Team 2 - NMT Soccer Coalition
Final Report

1. Project Overview

For this project, we have developed a web-based application that can help managers at the NMT Gym create a Soccer League based on different parameters, generate a schedule, and share with all the teams' captains. This application is also able to display valuable information to every guest, and allows referees to update the status of games with information such as: goals, cautions, end of games, sanctions, and most importantly; standings and top scorers.

1.1. Scope and Objectives

We believe that the most important part of this project is the ability to update data as soon as a game has finished. This also updates standings and the schedule. Since this functionality would make our application very similar to many applications that are out there in the market, we have chosen to have our application generate the schedule based on the number of teams and with the unique parameters NMT Gym has for the League (things like: max number of games per day, games back to back, constraints preventing random dates from being used for games, etc.). We have also achieved other objectives like: modifying teams and their members online, as well as displaying various statistics.

1.2. Supplementary requirements

Some of the non-functional requirements identified for this project, among others, that specify the system's quality attributes or characteristics would be the following;

- Availability: The updated information about a certain game, or team, should be available for the users and guests to see right after a game has finished. The website should be available for users at all times of the day. If the website is non-operational, the users will be notified that the system is unavailable by visiting the webpage.
- Security: Only admin users, gym employees, and team captains are able to login and modify the data. However, everyone else is still able to visit the site and check for standings, schedules, teams, top scorers, etc.
- Maintainability: Since the most important part of our project is to update the site as soon as a game has finished, we have multiple users obtaining the results and updating the site constantly. If an user encounters any problems with the system, any admin user should be able to find the problem and fix it with ease.
- Extensibility: The project, in general, is capable of extensibility. There are many other small features that we could add for improvement of customer experience. The project is very open to be expanded without major changes (e.g. features like: different design format options, being able to check results for a certain team, seeing information about every player in each team, adding more sports, etc).

- Reusability: The design of our project will be able to be converted for use in another system with minor changes. Tech not only has soccer intramural, but it also has volleyball, and basketball. The design, or process, would be quite similar regarding the features that our project provides (e.g. teams, schedules, top scorers, sanctions, statistics, etc.). The only difference would be changing the rules of each sport; how the sport is played, in terms of how long games go for, how many days per week, or times a day.
- Reliability: The system's probability of failure on demand is significantly low, unless we encounter issues with the server, and we . This site should be very user-friendly since we have also accounting for it to be used, and visited, by non-technical users.
- Documentation: Documentation is, of course, a very important part of this and every project. Our request for proposal has been accepted, we have developed the requirements/statement of work/scope of work as well. Also, the system software design and functional specifications have been developed and worked on. We have fixed all known minor bugs and now need to start the user acceptance testing phase. Most of the technical documentation is in our project README. Of course, this report will contain documentation as well.

2. Customer Requirements

The NMT Intramural soccer players, team captains, and gym managers have expressed interest and need for an application such as our project. There are three types of users: regular users-- also referred to as guests--, captains, and admins.

2.1 Regular Users

Regular users, or guests, refer to users who don't have authority from the NMT Gym to officially update data regarding the standings or scoring of the NMT Intramural Soccer League. Therefore, these users will only be able to view the information about the League.

2.2 Captains

Captains are able to view all of the information that regular users are able to. They also have some information editing privileges such as adding or removing players and editing nicknames.

2.3 Admins

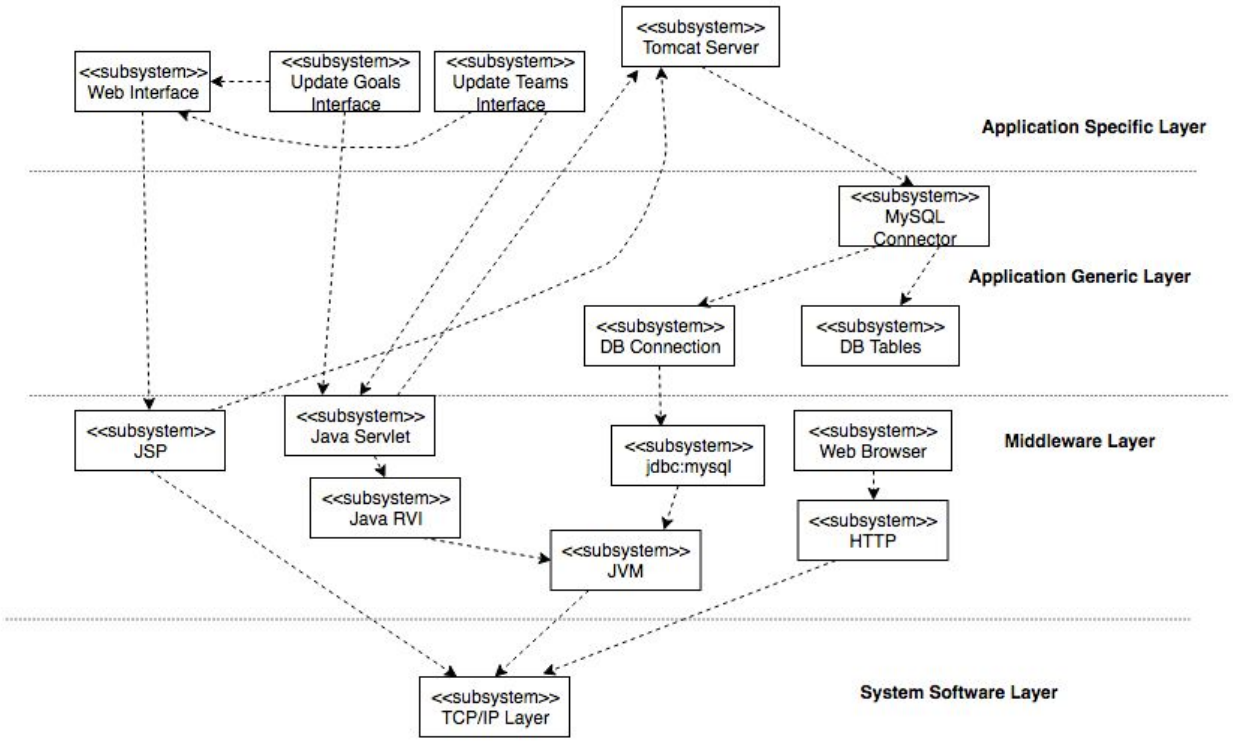
Admins include, but are not limited to, NMT Gym staff. They are able to do everything regular users and captains can do, but they also have the ability to modify and update information throughout the site using the website interfaces provided. Admins are able to input the results of games, schedule games, and modify existing games.


View Standings
View Results
View Game Results
View Statistics
Database
Regular User
Captain
Admin
Add Player to a Team
Remove Player from a Team
Edit a Player's nickname
Add a game to schedule
Modify existing game information
Input results of a game

3. Architectural Design

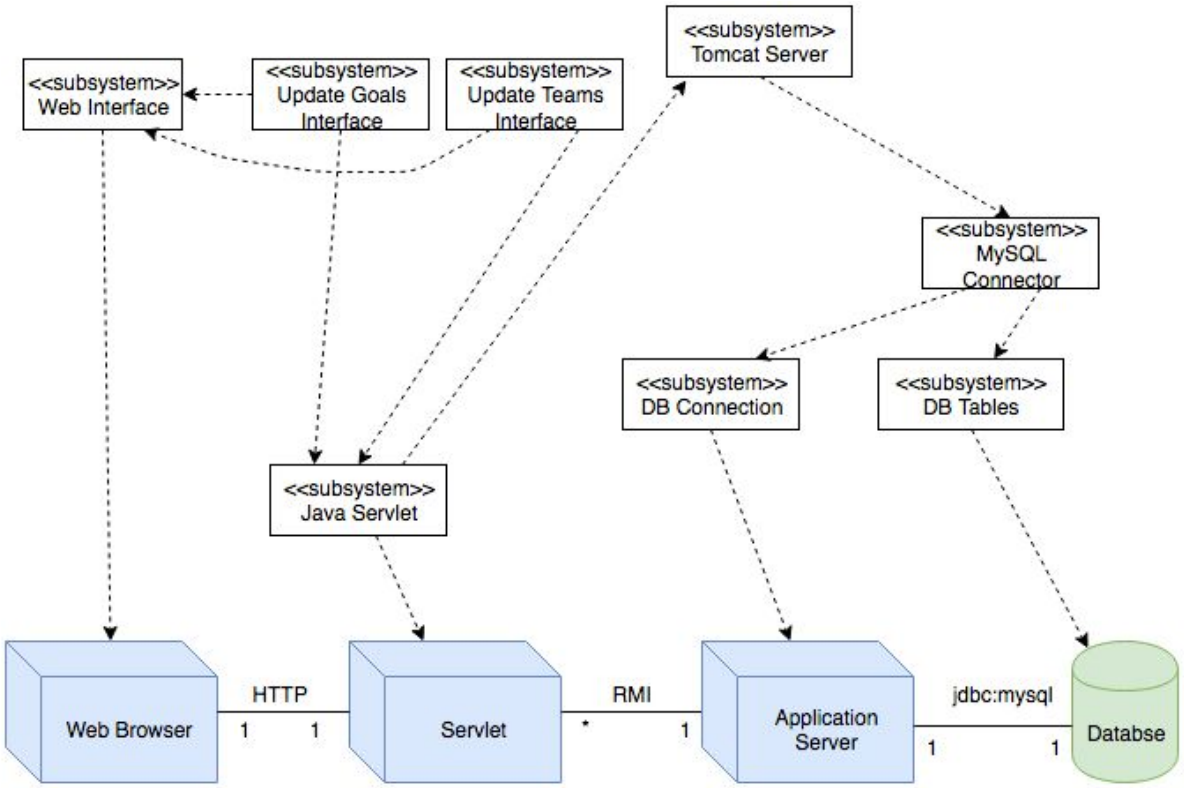
3.1. Subsystem Architecture

The major subsystems are depicted in the diagram below. The My SQL Connector is to abstract away the details of the database tables and connectivity processes. The Java RVI and Java Virtual Machine (JVM) are needed to use Java Servlets. Maria JDBC is used so that the Java Servlets and the Database can connect with each other.



3.2. Deployment Model

Deployment of the proposed application extends across for network nodes. Communication across these nodes is supported via HTTP, RMI and JDBC. Notice how the relationship between the Servlet and Application Server is many-to-one which may seem to contradict the previous diagram. This is because of the way Servlets are handled as threads, which is something the previous diagram is unable to express.



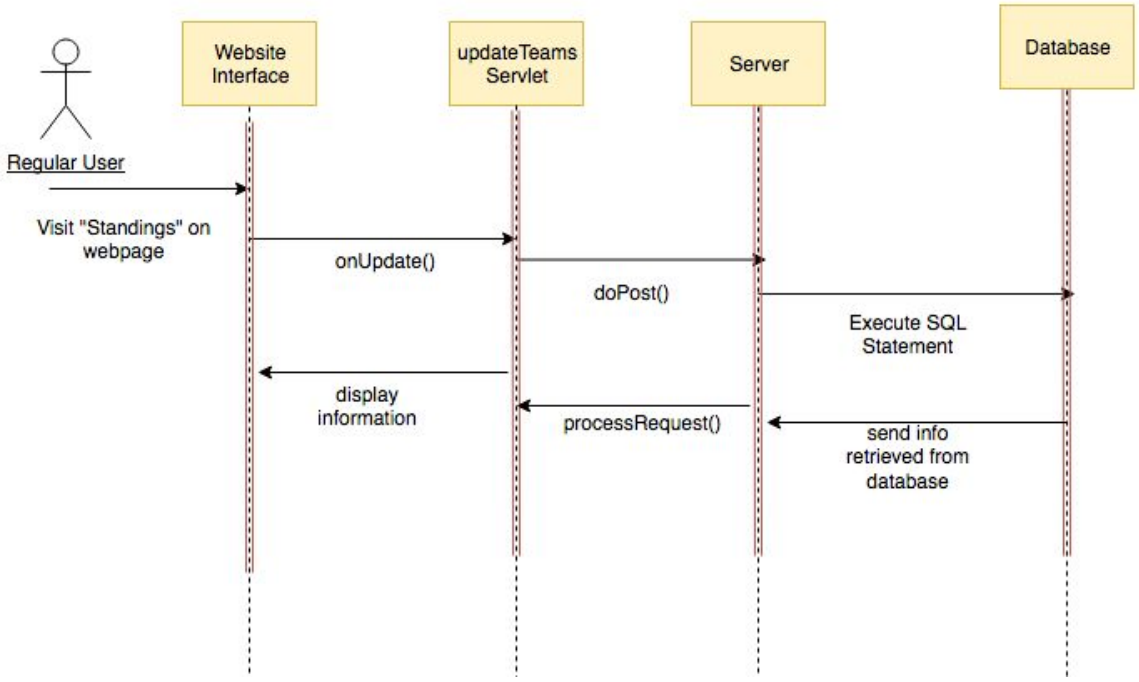
4. Use Case Realization Design

4.1. Regular User

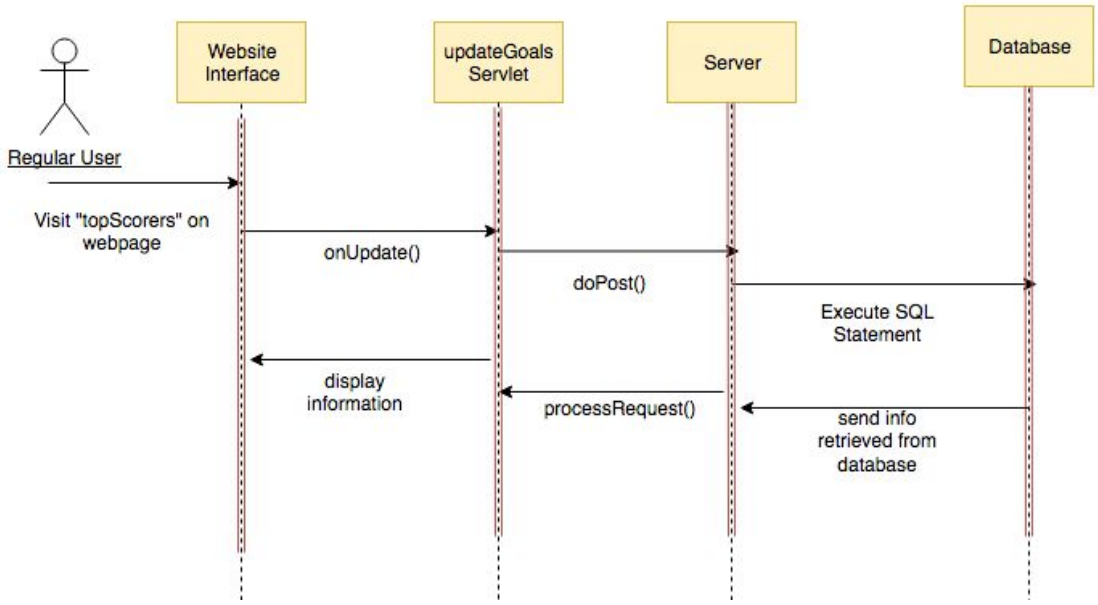
Regular users will largely be using the website to get information about NMT Intramurals soccer program. These users care about knowing statistics about teams in the league, players in the league, the current standings, and the schedule of future games. The way that the users interact with the website is largely similar and the type of information doesn't change how the use cases are realized.

There are two pages that use Java Servlets, whereas the other pages use Java code in a JSP page as a kind of miniature Servlet.

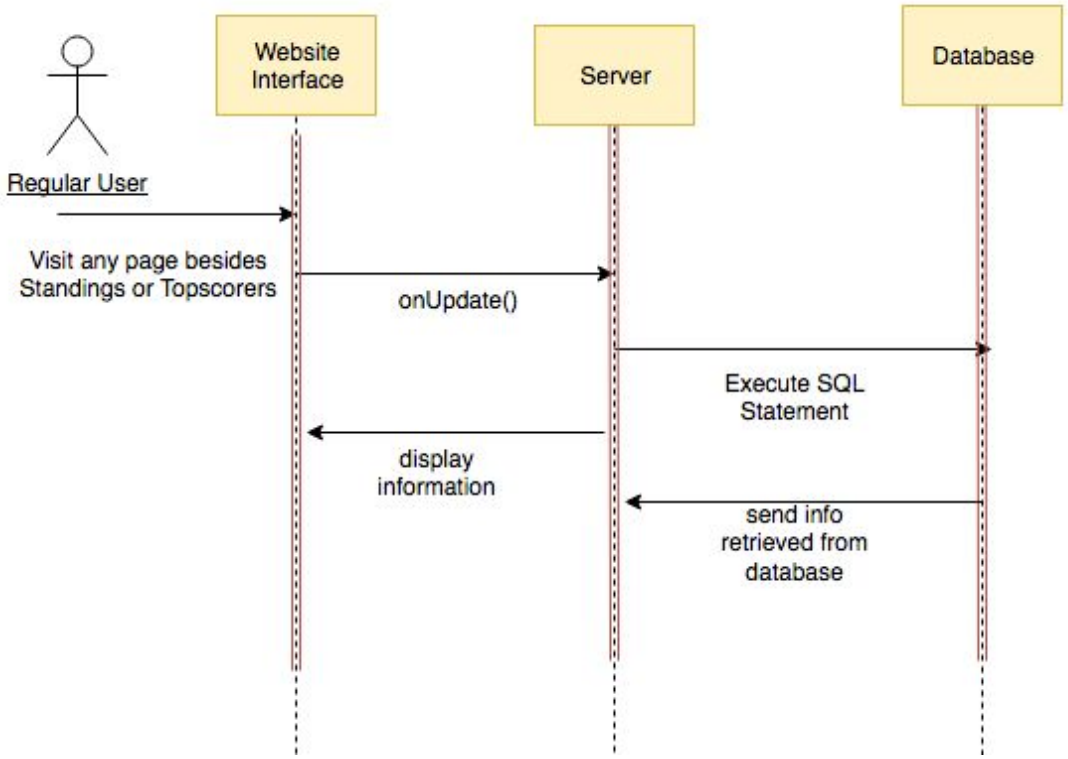
Consider the first case where full Java Servlet is used. A regular user visits Standings on the webpage. The Servlet will connect to the Server which will interact with the Database by executing a “SELECT” SQL statement, which will retrieve the information, and the JSP page will display it.



Now, consider the second case where a full Java Servlet is used. A regular user visits Top Scorers on the webpage. This case is nearly identical to the above case but will retrieve and display different information via a different Servlet.



Lastly, consider when a regular user visits any of the other pages. In these cases the JSP web pages includes Java code that essentially serve the same function as a miniature Servlet, which retrieves the data from the database, and the JSP page displays it.



4.2. Admin

Admins have full privileges. Admins can add or delete teams, can add or remove players from teams, update the results of games, and change the names and nicknames of players.

4.3. Captains

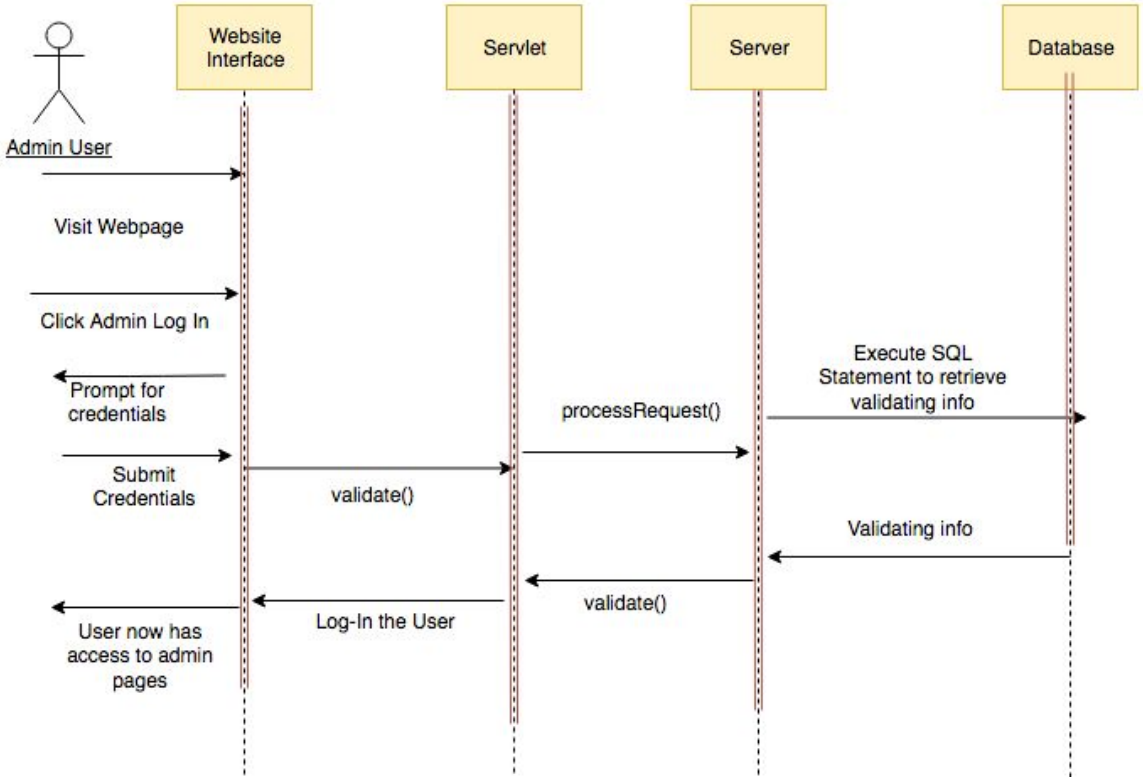
Captains are only allowed to change the nicknames of players.

4.4. Regular Users

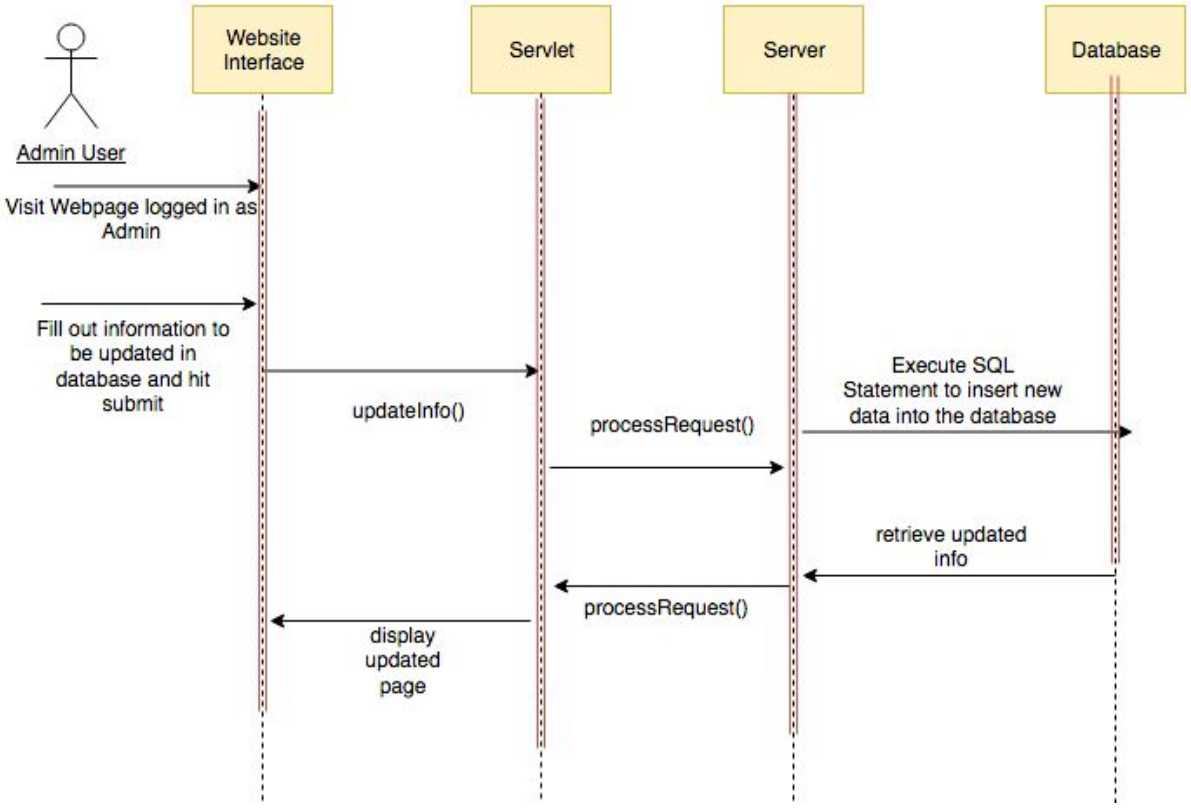
Regular users have no privileges and can only view the data displayed. These users will not have accounts.

4.5. Log In

Consider the following diagram depicting the process of an admin or captain logging in. Since the realization implementations will be nearly identical for both captains and admins, only one diagram was included. Assume the user's credentials are correct.



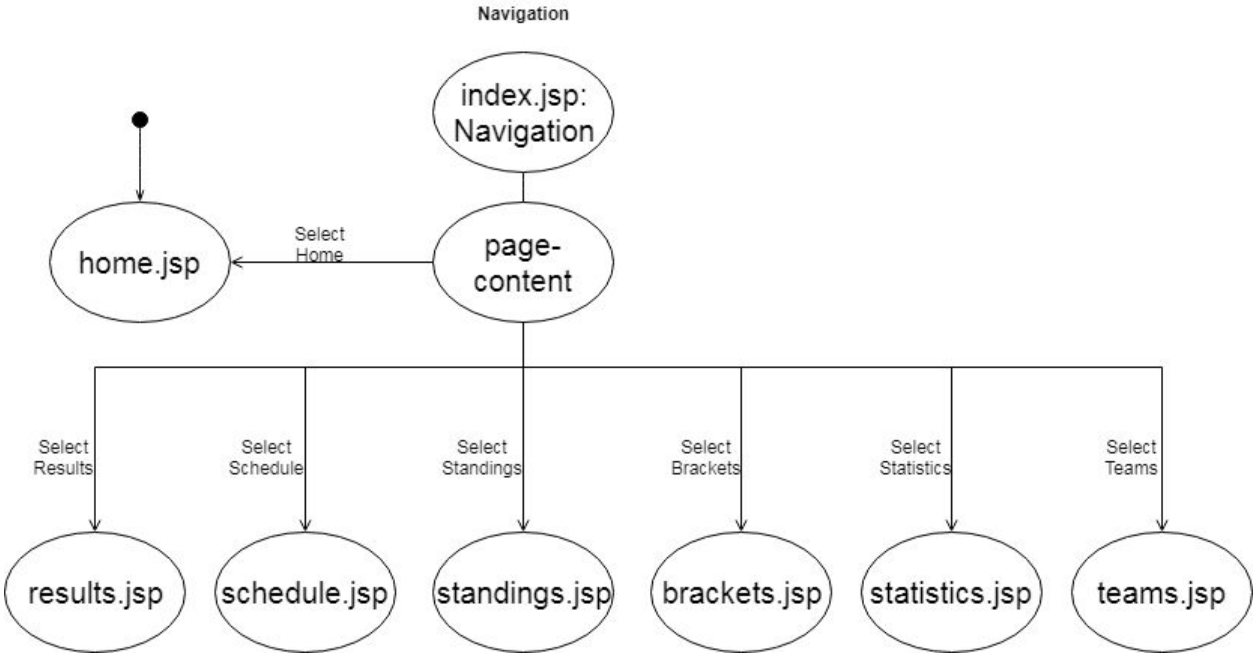
Also consider when an admin or captain needs to update information about the NMT Intramural Soccer league. They must be logged in as an admin or captain to have access to the pages with forms that will update the database. The realization for updating the various types of information will be handled very similarly for both admins and captains, so only one diagram was included.



5. Subsystem Design

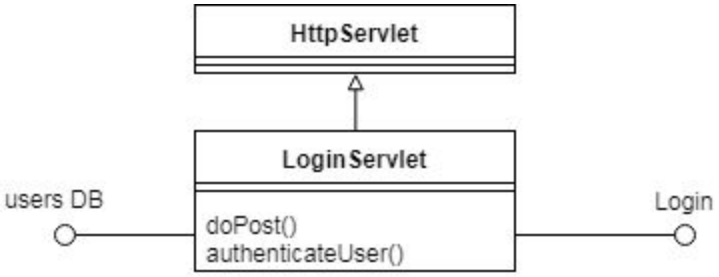
5.1. Web Interface: Site Navigation

The navigation system relies on a the main index page loading content into the page-content object. The page-content is initially the home.jsp page and through the index navigation bar any of the .jsp pages can be loaded into the page-content object.



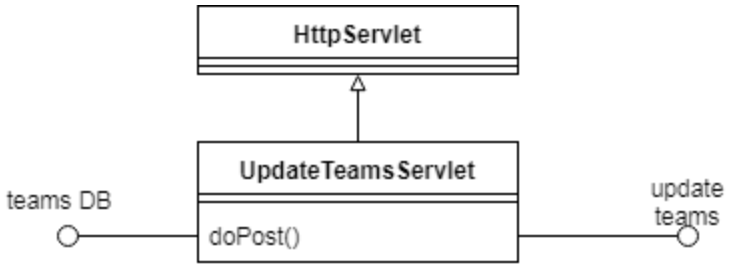
5.2. Admin Login

The login system is very simple. It takes a username and password and authenticates it against the appropriate information in the database.



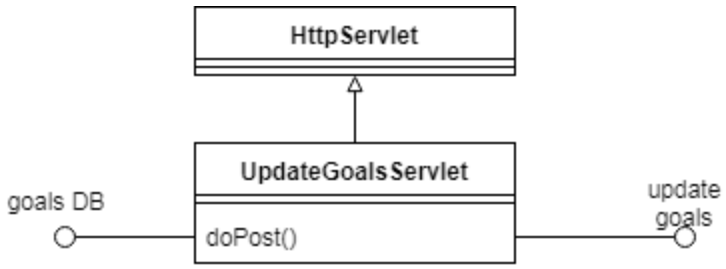
5.3. updateTeams Servlet

The updateTeams servlet is used to ensure that there are no inconsistencies in the data that is being displayed to the user. The servlet uses a combination of MySQL queries to zero out relevant tables and recalculate the data that was zeroed out. The data that is manipulated is then later displayed on the standings.jsp page. Logic for this servlet is handled in the doPost() method of the HttpServlet



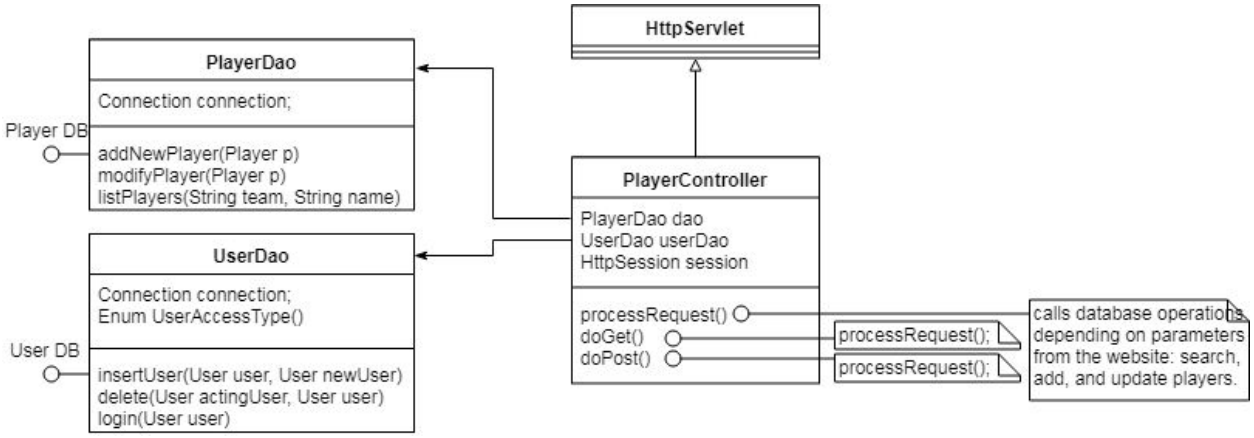
5.4. updateGoals Servlet

The updateGoals servlet, like the updateTeams servlet, is used to make sure database entries are updated and accurate. This servlet zeroes out table entries and repopulates them from other tables in the database. This servlet will be triggered by actions such as administrator data entries. Data manipulated in this servlet will be displayed on topscorers.jsp. Again, logic is handled in the doPost() method of the HttpServlet



5.5 PlayerController Servlet

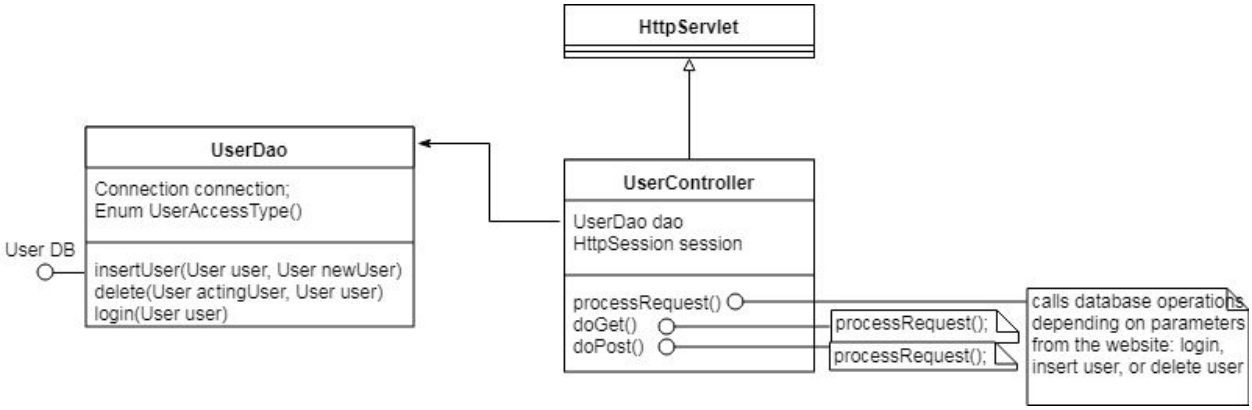
This servlet works alongside two classes that perform database queries and updates as well as check permissions of the user trying to perform the action. The PlayerDao class handles all operations having to do with the player table of the database, while the UserDao handles permissions for this servlet. There are 3 operations which can be performed at present: adding a new player, updating a player's information, and searching through the players that currently exist in the database.



5.6 UserController Servlet

This servlet works with the UserDao class which handles the database queries and updates as well as the permission checks for the acting user. There are currently 3 operations implemented: inserting, deleting, and beginning/ending a new session

(logging in/out).

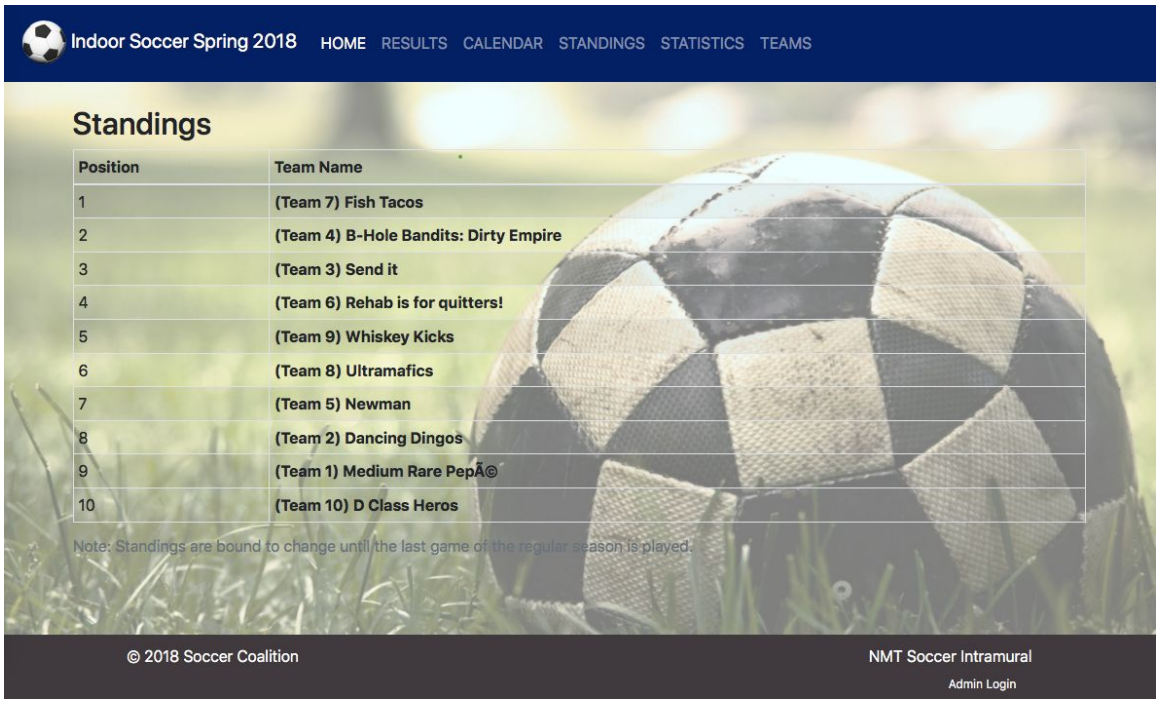


6. Human Interfaces

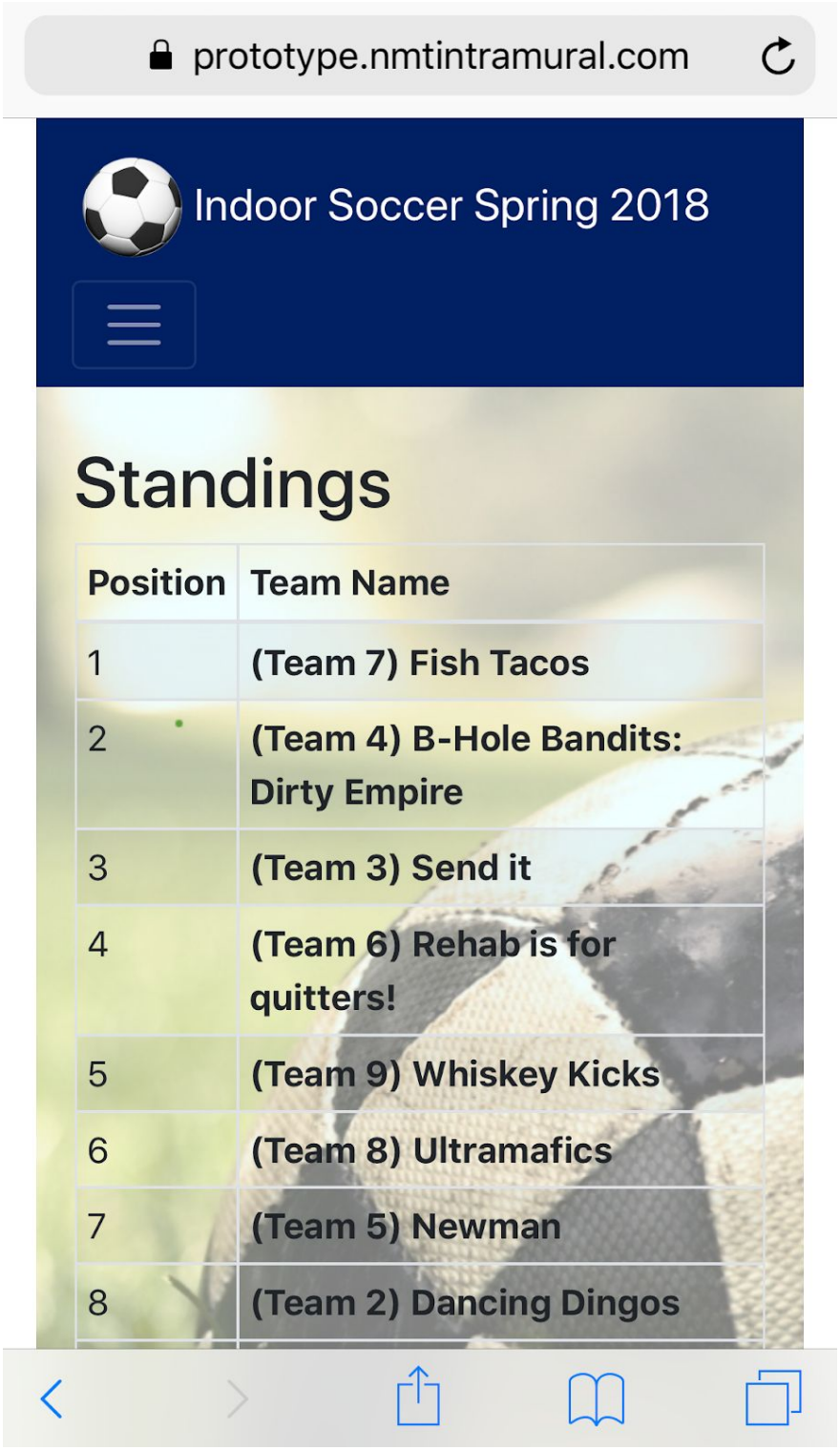
The interface is a basic flat web design that is common through the Internet. The design was chosen because it is common; users will have an intuitive understanding of how to use the website given they have experience using other websites.

The screenshots chosen are to demonstrate a few pages from the whole site and are meant to give a basic overview of the site's appearance and interface. The current website can be viewed (barring some issues connecting that we do know about and will fix as soon as possible) at: https://prototype.nmtintramural.com/soccer

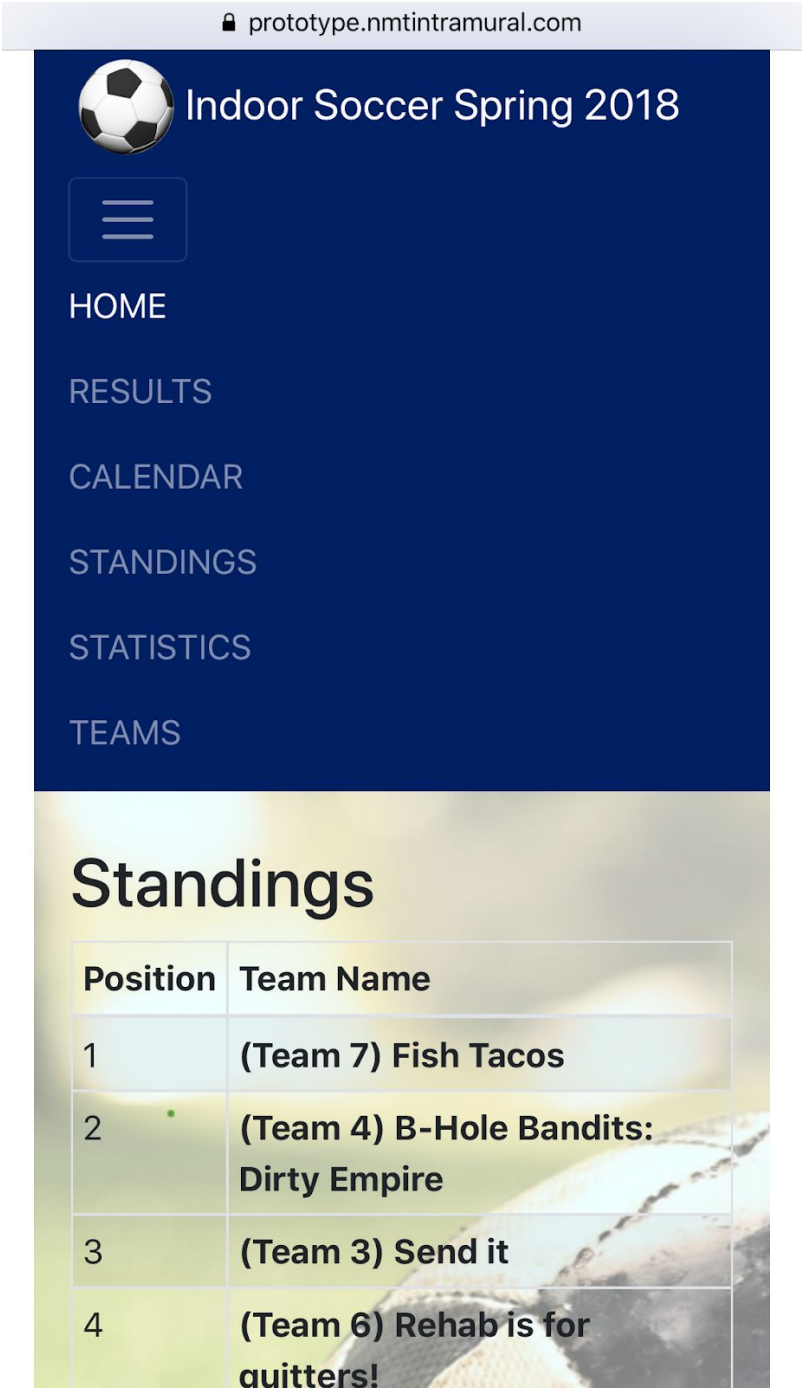
The following is a screenshot of the homepage when viewed in a desktop web browser:



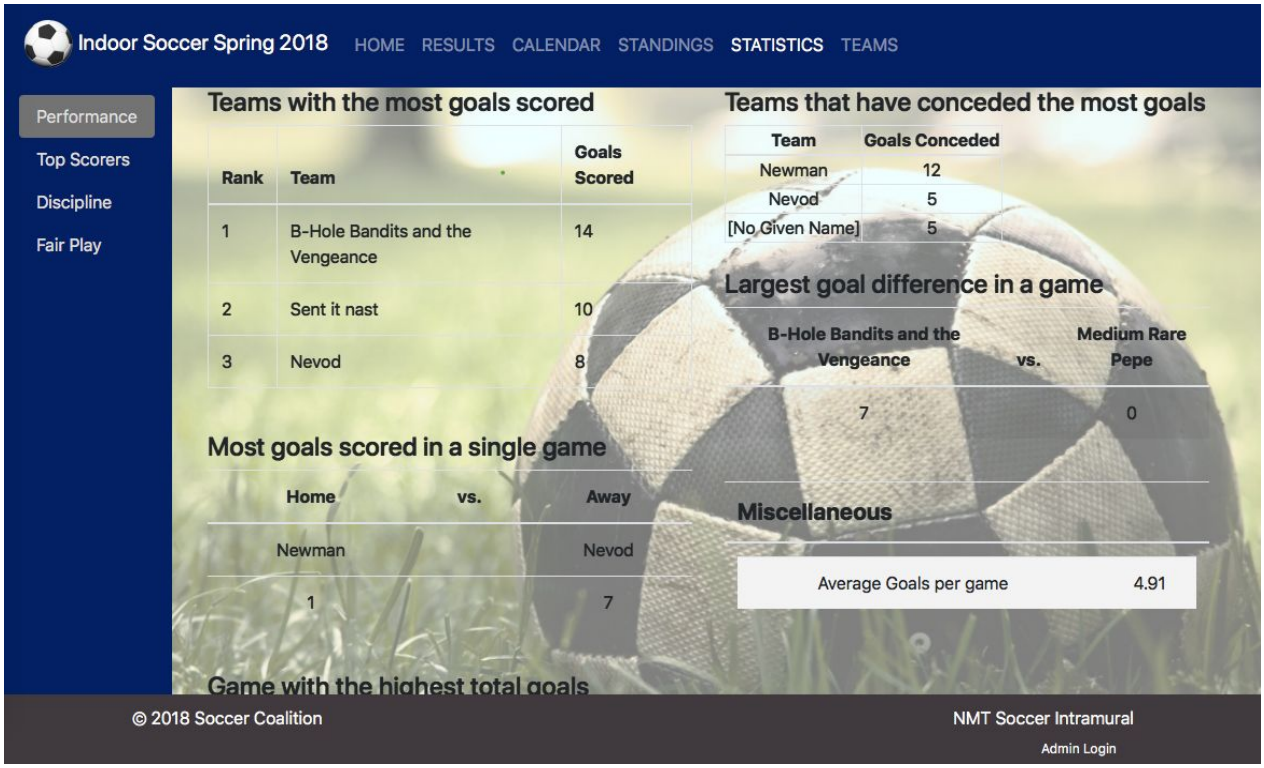
Here is the same page when viewed on a mobile device:



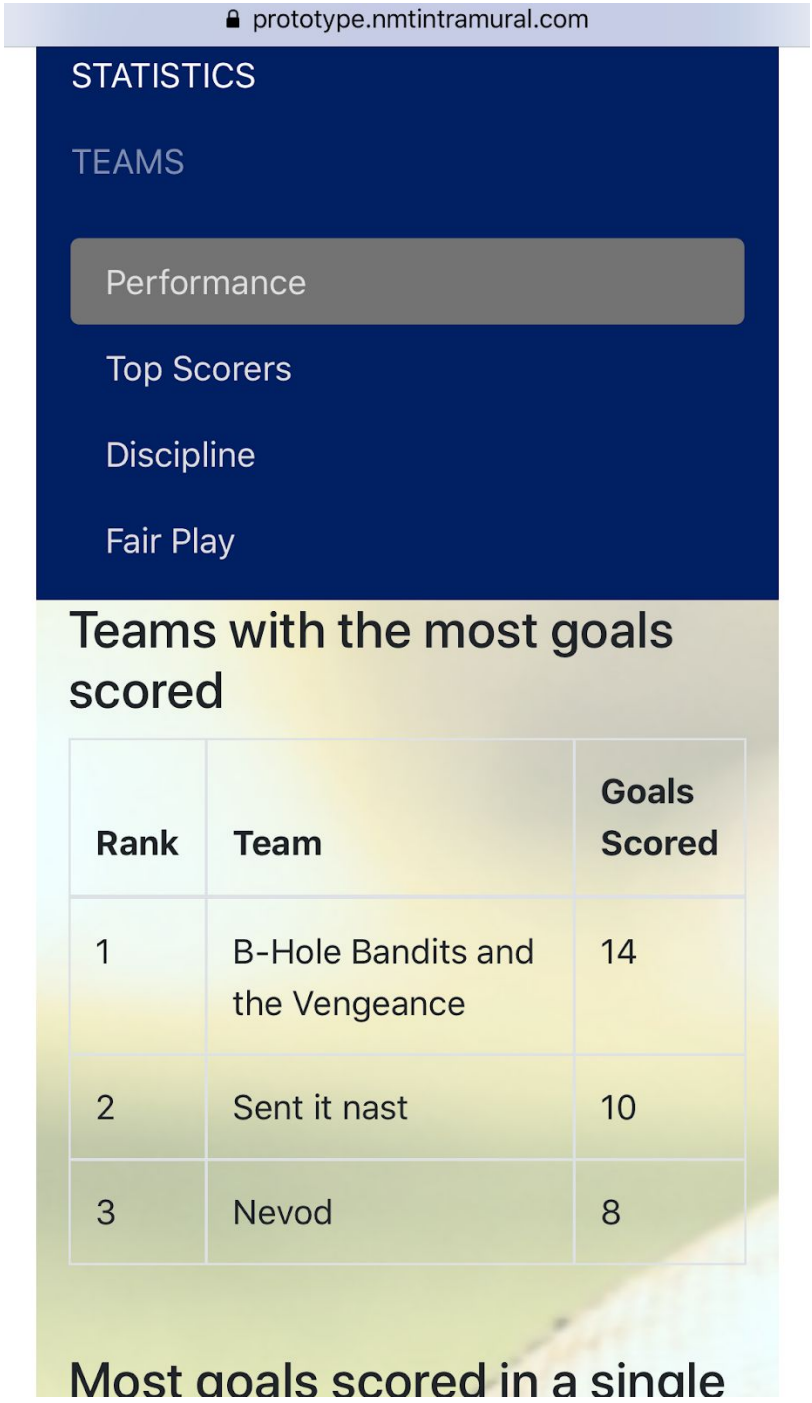
On mobile, a user will need to tap the menu button (the one with three lines) to bring up the navigation menu, which will look like this:

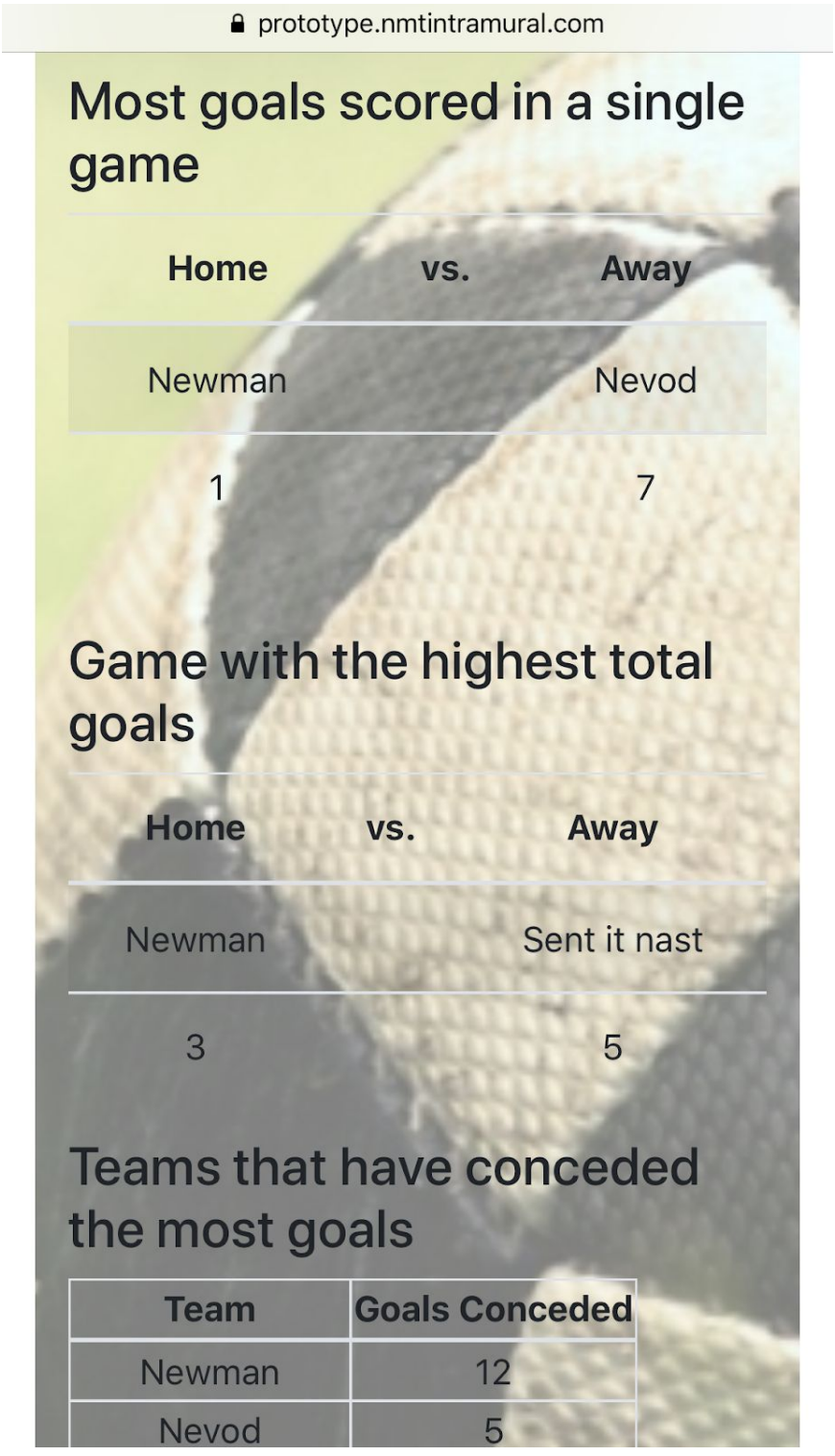


The following page is the statistics page, where the largest density of information is concentrated:

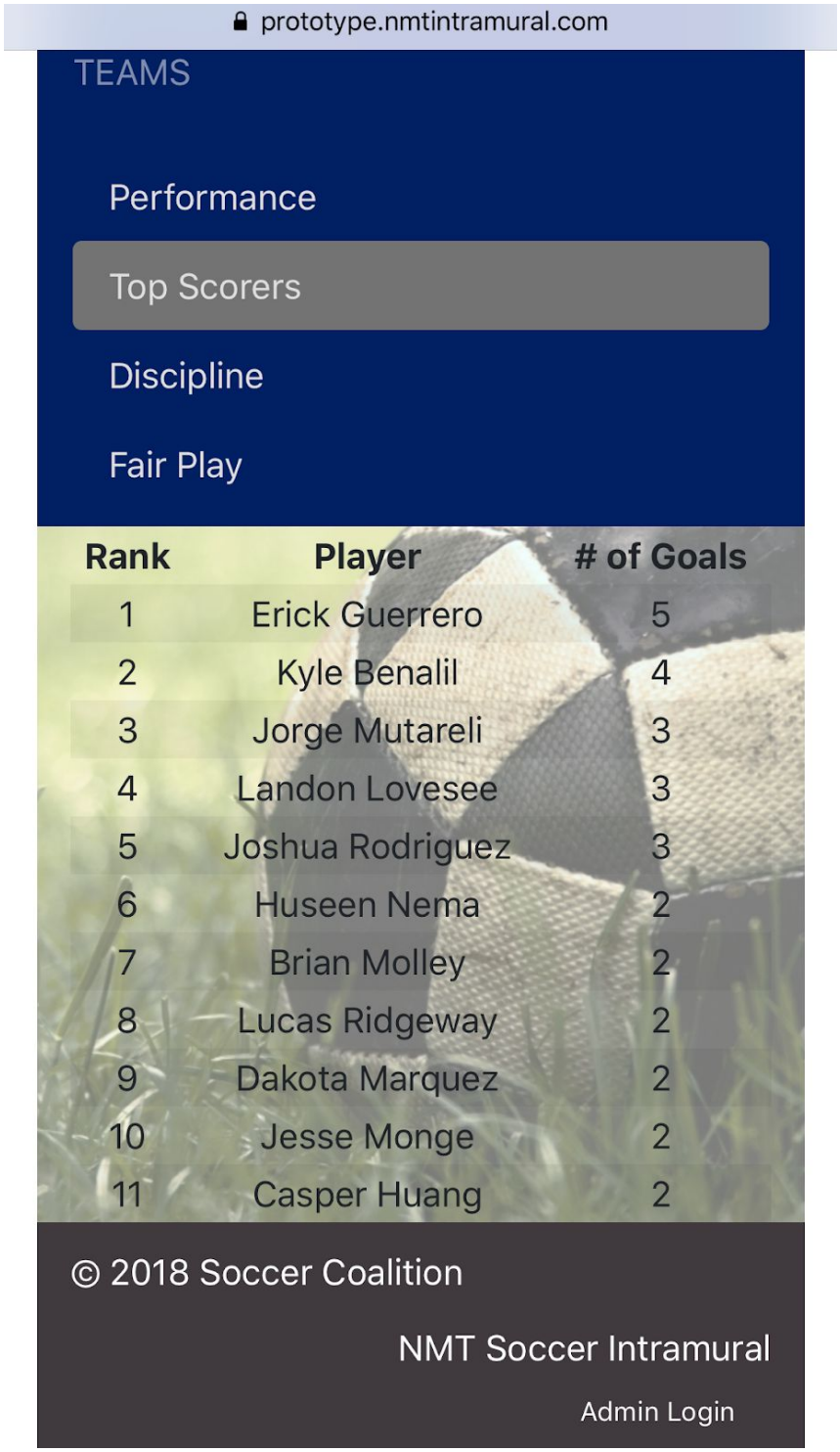


And the statistics page on mobile:
Scroll down…

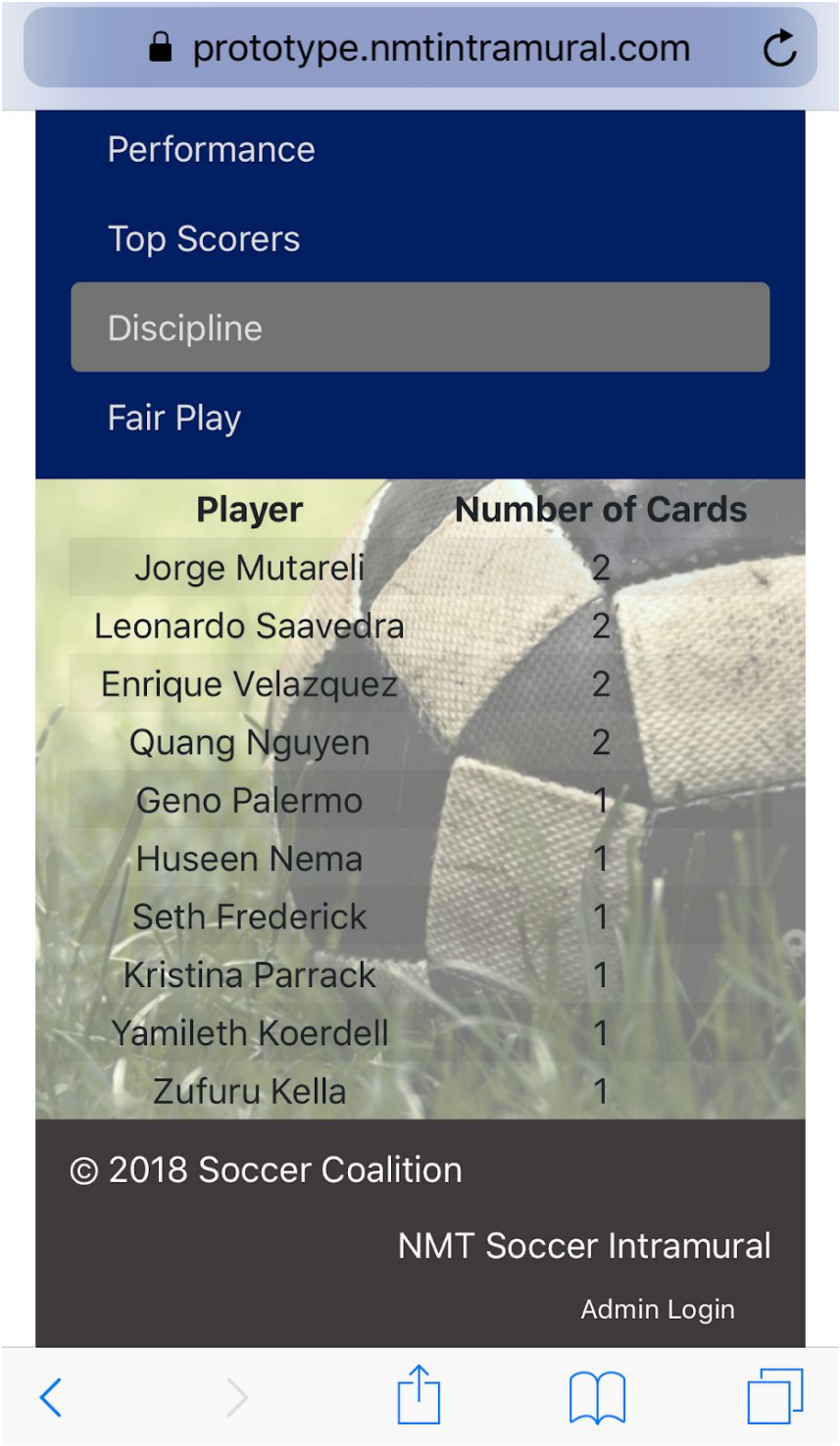


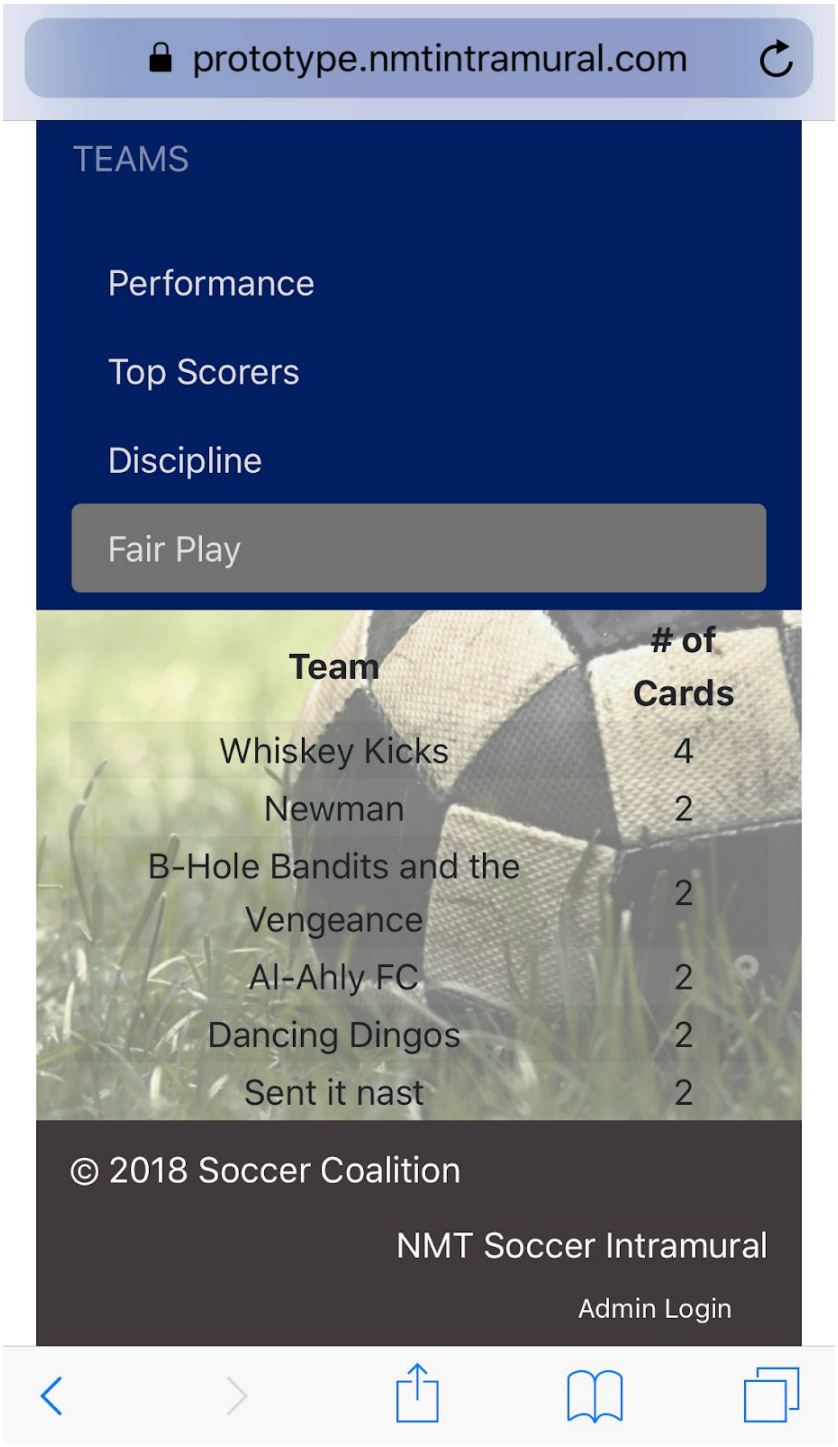

prototype.nmtintramural.com
Most goals scored in a single game
Home vs. Away
Newman Nevod
1 7
Game with the highest total goals
Home vs. Away
Newman Sent it nast
3 5
Teams that have conceded the most goals
Team Goals Conceded
Newman 12
Nevod 5

Scroll down…


prototype.nmtintramural.com
TEAMS
Performance
Top Scorers
Discipline
Fair Play
Rank Player # of Goals
1 Erick Guerrero 5
2 Kyle Benalil 4
3 Jorge Mutareli 3
4 Landon Lovesee 3
5 Joshua Rodriguez 3
6 Huseen Nema 2
7 Brian Molley 2
8 Lucas Ridgeway 2
9 Dakota Marquez 2
10 Jesse Monge 2
11 Casper Huang 2
© 2018 Soccer Coalition
NMT Soccer Intramural
Admin Login

Scroll down…


prototype.nmtintramural.com
Performance
Top Scorers
Discipline
Fair Play
Player
Number of Cards
Jorge Mutareli 2
Leonardo Saavedra 2
Enrique Velazquez 2
Quang Nguyen 2
Geno Palermo 1
Huseen Nema 1
Seth Frederick 1
Kristina Parrack 1
Yamileth Koerdell 1
Zufuru Kella 1
© 2018 Soccer Coalition
NMT Soccer Intramural
Admin Login



Using the application on either mobile or desktop is intended to be straightforward and intuitive, and although the mobile version is currently less cluttered, information can be seen clearly on both platforms.

7. Testing Plan

7.1. In-House

In-house testing consisted of running the website on various browsers and platforms, as well as with different viewport sizes to work out any artifacts in the front end. We also entered information and deleted it using the interface to check for bugs in those operations; which was done in order to make sure that our servlets work as expected and do not have any unusual behavior. Bugs were found and corrected. Now that there are users are able to access database modification, the maintainers of the site will have to monitor the MySQL database closely to make sure the data entered is not erroneous. SQL triggers may be implemented to automate this process.

7.2. Prototype Testing

We intend to have our system tested by potential users before we deploy it, as well. We will ask intramural soccer players, referees, and spectators to use our website. After they've used it we can ask them for feedback, whether it be informal or through a questionnaire. This will give us an idea of things we need to do/change in order to improve our system. This will occur outside of the scope of the class.

8. Project Status and Summary

8.1. Project Status

Looking back at our statement of proposal from the beginning of the semester, we can say that we have achieved what was proposed. Our web-based application is able to display valuable information to every guest, while allowing referees to update the status of games like: goals, cautions, end of games, sanctions, and most importantly; standings and top scorers. Every user is able to log in and modify, according to their user-privileges, information on our website. The most important part of the project was to be able to update information as soon as possible, and these implementations we achieved as well. The plan was maintained, although we did modify it slightly.

At the beginning of the semester we mentioned how we wanted to add some other features, if time allowed it, just to make the site more enjoyable; but some of these were not completed. We ended up not adding the league calculator that allowed guests to input results for games that have or have not been played just to see the 'what if' table, without results being saved. Or displaying an actual calendar rather than a table for the calendar tab on the website that shows the dates of every game, etc. Other than small details, we were able to achieve what we proposed; a server was set up, we populated the database, login/logout servlets were set up as well, we were able to enable the SSL, user data entries, improved website design, and implemented data manipulation. If this project were to continue, say if the gym were to use it as their own site for all of their

intramural sports, we would actually complete all the other features that we kept in mind since the beginning. Based on what we have as of right now we believe that the gym managers should be able to use our website not only for Soccer Intramural but for Volleyball as well, as we are only displaying all the basic information to the guests, which can also apply to Volleyball and/or other intramural sports.

8.2. Difficulties Encountered

Shortly after the server was set up it was attempted to be broken by brute force by people in China, which was initially fixed by blacklisting IPs with invalid login attempts. We eventually decided that SSH keys would be a better method of attenuating the risk of having our server compromised. We also had some difficulties with the SSL certificate while setting up SSL, but it was fixed and SSL is working. Once the database was implemented, problems with the design were discovered through difficulties in using the database, and the database had to be redesigned. Small, easily fixable errors were found in the Java servlets, such as a Null Pointer Exception, which were fixed, so that data entry using the web interface went smoothly. Some data that was supposed to be from the database was hard coded in as static values, so the proper SQL statements had to be devised and used to pull data and organize it for display on the website. The database design is usable but still could be improved, which led to some difficulties designing SQL queries for certain data. Java code that calculated the information was used to work around these difficulties. The largest difficulty arose from not having a set project manager to organize tasks and communicate with the team, but this too was easily fixed by all team members being willing to work on what needed to be done and otherwise being team players.

8.3. Journal of Project Activities

- The server was leased
- The Apache server was set up
- The Tomcat server was set up
- Additional security measures were taken (SSH keys, etc.)
- The database was designed
- The database was implemented using MySQL.
- The database was populated using data from NMT Gym
- SSL was set up.
- A HTML and CSS prototype of the web interface was developed.
- SQL queries were used to replace static data with dynamic data in the JSP pages. There are fourteen sections of data that is dynamically displayed from the database.
    - Once this began, the project folder had to be reorganized for use with the Netbeans IDE and HTML files replaced with JSP equivalents

- Servlets were created that are used to update the database when a user uses the web interface to input new data.

8.4. Individual Contributions

Eugene Garcia

- Server-side Operations and Management
  - Apache web server installation/configuration
  - Tomcat installation/configuration
  - MySQL installation/configuration
  - Security (firewalling, blacklisting, ssh keys, etc)
  - Configure and enable SSL
- Website Design and Implementation
  - Design and refactor web pages
  - Create Java Servlets
  - Design and manage database
  - SQL queries and Java code for various pages.
- Documentation
  - Contributed to group papers

Carlos Rubio

- Website Design and Implementation
  - Design initial conception of website
  - Draw multiple sketches for the website design.
  - Design and implement database
  - Write SQL scripts to drop/create whole database
  - Create Java Servlets
  - Gather real data for database and populate it
  - SQL queries and Java code for various pages.
- Documentation
  - Contributed to group papers

Michael Malett

- Website Design and Implementation
  - Implementation of website design
  - Design and Implementation of (restricted) user's areas
  - Front end design and implementation of dynamic content indexing and navigation
  - Design and implementation of database interaction classes
  - Organization of project files, packaging appropriately for deployment.
  - Various SQL queries, Java, and Javascript throughout the site.
- Documentation
  - Contributed to group papers / presentation

Bryonna Klumker

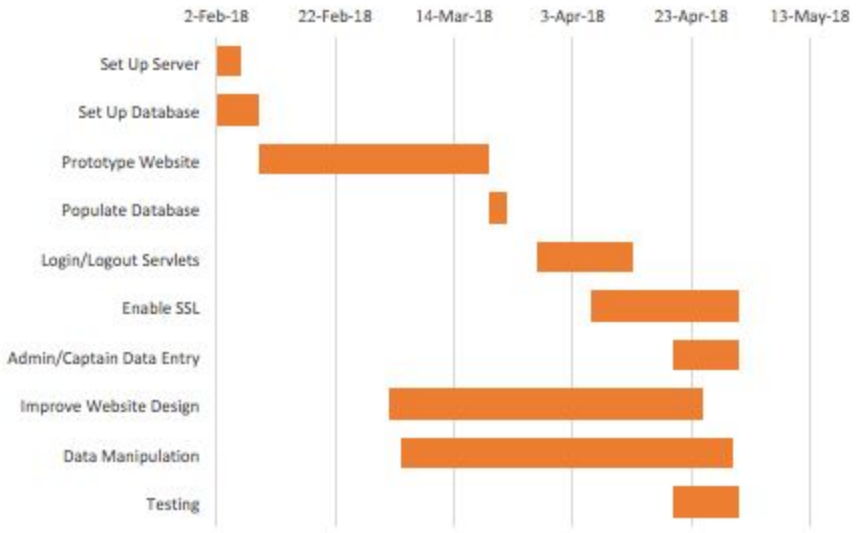
- Website Design and Implementation
  - Participate and contribute to group discussions regarding various design choices
  - SQL queries, Java code, and data organization on the Statistics.jsp page.
  - Made suggestions for future database improvement.
- Documentation
  - Designed format of Project Proposal for logical organization of sections and subsections.
  - Wrote and edited much of the Interim Report, which included creating most of the diagrams.
  - Contributed to the final presentation.
  - Organized sections of Final Report for logical organization of sections and subsections.
  - Contributed and performed final edit on the Final Report.

Krishna Marentes

- Website Design and Implementation
  - Developed the final website design/layout.
  - Contributed to data organization on the Statistics page.
- Documentation
  - Contributed to every group paper throughout the semester.
  - Contributed to the final presentation, and report.

8.5. Project Schedule

Updated Gantt Chart.



9. Appendices

See the “soccer_coalition” folder included in the zip file along with this report for the source code files of our project.