Official Unofficial Kilominx Results

The World Cube Association (WCA) is a non-profit organization which holds official competitions and collects official results. They have official rankings, records, and profiles for all official events. However, they do not keep track of results at an official competition which do not correspond to any of the 18 official events. Any of these puzzles or events are thus not officially ranked, nor is there much consistency in format. Over the past 2 years the “Speedcubing” community has had an increase of interest in a new puzzle called a Kilominx. This 12 sided 2 layered contraption is easy enough to solve and yet provides a new challenge that other WCA events do not have. Due to its popularity, results from competitions holding kilominx were collected and put on a forum site. Once this became too much, they moved the data onto a spreadsheet which has also become too much to manage by the community members. The spreadsheet currently consists of each of these official competition’s results which are not allowed to be put onto the WCA website.

**Original Contributions**

Once we move the data into a database from the spreadsheet, we can begin to manipulate it and give many new features in the form of an easy-to-access website. We can provide a similar, but more appealing, site for each competition’s data. We would be able to query the data and provide rankings for each competitor’s best single result, each competitor’s best average result, all single results, and all average results! We can also provide a web page for each competitor’s individual results, to show it all in once place, opposed to just throughout each competition. We would be able to assign records on a World, Continental, and National basis (as recognized on WCA). We can query a history of these records. We can also easily create statistics, such as, the total number of competitors, total competitions, total countries that have held the event, and total nationalities who’ve competed in a more accurate manner than guessing. We can summarize this on a home page and link to each of the new features mentioned.

**Broader Impact**

These rankings and features can be utilized by the community who are competing in the results to see how well they are doing compared to others. As well, with the continual growth of the Kilominx event. This extra information provided by a database can be used to support claims to push it to becoming recognized as an official event by the WCA Regulations Committee.

**System Architecture**

The system architecture will be as follows: the client will connect to a Node.js backend which will query a MySQL server that returns the necessary data. Since our kilominx results data will be static and local, there is no need for any external data APIs. There may be a need for other, more UI-focused APIs, such as a geographical map API, in order to provide a more novel experience for the user querying the data. Once the concept is tested and working locally, remote features may be added to the architecture, such as a cloud-hosted database/application server (Heroku), and/or a reverse proxy (Cloudflare), in order to allow this application to reach its end users and perform well enough to be effective.

**Technical Details**

On a more technical note, since there is no experience with Angular in our group, and we want to be able to have bookmarkable user-specific result pages, a single-page app is probably out of the question, as there will be no client-side routing. However, a clean look and feel can still be accomplished using ajax where applicable and minimizing the depth of page nesting. A good choice for the UI is the Materialize.css library, as it employs aspects of material design in its reusable components, and a member of our group has experience with it on prior projects. For querying the database, there is a well-documented and popular node module called ‘mysql2’ that allows for simple connecting and querying of any MySQL database, whether remote or local. It has a JS Promise wrapper called ‘mysql2/promise’ that will allow clean code and no ‘callback hell’ when it comes to fetching and handling the results of these queries (queries which can still be written as either plain SQL or as prepared statements).

**Related Work**

In terms of related work, as stated in a previous section, there is not yet any place on the web which displays kilominx result statistics. For other official cube-solving statistics in general, it seems that <https://www.worldcubeassociation.org/results/statistics.php> and similiar pages under the same domain are the only sources of result data, and even these pages contain data in a plain, tabular format. It would be our goal to be the first application to display the kilominx result data of users around the world, in a more novel, easily-digestible format than the data presented by the WCA.

**Planned Timeline**

* Collect information from existing excel workbooks.
* Plan out the schema.
  + Identify the objects
  + Identify the information about the objects
  + Identify the relationships between the objects
* Physically create and populate the database.
  + Write a dump file with all necessary tuples
* Ensure that the database is tested and working before moving to the front end.
* Allow for the use of mysql2 to allow for querying the database either remote or local
* Build a UI/front end for the database to allow the information to be used by the end users; including any potential APIs.
* (Potentially) Have this cloud-hosted rather then just local so i can be reached by the end users.

**Team and Responsibilities**

* Brandon Canaday - Design and create the UI and building the front end. Allow for the use of mysql2 so that the database can be accessed either locally or remotely. Have the kilominx results cloud-hosted remotely.
* Jacob Ambrose - Plan out and create the schema. Define all the objects and important information, as well as the relationship between objects. Write a dump file to populate all the objects/tuples.
* Zachary Davis- Test and ensure the functionality of the database both before and after the front end has been implemented. Help with the construction of the front end UI.

**Conclusion**

With the rise if Kilominx and its gaining popularity spreadsheets willno longer be sufficient for keeping and displaying the results of these competitions. Not being kept track of by the World Cube Association there is no consistency in formatting with other categories and no easy way to store and use the statistics. Our first task of moving the results into a database will quickly remove the pressure of the growing size of the statistics and host the results on and easy-to-use-website. It will also allow for the quick and continuous implementation of new and useful features to better use the data. Most importantly with the database we will be able to query the data and provide rankings of competitors based on their best individual result. These rankings can also be done on different scales such as World, Continental, and National in keeping consistency with the WCA. All of this can be summarized on a homepage and with directions to all of the different features described. It will also be simple and easy to connect to the database locally or remotely and conduct additional queries. This database and the related front end will allow for the record keeping of a new and rapidly increasing speedcubing category that will keep consistency with other competition categories and allow for recognized rankings of competitors that call all be accessed by the end user.

**References**

World Cube Association (<https://www.worldcubeassociation.org/>)

Kilominx (https://ruwix.com/twisty-puzzles/kilominx/)

Official Unofficial Kilominx Results Spreadsheet (<https://docs.google.com/spreadsheets/d/1p8uFFILT2TkmkTodaHzeDHiWBjfqUz7YUGaOslbyR2A/edit?usp=sharing>)