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# Online Games Tournament Management

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**Final Year Project**

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# About this project

**Abstract** Competitive online gaming has seen a significant increase in popularity in recent times, whether watching or participating, competitive games can consume a large portion of our free time. Organising tournaments require organisation and rules. To ensure the rules are upheld require some form of administration from a system or individual. Issues can occur when an individual is responsible for managing these tournaments, for example, if a tournament has a fixed schedule but the person responsible for managing the tournament is unavailable, then the tournament game must be postponed. Administrators are also required to ensure matchmaking fairness between teams which can be very time consuming and inefficient.

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# Chapter 1

## Introduction

Competitive online gaming has seen a significant increase in popularity in recent times. The estimated global esports audience was estimated at 335 million people in 2017 generating a revenue of more than \$900M with an estimated growth of over \$1600M in 2021. [1] Yuri Seo and Sang-Uk Jung [2] outlined why people play or spectate competitive games. The main factors include entertainment and gaining a better understanding of a game. Whether spectating or participating, competitive games can consume a large portion of our free time. Organising tournaments require organisation and rules. To ensure the rules are upheld require some form of administration from a system or an individual. Issues can occur when an individual is responsible for managing these tournaments, for example, if a tournament has a fixed schedule but the person responsible for managing the tournament is unavailable, then the tournament game must be postponed. Administrators are also required to ensure matchmaking fairness between teams which can be very time consuming and inefficient. The disadvantages of physical tournaments do not exist in an online game

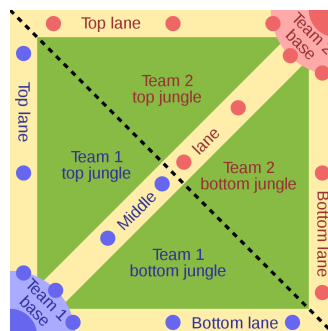
# Chapter 2

## Context

- Provide a context for your project.
- Set out the objectives of the project
- Briefly list each chapter / section and provide a 1-2 line description of what each section contains.
- List the resource URL (GitHub address) for the project and provide a brief list of the main elements at the URL.

### 2.1 League of Legends

League of Legends is a free-to-play multiplayer online battle arena (MOBA). A match is played between two teams, each consisting of five players and five roles. each player is responsible for picking a role. The main objective of the game is for players to defend their base and attempt to destroy their opponents'.



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# Chapter 3

## Methodology

### 3.1 Development Methodology

Project meetings were established at the beginning of development, Initial meetings consisted of brainstorming and considering project ideas. During this period, I conducted research on various technologies that could possibly be used throughout the project. I began development once the project was defined and understood what technologies were suitable for use throughout. Every week I would meet with my supervisor and discuss what has been implemented in the past week and what I will work on for the upcoming week. I took an iterative approach in the development of this project so I could see significant developments in the project.

### 3.2 Testing

I opted to use System Testing as the main type of testing for the project as this suited my workflow. I wanted to implement the functionality of client-side elements before testing. Unit tests were carried out near completion of development on individual components for both server-side and client-side. Jasmine and Karma was the framework used to test the functionality of web components.





Python's Unittest was used to test server-sided functions ensuring that both HTTP Requests and the Matchmaking algorithm operated as expected.



End to end testing (e2e) was used to test the interactions and relationships between the backend and the presentation layer of the application. E2e testing was a great way to ensure that the components of the application worked together cohesively and also the application functioned correctly at a high-level overview. I concluded that unit tests were not sufficient enough, as unit tests only tested isolated elements of my project. I needed to test how the application's components operated as a combination. E2e testing was the best way to accomplish this. Test cases were generated by scenarios in the following ways: [3]

- (1) Identify the input data that meet the conditions associated with the component based on different testing techniques (e.g. unit tests).
- (2) Determine the expected results from input data.

The main way I generated test cases was based on application usage, e.g., one component can be affected by several conditions, and each condition can be satisfied by multiple data. For example, the registration element may have input data such as username, summoner name and password. Therefore, the conditions for this test case include

- 1) Valid username;
- 2) Valid summoner name;
- 3) Valid password;

The first test case satisfied these inputs and then the second test case took the exact input from the first scenario proving that duplicate usernames cannot be inserted into the database.

### 3.3 Source Control

GitHub was used for source control and project management. Initially, I was using Trello for task management but this quickly became complicated to associate updates with unfinished tasks of the project. Therefore I changed the projects task management to GitHub's Issues section. I posted issues for any viable element that needed to be implemented into the project and when one of these elements were complete I would close the corresponding issue on GitHub. Each issue was categorized with tags depending on the type. These tags include:

- To-do: Tasks that have yet to be implemented.
- Tests: Types of tests that have been or need to be carried out.
- Bugs: Issues or bugs that occurred throughout the project and how they were solved.
- In progress: In progress are tasks that are currently being implemented.
- Completed: Finished tasks.
- Enhancement: When a completed part of the project has been upgraded, changed or removed.

This method of task management proved to be a lot more manageable compared to my previous method of using Trello. I could easily compare my current tasks to my commits on GitHub. Anytime I had implemented a significant change or addition to my project, I would perform commit it to through git and push the change.

### 3.4 Technologies Selection Criteria

The primary development environment used throughout the project was Visual Studio Code, The main reasons why I chose this environment is because it supports debugging, Git control, syntax highlighting, intelligent code completion and for its customisability. Both Frontend and backend of the project were developed in this environment. I used Angular which is an open-source web application framework led by the Angular Team at Google. The reasoning behind choosing Angular is because I wanted the project to be a web application as compared to a hybrid application, Angular seemed to be the most viable framework for this application. When researching options for the

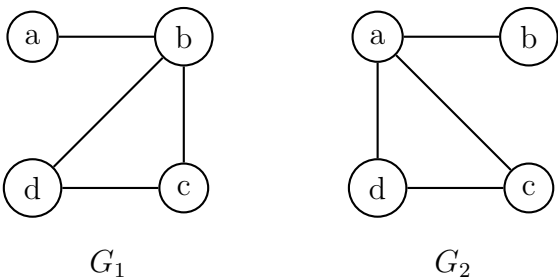


Figure 3.1: Nice pictures

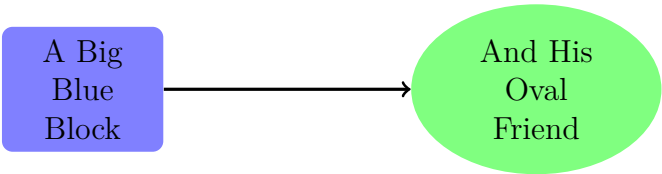


Figure 3.2: Nice pictures

database server, the two main options were python and flask or using MEAN stack (Mongo, Express.js, Angular and Node). I wanted the database to be a relational instead of using a NoSQL database, so a NoSQL database did not suit. I also wanted to use a technology that I'm not familiar with. These factors

- Agile / incremental and iterative approach to development. Planning, meetings.
- What about validation and testing? Junit or some other framework.
- If team based, did you use GitHub during the development process.
- Selection criteria for algorithms, languages, platforms and technologies.

Check out the nice graphs in Figure 3.2, and the nice diagram in Figure ??.

# Chapter 4

## Technology Review

About seven to ten pages.

- Describe each of the technologies you used at a conceptual level. Standards, Database Model (e.g. MongoDB, CouchDB), XML, WSDL, JSON, JAXP.
- Use references (IEEE format, e.g. [1]), Books, Papers, URLs (timestamp) – sources should be authoritative.

### 4.1 XML

Here's some nicely formatted XML:

```
<this>
<looks lookswat="good">
Good
</looks>
</this>
```

# Chapter 5

## System Design

As many pages as needed.

- Architecture, UML etc. An overview of the different components of the system. Diagrams etc... Screen shots etc.

Column 1	Column 2
Rows 2.1	Row 2.2

Table 5.1: A table.

# Chapter 6

## System Evaluation

As many pages as needed.

- Prove that your software is robust. How? Testing etc.
- Use performance benchmarks (space and time) if algorithmic.
- Measure the outcomes / outputs of your system / software against the objectives from the Introduction.
- Highlight any limitations or opportunities in your approach or technologies used.

# Chapter 7

## Conclusion

About three pages.

- Briefly summarise your context and ob-jectives (a few lines).
- Highlight your findings from the evalua-tion section / chapter and any opportuni-ties identified.

# Bibliography

- [1] M. Sjöblom, J. Hamari, H. Jylhä, J. Macey, and M. Törhönen, “Esports: Final report,” *Tampere University*, 2019.
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- [3] X. Bai, W.-T. Tsai, R. Paul, T. Shen, and B. Li, “Distributed end-to-end testing management,” in *Proceedings Fifth IEEE International Enterprise Distributed Object Computing Conference*, pp. 140–151, IEEE, 2001.