RU Food Pantry
By:
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***** *The words “donor” and “donator” in this project are used interchangeably.*
** *We only had the resources available to create and modify the databases in our project using a local server. Thus, we tried to provide videos of all our forms working properly and updating the databases but actually accessing the databases would require downloading a local server like XAMPP and creating the databases again in MySQL locally.*

Effort to make your solution dependable

There were several measures taken to make this solution dependable. Starting with the software specification, we detailed the functionality and attributes of the software in such a way that fault tolerance and recovery is written into the design. Doing this makes the software less vulnerable to failure and as a result, its dependability. Reducing the likelihood of the software failing at inconvenient times helps make the solution dependable.

Moving on to software evaluation, the verification and validation we performed revealed the existence of errors that would have threatened the dependability of the software. One such error allowed unregistered users to login to the website. This threatened the reliability of the software by allowing intrusions from users or entities who shouldn’t have access. Fixing this bug improved the security of the system which resulted in increasing the reliability.

A core quality of this project is that unauthorized users must not be allowed to successfully log into the system. This requirement has been verified using, as mentioned before, extensive testing. All of this goes towards giving the program the benefit of confidentiality. If the software were not confidential or not tested well enough to meet those confidentiality requirements, its purpose would be seriously compromised. The care put into

making the program as confidential as possible makes it more secure by extension, which was a large effort our team took to make the solution dependable.

Use advanced SWE solutions

Reusing existing software is a practice used within the industry in order to accelerate development and increase dependability as reused software has already been tried and tested in working systems. This was done specifically in sprint 1's MVP where we used Qualtrics as a way to get surveys and were able to get a functional minimal viable product in a very short amount of time.

Beyond this, the advanced SWE topic we depended on the most was component-based software engineering. Specifically, we made use of reusing existing software components that we made throughout the project. Specifically as our system contains many forms that need to collect user information, we built the first form by making a basic model object that could be reapplied to the other forms needed in our system without having to "reinvent the wheel" each time we made another form. This was an effective way of software development as it saved us time and confusion when different team members had to develop their own respective forms while also maintaining a standard.

Estimate time, cost, and effort of your solution, and create a plan

We estimated the time, cost, and effort of our solution at every stage and used this information to decide which ideas and features would make it to the final product and which should be dropped in the interest of preserving resources. With this in mind, the estimations for the first (sprint 1) MVP are as follows.

With this MVP we are to use the Qualtrics survey system to handle collecting the information of the donors in order to export an Excel Sheet that contains all the donations and use it as an inventory. This exporting needs to be done manually by a Food Pantry worker every so often to fetch the updated values of the inventory which is quite costly in time and effort done by the workers. Qualtrics pricing works on a subscription-based model requiring annual renewal. Plans start at $1,500 a year and go up to $5,000 a year. As the food pantry is under the Rutgers system they receive this software free of charge but the exporting of the survey information requires training for all the employees so that they can learn how to navigate this software. Within the first week of implementation of this MVP a suggested plan could be for the employees to have a rotation of when to pull the new excel spreadsheet that contains the latest information at the end of the day and change the checking frequency as needed. As we can see, the cost of this service and the effort needed to train Rutgers employees to use the software is quite considerable; all of which are reasons why this MVP ultimately did not see it through to the end.

The final product would include the use of hosting a server for this website and also include hosting the databases needed to store all the necessary data that the Food Pantry requires. After some research it is estimated that the Food Pantry can host the website through services like WordPress where we found it gave us one of the lowest prices in the market for 2.95$/month while providing 24/7 support and automated backups. The prior system in the food pantry was to hand count the food of each donor that comes into the pantry each day. With an

average of 30 donors per day as collected through the initial research we made and the average 6 minutes that it took employees to count the donation would mean about 3 hours a day being spent on counting inventory. The Food Pantry employees would then write what they had on paper and then on to an excel sheet for it and it is open 3 days a week taking lots of time, cost, and effort. With our solutions there would be an estimated save in time of about 468 hours per year by eliminating the need to hand count each can of food. Employees of the food pantry should receive appropriate training on how to use this software, specifically how to view the inventory data when needed, this should only be done once when onboarding and perhaps once more if there were any major updates to the software.

Incorporate at least one Program Management concept

Of the program management concepts utilized for this program, we found that the most important one to report on is Teamwork. The size of our group, 5, was perfect for reducing the friction and communication issues that result from having larger sized groups.

Having different perspectives with different areas of expertise working on the same project has the obvious benefit of creating a more reliable program. An important quality of our team is that we are a good mix of personalities

Adams : Self-Oriented
Jenn : Interaction-Oriented
Rebecca : Task-Oriented
Rohan : Task-Oriented
Nick : Interaction-Oriented

Along with this, we each have our own strengths and weaknesses which complement each other. An important priority of our team with regard to teamwork was making decisions together. The responsibilities of every team member as well as all of the important decisions pertaining to the project were discussed until a consensus was reached. We tried to assign each other tasks that matched with our respective skillset as much as possible but sometimes there was overlap, in which case we rotated responsibilities in order to give everyone the opportunity to work on whatever they felt comfortable with.

Perhaps the most important benefit of our team being so cohesive is the fact that we all learned from each other. This project gave us the opportunity to learn for ourselves and teach each other new skills and knowledge. Conducting a project on your own is a good learning experience but is made better with the ability to ask a partner working on the same thing about something you're unsure of, or being able to teach them something to further your own knowledge on the subject.

Requirements Table

Functional Requirements

Requirement	Description
Inventory should be accessible by both Employees and Students, but not necessarily Donators.	It is necessary for the inventory to be accessible by employees and students
Verify that the person taking food is a Rutgers student	This requirement is necessary because only Rutgers students are authorized to take from the food pantry. Anyone else doing so would mean the system is not secure.
Each time food is taken out of the pantry, the recipient must log what is taken out, this should update the inventory in the database.	The only way for the inventory to accurately represent what is available in the food pantry is to also log and update the database every time food is removed. This importantly is done anonymously without recording the student's name in order to not shame the student for their food decision that was highlighted as a concern by the Food Pantry.
Deny website access to non-authorized users	Only students of Rutgers should be allowed to take out food from the pantry
Implement using HTML	HTML is the most readily available skill within our team to design websites.
Use PHP in implementation	PHP was used to connect the HTML values to the database
Upon successful sign up, credentials are entered into the database	Successful sign up means the user is registered in the system and must be reflected in the database so their credentials can be managed as necessary.
When login is attempted, database is scanned resulting in one of two actions: - Deny access - Allow access	When a user logs in there should only be two possible outcomes. A user cannot be both in and not in the database, so any login attempt should be either allowed or denied.
Write databases in SQL	Create databases and tables in SQL and be able to use queries to insert new values into the tables/databases and update the values as needed and view the values as needed
Generate RUID for student whenever one is registered	Successful sign up for a student randomly generates an RUID for the student so it mimics the actual Rutgers database of

	students
Should look like current Rutgers sign in and log in pages so the usability of the system is greater among RU students.	The purpose of this requirement is to reduce the difficulty for Rutgers students to use the software.

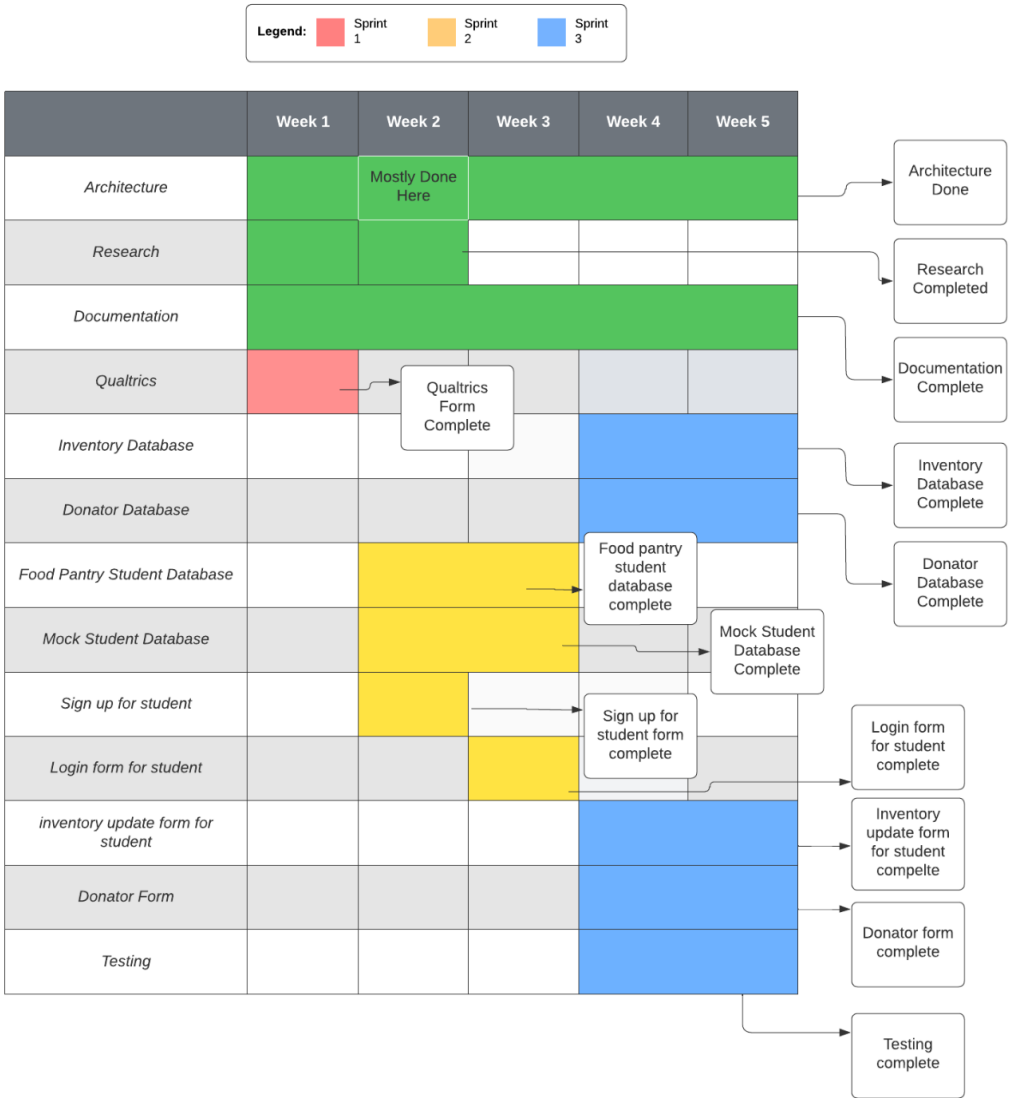
Non Functional Requirements

Requirement	Description
Be able to service the various users interacting with the food pantry this includes but is not limited to: donors, employees, food recipients.	The system should be made to serve the food recipients who log in to the system and are allowed to enter the food pantry and then they can fill out a form to update the inventory of the food pantry. The donors should also be able to donate and log what they donate in a form easily and that donor information gets stored in a database and the inventory is updated. Employees should be able to access the database and view the inventory, donators, and information of students that go to the food pantry.
Easy and fast process for donors to log their donation.	If the process is too long or complicated it may result in a negative outlook of the food pantry and donations could come less frequently due to this unpleasant user experience.
Must be working and reliable at least 99% of the time.	System failures should be rare because people rely on it for a variety of reasons. If needs are not met as a result of system reliability, those who depend on it may look elsewhere which can have a negative impact.
Have high availability (> 99.99% of the time)	This software is depended on by food insecure students, having the system down for any period of time can have negative effects on those who rely on it.
Open and process information quickly	To maximize the efficiency of the food pantry operations, information processing should be as quickly as possible. Stalls in the system will cause a domino effect resulting in many people waiting longer than expected for the software's services.
Allow any student to access login form	Only students with valid credentials, provided by the mock Rutgers student database, can login.

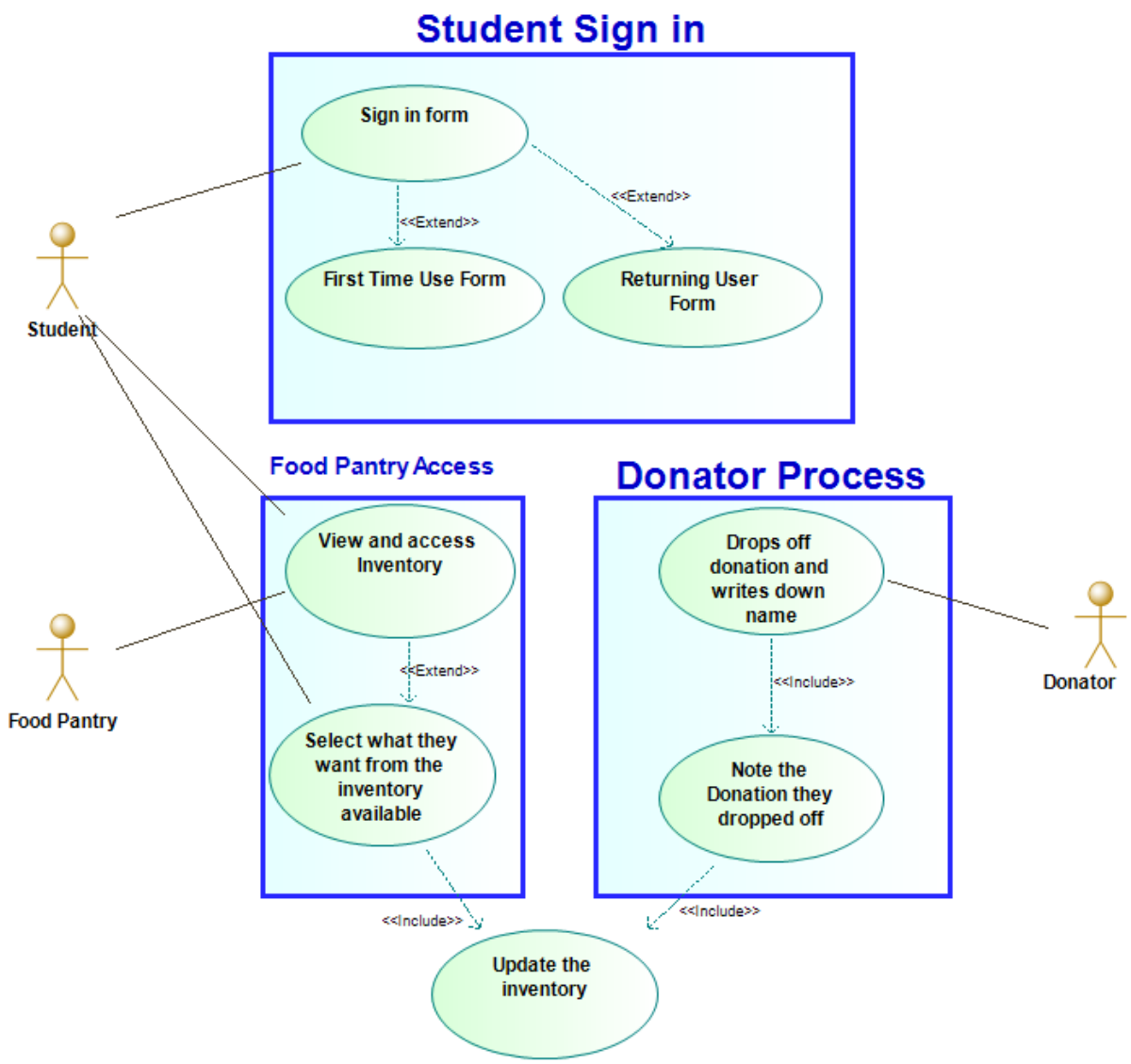
Create and use mock Rutgers student database	Since we cannot access this real Rutgers student database in order to validate the information of the students entering the food pantry we worked with mock data within a
In the case that the webpage fails, the user should be able to leave and return to it.	The webpage should be able to just be reloaded incase of any failures (whether the user inputted incorrect information or the website time out) and the system should be returned to how it originally works.
Easy and fast process for donors to log their donation.	The donors should be able to easily donate to the food pantry without hassle. They're contributing to the food pantry to help others and it should be easy and encouraging for them to do so. A form to log donations should be simple and user-friendly and shouldn't take too long to load or submit.
Must be working and reliable at least 99% of the time.	If the system were to fail, it would not be catastrophic which means there is room for the system to fail.
Non–authorized users should not have access to the inventory or donor database	Only students are allowed to enter the food pantry and all those with invalid credentials will not be logged in and will be turned down.
Inventory should be accessible by both Employees and Students, but not necessarily Donators.	Since donators are not necessarily students of Rutgers then this means that donators should not be able to see the inventory of food.
Verify that the person taking food is a Rutgers student	The login to enter the food pantry and take food should verify that the person is a Rutgers student. The person should be a student that has their information stored in the mock Rutgers database and when the information in the database matches the person/student's login information, the person should be verified to be a student and allowed to take food.
Each time food is taken out of the pantry, the recipient must log what is taken out, this should update the inventory in the database.	There should be a form to log what is taken out of the food pantry and the form inputs should update the inventory in the database so that the inventory automatically decreases based on the form.
The system must allow for a sense of privacy	An important aspect of this software is to provide confidentiality which many users depend on. If it is not provided, it would mean

	the security of the software is less than what is expected.

GANTT CHART



All Diagrams



Use case diagram of System

System	Food Pantry System
Use Case	Sign In to Food Pantry
Actors	Student
Data	The user provides their netid and password

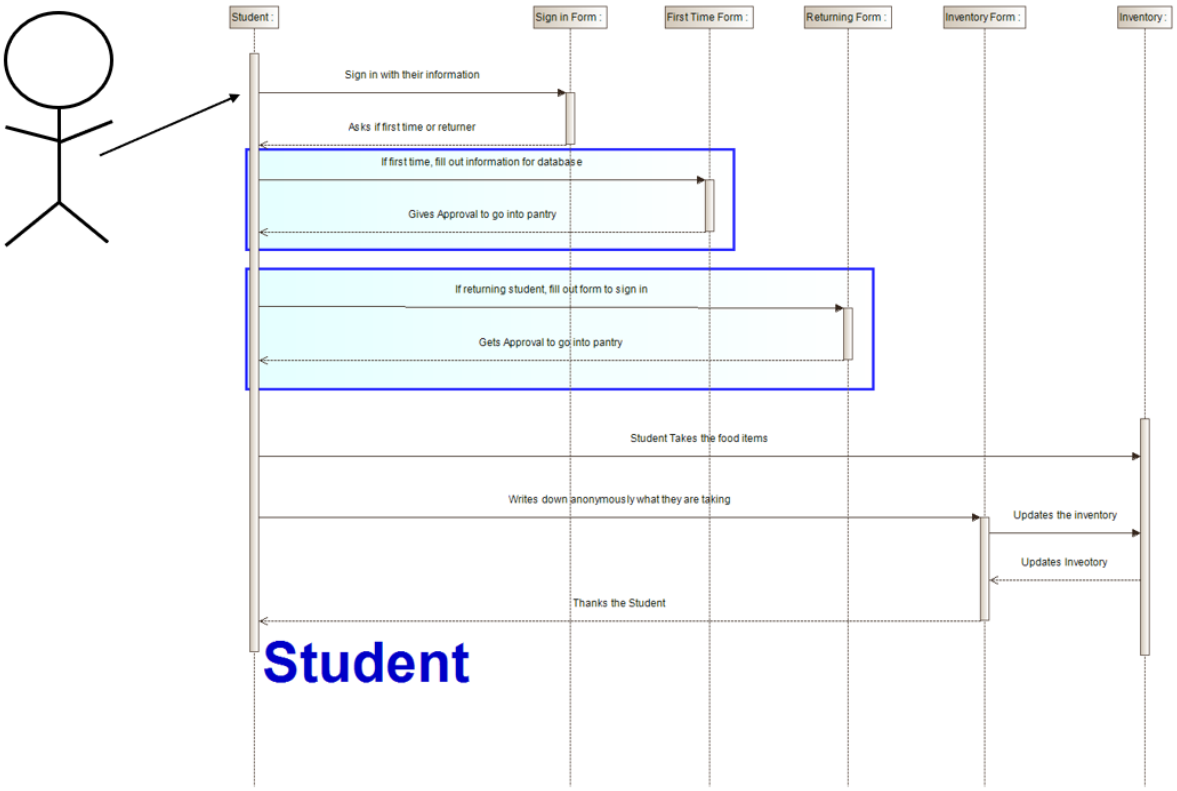
Stimulus	The user hits the enter button and the system validates whether the netid and password is valid by checking the Rutgers student database.
Response	The system redirects the student to either a first time form if it is the user's first time here or confirms that the user has logged in.
Comments	The user's information is validated from a mock Rutgers student database that was created by our team.

System	Food Pantry System
Use Case	First Time Use Form
Actors	Student
Data	The user provides their netid and password
Stimulus	The user hits the enter button and the system validates whether the netid and password is valid by checking the Rutgers student database.
Response	The system redirects the student to either a first time form if it is the user's first time here or confirms that the user has logged in.
Comments	The Food Pantry made it clear that for their business needs it is very important to collect the information of first time student

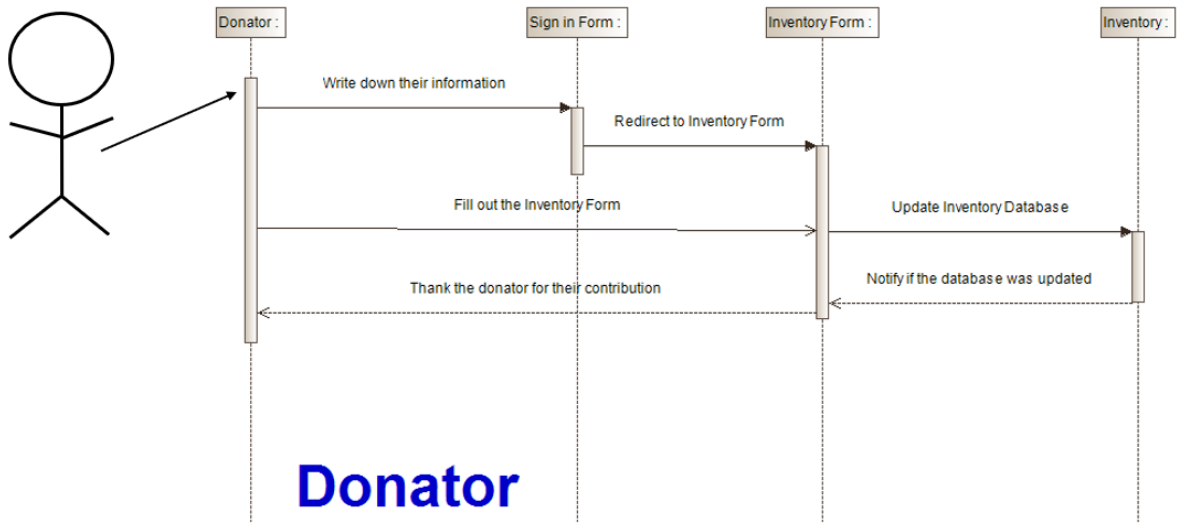
System	Food Pantry System
Use Case	Donation Form
Actors	Donator
Data	The user provides their information such as name, email, phone number, donation, donation quantity, etc.
Stimulus	The user hits the enter button and the system validates whether the netid and password is valid by checking the Rutgers student database.
Response	The food pantry database takes the survey's input and stores them in the appropriate table in the database, updating the number of items in each food category

Comments	The donor's information is stored in the database as part of the business needs of the Food Pantry.

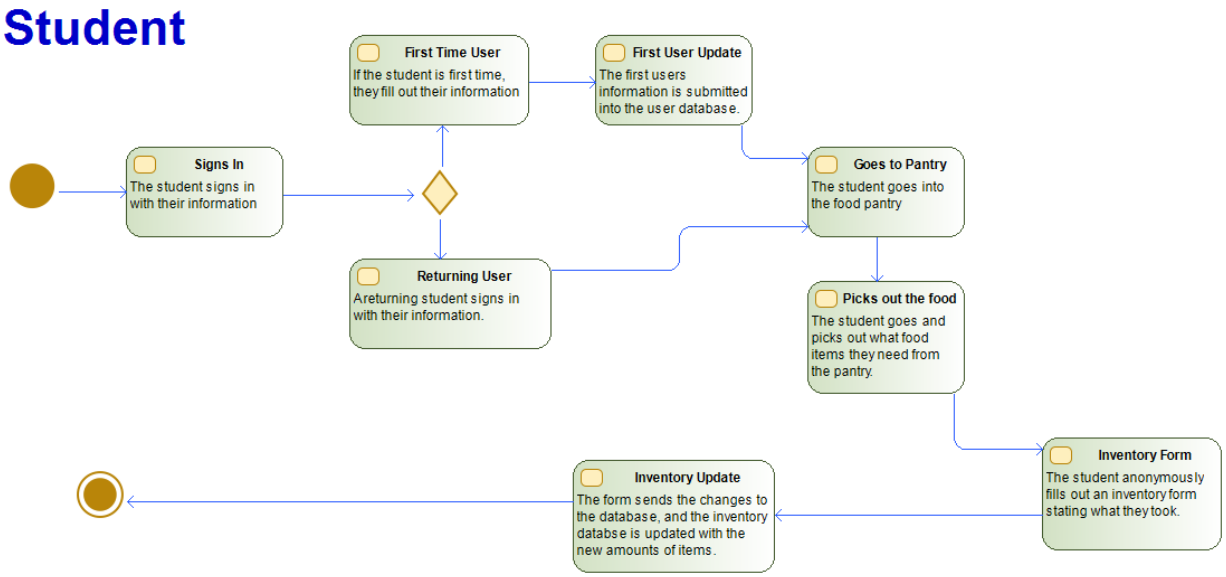
System	Food Pantry System
Use Case	Inventory Check
Actors	Food Pantry Employee
Data	The User checks the database of the inventory
Stimulus	The user will want to check how much food and items are available at the end of the day by checking the database of the inventory.
Response	The database will display the current amount of each category
Comments	Our database is hosted through a local host server



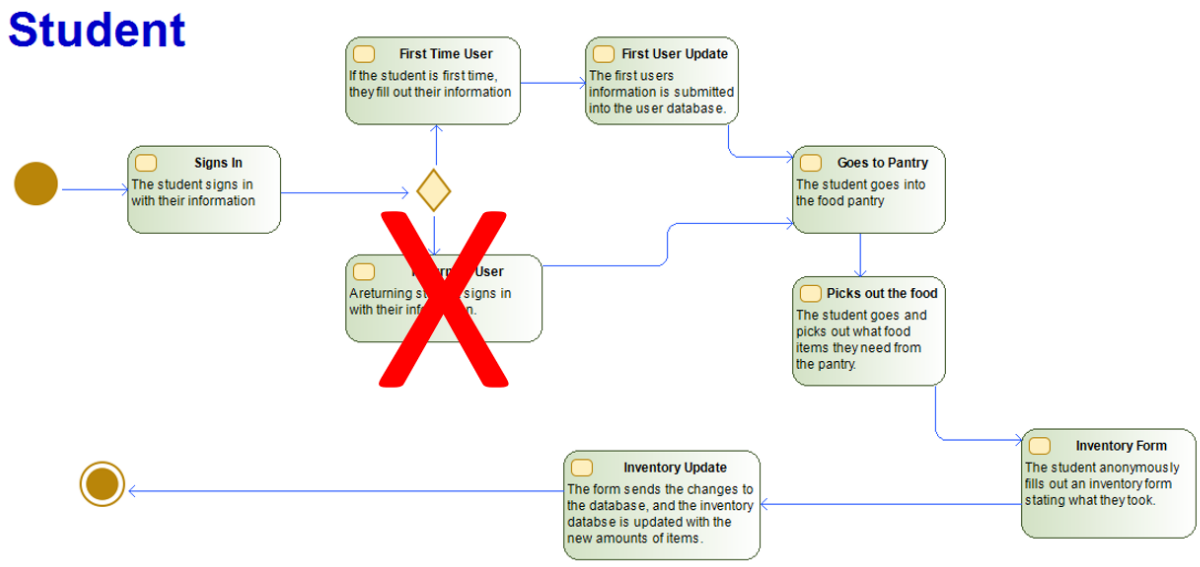
Student Sequence Diagram



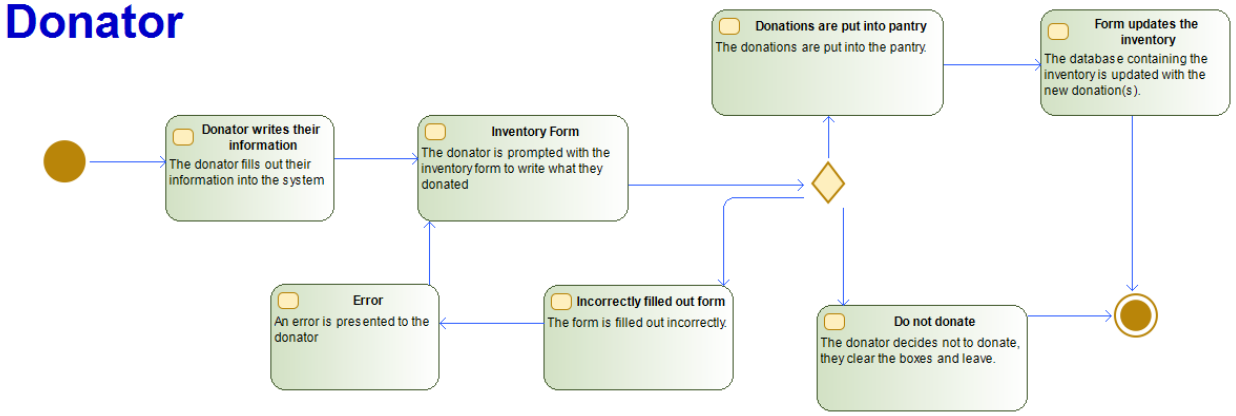
Donator Sequence Diagram



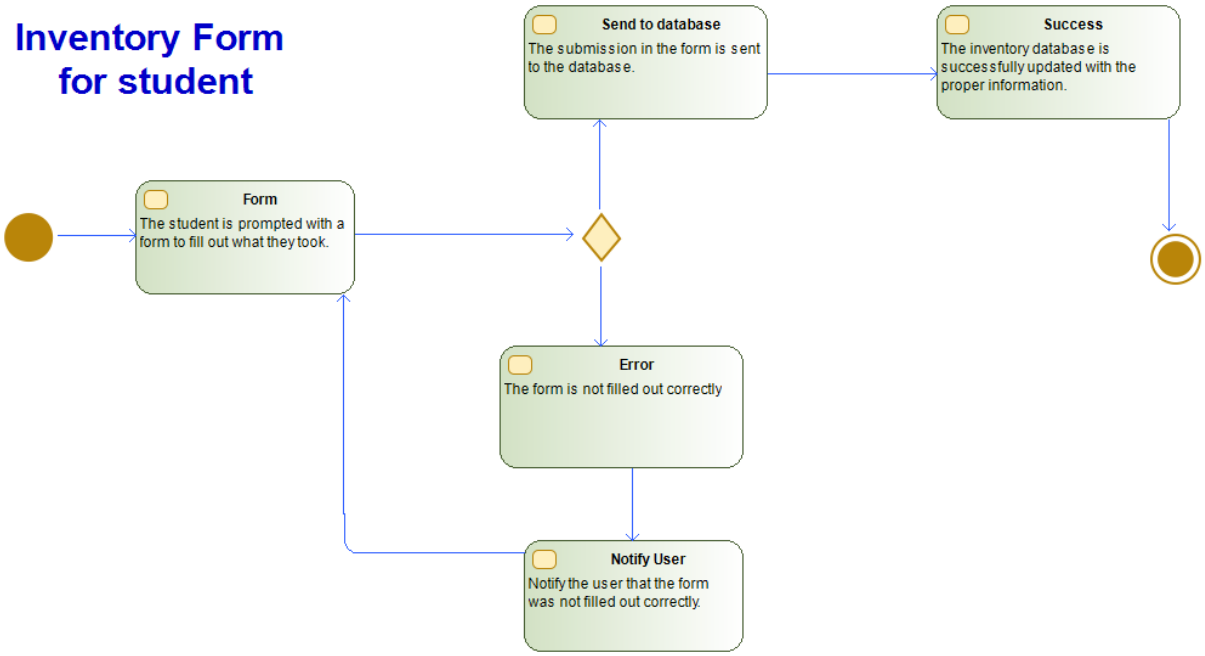
Student Activity Diagram



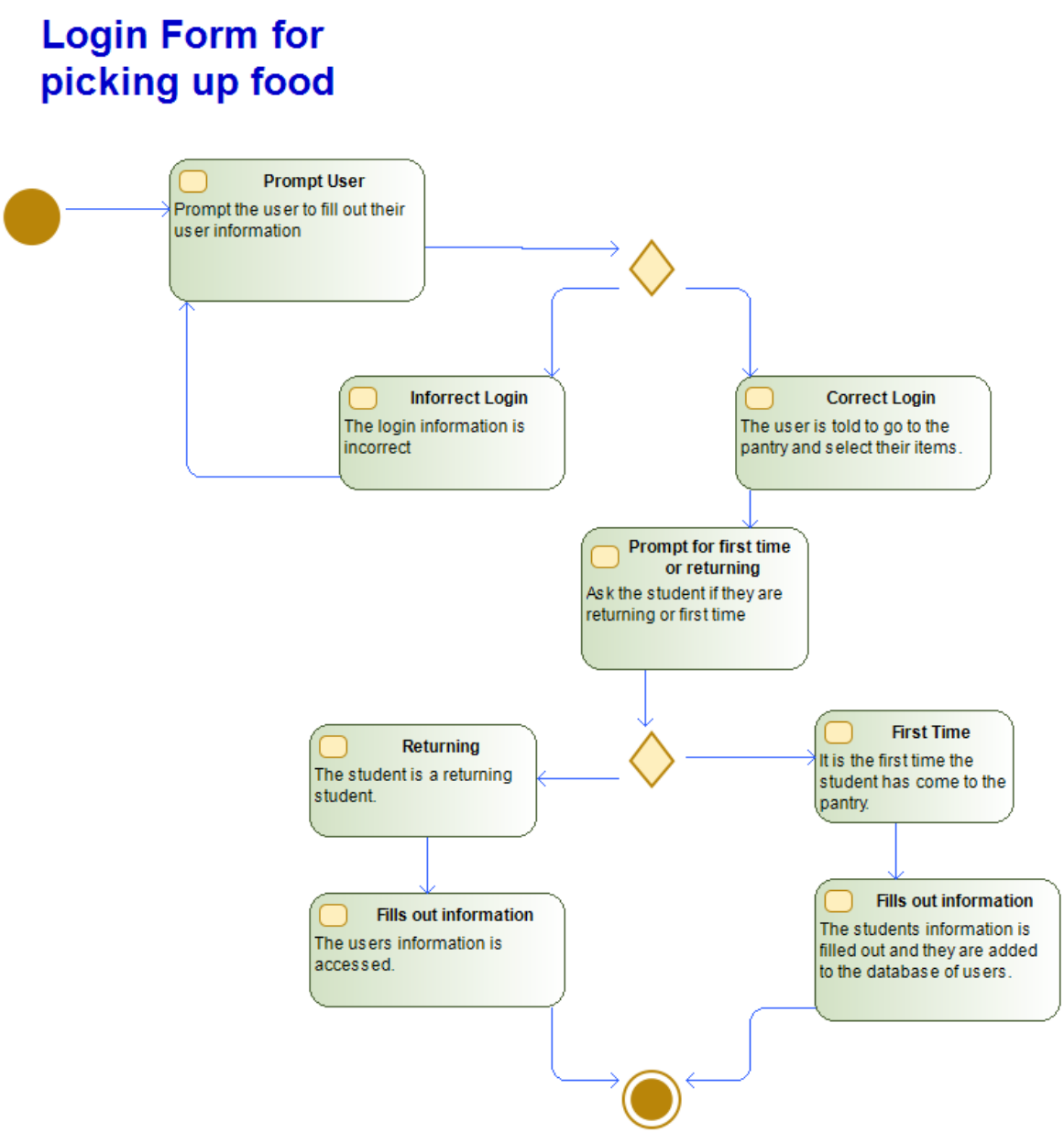
Updated Student Activity Diagram



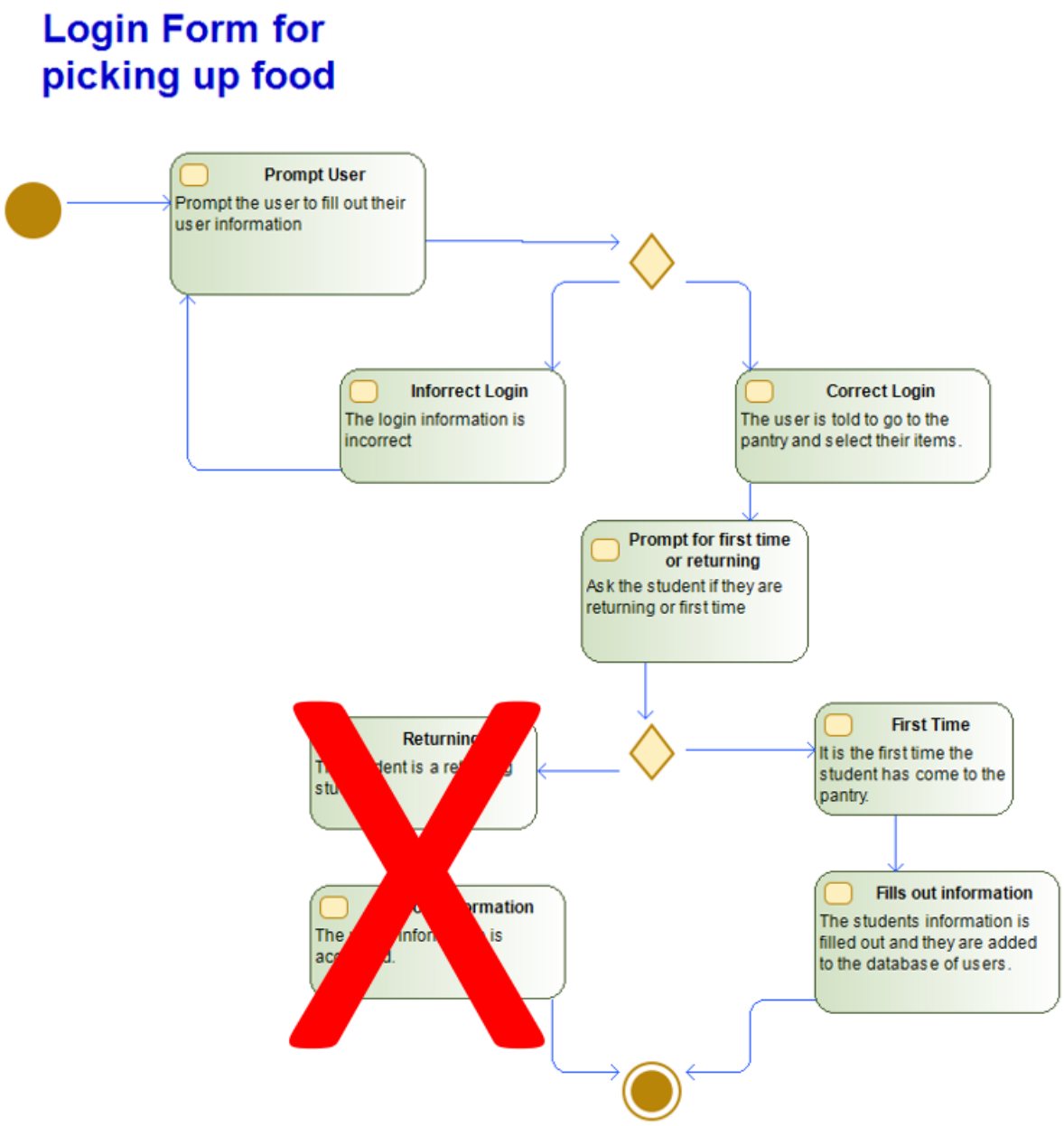
Donator Activity Diagram



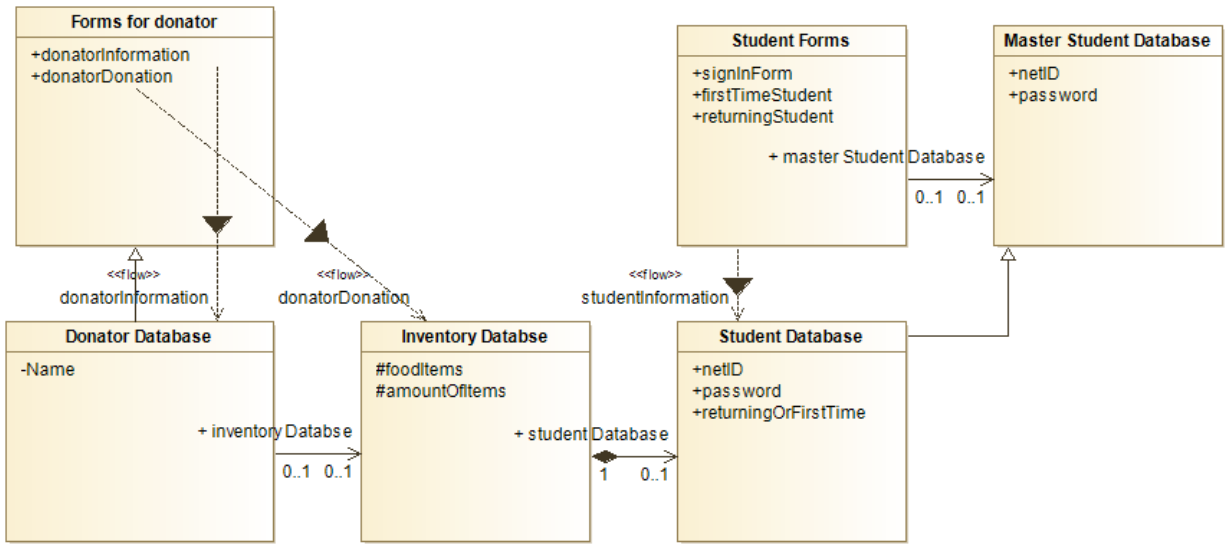
Inventory Form for student activity diagram



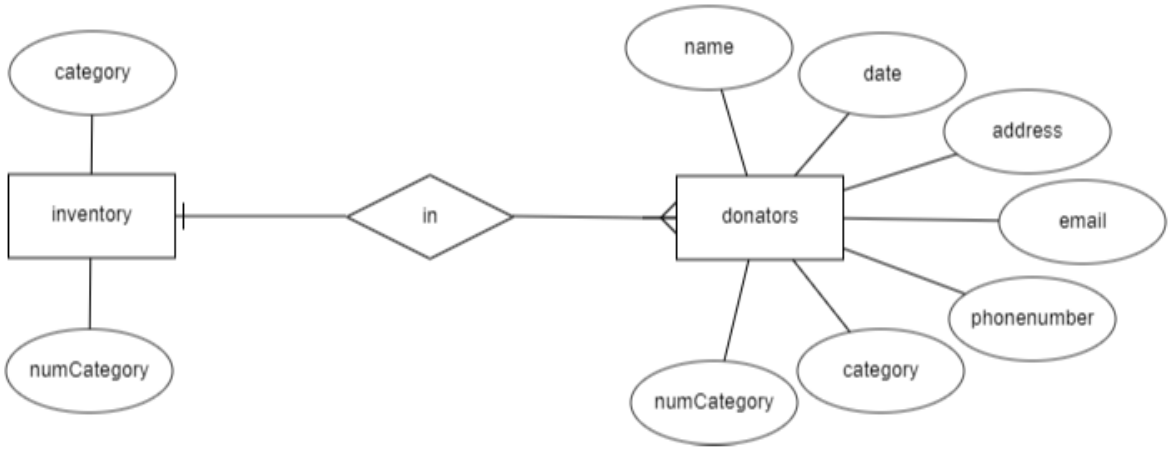
Login form for students picking up food activity diagram



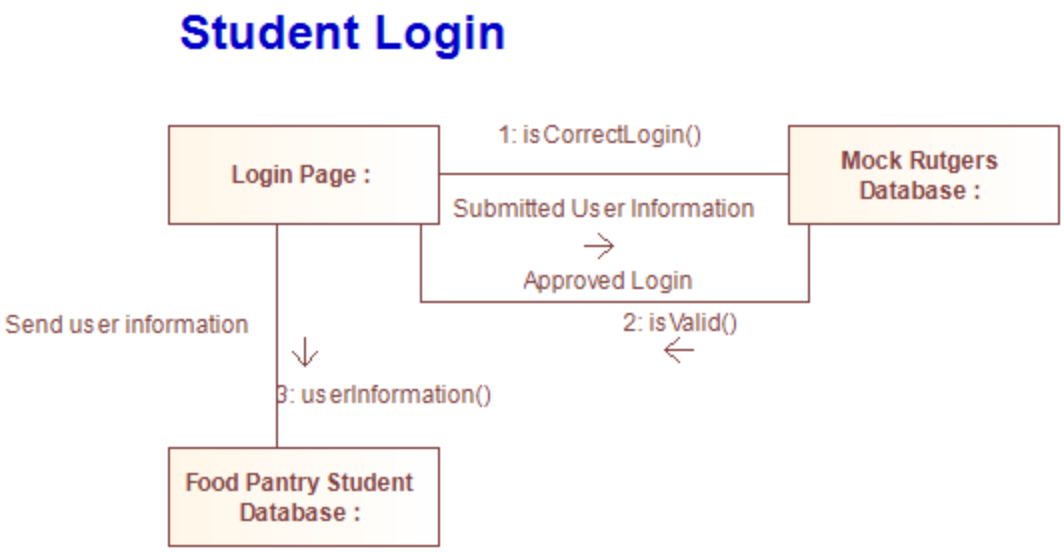
This diagram is an example of edits made to our modeling as we progressed in our sprints as an updated login form for the students picking up food.



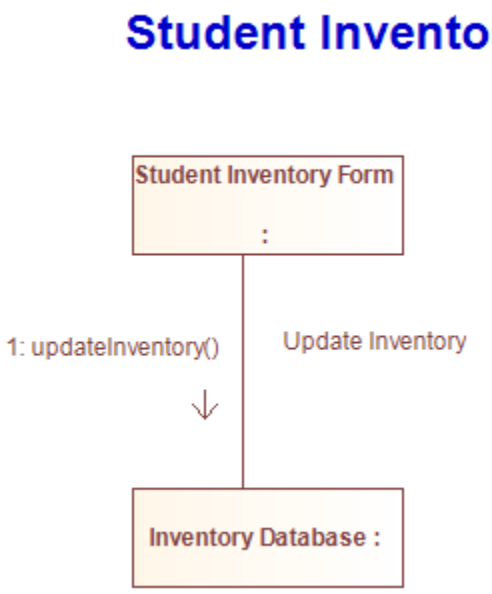
Class Diagram for the entire System



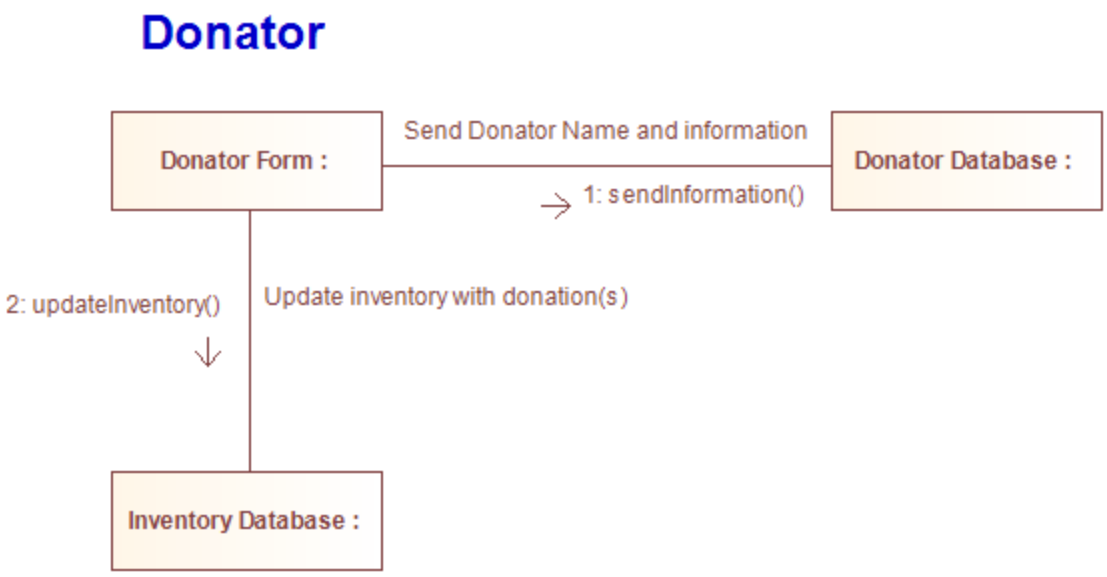
ER Diagram for Food Pantry Database



Behavioral Diagram for student login



Behavioral Diagram for student taking food



Behavioral Diagram for donator donating food

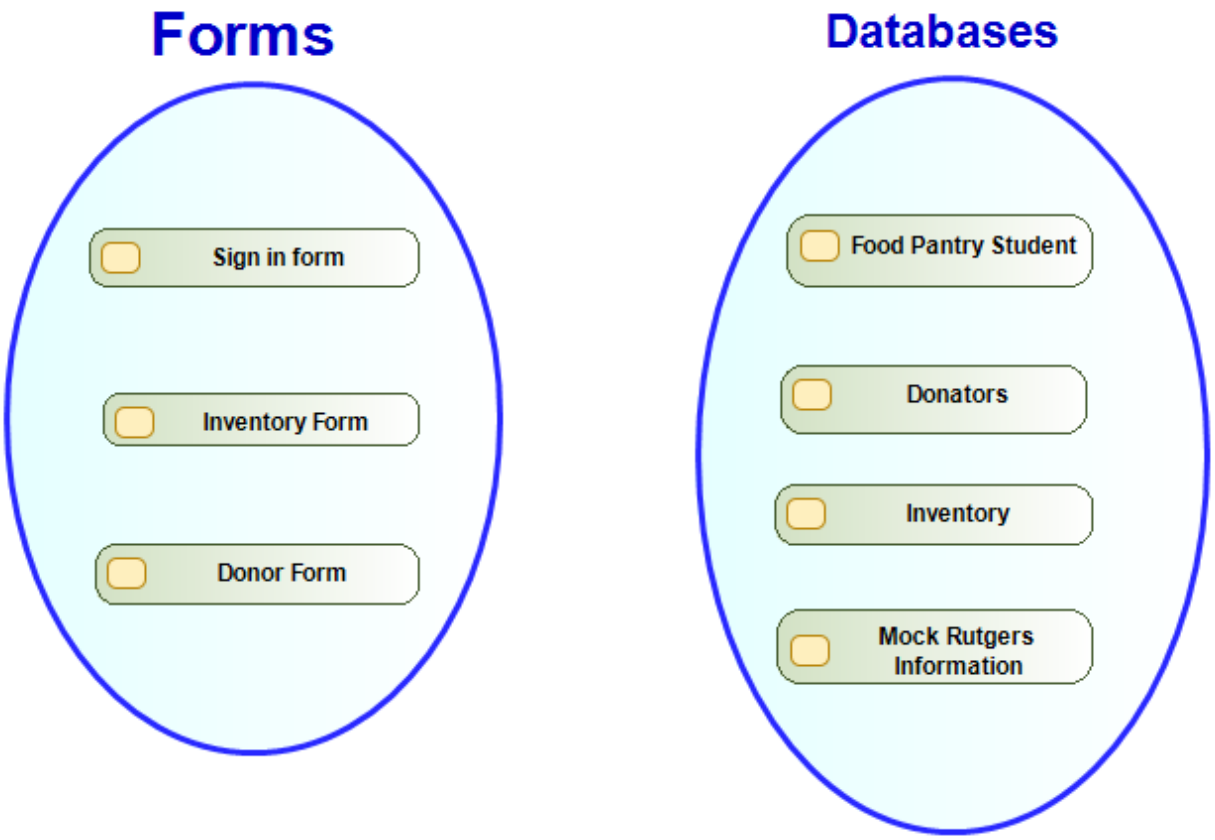
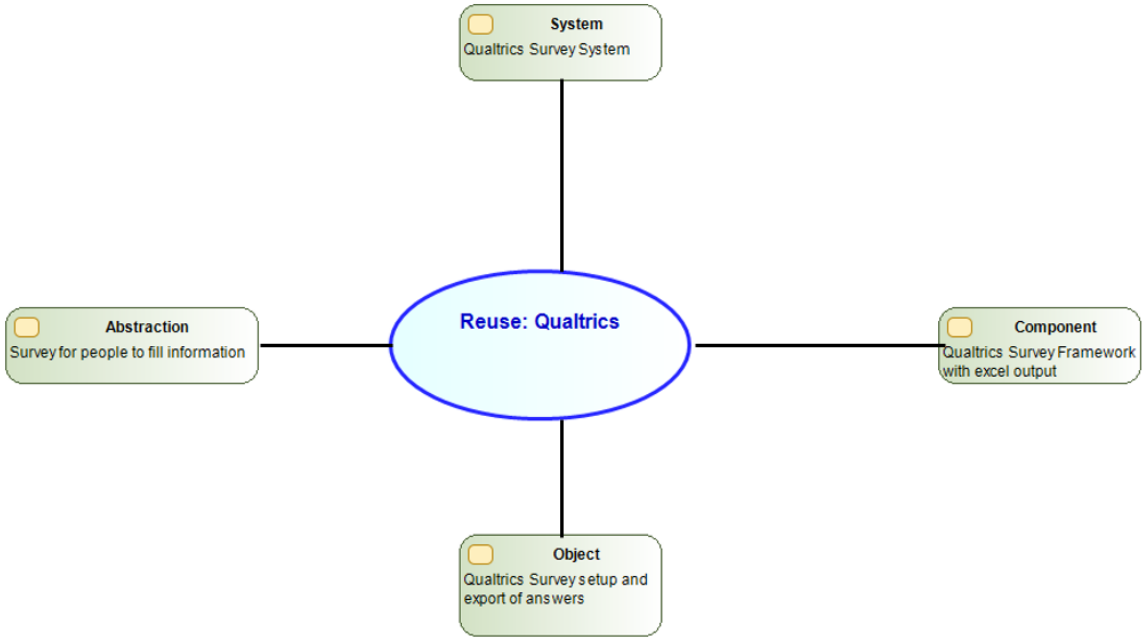
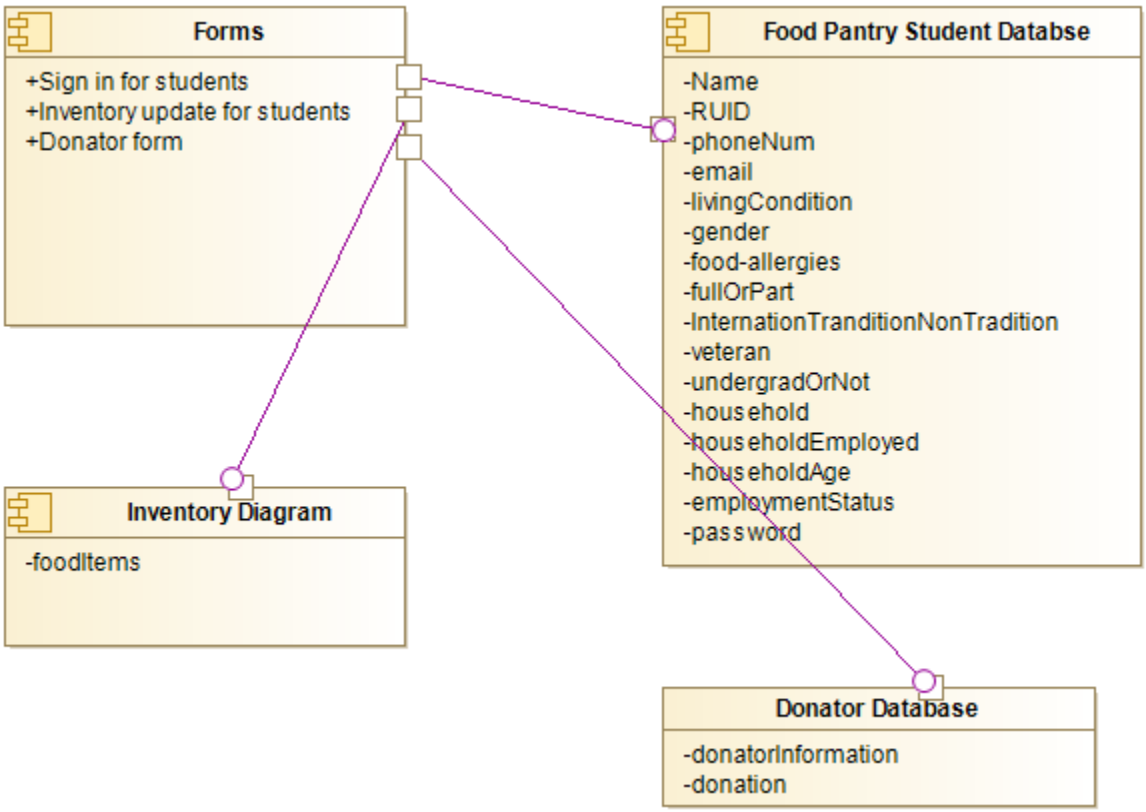


Diagram of all components



Qualtrics Software Reuse Diagram



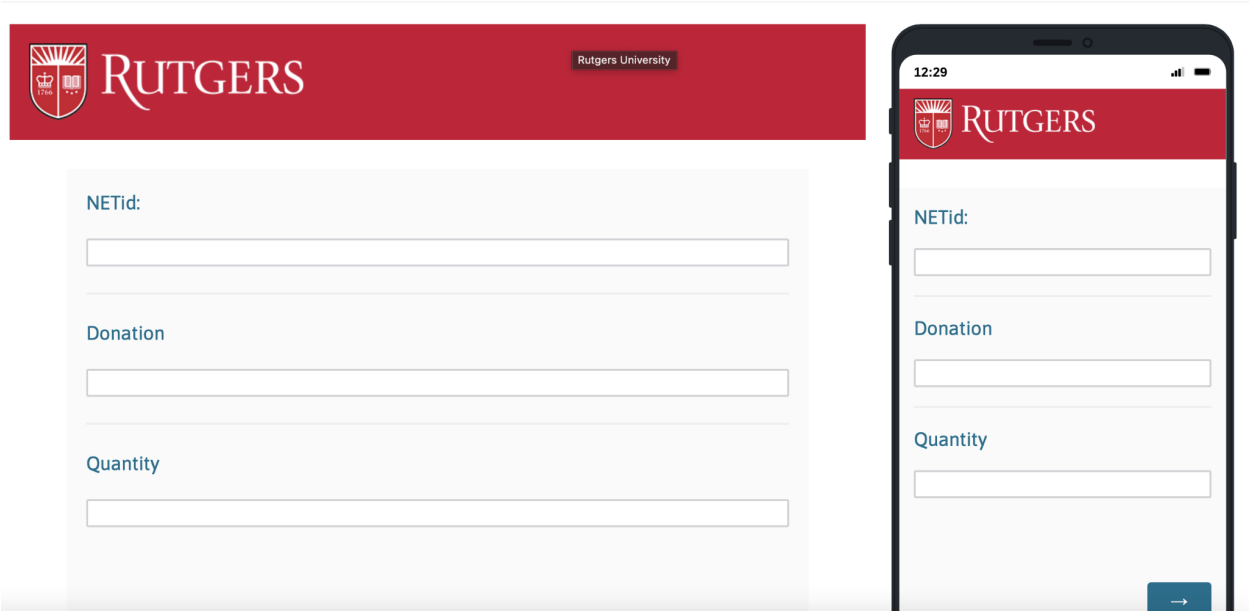
Component Diagram for databases and forms

Design and Implementation of MVP for Each Sprint:

Sprint 1:

The MVP for this sprint is a form which asks for certain information from the user relevant to the goal of software. It first asks for the user to enter their name and netid. Next, it will ask for the user to input the name of what they wish to donate. The final text field will be for the user to enter the quantity which they would like to donate. This was implemented via a qualtrics form. The output of this form is an excel spreadsheet containing the inputted information.

Due to constraints in time for this sprint, it doesn't cover how to delete items from an inventory, in the case that a student takes something from the pantry for instance. Below is an image of the screen in which a user will enter the aforementioned information.



Sprint 2:

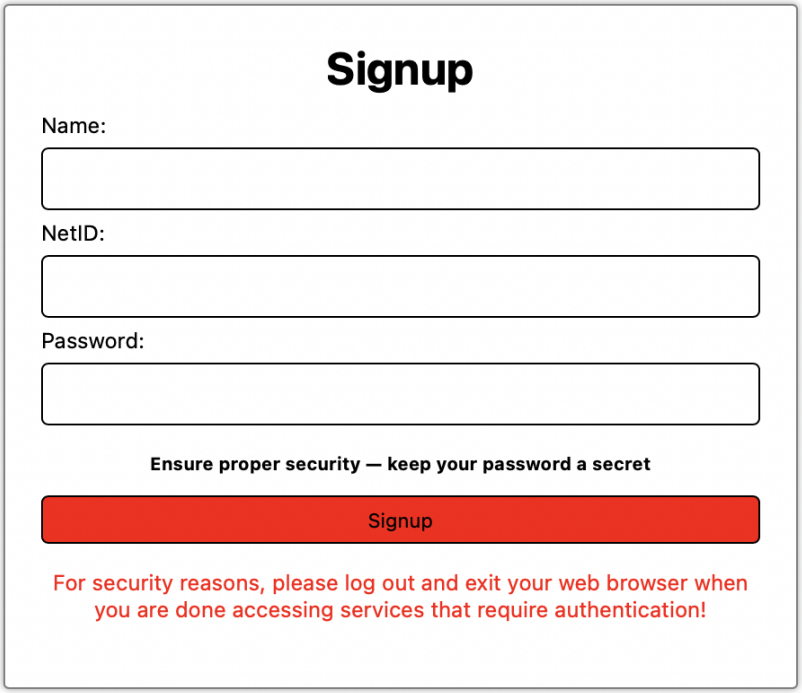
The MVP decided upon for sprint 2 allows the user to sign up and log in to the food pantry website. The website was developed using HTML, a markup language, and PHP to help put the HTML values into the corresponding database. The website values are able to update the database through the local server XAMPP (cross-platform web server) and thus have to be run locally. The database will be a mock representation of the Rutgers student database on a smaller scale suitable for the purposes of this software. It will have the capability to store, manage, and search for students that are created using the sign up form.

The user of the software has the option of filling out a signup form if they have the authority to or a login page. The sign up form takes as inputs the name, netid, and password of the user which then gets written into the corresponding database. This mimics the process of creating a new student registered with the food pantry.

If the user instead decides to log in to the website, the user's netid and password are taken as inputs at which point the database will be scanned to check if a student with matching credentials exists. If not, it will treat the user as a non-rutgers student trying to access the food pantry and deny them entry. However, if the database does find a matching user, they will be successfully logged into the website

Preceding the design of this sprint's MVP, we made the decision to decommission the use of the qualtrics form which was implemented in the last sprint. We made this decision because although the qualtrics form was a convenient way of registering users, the time and effort cost to make it compatible with the database being implemented for the inventory was ultimately too great. The qualtrics form would export the data onto an excel sheet in an unreadable format.

Sign-up Form:



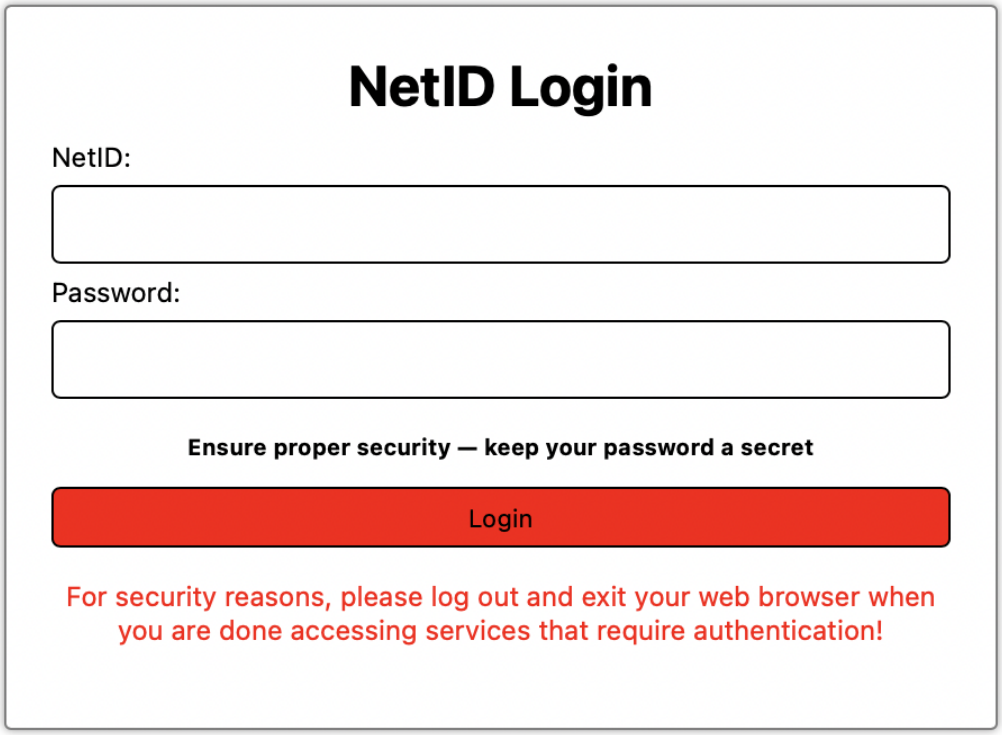
The signup form was used by the team to input into the "Mock Rutgers Database" students that are attending the university. This was so that we could collect a bunch of student test cases that would be used to login to the Rutgers Food Pantry system. The Rutgers Food Pantry is only offered to Rutgers students and so we had to make sure that anybody signing into the system was a Rutgers student. It would work by us writing a name, netID, and password and then this would be sent to the login_info database. A

random RUID would be generated which is implemented inside the signup.php file. An example would be: “Nick Lluen”, “nl403”, “cheese” as the name, netID, and password respectively. This would be stored into the database in order to verify the login information, which is explained in the next section.

+ Options

	id	RUID	netID	password	date	name
Edit Copy Delete	2	475399278	nl403	cheese	2022-04-20 12:40:44	Nick Lluen
Edit Copy Delete	3	429825236	ajp123	josue	2022-04-20 12:41:34	Adams Perez
Edit Copy Delete	4	48145629	rgj204	coffee101	2022-05-02 13:34:46	Rohan Gorajia
Edit Copy Delete	5	958016456	jp543	korean	2022-05-02 14:27:34	Jennifer Pickle
Edit Copy Delete	6	491959468	bj124	software	2022-05-02 20:05:55	Becca Jr
Edit Copy Delete	7	999973183	js509	monkeys	2022-05-02 20:15:09	Jennifer Segura

Login Form:



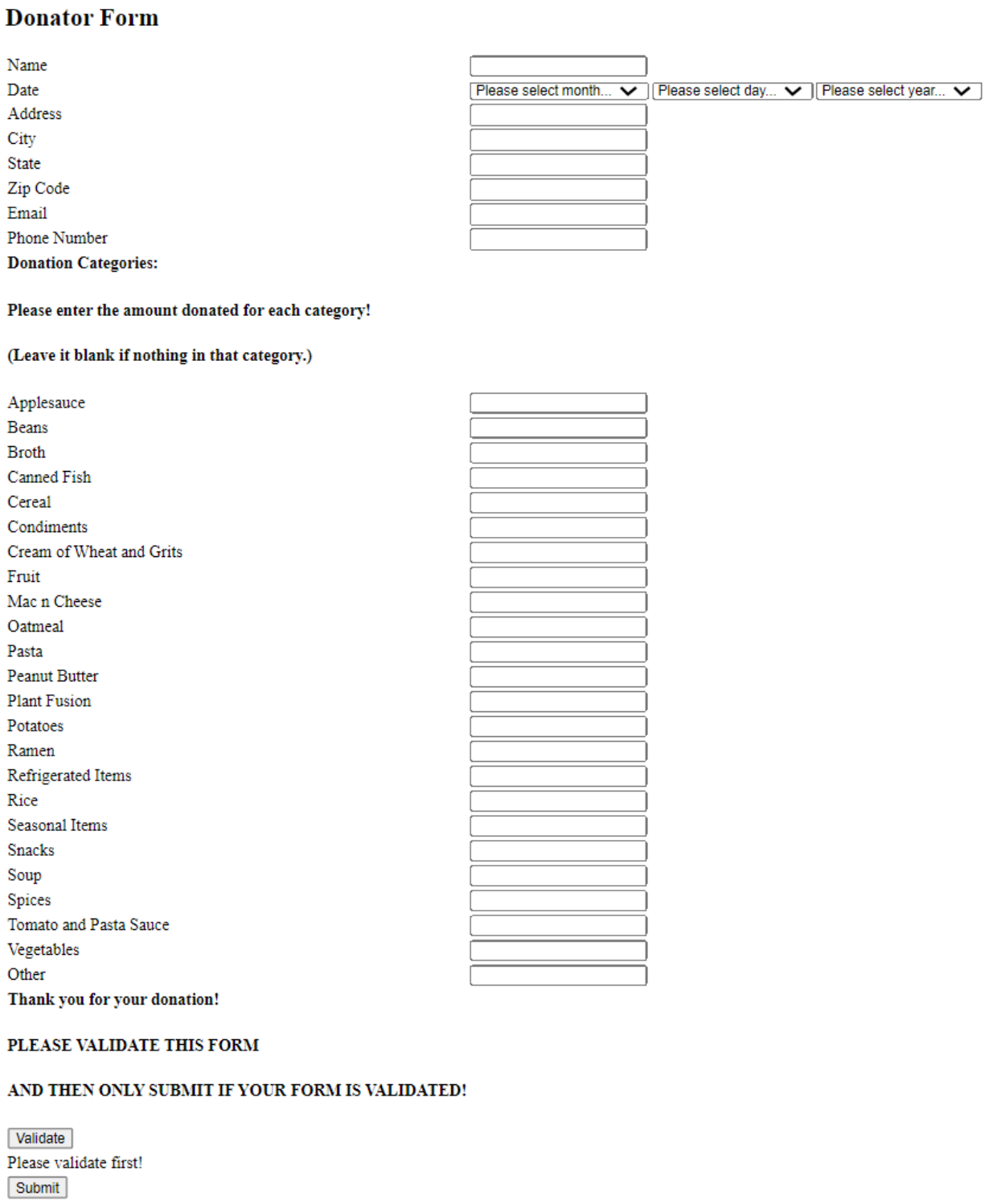
The login form will compare the information posted into the login_info database with the information that the user has typed into the “NetID” and “Password” sections. If the information does not match that of the database then it will not allow the user to login and will prompt them with a text that tells them to retry with valid information. If the

information does match then the user will be prompted to the index page discussed in the next sprint.

Sprint 3:

The donator form and student form are both made using an HTML form that the user inputs their information into, JavaScript inside the HTML file to validate the inputs (name shouldn't have numbers in it, date values should be selected, address just shouldn't be empty, category values can be empty but at least one category should be donated or picked up, etc), and PHP to put the HTML inputs into the FoodPantry database with tables for inventory and donors using SQL queries. XAMPP is the local server used to make the HTML interact with MySQL and have the form make changes to the database so the files are run locally.

The donator form is shown below to demonstrate the inputs the form asks for from the donors. Note that the student form has just the categories since it's an anonymous form (the food pantry doesn't want to know what a specific person picks up from the pantry but they still want the inventory updated).



A donator inputs their information and then presses “Validate” to validate their inputs (certain inputs should have certain formats like name is only alphabetic characters and zip code is 5 numbers and the category inputs should only have numbers or be blank but at least one category should have an input). The donator can donate multiple items in different categories and fill out as many category inputs as

desired as long as at least one category has an input. If the form is valid, the donator presses “Submit” and the donator information and donation categories and amounts are inserted into the donator table of the FoodPantry database and the inventory table of that database has the amounts of each category updated (amounts increase). The donator table has a row inserted for each category and amount donated so a single donator that donates multiple items in different categories has multiple rows inserted with the same donator name, date, etc information.

The student form below only has the categories and the “Validate” and “Submit” buttons work in similar ways to those buttons in the donator form. When “Submit” is pressed, only the inventory table of that database has the amounts of each category updated (amounts decrease).

Student Form

Food Categories: Please enter the amount taken for each category! (Leave it blank if nothing in that category.)

Applesauce	
Beans	
Broth	
Canned Fish	
Cereal	
Condiments	
Cream of Wheat and Grits	
Fruit	
Mac n Cheese	
Oatmeal	
Pasta	
Peanut Butter	
Plant Fusion	
Potatoes	
Ramen	
Refrigerated Items	
Rice	
Seasonal Items	
Snacks	
Soup	
Spices	
Tomato and Pasta Sauce	
Vegetables	
Other	

PLEASE VALIDATE THIS FORM

AND THEN ONLY SUBMIT IF YOUR FORM IS VALIDATED!

Validate

Please validate first!

Submit

Generally, the donator form is the only form that the donator (could be any person) has to fill out and that information is stored in the donator table of the FoodPantry database. The student form is filled out anonymously when the student is exiting the food pantry (they have to fill out the login form when entering the food pantry). Both forms update the inventory table of the FoodPantry database so that the food pantry can easily keep track of inventory.

There is a video that shows us putting valid inputs into the Donator Form and looking at the donor table and inventory table of the FoodPantry database changing. There is also a video that shows us putting valid inputs into the Student Form and looking at the inventory table for the FoodPantry database changing. Putting invalid

inputs would show errors when trying to validate the forms and the donator/student shouldn't submit the form so the inputs don't change the tables in the database.

Shown below is the donator table of the FoodPantry database and then the inventory table of the FoodPantry database after all the group members donate to the food pantry (shown in the donators table and increases the numCategory in the inventory table), all of the items they donated are picked up by anonymous students (decreases the numCategory in the inventory table back to 0), Shantenu Jha donates to the food pantry (shown in the donators table and increases the numCategory in the inventory table), and two cereals are picked up by anonymous students (decreases the numCategory for cereal in the inventory table).

name	date	address	email	phonenumber	category	numCategory
Rebecca Kim	2020-06-06	33 Rutgers Rd, Piscataway, NJ 08854	rbccjkm@gmail.com	1112223333	applesauce	1
Jennifer Penaranda	2019-09-19	1 St, Ekdfks, NJ 31111	rr@gmail.com	1234567890	beans	2
Adams Perez	2018-02-04	2 Rd, Eld, NJ 03939	ajp@hotmail.com	2839583748	fruit	4
Nick Lluen	2022-05-02	44444 Tt Ln, New Brunswick, NJ 32222	tt@ln.org	9381112345	applesauce	20
Nick Lluen	2022-05-02	44444 Tt Ln, New Brunswick, NJ 32222	tt@ln.org	9381112345	beans	500
Rohan Gorajia	2020-12-25	2 St, Tokyo, NJ 54321	japan@govt.gov	1912031933	other	100
Shantenu Jha	2018-02-03	12 SWE St, New Brunswick, NJ 12345	swe@ru.edu	1231231234	cereal	5
Shantenu Jha	2018-02-03	12 SWE St, New Brunswick, NJ 12345	swe@ru.edu	1231231234	vegetables	2

category	numCategory
applesauce	0
beans	0
broth	0
canned fish	0
cereal	3
condiments	0
cream of wheat and grits	0
fruit	0
mac n cheese	0
oatmeal	0
pasta	0
peanut butter	0
plant fusion	0
potatoes	0
ramen	0
refrigerated items	0
rice	0
seasonal items	0
snacks	0
soup	0
spices	0
tomato and pasta sauce	0
vegetables	2
other	0

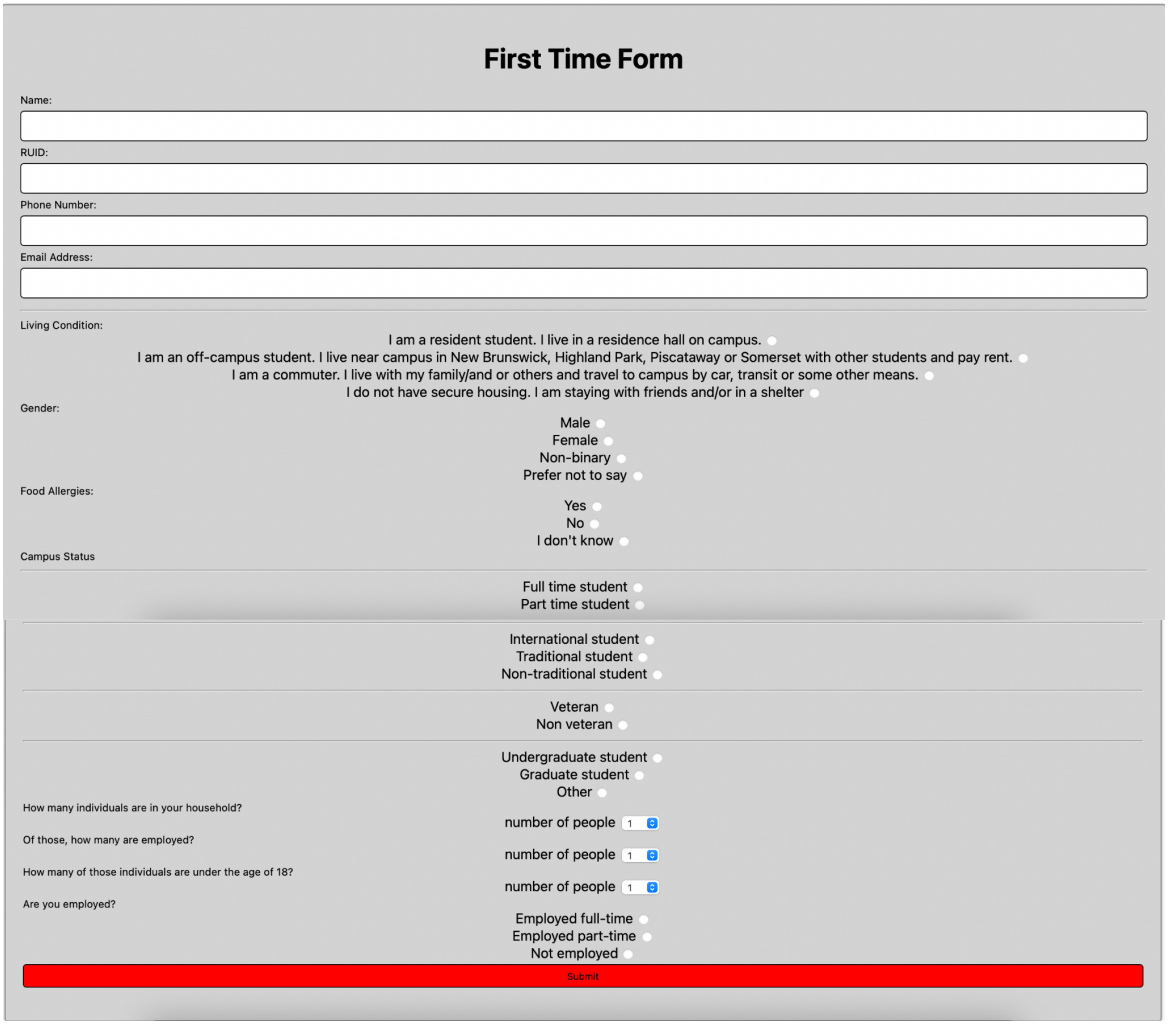
Logout

Hello, Nick Lluen

First Time Form

This is the index page that appears once the specific user is verified and logged in. It will prompt them with their name in order to prove that it is their own unique page. On this page there is the potential to logout and to click on the first time form. The first time form will send the users to the next section.

First Time Form:



Here the user will now fill out the form according to what suits them with the choices provided. This information will be inputted into the foodPantry_users which is a database that keeps track of the students that use the food pantry.

id	name	ruid	phone_number	email	living_condition	gender	food_allergies	full_or_part_time	international_or_traditional	veteran	undergraduate_or_not	household_number	household_employed	household_age	employed
1	dkeedf	2032043	2920939	g@h.com	resident	male	yes	full-time-student	international-student	veteran	undergraduate-student	1	1	1	
2	ncik	202020	102039003	h@g.comg	off-campus	male						1	1	1	
3	Nick	192006819	9736418554	n@h.com	no-housing	non-binary	idk	part-time-student	non-traditional-student	non-veteran		1	1	1	
4	fjnjerj	2200	193949	h@h.com	commuter	no-answer	yes	part-time-student	international-student	non-veteran	graduate-student	2	1	1	
5	Nick	192006819	97344	n@n.com	resident	non-binary	no	part-time-student	traditional-student	non-veteran	other	1	1	1	
6	Nick	192006819	929329	h@h.com	commuter	female	yes	part-time-student		veteran	graduate-student	4	3	1	
7	Nick	100	1010	h2@h.com	commuter	no-answer	no	full-time-student				1	1	4	
8	ferfe	20202	20200	h@h.com								1	1	1	
9	kmkkk	9999	0									1	1	1	
10	kjjj	9202	202									1	1	1	not-employed
11	kkk	29292	1021020	h@h.com	resident	male	idk	full-time-student	non-traditional-student	non-veteran	graduate-student	1	1	1	employed-part-time
12	Nick	192006819	9736418554	nlluen24@gmail.com	resident	male	no	full-time-student	traditional-student		undergraduate-student	5+	2	3	employed-part-time
13	Adams	19999	1109292	n@h.com	resident	female	idk	part-time-student	international-student	veteran	other	5+	5+	5+	not-employed
14	Becca Jr	192006819	9734306789	beccajr@hotmail.com	resident	female	idk	full-time-student	traditional-student	non-veteran	undergraduate-student	5+	3	4	employed-full-time
15	Jennifer Segura	999973183	111111111	jsegura@hotmail.com	resident	non-binary	yes	full-time-student	traditional-student	non-veteran	graduate-student	5+	3	5+	employed-part-time

Once the student has submitted their information, they will be prompted with a thank you text and then they will be able to log out. From here, the students will be able to enter the food pantry.

Thank you!

Logout