

THE LORD OF THE RINGS

ONE APP TO
VIEW THEM ALL

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Chapter 1: A Long-Expected Visualization

The Lord of the Rings, - the masterpiece by Tolkien, illustrated by Peter Jackson. The story of Tolkien's universe is complicated, to say the least. In this project we want to take people to a journey in the Middle-Earth, and give a chance to explore their favourite characters and places.

We focused on three main questions: who, where, and when. Through our visualizations, people can find answers to questions like "Whom did Aragorn speak with most?", "How far away from home did Frodo and Sam went?", "When did Gandalf become white ?" or "Which Gondor king has the longest ruling time?". To achieve this, we had three milestones.

Part 1: Milestone 1

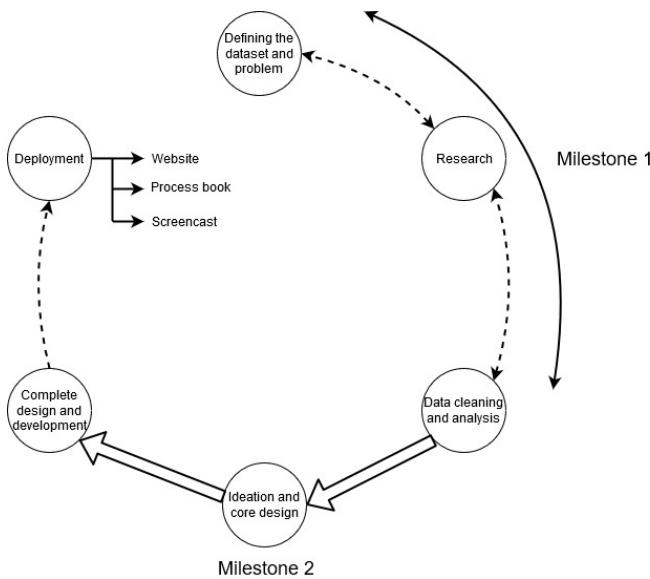
- **Defining the dataset and problem:** We have explored multiple datasets, yet we wanted something fun, something mysterious, and with story. In the end we decided to go with the Lord of the Rings which fit all of our interests.
- **Research :** We did research not only based on the dataset and previous work on it, but also different resources related to the Lord of the Rings, and previously done visualizations. We explored their main functionalities, and drawbacks from user experience point of view.
- **Data cleaning and analysis:** The raw data was not too dirty, however in order to get certain information we needed, we preprocess the important part using multiple data wrangling, and NLP techniques. Also, for the events we scraped additional dataset from the wiki-like website.

Part 2: Milestone 2

- **Ideation and core design:** We come up with multiple ideas, and in the end finalized the structure of the website, chose three main question to answer - "whom", "where", and "when". We divided the job as following:
 - Whom? -> Mammad Hajili
 - Where? -> Pavlo Karalupov
 - When? -> Erdem Böcügöz
- **Development:** During development we decided to use typescript as it will make compile time type checking and helps to escape majority of errors in the code. We, also, used modern powerful framework Vue.js as it helped us to split our code into handy components and had an inbuild support of a webpack for easy deployment (bundling and minification). Moreover, we used linting to ensure same code style.
- We built initial and core design, and develop the visualizations.

Part 3: Final milestone

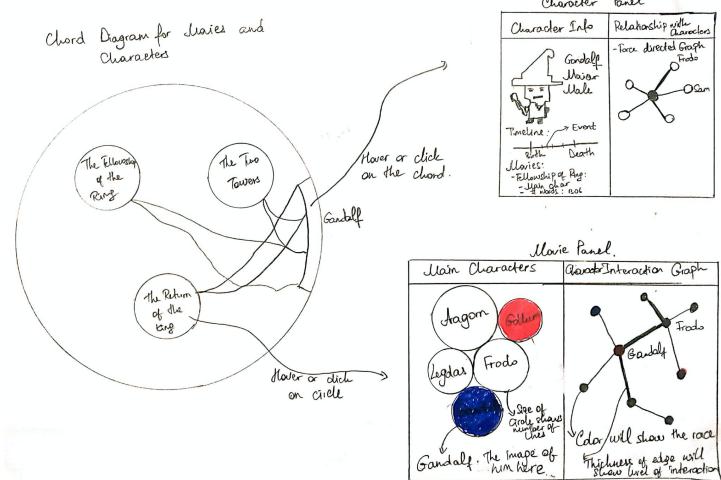
- **Development:** Each of us completed its own visualizations with discussion and feedback with other team members. In the end we finalize the main web page together, and wrote necessary information for readers.
- **Deployment:** We deployed our finalized website as a single app, host it as a github page (<https://com-480-data-visualization.github.io/com-480-project-bkh>). Additionally we have recorded screencast (<https://youtu.be/8C7F88gJzL4>), and we are writing this process book, and hopefully you will like it :)



Chapter 2: The Decisions of the Past

Part 1: Who?

For answering question “Whom?”, we initially created the main visualization, a chord diagram which illustrates the characters and their roles in the movies as a path from the edge of the big circle to the small ones inside which represents three different movies. Our plan was to create a panel in two different actions, - action on the movie circles, and action on the character chord. In the movie panel we planned to design two separate visualization, - bubble diagram to show importance of the characters, and force directed graph to show their interactions. In the character panel our plan was similar, in the left part we wanted to main character characteristics, and in the right forced directed graph to show interaction of the character with others. The photo below illustrates our previous plan.



However, after brainstorming, and reanalyzing, we have come up simpler, but not limited design. We kept the main chord diagram in the left, and two different actions and panel ideas the same. However in each panel, instead of two different visualizations, we illustrated only one.

For movie panel, we simply created the interaction graph of the characters. In order to illustrate their importance, we project number of words they speak in the movie to the size of nodes that represents them. So we can generalize our graph with these two statements:

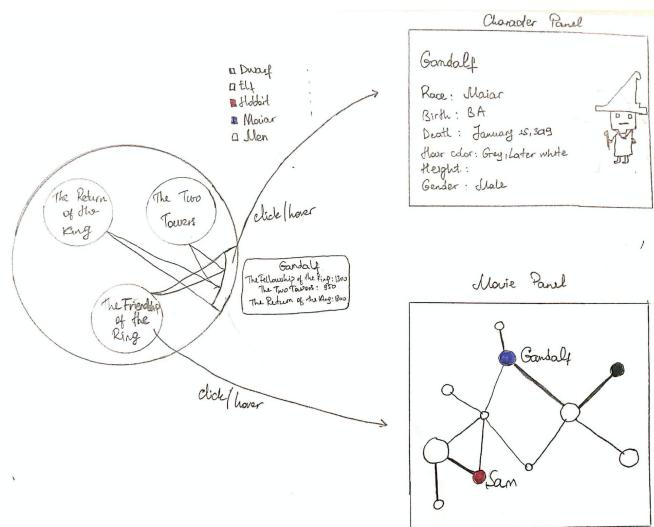
- Bigger node for the character, greater role in the movie.
- Thicker edge between characters, more interaction between them in the movie.

For character panel, we decided to get rid of interaction graph, because we already have this information in the movie panel, and from logical point of view interaction is not character specific, but movie specific feature to explore. So in the final design for character panel, we have main information about the character, - the race, birth/death date, hair color, height in the left, and the pixel art photo of him/her in the right.

Moreover, you can see number of words of the character in three movies during the action near the chord specified for the him/her.

For the characters, one of the most important features is their race. So, we assign a different color for each of most dominant ten races. The races and the colours that represent them are listed in the top right of the main chord diagram.

Moreover, this colours are used to represent the race of the character in outer part of the big circle, and in the nodes in the interaction graph. The sketch of the final design is as following.



Part 2: Where?

We thought that it will be interesting to see geography of J. R. R. Tolkien world in order to have better understanding of trips of the characters and political relationships between kingdoms. That's why we decided to visualize map of the Middle-earth, continent of Arda world, where events from Lord of the Ring and Hobbit happens.

One of the main challenges was to find a data, however it appears that fans already did handy geojson files for all objects on the map.

Another challenge was to fill forest and mountain range with svgs of trees and mountains respectively. As polygons can be of the arbitrary shape, it becomes challenging to fill them uniformly, also we cannot put a huge number of jsons as it will make map very slow. To solve this issue, we create an algorithm that will split polygon by triangle areas, select one of the triangles with probability according to its area and select dot in this triangle. This algorithm helps us to preserve shape of polygon using icons as well as to speed up render of the map.

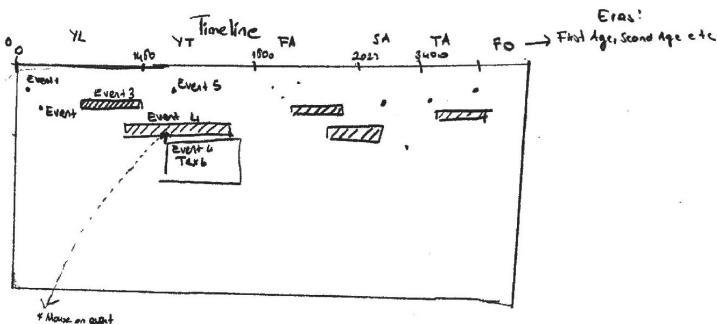
Moreover, we had to adjust each label of the object on the map according to the objects size, because during zooming some labels should hide and some should appear.

Furthermore, initially we did not think about path intersection of the characters so in order to see when characters went together and when separately, we made intersection of their paths as a composition of colours derived from their paths.



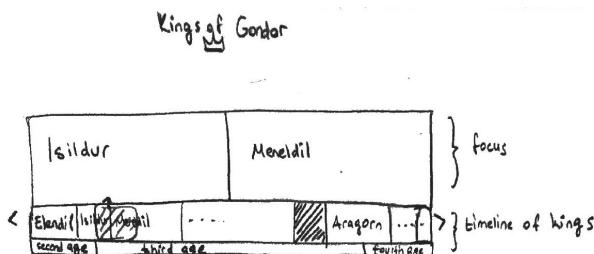
Part 3: When?

In order to answer the question when, we initially planned two main charts: a time-line for the major events and a time-line for the mighty kings of Gondor, the largest kingdom of men. Our initial plan for events time-line was showing all the events in a continuous flow.



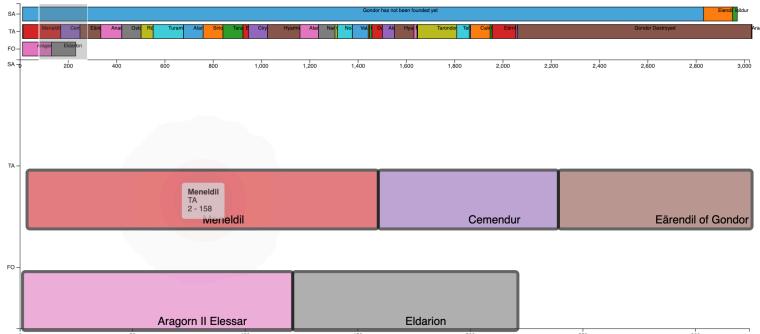
However, we realised that most of the events just a point in time rather then an interval. Therefore, we changed our visualization to a scatter-plot instead of continuous bars. Furthermore, there were many overlapping events, which made us decide to separate events by character and only focus on the major ones. With this design decision, we also decided to add feature to filter by character name as checkboxes.

Unlike events time-line, for the kings of Gondor timeline continuous bar representation was possible. However, in our sketch we were only planning to have focus and context.



We mostly achieved this in the chart below. However, visual design was unpleasing.

SA:Second Age, TA:Third Age, FO: Fourth Age



So we decided to change this, removed the larger graph. Instead we append a text to top of smaller-chart with the information of the respected king, made it scrollable instead of showing everything ,and made it less colourful. Nonetheless, we believe that we kept the core design of having a continuous bars representing ruling duration of the kings.