

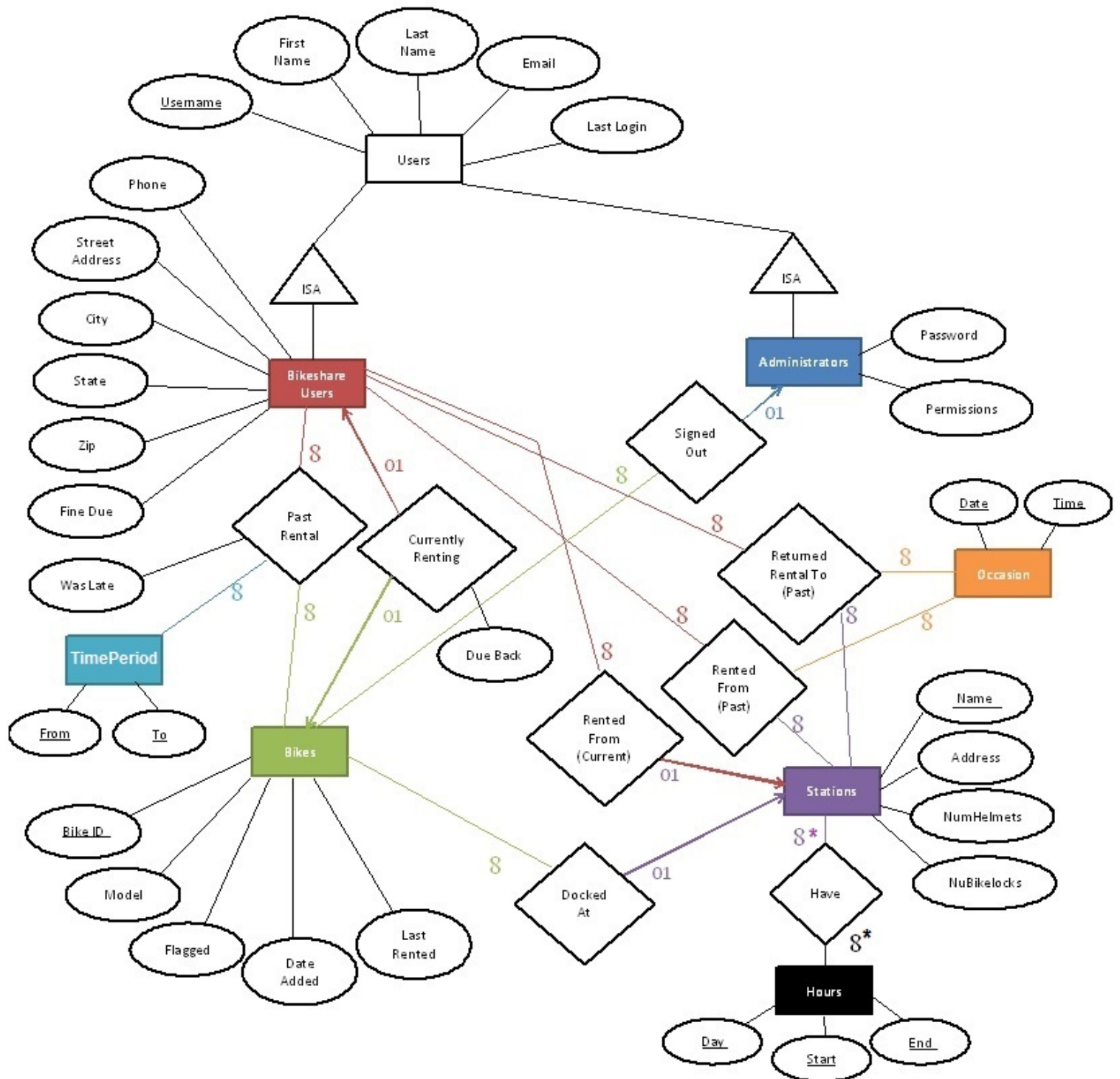
INFO 2300: Milestone 2

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Database Design

Database Design ER Diagram



Above 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,” the sideways infinity sign indicates “many,” and “*” further denotes forced participation (“at least one”).

What Database Will Do

The database is an 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. A Bikeshare User is someone who has signed up to participate in the Big Red Bikes bikesharing program, while an Administrator is someone on the Big Red Bikes team who has been given permission to manage the bikes and other users.

Some common information is kept on all Users, such as username and email address, while the subclasses have some different specific information regarding their role. For instance, we need to collect much more contact information for Bikeshare Users because they would need to be contacted in the event that they do not return a rented bike. Administrators require different fields, such as a permissions level to represent what administrative functions they are allowed to perform. Note that Bikeshare Users do not have a password because they will be authenticated with CUWebAuth (the Cornell netid login system) at the client’s request. Administrators will have their own separate login system, and so they do have a password field.

Bikes denote the bicycles that the program rents out to students. Bikeshare Users can be currently renting at most one Bike and each Bike can be currently rented out by at most one User. We also wish to record the Bikeshare Users’ past rentals. We need another entity, Time Period, to do this properly, since a particular User can have rented a particular Bike multiple times in the past at different dates/times. Therefore, we can say that Bikeshare Users can have rented zero or more Bikes in the past during different Time Periods and Bikes can have been rented out by zero or more different Bikeshare Users in the past during different Time Periods. This becomes a many-Bikes to many-Users to many-Time Periods ternary relationship. Furthermore, all Bikes that are currently rented must have been signed out by an Administrator. Specifically, Administrators can have signed out zero or more Bikes currently and a Bike can be signed out by zero or one Administrator, since a Bike may be currently signed out at most once and an Administrator can sign out any number of Bikes.

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 located at it. Bikeshare Users who are currently renting a Bike must have rented it from a particular Station. Bikeshare Users can have currently rented from at most one Station and a Station can have rented out to many Users. Because we also wish to store historical information on which Stations Bikeshare Users have rented bikes from or returned them to, we introduce another entity, Occasions, which represent single specific dates and times for this purpose since each rental by a User corresponds with a particular date and time. Bikeshare Users can have rented from zero or more Stations in

the past on different Occasions and Stations can have been rented from zero or more Bikeshare Users in the past on different Occasions. Similarly, Bikeshare Users can have returned rentals to zero or more Stations in the past on different Occasions and Stations can have had rentals returned from zero or more Bikeshare Users in the past on different Occasions.

Hours are used to denote the business hours of different stations. This information is allows us to for let users know when they can rent a bike and the deadline for returning a rental. Stations have many hours, since operating hours depend on the day, and an Hour can correspond to many Stations. Furthermore, each Station must have at least one Hour (since they must be open at some time) and each Hour must correspond to at least one Station.

Website Layout

Content Categories

The following is how the site will be categorized (the words in bold are main categories and those not in bold and indented are subcategories):

Register

Thank You

Login

My Account

Home

Bikes

Mann Library

Olin Library

Service Building

Appel Commons

How

What is Bike Sharing?

Bike Models

FAQ

Media

Donate

About

About Us

Jobs

Apply

Contact

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 dictates 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” 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.

Content and Page Structure of Each Category

Register:

The register page will, as the name implies, be the location for which new users can sign up for the bike sharing service provided by our client. Currently, this feature of the clients’ site is housed on a different standalone site called Zagster. We plan on integrating this page into the new, holistic website that will build. This page would include a form so that users can enter vital information into the site database such as name, netID, telephone number, campus address, 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.

Login:

The login page will be website 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.

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.

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).

Home:

As insinuated, this will be the index page or the first page visitors see by entering the website URL. It will contain a Javascript sliding photo gallery and some images below that are quick links to other pages: “How Big Red Bikes Work”, “Join the Team”, and “Adopt a Bike.” 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.

Bikes:

This page will be the hub for users in tracking where bikes are currently available to use around campus. There will be a Google map insert on this page denoting where a user can check out a bike, if available. This page will lead to 4 subpages “Mann Library”, “Olin Library”, “Service Building”, and “Appel Commons”, will serve as guides to showing the user how many bikes are available at each location and other data such as building hours, frequency of usage at each location, etc. It makes sense to make them 4 different subpages since each will house different information updated in real time. In addition, the subpages will be on the left hand side of the main page of “Bikes” and each subcategory.

How:

This page will quickly describe the process of how to become a member and borrow a bike. It will lead to 3 other subpages. The first subpage, “What is Bike Sharing?” will describe the concept of lending out bikes (for free) and how it has caught on in recent years around the country. The second subpage, “Bike Models” will delineate the models currently available for checkout: classic and new and will have diagrams depicting their anatomy and differences. 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 will be displayed--most likely with a collapsable jQuery feature to make only the answers to questions the user clicks on visible. These subcategories are appropriate for the category “How” because they describe what the company does: bike sharing. In addition, the subpages will be on the left hand side of the main page of “How” and each subcategory.

Media:

This page will contain a list of articles and interviews about Big Red Bikes with a quick blurb below each title. The company does not currently have videos or images they wish to display as media. The only thing the clients wish to display in this category is the various news articles about them, which are essentially links to outside websites. These will be ordered in reverse chronological order: the most recent media first and so forth. Subcategories are not necessary for this page.

Donate:

This page will contain quick information about how to donate to the 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 will most likely be links to the Big Red Bike’s email address and the contact page here. Again, no subpages needed.

About:

This page will contain information about the company and its history and an image or two. The subpage “About Us” will contain a more detailed look into the key members of the Big Red Bikes team and potentially pictures of each member. The “Jobs” subpage will have a plethora of information about current job openings within the company and descriptions of said openings. Lastly, the “Apply” subpage will have a form for anyone (not just users) to submit with their intended job preferences. It will contain text boxes, drop down options, and checkboxes. In addition, the subpages will be on the left hand side of the main page of “About” and each subcategory.

Contact:

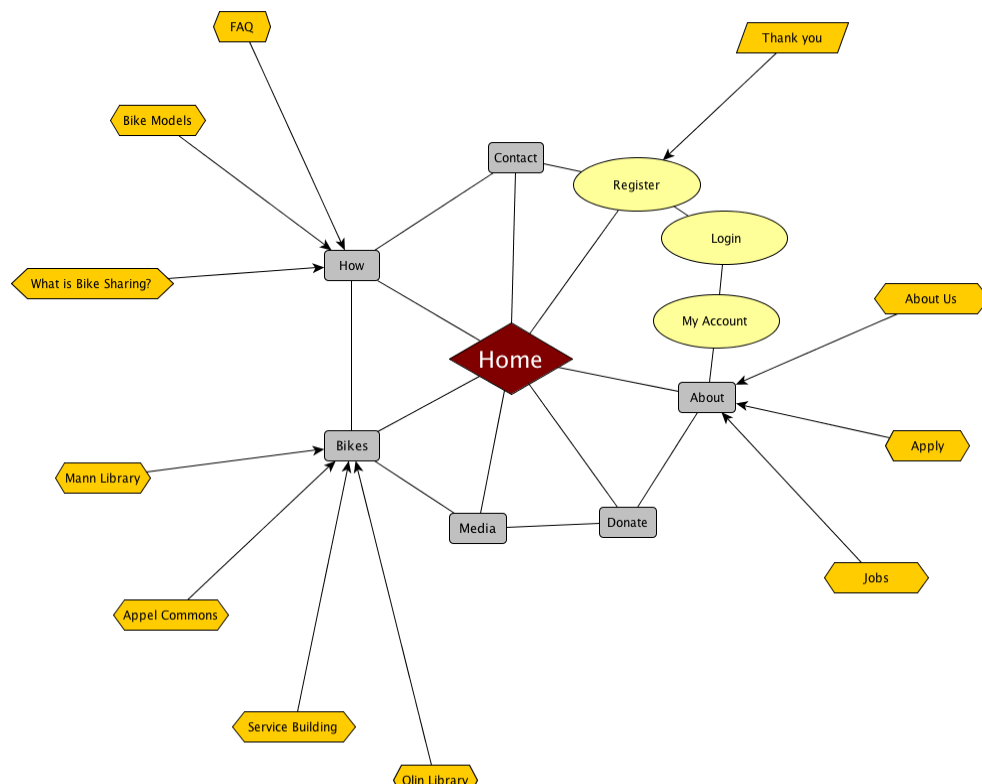
The least adorned of all the pages will be the “Contact” page, which will house a form for anyone viewing the site to submit a message to Big Red Bikes whether it be feedback or requesting more information about a certain topic. As with all the forms, there will be input validation to prevent malicious inputs. There will be no subcategories.

Navigational Structure

We intend on using 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, will be as follows: “Home,” “Bikes,” “How,” “Media,” “Donate,” “About,” and “Contact.” The bar will be centered and will be beneath the company logo. In addition, the other 3 main categories will be neatly visible on the top right of the page: “Register,” “Login,” and “My Account.” 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 10 main categories as seen in the diagram below.

For the main categories with multiple subpages, a left-hand side bar will be implemented on each of the subpages and main category page. That way all links are accessible.

Site Map Diagram of the Information Architecture for Big Red Bikes



Navigational Structure Justification

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 that 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 menu but it is our believe that such a feature would over-complicate the site and detract from the content. Simpler is usually better, in this case.

In addition, we chose to place “Register,” “Login,” and “My Account” 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, will be placed on the left of the page since that is where users will look first (again according to research showing that English users look to the left and top of a page first).

PHP Interactivity

Below are the main list of functions and functionalities we will implement in PHP. The name of each function is followed by a brief description.

User Sign-Up Form

This functionality is used to add a new user to the database of bike users. Users must sign up in order to be able to rent bikes.

valid_netid – Since Big Red Bikes can only be used by Cornell students and staff, the new user netids should be a valid Cornell netid

valid_address – Check if user is implementing a valid postal address

create_user – If user inputs valid information create user and add to database, initilize the necessary variables (FineDue)

send_confirmation – Send confirmation email to the user upon successful sign up

User Log-in Form

This form will be used for users to login to the site. It will give them access to their personal account.

valid_pass – validates a user’s username and password

is_admin – checks if logged user is an admin

session_user – Stores the current user id or name in sessions along with a way to store whether user is admin or not

log_out – Clears sessions, reroute to home page.

Admin Utilities

These are additional functions that are visible to logged in admin. Admin must have additional functionality since they are the ones renting out the bikes.

add_admin – Allows a currently logged in Admin to add a new admin, send email to new admin with a random password which should be changed once new admin logs in.

add_bike – Allow admin to add bike to database

flag_bike – given a bike add, update the flag field of bike in database

loan_bike – Update the CurrentRentals table with necessary information, along with updating the loaned bike LastLoaned timestamp

edit_bike – Given a bike id along with other parameters, update bike information with given parameters

dec_helmets – given a station name, decrement number of helmets at station

dec_locks – given a station name, decrement number of locks at station

edit_hours – given a station name and day of the week, edit hours for station

add_note – append announcement to notes table, with a time_stamp and admin_id

del_note – remove note

Other Utilities

search_user – search for user in database

show_history – show rental history for logged in user