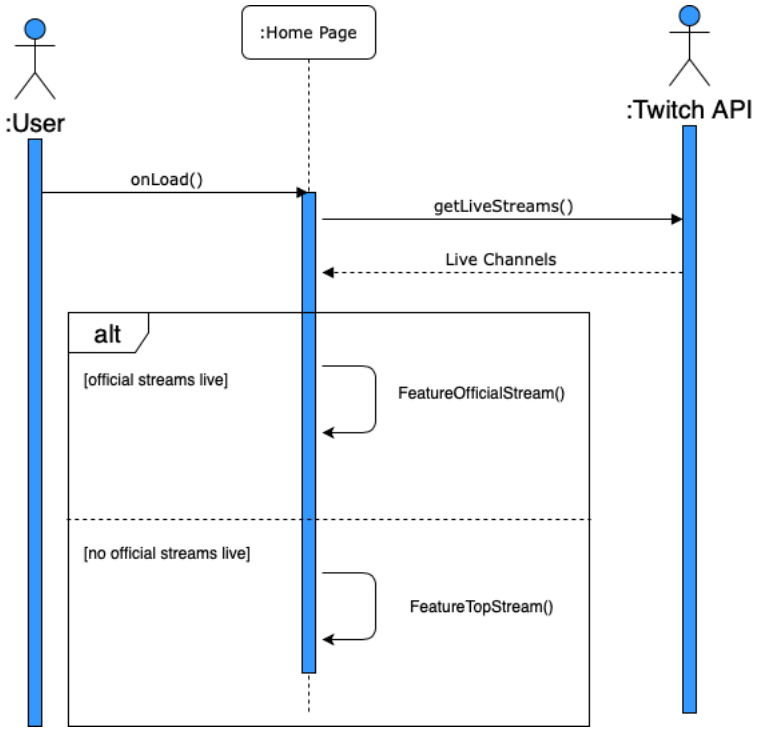


Software Architecture

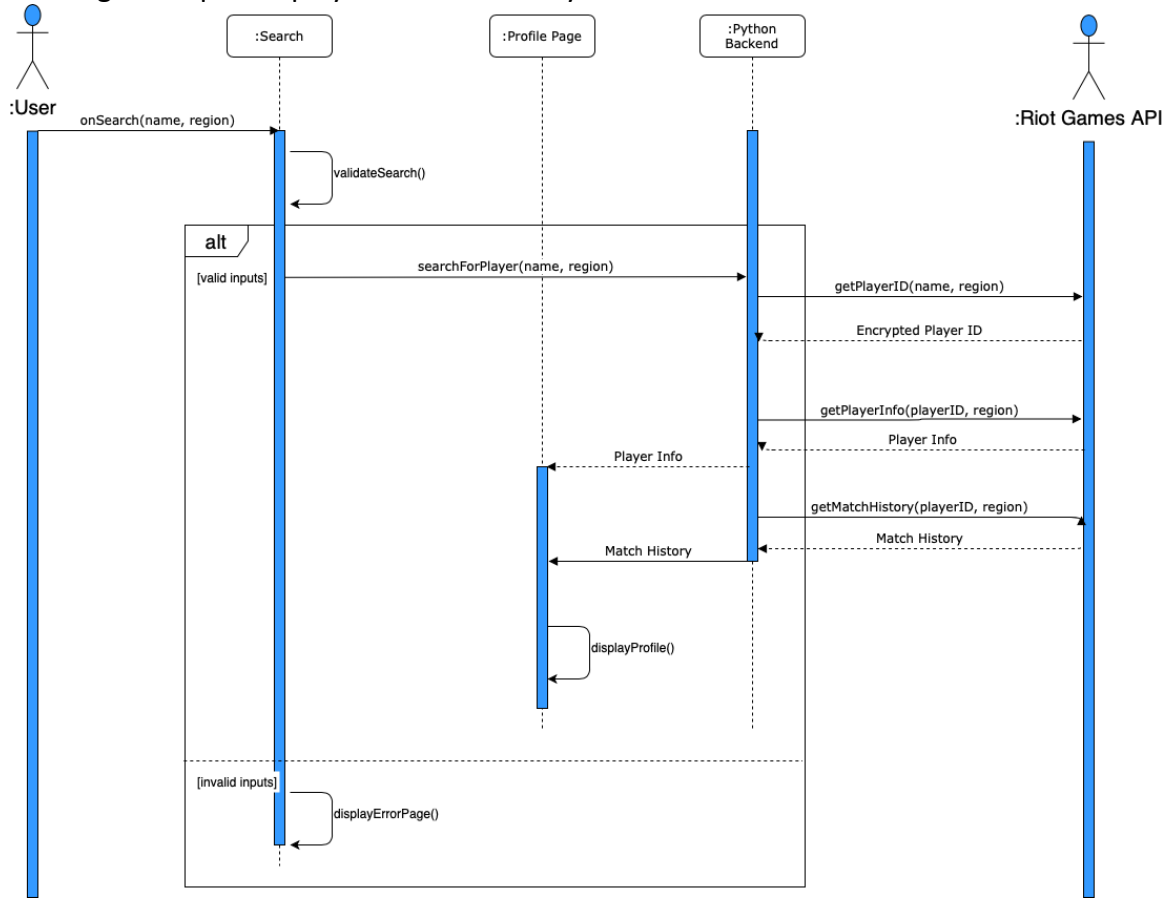


Sequence Diagrams

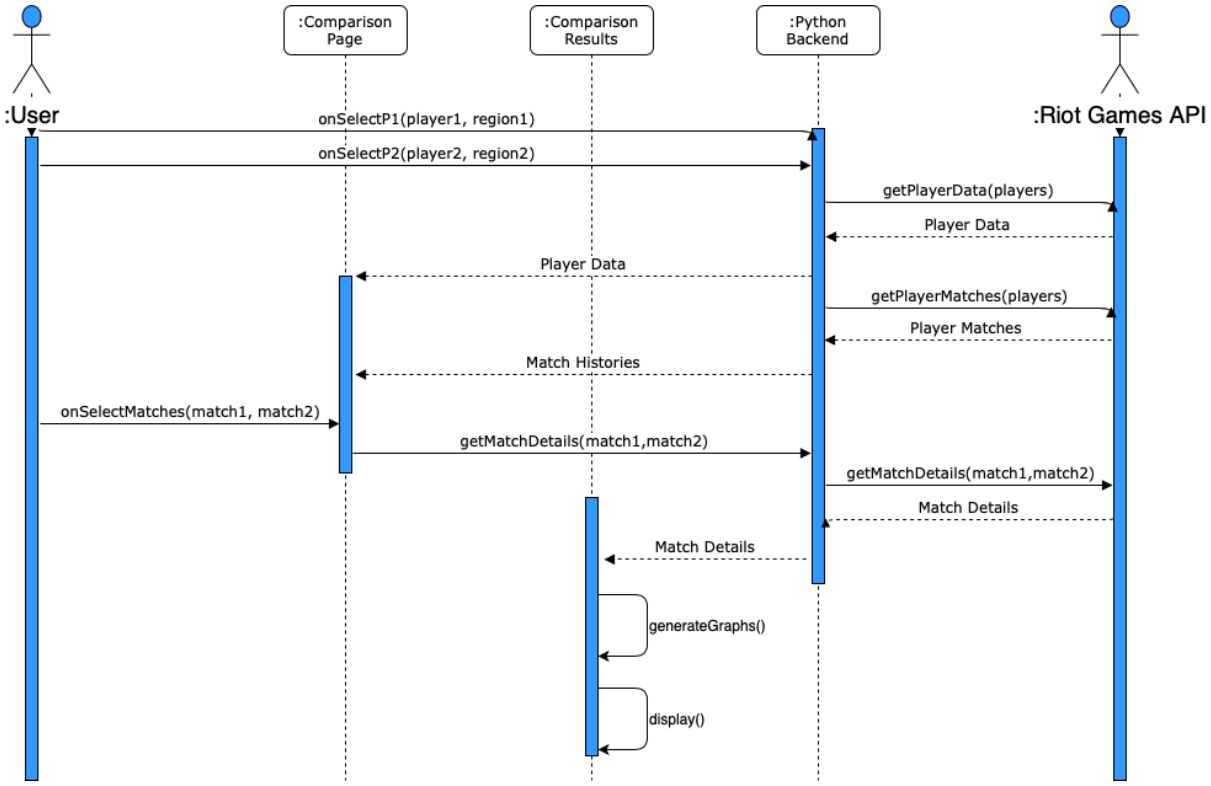
Display of live professional play on homepage.



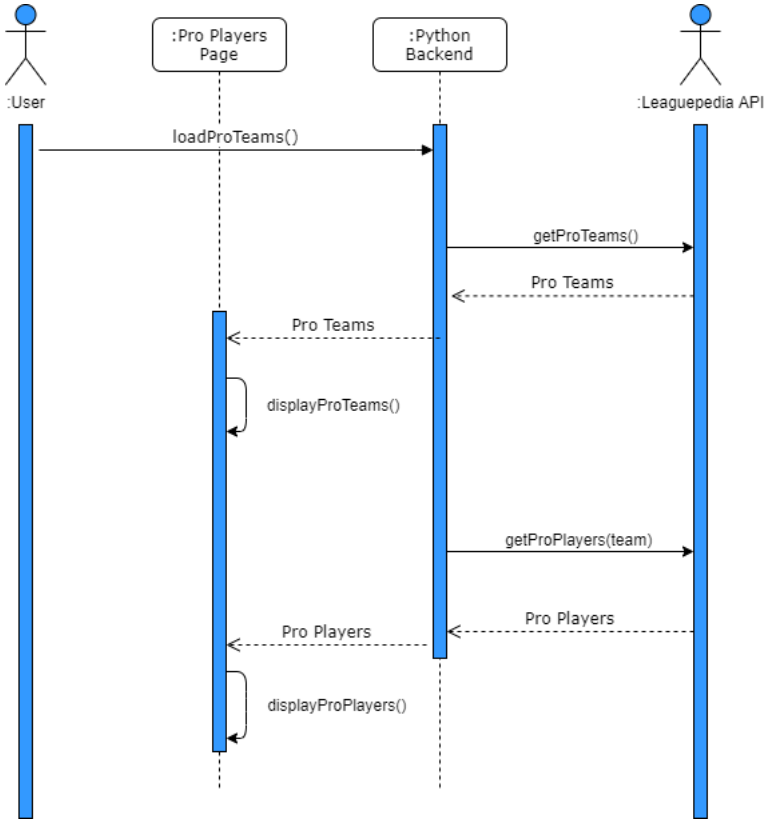
Searching for a specific player's match history.



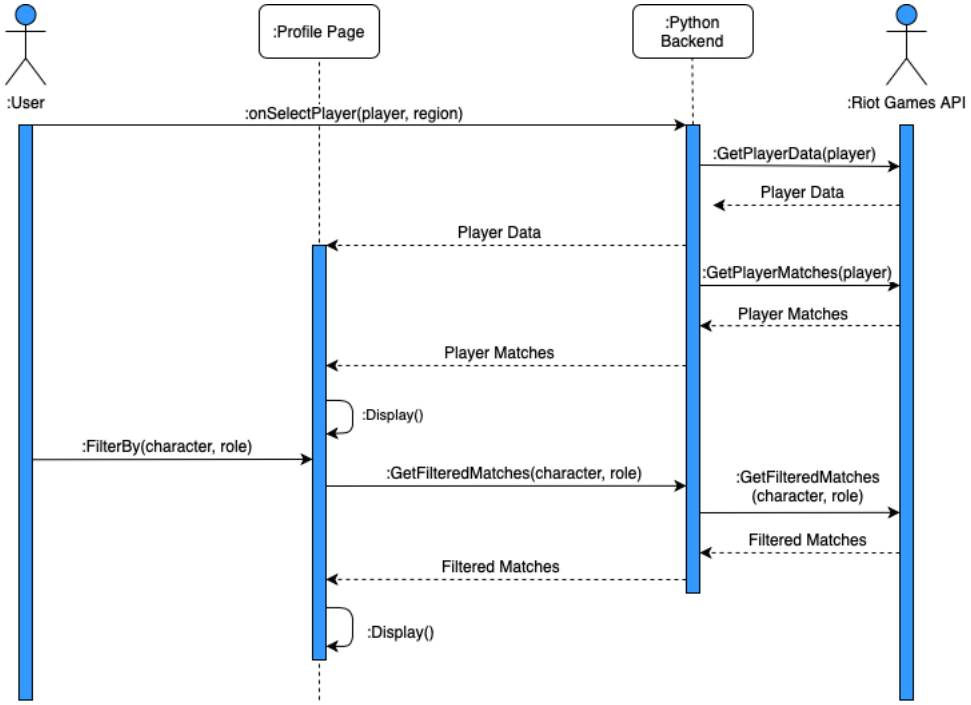
Compare two player's specific matches.



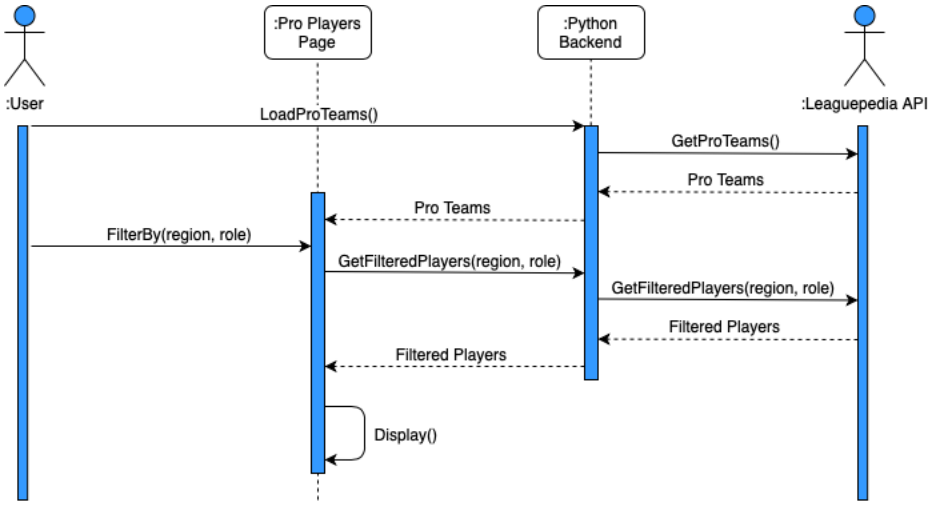
View list of active professional teams and players.



Filtering a player's match history by character and/or role played.



Filtering professional players by region or role played.



Design

When the route for the home page is requested, a few calls are made to the Twitch API. The first determines whether or not any official League of Legends tournament play is being streamed by official Riot Games channels. If so, those streams populate the five available slots first as they are the best example of professional play. The remainder are the top channels streaming League of Legends content on Twitch.

When searching for a player, be it through the search bar in the header or on the compare page, a series of requests are made to the Riot Games API, interacting with various endpoints. The first obtains the encrypted identifier for an account based on a username and region. The second obtains a match history, restricted to the last six months as well any filter criteria, if any. Then, for each match, detailed statistics are obtained from another endpoint. In extension, when comparing two matches, another endpoint detailing the minute by minute events in a given game is accessed and utilised.

On loading the professional player's page, two different data sources are accessed. In the case where the cached data is requested, there is no interaction with the Leaguepedia API. The Flask application simply obtains the locally stored data to avoid loading times. However, in the case that this data is outdated, the user can request an updated version of this data through the page, in which case the application interfaces with the Leaguepedia API using SQL queries.

The visual aspects of the website's front end have been designed using HTML and CSS. Specifically, the HTML is written for use with Flask's inbuilt Jinja 2 templating engine and styled with vanilla CSS. Furthermore, the JavaScript library jQuery has been utilised to improve the user experience namely by showing and hiding load screens to note transitions and allowing for interaction with the user interface, such as when clicking on a professional team to view relevant players.

The back end is a Flask application that handles the serving of rendered webpages. It communicates with the external data sources using REST API calls embedded in Python functions. The response data is decoded and processed for use with the aforementioned HTML templates. Furthermore, the professional player response data is cached using Python's inbuilt pickle library to reduce the number of API calls and SQL queries made to the external database.

Benefits

In using vanilla CSS, a distinct visual style was created for ProDiff. Other CSS frameworks can often add bloat and result in websites with similar styles, both of which are problems that were avoided through this implementation.

Using a Python based web framework allowed for a simple back end with the ability to use an extensive library of pre-existing modules to simplify many tasks, and more importantly allowed for the use of Flask. Flask provided an inbuilt templating engine in Jinja2, allowing for the HTML to be rendered on the fly with a given set of data. This greatly simplified the process of creating dynamic web content and allowed us to avoid repeated and bloated HTML that would be hard to maintain.

Furthermore, jQuery was utilised in combination with the above technologies to provide a better user experience. Through jQuery, various content could be rendered and de-rendered without having to connect to the Flask application. For example, teams on the professional players page can be expanded to show their players without having to reload the page with the relevant information.

Responsibilities

During the development phase of our project, each individual worked on their own functions based on the aspect of the project that they were allocated to. For more difficult functions, pair programming was employed to ensure that an efficient and correct solution was developed and delivered. Towards the end of the project, every member made minor contributions to all aspects of the project as a part of bug fixing and quality assurance.

Avi - Worked on frontend development including HTML, CSS and JavaScript. Set up the Flask application for use with Python. Developed the backend functions relating to the stream showcase that is present on the homepage of the website. Implemented backend based filtration functions for all relevant areas.

Sai - Worked on frontend development including HTML and CSS. Worked on Flask templating on some webpages. Worked on the backend functions for the comparison and compare stats pages alongside William. Worked on the backend for the professional players page alongside Zeyi.

William - Worked on frontend development, namely JavaScript. Worked on Flask templating on some webpages. Worked on the backend functions for the comparison and compare stats pages alongside Sai. Worked on the backend for profile page.

Zeyi - Worked on frontend development including HTML, CSS and JavaScript. Worked on the professional players page alongside Sai. Worked on the graphs that are found on the compare stats page.

Result of Project Completion

As development came to a conclusion, the team had produced a functional League of Legends analytics web application that fulfilled all previously presented requirements. Through this process, each individual's skill set was broadened through valuable programming experience, and their abilities in teamwork and project management strengthened.

Issues Faced During Development

A recurring issue that plagued the project was in relation to the limitations present in the Riot Games developer API key. The rate limit of 20 requests a second and 100 requests per minute was too little for our needs, resulting in errors during implementation and testing, as well as restricting the amount of information that could be displayed via a single page load.

Furthermore, the Leaguepedia API, specifically the database with which it interfaced caused the team issues. The game ID's of professional players had a multitude of problems, including being outdated and also having multiple values, some of which were not accurate. As a result, the match histories for some professional players could not be shown, and the planned method of showing a comprehensive match history for a professional player across many accounts by amalgamating the data with a merge sort could not be achieved due to the aforementioned rate limits present in the Riot Games API.

During the development of the web application, League of Legends saw patches which changed certain values in the game, thereby affecting our cached data. As a consequence, this data had to be manually updated at several points throughout development to ensure the correct data was being presented to our user base.

A Post Mortem of the Current Implementation

In hindsight, certain practices or further development to particular areas would have produced a product of greater quality. These include but are not limited to the following.

- The further and earlier utilisation of jQuery would have resulted in cleaner and easier to maintain JavaScript code, as well as more user interactable elements and responsive web page design.

- The service would provide further detail regarding the performance of teammates, thereby conveying the different factors that influence a game, as well as allowing for a contrast to be drawn between the performance of an individual player to that of their team.

- There could also be information regarding each character's optimal permutations of allies and opponents based on prior aggregated data. Furthermore, general advice for each and every character in the game should be available for users to peruse directly on the site.

- With regards to featured streams of professional play, the external data source PandaScore boasts an API that provides live data for these matches at a hefty additional cost. If this were to be implemented, players could view beneficial data in addition to the professional play.