Open Powerlifting Analytics

Advanced Web Development

Project Plan

Supervised by: Hugh Shanahan

Department of Computer Science

Royal Holloway University of London

Biddiscombe-Barr, Jake

100948416

1 Abstract

Powerlifting is a strength sport that consists of a 1 rep max attempt of 3 compound movements, these movements are as followed, squat, bench press and deadlift [1]. The term used to describe a competitor of this sport is called a Powerlifter[2]. Open powerlifting is an online database that contains thousands of powerlifter competition results over many years now, this information is freely available to inspect [3] however, the user interface is confusing, and the data is raw and not particularly useful. The aim of my project is to create a web tool that uses this data in a more functional manner, allowing users / powerlifters to run analytics on their accounts, filter through lifters or search via various categories, compare against a single lifter or a group of lifters where an average will be created for the parameters selected. An example would be, comparing against all the U83kg Junior Male powerlifters.

The focus of this project is to provide the user with a seamless experience, where results are returned rapidly, the UI is attractive with smooth animations and the UX is intuitive. To achieve this, I want to use the state-of-the-art technologies that are most popular in industry to date. The project will be created using Next.js coupled with TypeScript which will allow me to capitalize on its server-side rendering capabilities and simple page routing. Next.js is also described as a full stack framework allowing me to not need a separate BE system [4]. As Next.js uses React.js I will also be able to benefit from Reacts state management system [5], allowing pages to effortlessly connect only requiring small renders depending on state changes instead of whole page changes. I will also be using skeleton loading to display loading segments to the user. This approach is followed by many large corporations such as Google, Facebook, LinkedIn and more [6]. The last few technologies I will use are StoryBook to help design components more effectively [7], Eslinter to adhere to industry standards and follow efficient coding practices [8], and Sass styling which will increase readability, reusability and productivity of my web styling [9]. The project will also have elements of statistics, when attempting to create comparison results and the analytics results. There are a few models I would like to further research to create these.

There are a few approaches I can take to the project. I discovered using the web development tools that I can query Open Powerlifting's API to collect user information without the need of an API key. I could create some helper classes, in Next.js alongside node to utilize their full stack capabilities, to handle the data and mathematics. Another possibility is that I could use an entirely new BE system to add some complexity. However, these are both risks as I am not in control of the Open Powerlifting system so another approach is localizing this data via a Firebase database with dummy data as this will allow me to quickly access info directly from the FE. I will also be using Firebase alongside Next Auth as a user authorization system [10].

2 Timeline

The focus of term 1 will be around finalizing research, creating all the designs and all the static pages. The second term will be focused around implementing the logic of the problem, these tasks will be more intensive, so I have made sure to follow proper time management and give myself a couple weeks for these more complex tasks.

Term 1

- Week 1: Continue research of Next.js and Storybook.
- Week 2: Finalize Next.js course, research of authentication system and create basic repo structure / common files.
- Week 3: Create the designs and flow for the Homepage, Comparison and Analytics.
- Week 4: Create the designs and flow for the Search, Landing and Login.
- Week 5: Ensure that the designs are responsive on all devices.
- Week 6: Create the common reusable components of the project such as buttons and navbars.
- Week 7: Test the API thoroughly to understand the Helper class / BE structure or if I need to use a Firebase BE.
- Week 8: Solidify the mathematical models used to create the comparison / analytics.
- Week 9: Create the static Homepage and Analytics page.
- Week 10: Create the static Comparison and Search pages.
- Week 11: Prepare for the interim report and presentation.

Term 2

- Week 1: Create the static Landing and Login pages.
- Week 2: Implement the router.
- Week 3: Create the code for the login system.
- Week 4-6: Create the state management system for the website.
- Week 7-8: Create the Helper / BE code.
- Week 9: Finalize styling and animations.
- Week 10-11: Prepare for the final report.

3 Risks and Mitigations

Risk	Impact	Probability	Mitigation
Open Powerlifting API not having expected customizability	Medium	20%	The API has no documentation, I have done some simple testing, and I should be able to get all the information I require through a single query. If this becomes impossible, I will have to use the Firebase approach.
Testing and debugging overtime	High	15%	Make sure to test as I code to keep testing simple instead of large confusing chunks
Scope Creep	High	10%	Do not increase the scope throughout the project and adhere to the plan
Poor time estimation	High	10%	Realistic time management is essential, some tasks could take longer than expected so giving myself a buffer to allow for some tasks will be prevent delay and frustration.
Designs are not responsive	High	10%	The designs need to be fluid across all resolutions as the focus of the project is user experience. To allow for this I will create individual designs for mobile, tablet and desktop with industry break points. This has been allocated sufficient time to design effectively and carefully.
Chosen technologies not performing as expected	Low	5%	From my research, I have selected technologies that should all enhance user experience from design to speed. For example, if Next.js has server-side rendering to enhance client speed, there is a chance that I do not optimally utilize this due to lack of experience with the technology. I have given myself some time to learn these technologies during the first couple of weeks.
Uneven project balance	High	5%	Focusing purely on just the project could hinder my report quality and vice versa, to allow for these reports and deliverables, I will give myself a week or two towards the end of each term to focus on the reports.
Security Concerns	Medium	5%	Following good security standards is an essential web development practice. As this is not going to a real client, it is

			not a priority however, I will attempt to adhere to good standards to increase my personal coding skills as I will not want to bring bad habits into industry
Open Powerlifting removing their data	Medium	< 1%	As this is a third party, if they do anything unwanted with the data on their end it will be unusable to me. This could include removing the API for maintenance or moving to a different system.

Glossary / Acronyms

U83kg - refers to the weight category of a powerlifter, this format indicates the competitor is above 74kg but below 83kg in body weight.

UI – User Interface

UX – User Experience

FE – Front End

BE – Back End

API – Application Programming Interface

References

[1] Ferland, P.M. and Comtois, A.S., 2019. Classic powerlifting performance: A systematic review. *The Journal of Strength & Conditioning Research*, *33*, pp.S194-S201. Link

[2] Ball, R. and Weidman, D., 2018. Analysis of USA powerlifting federation data from January 1, 2012–June 11, 2016. *The Journal of Strength & Conditioning Research*, *32*(7), pp.1843-1851. Link

[3] Ferland, P.M., Allard, M.O. and Comtois, A.S., 2020. Efficiency of the wilks and IPF formulas at comparing maximal strength regardless of bodyweight through analysis of the open powerlifting database. *International journal of exercise science*, *13*(4), p.567. Link

[4] Dinku, Z., 2022. React. js vs. Next. js. Link

[5] McFarlane, T., 2019. Managing State in React Applications with Redux. Link

[6] Experience, W.L. in R.-B.U. (n.d.). *Skeleton Screens 101*. [online] Nielsen Norman Group. Available at: https://www.nngroup.com/articles/skeleton-screens/#:~:text=Summary%3A%20A%20skeleton%20screen%20is [Accessed 2 Oct. 2023].

[7] Lanciaux, R., 2021. *Modern Front-end Architecture: Optimize Your Front-end Development with Components, Storybook, and Mise en Place Philosophy*. Apress. Link

[8] Tómasdóttir, K.F., Aniche, M. and Van Deursen, A., 2018. The adoption of javascript linters in practice: A case study on eslint. *IEEE Transactions on Software Engineering*, *46*(8), pp.863-891. Link

[9] Cederholm, D., 2013. *Sass for web designers*. A Book Apart. Link

[10] Moroney, L. and Moroney, L., 2017. Using authentication in firebase. *The Definitive Guide to Firebase: Build Android Apps on Google's Mobile Platform*, pp.25-50. Link