



INFO 2300: FINAL IMPLEMENTATION

MAY 13, 2014

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I. DESIGN RATIONALE

CLIENT DESCRIPTION

CLIENT: BIG RED BIKES

Big Red Bikes is Cornell University's student-run bike share system that aims to provide a bike share service that is convenient, reliable, and free for all Cornellians. You must be a member of Big Red Bikes before you can check out a bike and registration is free for Cornellians, staff/faculty, and visitors.

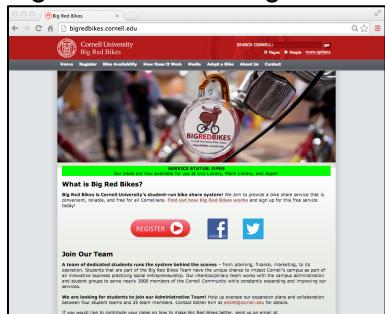
Borrowing a bike is a 3 step process:

- Step 1: Ask to check out a bike at the service desk at any of the three stations (Appel Commons, Mann Library, and Uris Library). Bring a Cornell ID with you. The service staff will provide you with a helmet and key for your bike. To check on bike availability Cornellians can check the website which is updated every 5 minutes noting each of the three stations availability.
- Step 2: Unlock the bike, wear your helmet, and go! Big Red Bike's bike locks are heavy-duty, so they recommend you carry it in a backpack while you ride your bike.
- Step 3: Return the bike at any of the stations before they close; you don't have to return it to the same station you borrowed your bike from. You may incur fines if you keep the bike overnight.

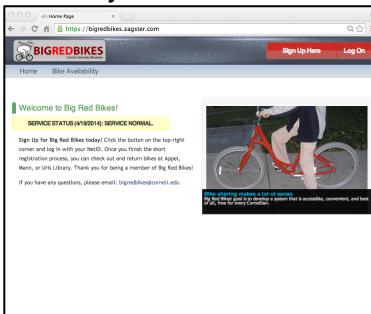
CLIENT EXPECTATION

The client expected the website to be completed by the end of this semester to be able to be used starting next year. They wanted it to integrate their three websites into one. There three websites when we started the project included: an Information Site Cornell Website, a Registration and Bike renting database Website (using 3rd party service Zagster which cost the organization \$10,000 per year), and a Recruitment Website. They also want the website to have a cohesive design.

Big Red Bikes 3 original websites they wanted to combine to 1 website:



Big Red Bikes Information Site



Big Red Bikes Registration Site



Big Red Bikes Recruitment Site

TARGET AUDIENCE

The target audience of this site is Big Red Bikes users (Cornell students, staff/faculty, visitors) to use the bike sharing program, check bike availabilities, and view their past bike trips. The other target audience is potential users that can use the website to learn more about the bike sharing program and can register to participate in the program. Also, Cornell students can use the website to learn more about Big Red Bikes and determine if they want to go through recruitment to be involved on the Executive Board.

There are two levels of Big Red Bikes administrators. The lower level administrators are responsible for checking out bikes to users. The upper level administrators consists of the Big Red Bikes Executive Board which can manage the entire bike rental database and content on the website.

SITE PURPOSE

The purpose of the site is twofold: for registered users to use the bikeshare program at Cornell and for administrators to manage the bikes. The components for Big Red Bikes users include information allowing them to learn about Big Red Bikes, signing up for the program, finding the location of available bikes, checking when a bike is due back, and accessing and editing some information on their user page.

The components for lower level administrators includes checking bikes in/out, managing and viewing the location of the bikes, adding and removing bikes, and flagging a bike that needs to be temporarily removed for repairs. The purpose for upper level administrators includes all of the functionality as lower level administrators including the ability to edit and delete bikes, stations, and users. The upper level administrators also are able to update content on the website and change the users' permissions levels.

PRIMARY CONTENT

The primary content is comprised of information pages that allow users to learn about the program, functionality that allows the bikeshare program users to participate in the program and find out about bike availability, and functionality for the administrators to manage the bikes.

DESIRED INTERACTIVE ELEMENTS

Users can sign up for the program (create an account), login to their account, view their past trips, check bike availability, and change their contact information. The bike availability page includes an interactive map powered by Google Map javascript API which display information about bike availability at renting sites. Additionally there are recruitment and contact forms users can fill out.

Administrators can check bikes in/out to users, add/remove bikes, find out who currently has a bike, flag bikes to take out of availability, and manage the location of bikes. There are also features searching as looking up where bikes are available or when they are due back.

Upper level administrators can edit and delete bike, stations, and users, in addition to being able to update content on website and change other users' permissions levels.

DESIGN OPTIONS

We have been able to meet most of our client's requests and expectations. Throughout the project we have met with members of the Big Red Bikes Executive Board three times to get their feedback and teach them how to use/edit the site. The most work-intensive tasks were the user and administrator pages, in addition to overall styling. We were able to keep all of the functionality Big Red Bikes had with their previous three websites.

WEB HOSTING PLAN

The client is planning to host their page on iPage. The organization is still finalizing payment for the service and as soon as they get the hosting site set up, we will move the new website over and teach them how to maintain it.

When Big Red Bikes switches to using our website they will require all users to create new accounts since the login previously was users' netID and netID password in our new website users' log in with their email and a password they create specifically for Big Red Bikes. Since switching to our new website requires time and communication to all users, Big Red Bikes has decided to make the official switch after finals when they think they will get better a response from students.

PROJECT REQUIREMENTS

CONTENT

The content of the website consists of information about the bike sharing program, news or announcements site administrators wish to share with the users, bike availability, donate information, recruitment information and application, and a contact form.

Depending on whether you are a website visitor, registered Big Red Bikes user, low level administrator, or high level administrator additional content is available. There are login and sign up pages. When a user logs in they can all view their past trips and access a form to edit their log in information. Administrators also have pages to view/search all users, log rentals, and flag bikes. Upper level administrators also have pages to edit station information, edit bikes information, and edit the media page.

DESIGN

Design elements:

We completely re-designed the look and feel of the website to make it consistent across all pages. We incorporated all of the necessary content from the 3 Big Red Bikes original websites. Big Red Bikes wanted us to keep the current color scheme of their site: carnelian red, white (Cornell's colors), and slate gray. Our color swatch for the entire site is an analogous split based around these three rudimentary colors. Sharp non-Serif fonts are used predominantly--three to be exact. In regards to the overall layout, an F-layout design

was implemented as well as a top-page navigation bar. Custom graphics such as icons, page headers, buttons, etc. were created to add to the overall design in hopes of creating a site that had finesse but was not too visually overstimulating.

C.R.A.P design principles:

- **Contrast:** All the non-login pages (save for the home page) have a striped gray and white background with a cream colored foreground, in order to distinguish content from background. In addition, the top of the page is a Carnelian red to convey the sense of the navigation bar being different from the content and background. Most custom graphics are either red and black or transparent and red to stand out against the cream colored foreground. Icons and images in the red top part of the website are white to contrast with the red.
- **Repetition:** Almost all the non-login pages have the same background, foreground, and page header design (an image banner with knockout text). Pages that are accessed through logging in have no striped background image but rather a cream colored background. However, all pages have a light watermark of the company logo on the bottom right corner of the page. In addition, all pages have the same navigation header (with logo, main navigation, sub-navigation if required, and right hand login/logout/register/my account options), content body, and footer positioning and structure as well as red text headers and black normal text. All HTML form inputs have red outlines when hovered over and all buttons / image links have an animation when hovered over (e.g. “Submit” buttons all turn red and pulsate when hovered over).
- **Alignment:** All text is left-aligned while images and applications are usually centered. The padding for all non-login pages is the same and the margin for the content is centered. The top part of the page and footer section are centered.
- **Proximity:** In following an F-layout design, after the page header comes either text immediately relating to said header or a sub-header (in red) following by related text. Most of the text contents are in blurbs (page header or subheader followed by more black text) with few long paragraphs. This is to facilitate the reader in searching the site for the information he or she needs. Pages with mostly images or interactive features are grouped by what they represent. For example the media page has text blurbs and icons that are in reverse chronological order but has a title, date, icon, and text description of each media item.

Why certain design choices were made:

We made design choices based on what the Executive Board of Big Red Bikes wanted in their new website. The color scheme is inspired by our school's colors and will serve to better connect with Cornell students, target audience, who wish to use Big Red Bike's services. The slate gray elements in the design (such as the fixed striped page background) serve to convey a sense of industrial metal--a component in all bikes. In addition three clear non-Serif font were used to aid viewers in understanding Big Red Bike's textual content and add a modern feel to the site. The F-layout and top-page navigation bar made locating vital information efficient, as research has proven such site features facilitate viewers the most

in finding what they need quickly. Lastly, the custom graphics were implemented to create a sense of a “grand opening” for Big Red Bikes and to grab visitors’ attentions--it will likely attract new customers as well.

INTERACTIVITY

Important interactive features include a login system to unlock extra functionality. There is one login for both users and administrators; however, administrators can unlock extra functionality once logged in. The login for administrators will facilitate them in adding content to the site via our platform, edit/add station and bike information, and edit/view user information. Upper level administrators can in a very user-friendly interface easily add, manage, and edit media content. They can also use a search function to search for users, bikes, and stations. On the other hand, the login for users will display information to said user such as due date of bike, rental history, etc. The bike availability page includes an interactive map powered by Google Map javascript API which displays information about bike availability at renting sites.

DATABASE

The database is used to keep track of user, bikes, stations, rentals, user notes, bike notes, station notes, media, and Big Red Bikes status. Big Red Bikes needs a database for several reasons. They need to record the contact information of their users, since they are lending them bikes. This will also allow users to be able to register for the program online, login to see when a bike is due, and change their contact information. The database will also allow administrators to login to a system where they have special privileges. This is important because only administrators can rent out bikes to students, add or remove bikes, or flag a bike as out of service. Finally, the database will manage information about the bicycles. The bikes are the central component of Big Red Bikes’s program and each one must be accounted for. This includes information such as the bike’s current location, who, if anyone, is using the bike, the last time it has been used (for wearing the bikes down evenly), and whether it is out for repairs. A database is clearly critical to the intended functionality of the site and will allow Big Red Bikes to make their program easy to use for both users and administrators.

SCALE

The original website was very large with lots of pages that contained a lot of repetitive information. Our main priority was to incorporate the desired elements into one cohesive site. The site is 19 pages. The time breakdown for the various tasks includes: initial database design (7 hours), content (7 hours), logins and permissions (8 hours), search bar (2 hours), user account page (5 hours), administrator account pages (20 hours), overall CSS (21 hours), media page (6 hours), contact form (3 hours), Google Maps plugin (8 hours), recruitment application (2 hours), tweaking (20 hours), final testing and debugging (8 hours). In total, the site took approximately 117 hours of work.

WORK DISTRIBUTION

ABDULKAREEM ADESOKAN

Abdul was responsible for most of the PHP and Javascript interactions. He implemented login features of users and admin. Abdul created the administrator pages. He added javascript forms to the site, for added interactivity. Also, Abdul created the recruitment and contact forms.

ARIEL SORIANO

Ariel created a framework for which the whole website was built upon. Each and every graphic on the site from icons, backgrounds, social media buttons, to headers was created by him using Adobe Creative Suite software. Nothing is borrowed--with the exception of the yellow Google map markers and the original Big Red Bikes logo. He was in charge of how the site looks visually and how all the different pages come together--achieving a uniform look. Ariel put most of the content on the site. In particular all the pages with unique looks such as the homepage, bikes availability page, and media pages were carefully designed by Ariel to stand out yet fit fluidly into the overall design theme. Lastly, html and css validation was partly done by him.

KRISTEN TIERNEY

Kristen designed the database schema for the website. She also helped implement the administrator account pages, login page, and registration page. Kristen modified the media edit page so that administrators could more easily add and remove media links. She also helped with tweaking various miscellaneous parts of the website.

CLAIRE BLUMENTHAL

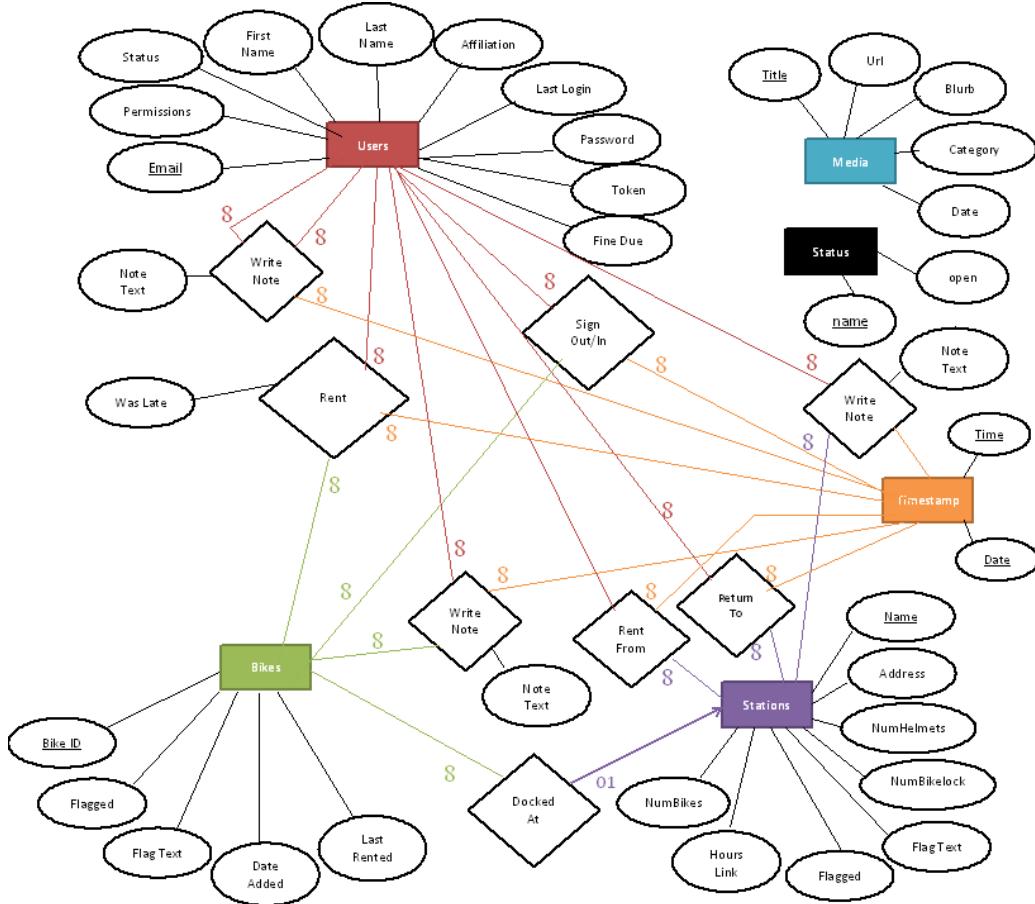
Claire as the team leader worked a lot on project management and making sure all of the group members get their parts of the project completed in time. She created the user account page My Trips that allowed any user of the site (including administrators) to view past trip information from the database and edit their account information. Claire helped develop some of the content on the website. She also was in charge of organizing and performing user testing both rounds.

II: DESIGN PLAN

DATABASE DESIGN

DATABASE DESIGN ER DIAGRAM

Below is the ER Diagram that presents the most important components of the database. Each entity is color-coded. Primary keys are underlined. “01” indicates “zero or one” and the sideways infinity sign indicates “many.”



WHAT DATABASE DOES

The database was essential element of the Big Red Bikes website, as it maintains the information regarding their current users, administrators, bikes, and bike stations. In order for the bikeshare program to operate correctly, they must keep track of these different components and different relationships between them. There are several entities that are involved in this.

Users represent anyone who can log into the site to access some special functionality, either as a general bikeshare user or as an administrator. Each user has a permission level that denotes their level of access.

Timestamps are entities that we use to represent different moments in time. This is because many of the different relationships can happen during multiple time periods. For example, a user can rent out the same a bike multiple times, and so, since a relationship is identified by the primary keys of its participating entities, the Rent relationship must also include Timestamp so that we can keep track of this time variable. Thus we include this entity in several different relationships to allow us to represent when time is part of a key.

Bikes denote the bicycles that the program rents out to students. A User can rent many bikes at different times and a bike can be rented by many users at different times. A User,

specifically a User with the correct permissions, can also sign out bikes. A single user can sign out many bikes and a bike can be signed out by many different administrative users at different times.

Stations correspond to the physical locations where the bikes can be rented or returned. Each Bike is currently located at zero or one Station, depending on whether it is docked somewhere or on the road, and each Station can have zero or more bikes currently at it. Users can have rented from zero or more Stations (on different Timestamp) and a Station can have rented out to zero or more Users. Similarly, Users can have returned rentals to zero or more Stations on different Timestamp and Stations can have had rentals returned from zero or more Users on different Timestamp.

Media consists of different news articles that the administrators want to display on their webpage. It is stored in the database so that they may easily add and delete entries via an interactive form we created for them.

Status is a simple representation of whether or not the program is open, as it often closes for long periods during bad weather.

DATABASE SCHEMA

The different tables involved in our database are described below. Primary keys are underlined. Some tables have additional constraints listed as well. All tables have been implemented on our 2300 MySQL (phpMyAdmin) database (the group username is brbsss). Please note that sometimes multiple relationships can be represented in one table. For example, the Rentals table can represent both a User renting a Bike and an administrative User signing out a bike. Furthermore, the Timestamp entity is represented as datetime fields within each table rather than having a separate table that consists only of dates and times.

BikeshareUsers(*varchar*: email, *varchar*: password, *varchar*: fname, *varchar*: lname, *varchar*: phone, *double*: fines_due, *datetime*: last_login, *varchar*: affiliation, *varchar*: status, *varchar*: permissions_level, *int*: rentalid, *varchar*: token)

- Contains information about the people who use the bikeshare program or are Big Red Bikes administrators.
- The rentalid field is a foreign key that references the Rental table. It can be null if the User does not currently have a bike rented out. On delete it sets null and on update it sets null.
- Only the current_rental field and token field can be null.
- The default value of fines_due is 0.
- The default value of status is Pending.
- The default value of permissions_level is None.
- The default value of rentalid and token is null.

- Though Rentals has its own table, we also chose to represent the current rental (rentalid) in the Users table. This is because a user can have many past rentals and only a single current one, but the administrators wanted this information in one table.

Bikes(*int: bikeid, date: date_added, datetime: last_rented, varchar: current_station, boolean: flagged, varchar: flag_descript*)

- Contains information about the bicycles.
- current_station is a foreign key that references Stations. On delete it restricts. On update it cascades.
- current_station can be null if the bike is not currently docked at a station.
- flag_descript can be null if there is no current reason to flag the bike as unavailable.
- last_rented can be null if the bike has not yet been rented.
- No other fields can be null.
- The default value of last_rented is null.
- The default value of flagged is false.
- The default value of flag_descript is null.

Stations(*varchar: name, varchar: address, int: num_helmets, int: num_bikelocks, int: num_bikes, boolean: flagged, varchar: flag_descript, varchar: hours_link*)

- Contains information about the stations where bikes can be docked.
- flag_descript can be null if there is no current reason to flag the station as unavailable.
- No other fields may be null.
- The default value for num_helmets, num_bikes, and num_bikelocks is 0.
- The default value for flagged is false.
- The default value for flagged_descript is null.

Rentals(*int: rentalid, varchar: email, int: bikeid, varchar: checkout_admin, varchar: rented_fom, datetime: time_rented, varchar: checkin_admin, varchar: returned_to, datetime: time_returned, varchar: was_late*)

- Keeps track of the bikes rented out to bikeshare users (past and present). Although the primary key could be (username, bikeid, time_rented), we have decided to use an auto-incremented ID field for simplicity.
- email is a foreign key that refers to BikeshareUsers. On delete it restricts and on update it cascades.
- bikeid is a foreign key that refers to Bikes. On delete and on update it cascades.
- Returned_to, time_returned, checkin_admin, and was_late can be null if a user has not yet returned the bike.
- The default value for due_back is “Due back 30 minutes before closing.” It is a message that gives a user information on their particular rental timeframe.
- The default value for was_late is NO.
- The default value for returned_to, time_returned, and checkin_admin is null.

- Note that although the admin and station fields refer to administrators and administrative users, we do not use them as foreign keys. This is because we want this information to persist even after the station or admin was deleted. Therefore, the referential integrity constraints of a foreign key are too strict for our purposes and the identity of these fields are instead enforced in the business logic.

UserNotes(*int: noteid, varchar: username, varchar: admin, text: note_text, datetime: timestamp*)

- username is a foreign key that references BikeshareUsers. On delete and on update it cascades.
- No field may be null.
- Note that the admin field will denote the administrator who originally left the note but is not a foreign key in this case because we want to keep the current UserNotes even if that administrator has been removed, and so a foreign key constraint would be too constrictive. The same principle holds for BikeNotes and StationNotes below.

BikeNotes(*int: noteid, int: bikeid, varchar: admin, text: note_text, datetime: timestamp*)

- bikeid is a foreign key that references Bikes. On delete and on update it cascades.
- No field may be null.

StationNotes(*int: noteid, varchar: station, varchar: admin, text: note_text, datetime: timestamp*)

- Station is a foreign key that references Stations. On delete and on update it cascades.
- No field may be null.

Media(*varchar: title, varchar: company, varchar: url, date: date, varchar: blurb*)

- Represents a media link to include in the webpage.
- No fields may be null

Status(*varchar: name, boolean: open*)

- Marks the program as open or close.

WEBSITE LAYOUT

CONTENT CATEGORIES

The following is how the site was categorized (the words in bold are main categories, those not in bold are indented are subcategories, and those in red lettering and black italic lettering are subpages with additional subpages or categories):

Home

About

 About Us

 Media

How it Works

- Bike Sharing
- Our System
- Bike Model
- FAQ

Bike Availability

Donate

Recruitment

- Recruitment
- Apply

Contact

Login

Sign Up

My Account

User Account Page

My Trips

Edit Account Information Form

Administrator Pages

Users

- Search Users
- Delete Users
- Change User Permission Levels

Rental Log

- Check Out Bikes
- Check In Bikes

Stations

- Edit Stations

Bikes

- Edit Bikes

Media

- Edit Media Page

Categories from a User's Perspective:

The division of the content into the above categories makes sense from a user's perspective because it is the most optimal presentation of information, allowing it to be digested and interpreted quickly by anyone viewing the site. The category labels are based on the most relevant topics to the site and thus make it that much easier to find what is needed. It is also based on standard web design practices that dictate all websites should have at least a homepage, an about page, and a contact page. If the user wants to find out how the bike sharing works there is no ambiguity in choosing the "How it Works" page or if they want to learn more about the company itself they would clearly choose the "About" page. In addition, the categories are intentionally shortened to one word to facilitate the process of the user navigating to his or her desired location on the site.

Justification for Categories:

Since we are renovating an existing site, the categories have already been established. However, we used a card sort method to find that a few of the categories were improperly labeled and should have contained additional content from other categories. In addition, the original website had two other sites that the client wished to be integrated into one main site. They had a Google Sites webpage dedicated to job applications for those wishing to join the Big Red Bikes team and Zagster webpage dedicated to tracking where the bikes were in real time. The current categories seen above combine both standalone web pages into the main web site. It now makes a lot more sense for both the admins who will be using the site to track vital information and visitors who want to learn about the company and services.

Home:

As insinuated, this is the index page or the first page visitors see by entering the website URL. It contains a Javascript sliding photo gallery (that link to main pages) and three text blurb images below that are quick links to other pages: about us, media, and recruitment. It will probably have the most images out of any of the other pages, as do most home pages of most websites to attract viewers and keep them at the site. After-all, landing pages--or the first page visitors see--determine if your visitor will stay or continue to explore the site further.

About:

This leads to two subpages: "About Us" and "Media" both of which have a sub-navigation bar. The subpage "About Us" contains a more detailed look into what the company is about and a link to become a part of the team (recruitment page). The "Media" page contains links to the company's social media pages and a listserv request. It also contains a list of articles and interviews about Big Red Bikes with a quick blurb below each title and date. It is in reverse chronological order and the list is populated by the admin in the "Media Editor" page.

How it Works:

This page leads to four subpages: "Bike Sharing," "Our System," "Bike Model," and "FAQ." The first subpage, "Bike Sharing" describes the concept of lending out bikes (for free) and how it has caught on in recent years around the country--it contains a video about bike sharing and links. The second subpage "Our System" contains a step-by-step process of how Big Red Bike's bike sharing system works. The third subpage, "Bike Models" delineates the model currently available for checkout--New--and has a diagrams depicting the model's anatomy. The last subpage is probably the most important page on the site as it is the "Frequently Asked Questions (FAQ)". Here, the many questions previously answered by our clients is displayed. These subcategories are appropriate for the category "How it Works" because they describe what the company does: bike sharing. In addition, each subpage has a sub-navigation bar for easy access.

Bike Availability:

This page is the hub for users in tracking where bikes are currently available to use around campus. There is a custom made Google javascript map application on this page denoting which stations users can check out a bike, if available. When an admin adds a station, the station name is automatically populated on the left and geomarker is created on the Google map on the right. In addition, the map displays the current location of the visitor.

Donate:

This page contains quick information about how to donate to Big Red Bikes, since they are a non-profit organization offering a free service to students and faculty on campus. There are two short blurbs about donating as a local business (they get free advertising) and donating as an alumni. There is a link at the bottom of the page to the contact page where users can specify why they are contacting Big Red Bikes (i.e. donation request).

Recruitment:

This page leads to two subpages: “Recruitment” and “Apply.” Each subpage has a sub-navigation bar. The “Recruitment” subpage has a general description of what working for Big Red Bikes entails. In addition, there is a right-side affixed menu bar that scrolls between four information blurbs: Business, Marketing, Operations, and R&D. This was created using the Bootcamp javascript library. At the bottom of the page lies a link to the “Apply” page. The “Apply” subpage contains the formal application for potential new Big Red Bikes team members. It has a myriad of inputs from text inputs and checkboxes, to file uploading. If submission is successful, the visitor will be directed to “Thank you” page that will timeout after a few seconds and redirect to the homepage. As with all the forms, there will be input validation to prevent malicious inputs.

Contact:

The “Contact” page, houses a form for anyone viewing the site to submit a message to Big Red Bikes whether it be feedback or requesting more information about a certain topic or even a donation request. If submission is successful, the visitor will be directed to “Thank you” page that will timeout after a few seconds and redirect to the homepage. As with all the forms, there will be input validation to prevent malicious inputs.

Login:

The login page will be page where a previously registered user can use his or her credentials to login to the site. It will contain a form that has two inputs: user id and password. If their login credentials match the ones in the database then they are granted access to the “My Account” page of the site. In addition there will be a link to reset a password if a user has forgotten it.

Sign Up:

The register page, as the name implies, is the location for which new users can sign up for the bike sharing service provided by our client. This page includes a form so that users can

enter vital information into the site database such as name, telephone number, email, user id, password, etc. Once they have entered the required information and press submit, they will be directed to a “Thank You” page asking them to save their user ID and password (they should automatically get an email after pressing the submit button stating that their registration was successful). Afterwards, they will be automatically redirected to the login page where they can enter their newly established credentials. Again, input validation will be enforced.

My Account:

After a successful login, this page will display personal items only visible to the person with matching credentials. Users can view things such as whether or not they have a bike currently checked out, personal information (name, email, campus address, phone number, etc.), and potentially bike usage history. They can also make changes to their personal information such as campus address, additional emails, telephone number, etc. If a credentials are detected, the buttons displaying “Login” and “Signup” on the top-right of the page will instead display a link to “My Account” page and a “Signout” option that removes session variables and leads the visitor back to the homepage.

NOTE: For users with admin credentials, this part of the site will look very different. It will contain features for administrators to check who has what bikes, check user privileges, add users, check bikes in and out, edit user/bike database, add other admins, etc. Essentially this page becomes a platform for the admin to alter the site (without knowing any programming).

SITE NAVIGATION AND INFORMATION ARCHITECTURE

Navigation and Information Architecture elements:

We decided on a top-page horizontal menu bar for the main navigation of the website. This bar will be visible on all pages and subpages on the site and will match the color scheme. The links on this horizontal menu bar, from left to right, are as follows: “Home,” “About,” “How it Works,” “Bike Availability,” “Donate,” “Recruitment,” and “Contact.” The bar is centered and beneath the company logo. The “About” main navigation link has two sub-links: “About Us” and “Media.” The “How it Works” link has four sub-links: “Bike Sharing,” “Our System,” “Bike Model,” and “FAQ.” The “Recruitment” page has two sub-links: “Recruitment” and “Apply”. All subpages have a horizontal menu bar, below the main navigation, where the related subpages links are located.

The other 3 main user pages will be neatly visible on the top right of the page: “Register,” “Login,” “My Account,” and “Sign Out.” It is important to note that the “Sign Out” link does not lead to a unique page, it is visible when a user is logged in and removes session variables and leads the user to the “Login” page. The same applies to “My Account” link: this link is only visible when a user is logged in and depending on the user credentials will either lead to the admin account page or user account page. This will also be visible on all pages of the site. The visibility of all the categories on all pages is shown by the

interconnectedness between the 7 main categories as seen in the diagram below as well as the “Login” and “Register” pages.

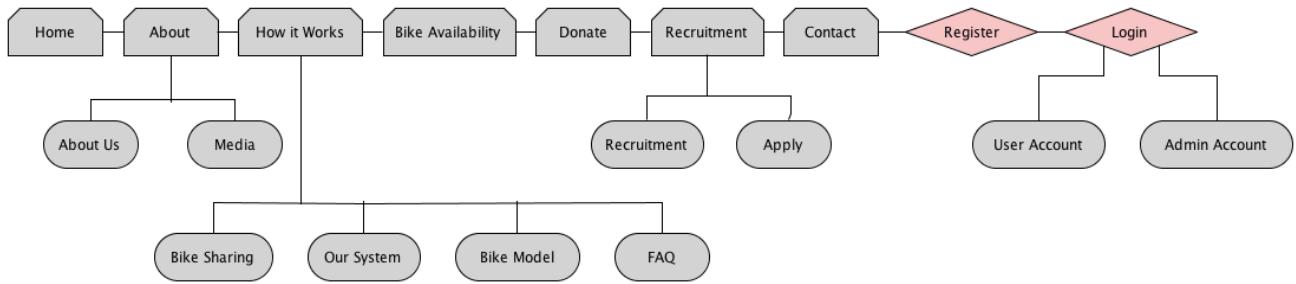
Justification for navigation and Information Architecture:

We chose to use a top-page navigation bar because it is the most standard and widely used in web design. In addition it makes finding information much easier since research shows that Internet users look at the top of a page immediately upon viewing a site and to the left (hence why we are also using a F-layout design for our content). We want the first thing users see to be a map as to where to go to find their desired information (i.e. navigation bar). One of our other options was to use a drop down jQuery hover menu but it is our belief that such a feature would over complicate the site and detract from the content and user experience. Such a hover menu would cause what's known as “hover tunneling,” which makes peripheral items slow and hard to click. Simpler is usually better, in this case, and going with a static main and sub navigation was indeed the best decision.

The order, from left to right, of the main categories was considered when creating the navigation bar. It is convention to place links to “learning pages” (pages that teach visitors what they need to know about the site, company, product, etc.) before “action pages” (pages that allow visitors to do something on the site such as fill out a form or sign up). Research shows that visitors are more likely to revisit a site and take action once they know more about the organization in question. Its basic psychology where user experience is predicated on trust between organization and visitor, which is formed by learning. Hence why we placed the learning categories (“Home,” “About,” “How it Works,” and “Bike Availability”) first and filled the rest of the navigation bar with the action categories (“Donate,” “Recruitment,” “Contact,” “Login,” and “Register”).

In addition, we chose to place “Register,” “Login,” “My Account,” and “Sign Out” on the top right of the page since again, modern web design imposes that as the most ideal location. Most websites with a login feature place the link on the top-right of all their pages (e.g. YouTube.com, Wikipedia.org). We do not wish to stray from this convention in the hopes that users will be able to find such crucial links quickly. Lastly the subpage menu bar, where needed, was placed directly beneath the main navigation since that is where users will first look when navigating from subpage to subpage and from subpage to main pages and so forth (again, according to research showing that English users look to the left and top of a page first).

WEBSITE LAYOUT DESIGN



PHP INTERACTIVITY

A major improvement we made to the existing Big Red Bikes website was making it more interactive. We implemented a log in feature that contains a PHP form that unlocks extra site functionality to users and administrators. The exact level of access is determined by the user's permission level. There is one login form for both users and administrators; however, administrators can unlock extra functionality once logged in. The login for administrators will facilitate them in adding content to the site via our platform, edit/add station and bike information, and edit/view user information. Upper level administrators can in a very user-friendly interface easily add, manage, and edit media content. They can also use a search function to search for users, bikes, and stations. On the other hand, the login for users will display information to said user such as due date of bike, rental history, etc.

On the client's previous website there were multiple pages as a way of filtering through information, such as having a separate page for current rentals and past rentals. This created a lot of pages resulting in unnecessary number of steps to accomplish simple tasks. We made it a goal to consolidate as many related pages into single pages. To achieve this we employed PHP and Javascript in order to make asynchronous calls possible without redirecting the user to a new page. This is evident in our accountadmin.php page (when logged in as a Manager) in which we used javascript to filter through rows of users by either the search box or the select options. Also for each row of users we are able to change the Admin Level and Status of users in the database on the fly through the drop down menus for each row of users.

On the client's previous site check in, check out, and users list were entirely separate pages. We were able to consolidate all three into one, the 'Users' page under an admin account. Admins are now able to search through users and also check in or check out users on the same page. To satisfy the constraints of allowing only a single rental at a time per user as requested by our client we ensured through PHP conditionals that the "Out" button for checking out a bike is disabled if the user has an ongoing rental, and the "In" button for checking in bikes is only enabled if there is a bike currently checked out by the user. Once the respective buttons are clicked a javascript function is triggered which displays a modal with a form populated by information about the user, admin, time, station options, and bike

options retrieved from the database through AJAX calls. Finally upon submission the necessary changes are made to the database for either a bike checkout or checkin.

The bike availability page includes an interactive map powered by Google Map javascript API, which displays information about bike availability at renting sites. Users can click on the yellow marker for a pop up to tell you exactly how many bikes are available at that station at the current point in time. In addition, the map will show you where you are currently located (once you give permission to the application to track your location) so that you can easily see where the closest station is.

Within the Recruitment section there is an “Apply” tab on the sub navigation bar that leads to a recruitment application. We made a PHP form that applicants can fill out to get more involved with the Big Red Bikes team.

On the Contact page there is a PHP form that users can fill out which generates an email to Big Red Bikes.

The homepage has an image slider and users can click links on the images to access different pages of the website.

The media page contains links to places in the news Big Red Bikes has been discussed. As you hover on different articles they move.

III. USER TESTING

TESTING SCRIPT

Thank you for participating in our user test! Our goal is to test the navigation of the new Bike Red Bikes website we are designing. Before we get started with the user test, we would like to ask the following questions to get to know your background better:

BACKGROUND QUESTIONS

- What major/year are you?
- How often do you use a computer?
- What websites do you normally visit?
- Are you a registered with Big Red Bikes?

We will now task you with some navigational requests to test the usability of our website. Be sure to remember that this is a test on our website, not on you - so relax and be sure to think out loud while going through each task. The way you answer these questions will help us in improving the website.

TASKS

- 1) Register and create a Big Red Bikes account.
 - What was your experience with this task? Was it easy or difficult?

- 2) Find the steps of how the Bike sharing program works.
 - What was your experience with this task? Was it easy or difficult?
- 3) Fill out an application to get a position with the Big Red Bikes organization.
 - What was your experience with this task? Was it easy or difficult?
- 4) Find out how you can donate to Big Red Bikes.
 - What was your experience with this task? Was it easy or difficult?
- 5) Contact Big Red Bikes.
 - What was your experience with this task? Was it easy or difficult?

You have completed the user test! We now have some questions regarding your overall experience with the website during the user test.

FINAL WRAP UP QUESTIONS

- How was the experience of the actual user test?
- Were the questions clear enough? Did you know exactly what we were asking for?
- Do you have any recommendations, comments or questions about the website?

Thanks again for participating in our user test and helping us improve the Big Red Bikes website!

ROUND 1 USER TESTING

Below is an overview of our Round 1 user testing; however, we go into more detail about Round 2 user testing since it was with the latest version of our site.

ROUND 1 USER TESTING SUMMARY

Overall we got great feedback on our website from the two users we tested. Both were able to easily navigate through the website. The only navigation issue we ran into was with User 1 who did not understand what Task 3 was asking initially, but we edited the task to make it more clear for future user testing. We got some helpful feedback in terms of color scheme and overall page layout that we made changes based on.

ACTION TAKEN DUE TO USER TESTING ROUND 1

- Made several color scheme changes based on user testing to make the website have a more welcoming atmosphere and make the text more visible
- Added grey background instead of black background to emulate the metal in a bicycle
- Changed the font color of the logo to make it easier to read
- Removed the side secondary navigation bar and changed it to a horizontal sub navigation bar under the main navigation bar to break down categories

ROUND 2 USER TESTING

During this round of testing we wanted to test Big Red Bikes administrators as well, so we added the following question for administrator testing:

- 6) Log into Big Red Bikes as an administrator and fill out form to rent out a bike.
- What was your experience with this task? Was it easy or difficult?

ROUND 2 USER TESTING NOTES

User 1: Maggie Wong (Big Red Bikes Executive Board)

Major: Economics Year: Sophomore Computer Use: every day Frequent Websites:

Facebook, Gmail Registered w/ BRB?: Yes as administrator

Tasks: Task 1 - Easy to find registration button Task 2 - Easy to locate found quickly on top nav bar how it works Task 3 - Hard to find recruitment information Task 4 - Easy to find where to donate Task 5 - Quickly found how to access contact form Task 6 - Easily logged into Big Red Bikes administrator portion of the site

General comments and advice:

- Recruitment important have it in main navigation bar
- Move media page in the About section

User 2: Alice (Section TA)

Major: Information Science Year: Junior Computer Use: ~15hrs daily Frequent Websites: Facebook, Gmail, YouTube, CMS Registered w/ BRB? No

Task 1 - 12 sec, found register link at the bottom of the page in the footer stated we should make login more visible (i.e. make larger buttons)

make subnavigation visible immediately on hover

Task 2 - 1 sec, found link on top nav bar (found it easily)

How easy were tasks? Quite easy

How easy was website to use? Easy

How easy for first time user? Easy except login / register options will be challenging to find

General comments and advice:

- Found site enjoyable and well designed
- Thinks new users won't have problem
- Suggestion: make login / register icons larger and place in more prominent location

User 3: Ethan

Major: Fine Arts, IS Minor Computer Use: every day really often ~8hrs Frequent Websites: Facebook, Twitter Registered w/ BRB? No

Task 1 - 1 sec, found link in top of page Task 2 - 1 sec, found link in main nav Task 3 - 4 sec, first went to recruitment.php, then found apply now link at bottom of that page Task 4 - 1 sec, found link in top nav

How easy to were tasks? Very easy to navigate

How easy was website to use? Very easy

How easy for first time user? Easy

General comments and advice:

- Looks nice, well put design
- Could probably make sub nav more visible
- Confused on how top nav is arranged--home and about could be next to each other

User 4: Carolyn

Major: Information Science Year: Sophomore Computer use: everyday
Frequented Website: Blackboard, Facebook, Gmail
Registered? Yes, but never took out a bike

Task 1 - 2 sec, found link in top of page Task 2 - 1 sec, found link in main nav Task 3 - 5 sec, got link from recruit.php (couldnt find sub nav from main nav) Task 4 - 1 sec, found link in main nav Task 5 - 1s, found link in main nav

How easy were tasks? Easy

How easy was website to use? Very easy

How easy for first time user? Quite easy, simple interface

General comments and advice:

- Website looks great overall!
- Login / register options were not that visible--should make larger

User 5 Name: Nate

Major: Computer Science Year: Senior Computer use: Very often Registered? No

Task 1 - 4 sec, did not see register button at first but found link on top of page Task 2 - 1 sec, found link in main nav Task 3 - 5 sec, found link at bottom of recruitment.php Task 4 - 1 sec, found link in main nav Task 5 - 1 sec, found link in main nav

How easy were tasks? Pretty straight forward (giving extra links was a plus)

How easy to use website? Very easy

How easy for first time user? Easy

General comments and advice:

- Design looks great
- Make login and register larger
- Have sub nav 'apply' be more visible
- Change 'register' to 'sign up' to be less confusing

ROUND 2 USER TESTING SUMMARY

For the most part users were able to complete all of the tasks quickly and easily. A couple of users did not like the ordering of the categories on the main navigation bar. One user suggested putting the Recruitment page accessible from the main navigation bar and moving the Media page to go with the "About" section. Another user suggested changing registration to sign up in order to make it less confusing. Also, some users had a difficult time finding the register and login buttons and felt that they were too small at the top of the page. In terms of navigation, we also got feedback that the sub navigation bar should be more visible.

ACTION TAKEN DUE TO USER TESTING ROUND 2

- Changed 'Register' to say 'Sign Up' to make it more inviting and avoid ambiguity
- Made 'Login' and 'Sign Up' buttons more visible by enlarging and placing the right of the logo instead of at the very top of the page
- Added more links on pages to refer to other pages, especially those with subnavigation (e.g. on recruitment.php made links to the reference the positions)

- Changed order of links in main navigation: realized that “learning” links should be first, then action links
- Visitors want to know about the person or company the website is about and then perform an action such as contact or subscribing to a list
- Added ‘Recruitment’ to main navigation bar since our client said they wanted it to be easier to find
- Moved media page into the About section rather than it being accessed from the main navigation bar

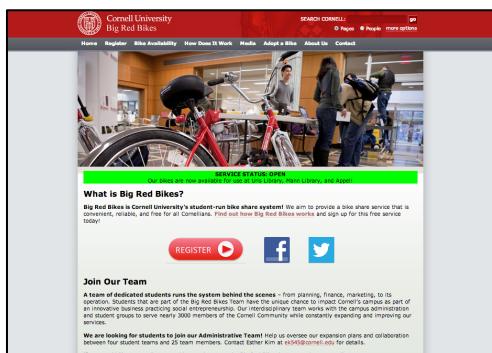
IV. BEFORE AND AFTER

THE ORIGINAL SITE

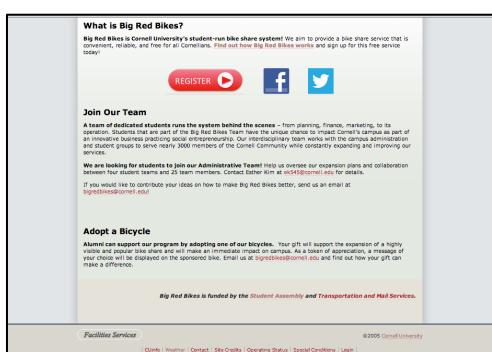
DISCUSSION OF PREVIOUS BIG RED BIKES SITE

Essentially every page was redone for formatting with a lot of the content staying the same. We combined all 3 websites and gave the site a more modern look while keeping the same logo and color scheme.

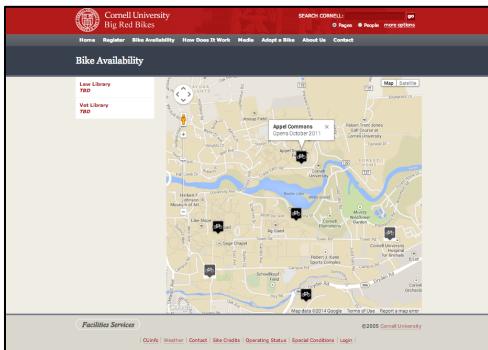
Big Red Bikes Cornell Website: <http://bigredbikes.cornell.edu>



The homepage was not very visually pleasing. It also had too much information on it.

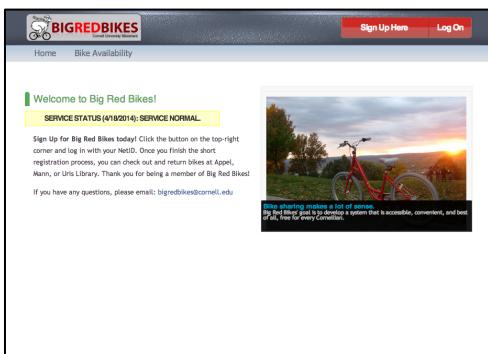


There was no footer that was related to Big Red Bikes. The site looked like it was put into a Cornell template with very little customization.



The bike availability page contained incorrect content and had not been updated since 2011. The format of the page was difficult for users to understand.

Big Red Bikes Zagster Registration Website: <https://bigredbikes.zagster.com/>



The Zagster registration homepage had a completely different look and feel than the Cornell Big Red Bikes website. There were no consistent design elements.

Big Red Bikes Recruitment Website:

<https://sites.google.com/site/bigredbikesrecruitment/home>

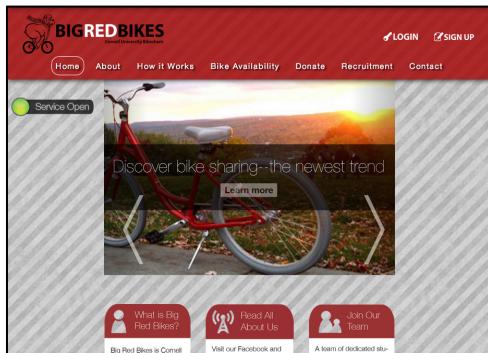


The Recruitment website also contained completely different design elements from the other two websites. There was no consistency between the sites and both the Cornell Website and Recruitment website included repetitive information.

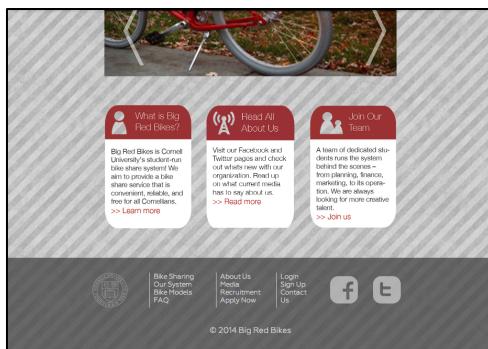
THE MAIN CHANGES

DISCUSSION OF NEW BIG RED BIKES SITE

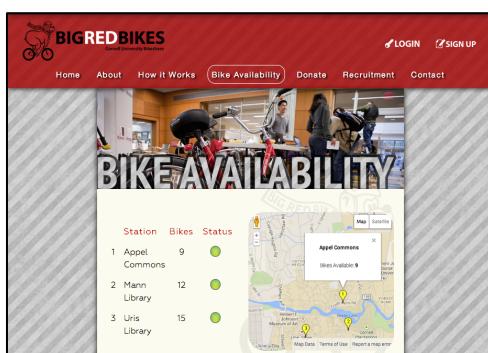
The old three websites were not consistent at all and were not designed well to brand Big Red Bikes. The biggest change we made was combining all three websites into one and including accessibility to all of the content with the navigation on the home page.



The homepage now make it very clear that it is the Big Red Bikes website, whereas the old Cornell website homepage looked like several other Cornell websites. The logo is at the top of the homepage whereas before it was not even on the homepage. Also, the login and sign up features are now accessible on the homepage whereas before you had to click a register link on the homepage and be redirected to the Zagster separate website.

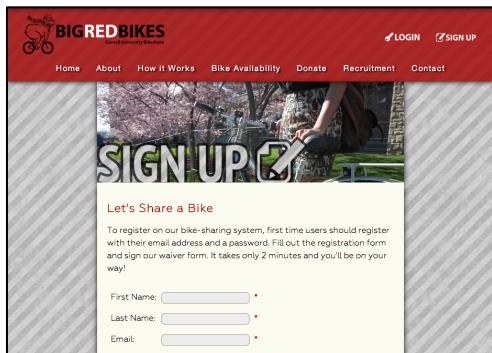


The website now has a consistent footer that is specific for Big Red Bikes. Before the footer was general for Cornell.

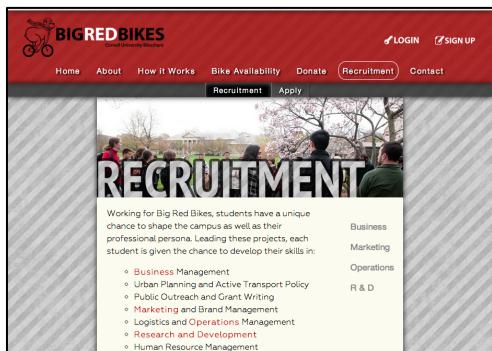


Station	Bikes	Status
1 Appell Commons	9	Green circle
2 Mann Library	12	Green circle
3 Uris Library	15	Green circle

The Bike Availability page is now changed to automatically reflect which bike stations are open and how many bikes they have available. We also integrated a map that shows exactly where all of the stations are located on campus and if you click the yellow marker a pop up will tell you exactly how many bikes are available at that station at the current point in time. In addition, the map will show you where you are currently located (once you give permission to the application to track your location) so that you can easily see where the closest station is.



Registering for Big Red Bikes is now done on the same website rather than being redirected to the Zagster website. The sign up form has a consistent look and feel with the rest of the website.



In the Old Site recruitment was done on a completely different website. Now recruitment information is included on the main website and there is a sub navigation bar labeled "Apply" which contains the actual Big Red Bikes Executive Board application. This also has a consistent design with the rest of the website whereas before the Recruitment website was designed completely differently.

V. DISCUSSION

Our website completes all of our client requirements originally laid out. Our client is extremely pleased with the new website and is excited about implementing it. There were three previous websites that had completely different design elements are now integrated into one website. We kept their original logo as they requested and developed a color scheme and overall design that complements it well. We created a database to store Big Red Bikes user information and track bike rentals that includes the same functionality of their old

Zagster system. However, with our new database we save Big Red Bikes the \$10,000 annual fee they paid Zagster. Also, Big Red Bikes can now customize their database and entire website much easier.

VI. LOGIN INFORMATION

We made three levels of access - top administrator, administrator, and user. The highest level administrator can do things such as add new bikes and add new renting stations. The lower permission administrator can do things such as checking out bikes users and flagging bikes. The user level can log in to see their bike usage history and change account information.

TO ACCESS THE TOP LEVEL ADMINISTRATOR

username: topadmin@cornell.edu
password: topadmin

TO ACCESS THE LOWER LEVEL ADMINISTRATOR

username: loweradmin@cornell.edu
password: loweradmin

TO ACCESS THE USER LEVEL

username: user@cornell.edu
password: user

DATABASE LOGIN

username: brbsss
password: 123456