

IS 4430 Final Project

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The University of Utah’s Lost and Found App will utilize Microsoft Azure as its front-end application. Azure provides a set of tools that can be used to help build the application. This service will enable us to utilize the React Native (JavaScript) framework to develop cross-platform mobile apps compatible with iOS/Android. This ensures a consistent format with responsive layouts that adapt images, text, and UI components to any screen size. Another front-end service that will allow us to implement an intuitive search bar is React.js. The React framework library that would be connected to Azure Cognitive Search will help build a dynamic search bar displaying real-time suggestion options that filter down based on the user’s input. This enhances the user experience by providing real-time feedback, which can potentially accelerate the search process. Azure’s cloud-based offerings also eliminate the need to establish a new IT department with the physical hardware and employees, which ultimately keeps expenses low.	26
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Part 1: Team Organization

Group Member Overview

- **Nicole Wolfe:** I am a senior at the U, majoring in information systems. I am interested in the combination of tech and sales analysis and the effects it has on youth in America. I love to ski, surf, and cook fun meals in my free time.

- **Jenny Kyizom:** I am an Information Systems student at the U. I am interested in tech, especially how tech can improve business operations and help people stay connected. I was born and raised in Salt Lake City, Utah, and I love to dance.

- **Karrie Roy:** I am a current Information Systems major and am working to pursue my MSIS from the fall semester! I have a strong interest in technology and data, and I'm looking forward to learn more about data analytics and software tools. Something unique about me is that I love hip-hop/rap dance, and have danced competitively for 6 years.

- **Zach Fletcher:** Hi everyone, I am an IS and OSC major with a minor in business analytics. I am interested in data analytics, UX, and product management. Currently, I am doing an internship with GE Healthcare as a material planning intern.

Project Usage Disclosure Statement:

Our project, *Campus Lost and Found System*, was developed as part of coursework for IS 4430 at the University of Utah. Its purpose is to demonstrate the application of systems analysis and design principles through the creation of a conceptual system that assists students and staff in reporting, managing, and recovering lost items on campus. The project does not reflect the current lost and found system at the University of Utah, and utilizes fictional users, not real students. While it may be shared with peers, faculty, or included in team members' academic portfolios, any use, reproduction, or distribution of the project beyond an educational setting requires prior written consent from the project team, "Big Data Ballers".

Part 2: Project Selection & Requirements Analysis

Executive Summary

Business Problem

The university currently uses an outdated lost and found system. It relies on single shared excel for the recording and tracking of items, which can lead to inaccurate records and vague item descriptions. The current system has no quick method for communication once an item has been found, leading items sitting in the lost and found for extended periods of time. The current system also has no other tools for verification other than asking questions, which can lead to fraudulent claims. There is a high level of uncertainty because there is not an easy way for students to see the status of their lost item.

Solution

To address these challenges, we propose a mobile friendly lost and found app. The system would allow students to submit a report for lost items, while administration submits a report for found items. The system would allow users to submit a greater variety of information and receive automatic emails or text messages about potential matches. The system would include the following:

- Secure login with university SSO and multifactor authentication
- Report submissions with photos, descriptions, location found / lost, date found / lost, search tags
- Assign search tags for better matching
- Status tracking for students to view their reports at a glance
- Admin interface for verifying and approving item claims
- Keyword search and filtering
- An ownership verification workflow

Impact

The implementation of this app would streamline the recording of records, minimizing inaccuracies and offering a simpler solution for managing lost item data. An automatic notification system and search function would allow students to allow students to receive immediate feedback and provide peace of mind being able to search through a history of their potential matches. This would greatly speed up the time it take to retrieve a lost item. Lastly, a verification system would allow an extra security measure against fraudulent claims.

Target Actors:

Our target actors in this project are the students at the University of Utah. Our specific audience is students who have lost items on campus and are trying to get them back. The system will require the campus staff and admin who are in charge of tracking lost items to interact with the system and manage the lost and found system inventory.

Detailed Requirements:

Interview Questions for a University Campus Employee (Lost and Found Staff)

Employee Interview

Questions	Answers
1. Can you describe your role and responsibilities regarding the lost and found?	I'm in charge of tracking items turned into the front desk and verifying the ownership of items when students ask to see items in the lost and found.
2. What is the current process for returning lost items?	Someone turns in a lost item, I log it in my excel sheet. When someone asks if we have an item in the lost and found, I ask them to describe some defining features of the item, before giving it to them and deleting the item from the excel sheet.
3. What kind of information do you record when an item is found or claimed, if any?	I log the date, location it was found, an item description, and the name and UnID of who turned it in.
4. How do you communicate with students who report or claim lost items?	We ask them to call the front desk again later to see if their lost item has been turned in.

5. What tools (software, spreadsheets, databases, paper logs) are currently used to manage the lost and found?	We use a shared Excel file to track the lost and found.
6. Are there any limitations with the current system?	Yes. It can be difficult to determine who actually owns an item, we can forget to delete entries from the excel file, and it can be difficult to keep track of all the items in Excel.
7. What are the most common challenges you face in managing lost and found items?	Matching items with vague descriptions, limited storage space, and finding that item in excel is our biggest issues.
8. How often do items go unclaimed, and what do you do with them?	Most do not get claimed. After 60 days, we donate them to a local charity.
9. Have there been issues with fraud, misidentification, or disputes?	Yes, since all we can really go off of is whether or not they can describe the item.
10. How easy is it for students to report or retrieve lost items?	Very easy, if they know to talk to the front desk.
11. Do you receive feedback from students about the lost and found process? If so, what do they typically say?	Some feel frustrated on how slow and outdated the process

	feels. A few have suggested a more automated system.
12. What improvements would you recommend for the current system?	A mobile or web-based app where students can report, search, and get notifications about lost items.
13. What features would you like to see that would make your job easier?	A searchable database with photos, and the ability to verify that was the student who reported the lost item.

Interview Questions for a Student Who Has Used the Lost and Found

Student Interview

Questions	Answers
1. What process did you go through to get your items back?	Went to lost and found to see if items were returned. You called the lost and found number. They had me provide a description of the item so they could call me if the item was turned in.
2. What did you think of the process?	I liked how they took my name, number and the description of the item.
3. How long did it take to locate and retrieve your item?	It took about 3 days.
4. Did you have to provide any proof of identification to claim your item?	They asked for my student ID and to describe the item.
5. Were you satisfied with how your case was handled? Why or why not?	The admins were understanding and pointed me to the right resources
6. Would you improve any parts of the process?	I think it would be better if there was a system that tells you whether something has been turned in.
7. What parts did you like in particular about how the process was structured?	I like how they contacted me when an item was found, I didn't have to constantly check up on them.
8. Do you feel confident that the current lost and found system works well? Why or why not?	I think it relies too much on word of mouth. People don't know
9. What features would you like to see in a lost and found system (e.g., online search, notification system, item photos)?	Notification system if an item matches. If there was a search bar I want it to be secure. A map of where all the lost and found in each building were kept would be nice.

10. Would you be more likely to report lost items if there were digital integration?	It would make it easier to report items and check if they were there.
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Survey Questions:

1. Have you ever utilized the lost and found on campus?
 - a. No
 - b. Yes
2. Were you successful in finding your lost item?
 - a. No
 - b. Yes
3. How satisfied were you with your experience of the university's lost and found process? (1 worst – 5 best)
4. How difficult is it to recover a lost item using the university's lost and found? (1 extremely difficult – 5 extremely easy)
5. How likely are you to use an app for reporting and finding lost items on campus? (1 extremely unlikely – 5 extremely likely)
6. How useful would you find each feature? (1 not useful – 5 extremely useful)
 - a. Reporting a lost item through a user-friendly online or mobile app
 - b. Ability to upload pictures of lost and found items
 - c. Automatic email and/or SMS notifications when a lost item is found
 - d. Ability to match reported lost items with found items in the lost and found
 - e. The ability to view previously created lost item reports and view their status at a glance
 - f. The ability to search previous potential matches by keyword or description to find the correct item
 - g. Stronger verification of ownership process
 - h. Ability to assign search tags to item reports to streamline matching and searching
7. You would use a centralized platform to report and search for lost items (1 strongly disagree – 5 strongly agree)
8. How important is it that a lost and found system works well on mobile devices? (1 not important – 5 extremely important)
9. Do you have any recommendations for features of a university lost and found app? (text-based answer)
10. Do you have any suggestions on how to improve the current Lost and Found system? (text-based answer)

Analysis of Interviews:

The initial idea is that both the front desk administration and students would have to interact with the lost and found app, and so a student and front desk employee were interviewed. An interview is a great way to gather qualitative data, and get a more in depth look at the current system used by the University of Utah. Their current process involves a student turning a lost item they had found into the front desk. The employee records the date, the location it was found, the item description, and the name and UnID of the student that turned in the item in an excel sheet. Once there, the item is stored in a closet with little organization. A student will then ask the front desk about the lost item, where they will verify if that student is the owner of the item by asking them about the notable characters of the item. Once verified, the record in excel is deleted and the item is given to the student. If the item requested is not in the lost and found, then the front desk asks the student to call them in a few days. The employee has expressed several pain points with the current system, noting reliance on excel, records left open after verification, fraudulent item claims, having to match items to vague descriptions. From the student's point of view, they emphasized how much the lost and found system relies on word of mouth for students to properly utilize it. The student expressed the need for more reliable communication when lost items are found. The student suggested an automatic notification system with a verification system which would streamline and speed up the current process. An automatic notification system would also solve the admin's problem of unreliable recording of data, and provide a stronger method of verification, while also filling the student's need for a simpler process.

Analysis of Survey:

The survey analysis provided clear feedback on what stakeholders think about the current lost and found system, and their perceptiveness to a digital lost and found system. Looking at figure 1, most users found it slightly difficult to recover items using the current lost and found system. Respondents showed a moderate to low satisfaction with the current lost and found system. Most respondents said that they were somewhat likely to use a lost and found app, with all respondents agreeing they would use a centralized online system for the lost and found, as seen in figures 3 and 4. Notably, as shown in figure 2, respondents were highly perceptive to the suggested features. Results showed that a search function, "See My Reports" page, and automatic notifications would be highly useful in a lost and found app, with average scores between 4.60-4.80 out of 5. Respondents emphasized the ability to use mobile devices, and ease of use.

Figure 1

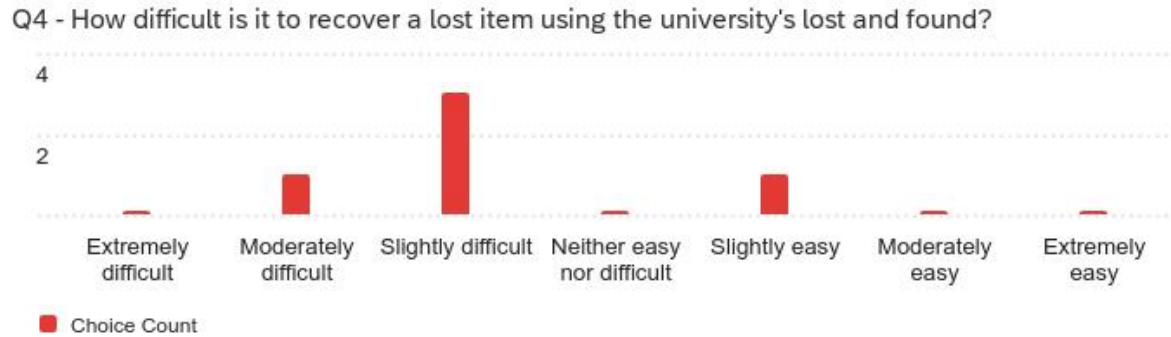


Figure 2

Q6 - How useful would you find each feature?

Field	Min	Max	Mean	Standard Deviation	Variance	Responses	Sum
Reporting a lost item through a user-friendly, online or mobile app	2.00	5.00	3.80	1.17	1.36	5	19.00
Ability to upload pictures of lost and found items	4.00	5.00	4.40	0.49	0.24	5	22.00
Automatic email and/or SMS notifications when a lost item is found	3.00	5.00	4.20	0.75	0.56	5	21.00
Ability to match reported lost items with found items in the lost and found	1.00	5.00	4.00	1.55	2.40	5	20.00
The ability to view previously created lost item reports and view their status at a glance	4.00	5.00	4.80	0.40	0.16	5	24.00
The ability to search previous potential matches by keyword or description to find the correct item	3.00	5.00	4.00	0.89	0.80	5	20.00
Stronger verification of ownership process	3.00	5.00	4.20	0.75	0.56	5	21.00
Ability to assign search tags to item reports to streamline matching and searching	3.00	5.00	4.60	0.80	0.64	5	23.00

Figure 3

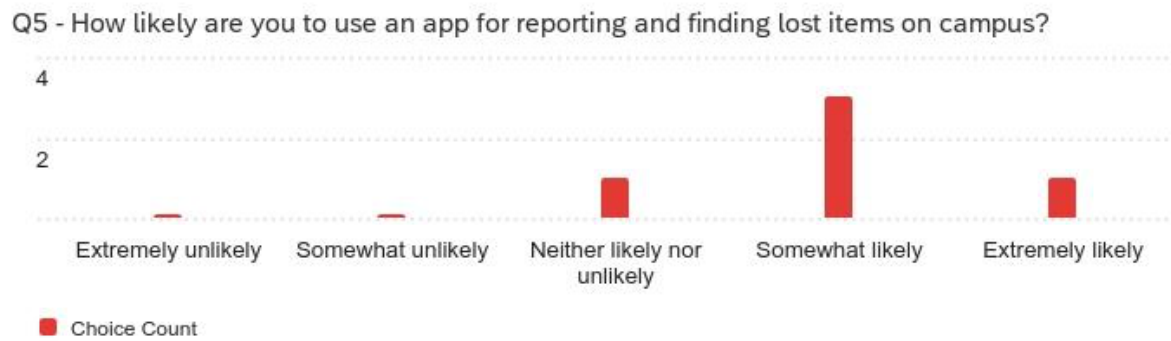


Figure 4

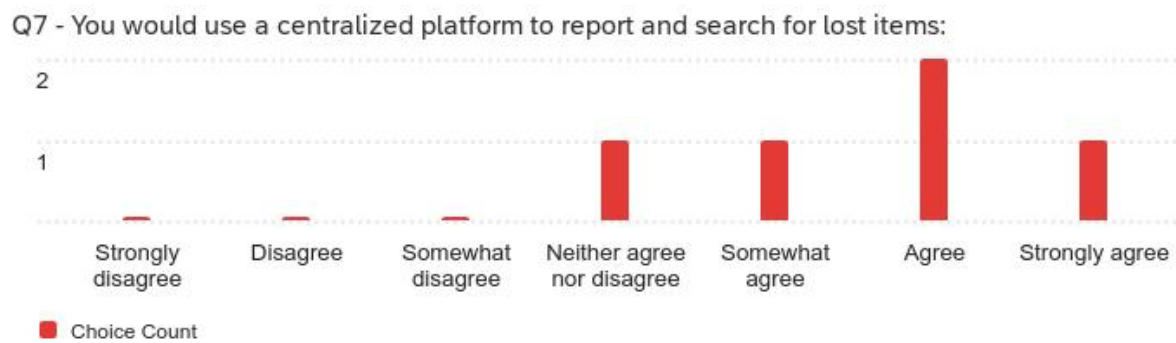
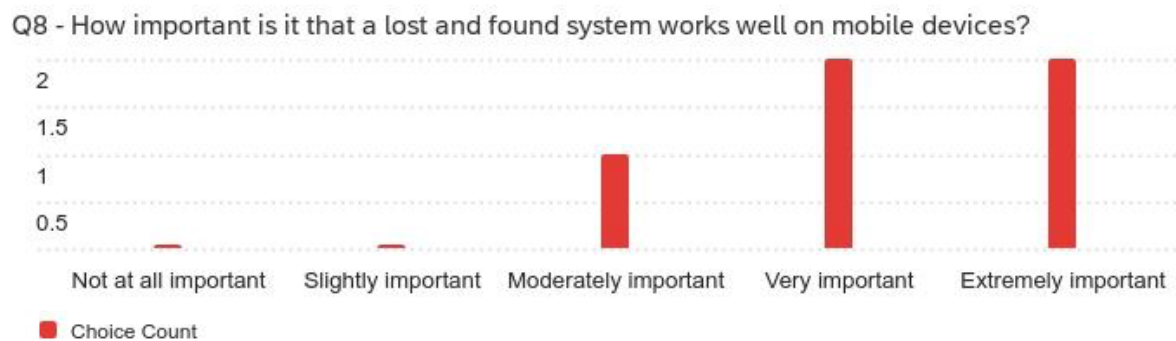


Figure 5



Functional and Nonfunctional Requirements

Given these results, We have decided upon these requirements for the new lost and found app:

Functional requirements:

1. Allow users to login into app with UnID credentials and allow PingID multifactor authentication

2. Allow students to report a lost item with a “Report lost Item” button by entering a description, location lost, date, search tags through a drop-down box, and contact email.
3. The system will optionally allow students to upload pictures of the lost item to lost item reports
4. When a lost item is returned to a front desk, the system must allow administration to submit a found item report with a “Report Found Item” button. They can then submit it’s description, an image, location found, date found, and which building’s front desk the found item can be retrieved.
5. The system must match lost item report descriptions and search tags with similar found item report descriptions and search tags. If a potential match is found, an automatic notification email is sent to the owner of the lost item report.
6. A “see my reports” button allows students to view a list of lost and found item reports they have created and shows their status of “Lost” or “Found”. When a report is clicked, it leads to that item’s report page.
7. Lost item report pages must display the corresponding reports information.
8. Found item report pages must display the corresponding reports information
9. On the lost item report page, students must be able to view potential matches below the lost item report information.
10. Students must be able to request verification of ownership of a matched lost item report and found item report with a button found in the automatic notification email.
11. Students must be able to search lost items reports’ description and filter results using search tags using a search bar
12. After Administration verifies a student’s ownership at the front desk by asking questions, Administration can approve the request for verification with button click and their UnID password.
13. Report lost and found Item forms must be identical to each other, save the only difference is which option you choose at the beginning, “Lost” or “Found”.

Nonfunctional requirements:

1. The app should support mobile devices
2. The app must have intuitive UI that requires minimal external help

High-Level Scope

Project’s Purpose

The project's purpose is to create and implement a centralized, student-friendly Lost and Found system for the University of Utah. The system enhances the process of locating, reporting, and reclaiming lost items throughout the campus. Creating this system will reduce the number of unclaimed items, increase the recovery rate for items, and enhance communication throughout campus.

Search by Categories

<u>Type</u>	<u>ID#</u>	<u>Title</u>	<u>User</u>	<u>Description</u>
F	1	Browse by item category	Student	As a student, I want to see items grouped by categories so I can quickly find similar lost/found items.
F	2	Open the lost & found portal through the CIS app	Student	As a student, I want to access the system via the CIS browser so I can view recent listings
F	3	Search for an item	Student	As a student, I want to use the search bar and type keywords such as “AirPods” or “water bottle” to locate my lost item more quickly and easily.
F	4	Filter by date	Student	As a student, I want to add a date filter (ex., 3-17) so it shows me the most relevant items during that time frame
F	5	Filter by location	Student	As a student, I want to filter results by buildings on campus (SFEBB or CRCC) so I can narrow down the items for locations
F	6	Save Searches	Student	As a student, I want to save my search filters (date & location) so I don't have to reapply them each time I visit the app.
F	7	Report a Lost Item	Student	As a student, I want to fill out a form to report a lost item with location, image, date, and description. Which allows others to help me find it.
F	8	Claim an Item	Student	As a student, I want to submit a claim request for a found item, providing ownership verification to retrieve my lost property.

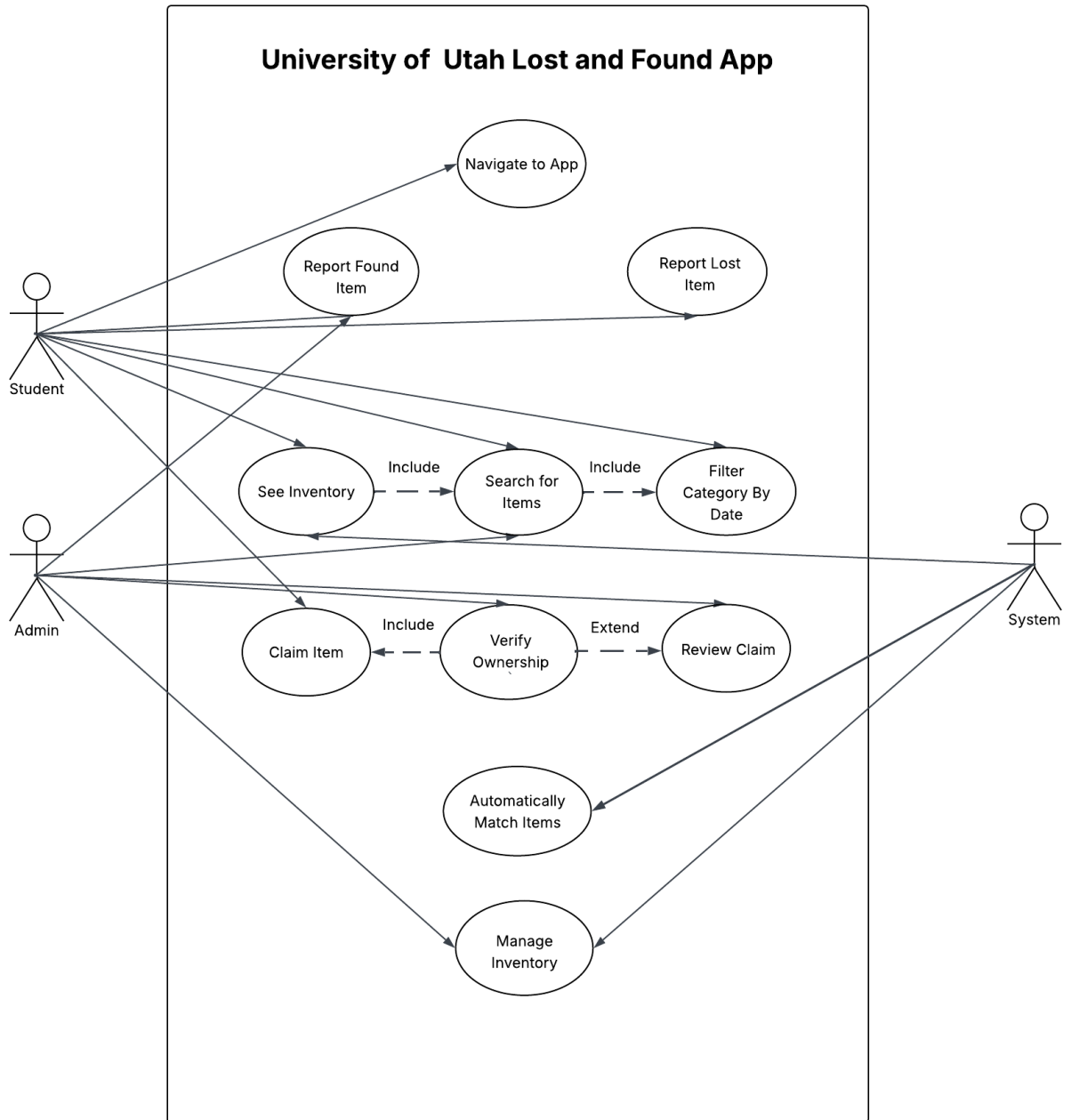
NF	9	Intuitive search	Student	The interface must be easy to use (ex, finding the search bar easily and filtering items) with tips on guiding first-time users
NF	10	Moblie Responsiveness	System	The portal must adapt to all screen sizes.

Acceptance Criteria

<u>Type</u>	<u>ID#</u>	<u>Title</u>	<u>User</u>	<u>Description</u>
F	1	Browse by Item Category	Student	Given that I am a student on the lost & found portal, when I view the main page dashboard, I see items grouped by categories (Waterbottles, Clothing, Accessories)
F	2	Open the lost & found portal through the CIS app	Student	Given that I am logged into the CIS system, when I view the main page and click on the “Lost & Found App” link, I am redirected to the portal without logging in again.
F	3	Search for an item	Student	Given that I am on the lost & found portal, when I type keywords (AirPods) into the search bar and press Enter, I see the list of similar/matching lost/found items.
F	4	Filter by date	Student	Given that I am viewing the search results, when I select a date (ex., March 18-22) from the filters, I will only see items reported lost between those dates.
F	5	Filter by location	Student	Given that I am viewing the search results, when I select the campus location (ex., SFEBB) from the filters, I will only see items reported lost in that building/on that specific date.
F	6	Save Searches	Student	Given that I have applied filters (date, location, etc.) When I return to the app later, my filters from previously are

				automatically applied, and it gives the same results.
F	7	Report a Lost Item	Student	Given that I am on the lost & found app when I click “Report Lost Item,” I fill out a form with description, location, date found for the item, and upload an image. Once done, submit, and then the lost item report will appear in the inventory with a “Pending” Status.
F	8	Claim Lost Item	Student	Given that I am matching a lost item, when I click “Claim Item,” by submitting ownership verification of my UID, and confirm, then the system notifies the admin for approval, and I slowly receive updates on claim status.
NF	9	Intuitive search	Student	Given that I am a first-time user of the lost & found app, when I access the app, I then use the search bar above, and have a toolbar explaining how to use the app.
NF	10	Moblle Responsiveness	System	Given that I am using a mobile device, when I open the portal, all buttons, images, and text adjust to the screen size.

Use Case Diagram:



Use Case Narratives:

Use Case 1: Report Lost Item

Actor: Student/User

Description: A student reports a lost item through the system.

Preconditions: The user is logged into the system.

Basic Flow:

- User selects "Report Lost Item."
- System prompts for item details (e.g., item type, description, date, location last seen).
- User submits the form.
- The system stores the report and sends a confirmation message.

Alternative Flow:

- If the user forgets required information, the system prompts them to complete missing fields.

Postconditions: The lost item report is saved in the system's database.

Use Case 2: Report Found Item

Actor: Student/Staff

Description: A user reports a found item to be listed in the system.

Preconditions: User is logged into the system.

Basic Flow:

- User selects "Report Found Item."
- User fills out item information (e.g., type, description, location found, upload image).
- User submits the form.
- System logs the item and makes it visible to users browsing lost items.

Postconditions: Found item is available in the system for matching with lost reports.

Use Case 3: Search for Lost/Found Items

Actor: Student/User

Description: A user searches the system for a lost or found item.

Preconditions: The System has entries in the database.

Basic Flow:

- The user accesses the search feature.
- User inputs search criteria (e.g., keywords, date, category).
- System returns matching items.
- User views item details and contact instructions (if applicable).

Postconditions: User receives a list of items matching their criteria.

Use Case 4: Claim Item

Actor: Student/User

Description: A user attempts to claim a found item by submitting verification information.

Preconditions: The user has identified an item they believe is theirs.

Basic Flow:

- User selects "Claim" on a found item.
- User fills out a form explaining ownership (e.g., unique characteristics, proof).
- Admin/staff reviews the request.
- If approved, system updates item status to "Claimed."

Alternative Flow:

- If the claim is rejected, the system notifies the user with a message.

Postconditions: Item is either marked as claimed or remains listed.

Use case narratives:

Use Case Name: Submit Lost Item

Actor: Student/User

Description: A student submits a report of a lost item by providing details such as item type, description, location last seen, and date.

Preconditions: The student is logged into the system.

Postconditions: The lost item is recorded in the system database and becomes visible to staff/admin for tracking.

Main Flow:

- Student logs into the platform.
- Navigates to "Submit Lost Item."
- Fills out required details and submits the form.
- System stores the information in the database.

Alternative Flow:

– If required fields are not filled, the system prompts the user to complete them before submission.

Exception Flow:

– If the database is unavailable, the system notifies the user and logs the error.

Use Case Name: Submit Found Item

Actor: Student/User

Description: A student submits information about a found item, including a photo, location, and description.

Preconditions: The user is authenticated.

Postconditions: The found item is added to the system and visible to users searching for lost items.

Main Flow:

- Student logs in.
- Navigates to "Report Found Item."
- Enters item details and uploads an image (optional).
- Submits the form; system records the data.

Alternative Flow:

- If image upload fails, user can submit without image.

Exception Flow:

- If submission fails, user is prompted to retry or try later.

Use Case Name: Match Lost and Found Items

Actor: System

Description: The system attempts to match submitted lost and found items based on similarity in description, category, and date/location.

Preconditions: Lost and found items are recorded in the system.

Postconditions: Potential matches are shown to users or flagged for admin review.

Main Flow:

- System regularly scans entries for similar attributes.
- When a match is detected, notifies user/admin.

Alternative Flow:

- If no match is found, system continues periodic scans.

Exception Flow:

- If matching logic fails, system logs the issue for review.

Use Case Name: Claim Item

Actor: Student/User

Description: A student who finds a match for their lost item can request to claim it by providing proof or details.

Preconditions: Item is matched or visible in system.

Postconditions: Claim request is sent to admin for review.

Main Flow:

- Student selects item to claim.
- Submits a claim with additional details.
- Admin reviews and approves/denies the claim.

Alternative Flow:

- If claim is rejected, user is notified with reason.

Exception Flow:

- If item is already claimed, user is notified accordingly.

Use Case Name: Admin Review Claims

Actor: Admin

Description: Admin reviews submitted claims to verify ownership and approve or deny the request.

Preconditions: A claim has been submitted.

Postconditions: Claim is resolved and item marked as returned or held.

Main Flow:

- Admin logs into backend.
- Views pending claims.
- Reviews evidence and marks as approved or denied.
- System updates item status.

Alternative Flow:

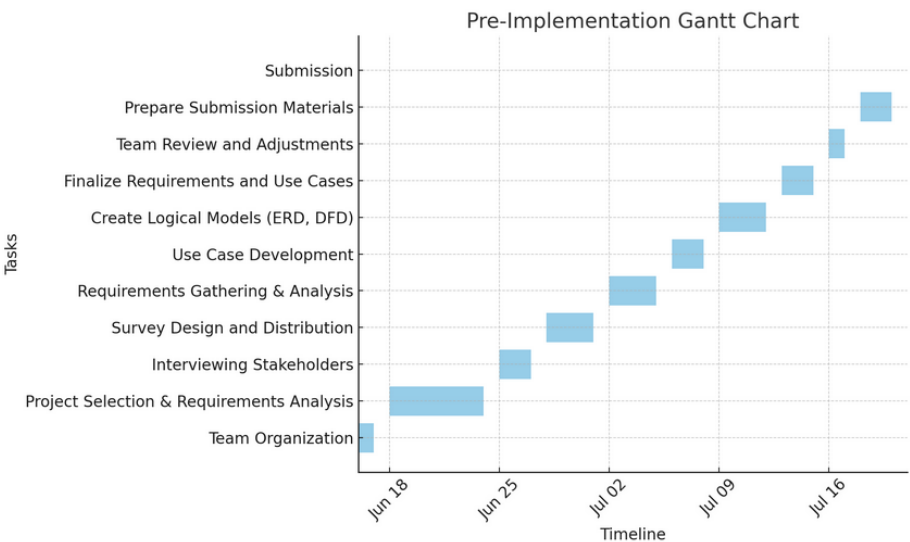
- Admin can request more information from claimant.

Exception Flow:

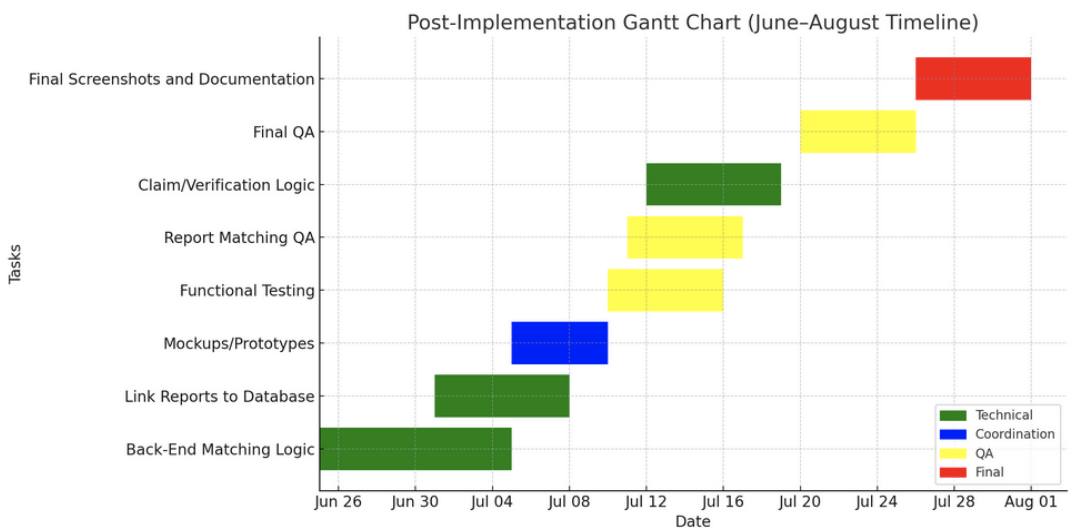
- If item is disputed by multiple users, admin marks item for in-person verification.

Part 3: Project Plan

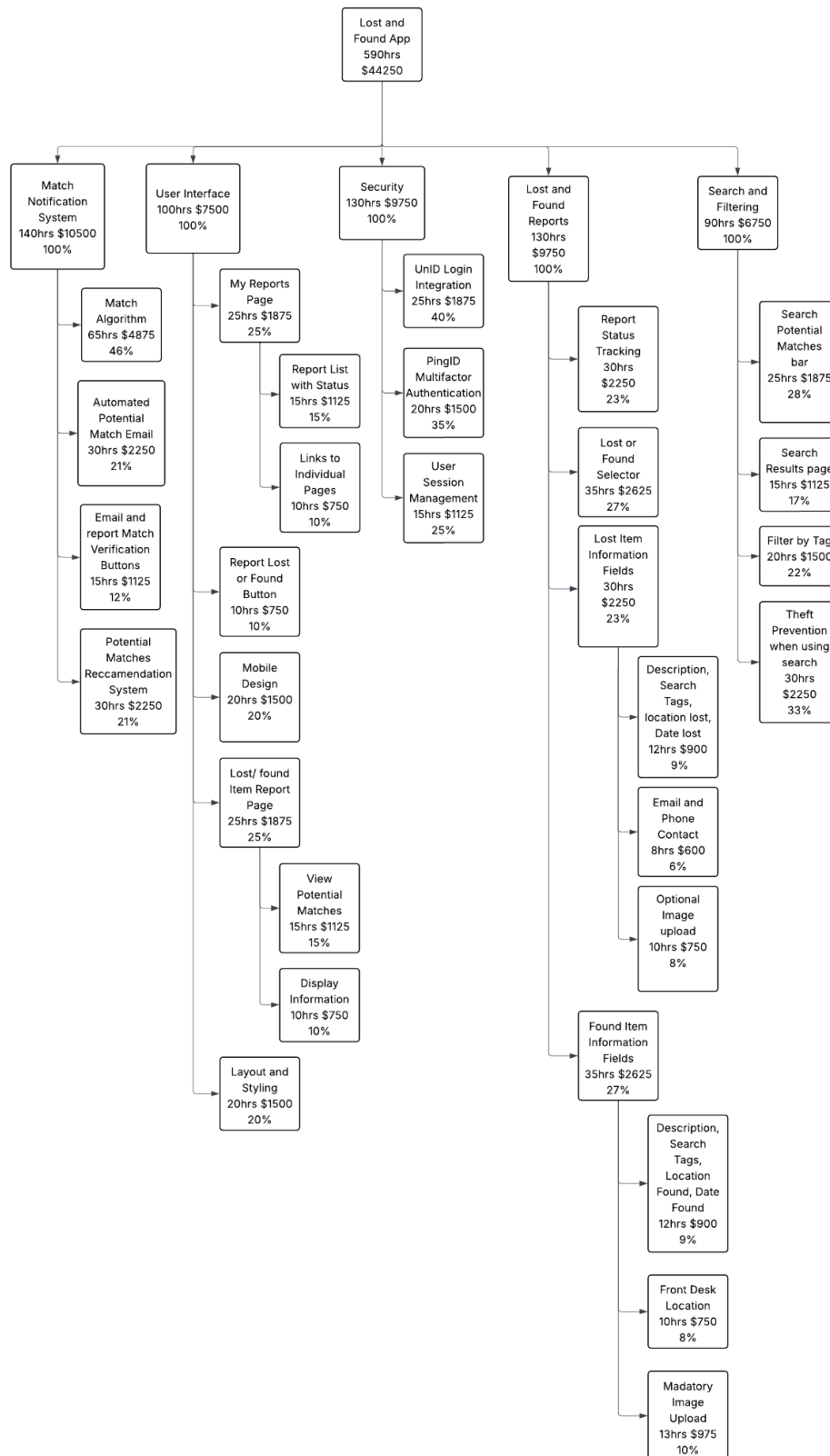
Pre-Implementation Gantt Chart:



Post-Implementation Gantt Chart:



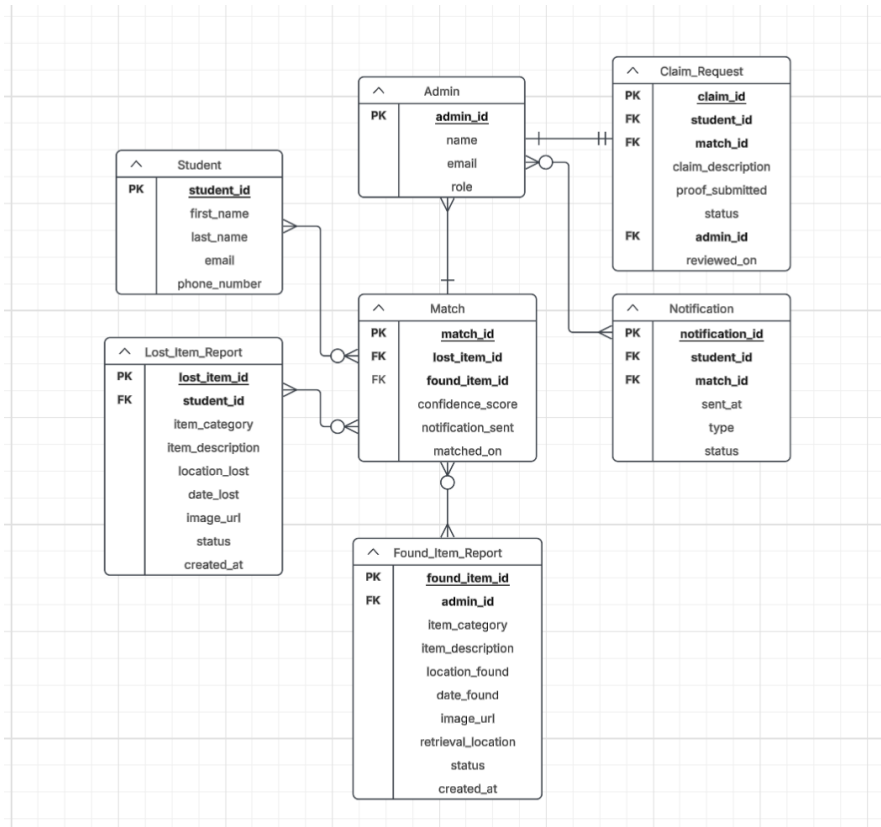
Product-Oriented Work Breakdown Structure:



Part 4: Analysis Documents (Logical Models) -

Logical Models:

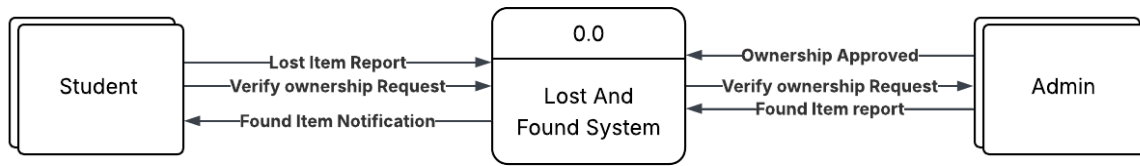
Logical ERD:



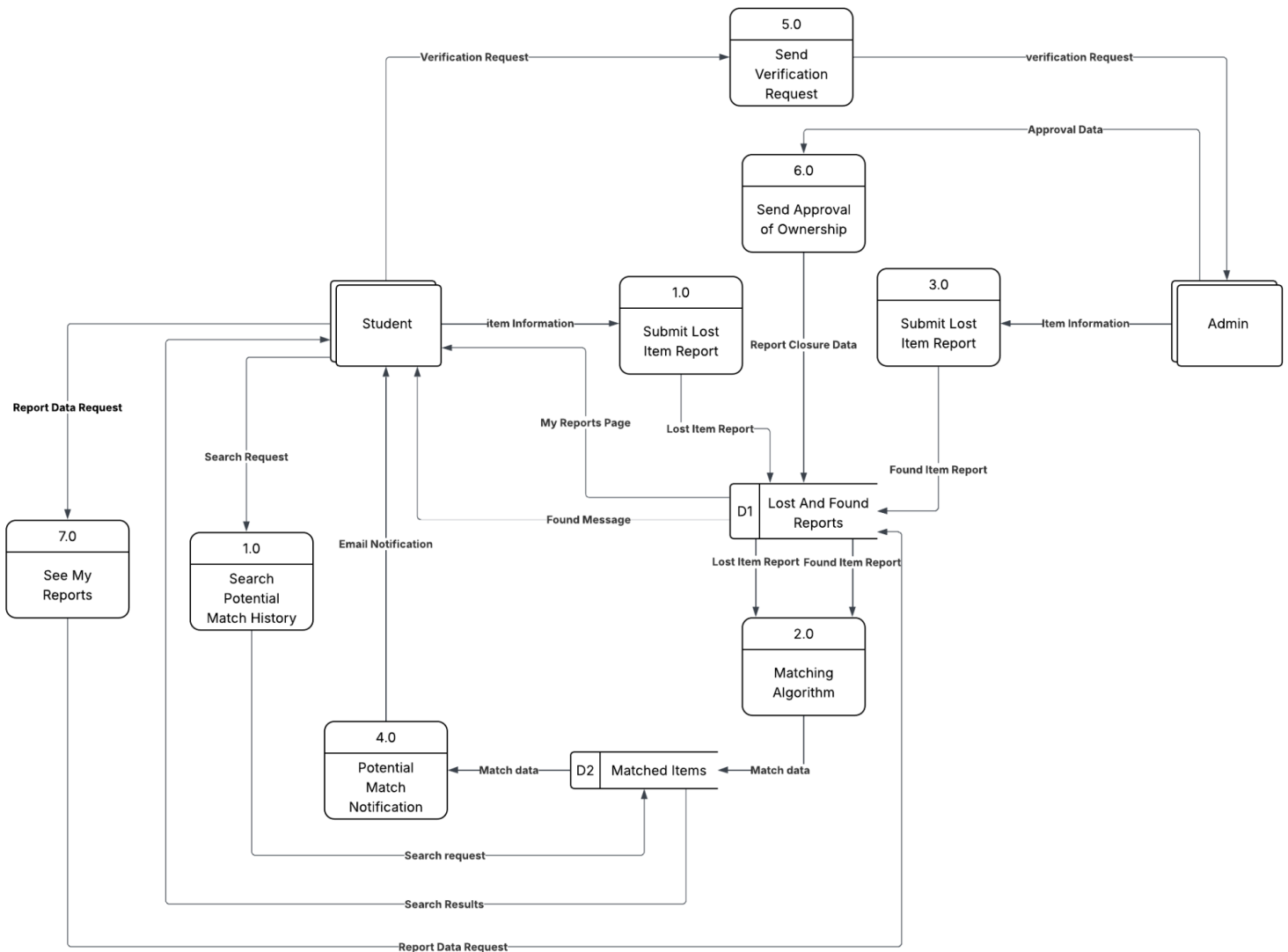
ERD Metadata Description:

The Logical ERD for the Campus Lost and Found System models the core data structure and relationships necessary for managing lost and found items at the University of Utah. The diagram includes key entities such as Student, Admin, Lost_Item_Report, Found_Item_Report, Match, Claim_Request, and Notifications. Each entity contains identifying primary keys and attributes, such as item descriptions, locations, dates, and status indicators. Their relationships are also represented using Crow's Foot notation to show cardinality and participation. For example, a Student can submit multiple Lost_Item_Reports, while each report is tied to one student. Admins handle Found_Item_Reports and review Claim_Requests, which are linked to potential item matches generated by the system. The Match entity connects lost and found reports, while Claim_Request and Notification track verification and communication processes.

Logical DFD – Context Level:



Logical DFD – Level 0:



CRUD Matrix

	Lost And Found Reports	Potential Matches
Submit Lost Item Report	CR	
Submit Found Item Report	CR	
Matching Algorithm	R	C
Potential Match Notification		R
Send Verification Request		
Send Approval of Ownership	RU	
See My Reports		R
Search Potential Match History		R

Part 5: Design Documents (Physical Models) mostly hypotheticals

Data Architecture Selection Analysis:

The University of Utah's Lost and Found App will utilize Microsoft Azure as its front-end application. Azure provides a set of tools that can be used to help build the application. This service will enable us to utilize the React Native (JavaScript) framework to develop cross-platform mobile apps compatible with iOS/Android. This ensures a consistent format with responsive layouts that adapt images, text, and UI

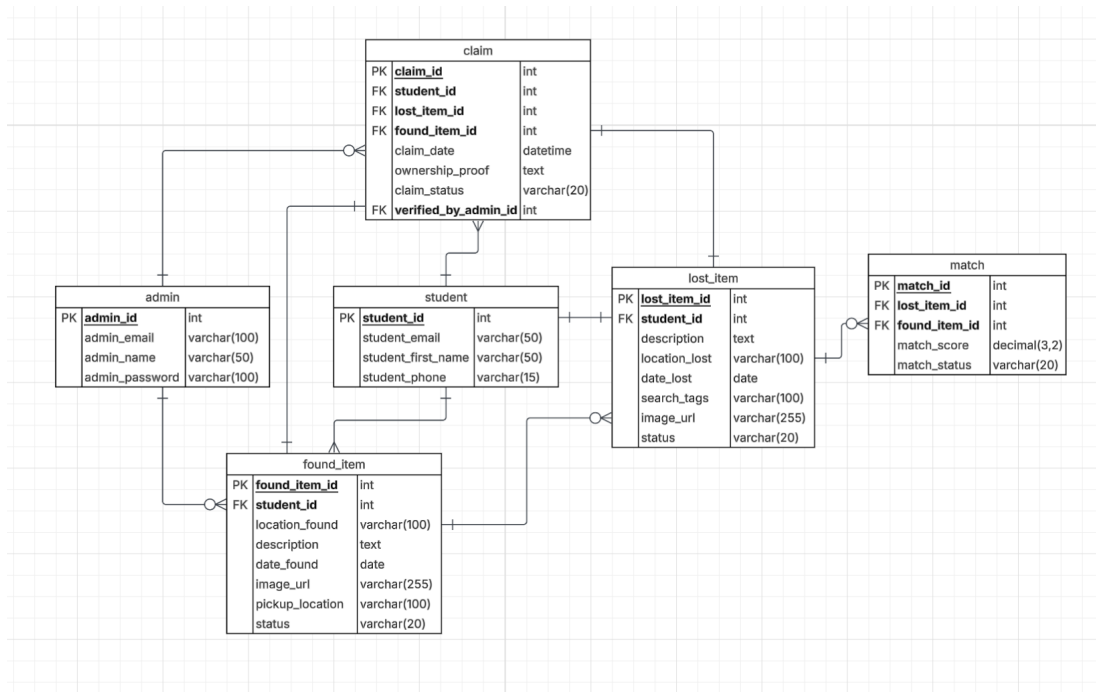
components to any screen size. Another front-end service that will allow us to implement an intuitive search bar is React.js. The React framework library that would be connected to Azure Cognitive Search will help build a dynamic search bar displaying real-time suggestion options that filter down based on the user's input. This enhances the user experience by providing real-time feedback, which can potentially accelerate the search process. Azure's cloud-based offerings also eliminate the need to establish a new IT department with the physical hardware and employees, which ultimately keeps expenses low.

Data Storage Selection Analysis:

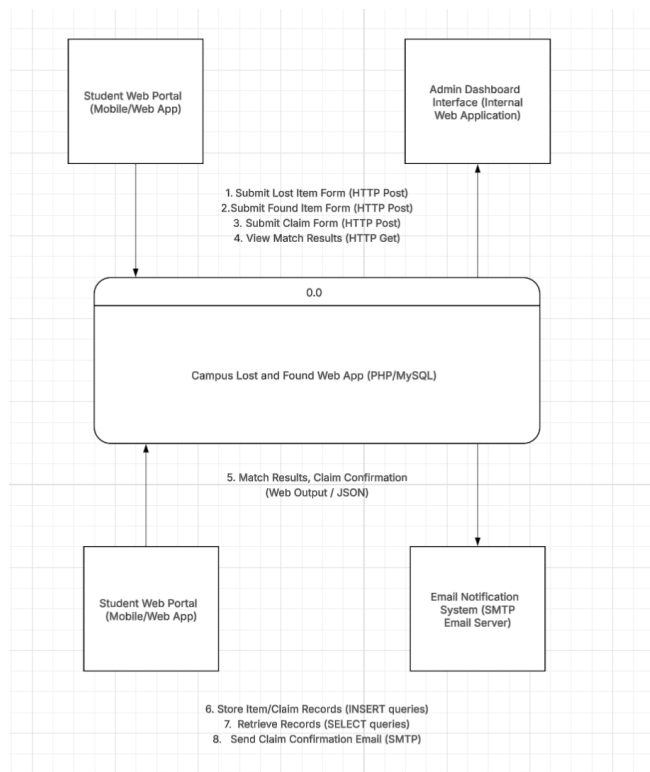
The University of Utah's Lost and Found App will utilize Azure SQL Database for a relational database management system to store data, including lost/found items, user profiles, and verification forms. This database seamlessly integrates with our JavaScript and React framework on the front end. It works flawlessly with Azure Cognitive Search to deliver enhanced user experiences and insights through AI-powered search features, like synonym recognition or matching words. For storage, the Azure Blob Storage helps create data lakes for SQL records of images and provides storage in order to build a cloud-native mobile app. These Azure services help with a cloud-native architecture that ensures high availability, autoscaling that handles traffic spikes during campus events, and cost optimizations with cloud-based offerings through Azure's pay-as-you-go model. The Azure SQL Database offers the right balance of structure and scalability for the Lost & Found App, as it aligns directly with our Azure architecture. This ensures that Azure's services meet both functional and non-functional requirements.

Physical Models

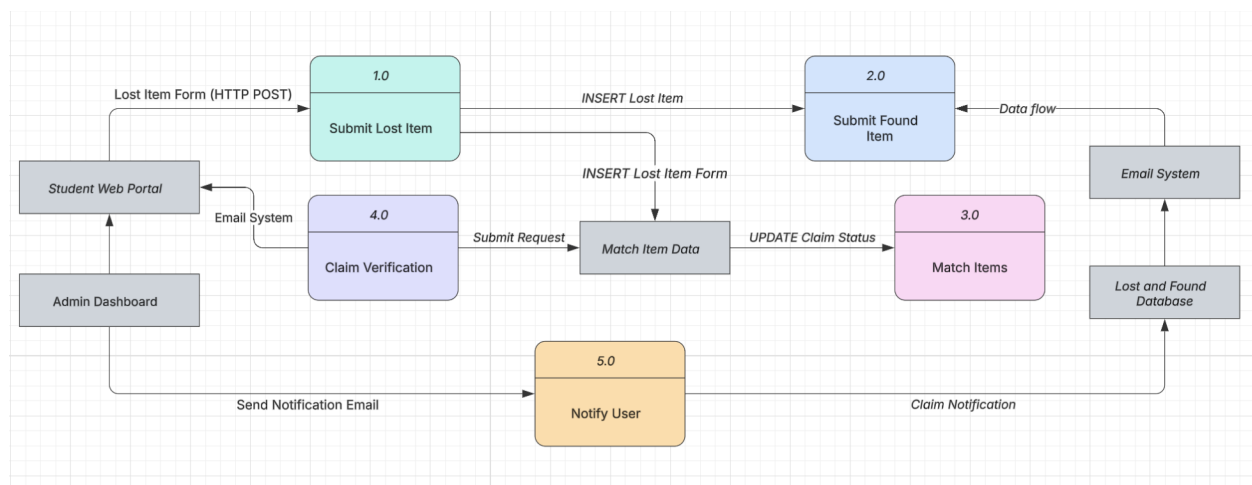
Physical ERD:



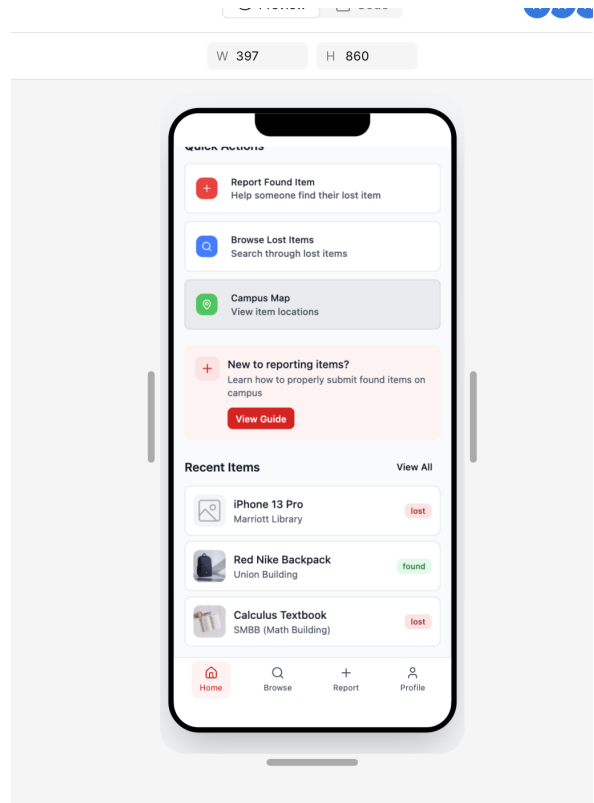
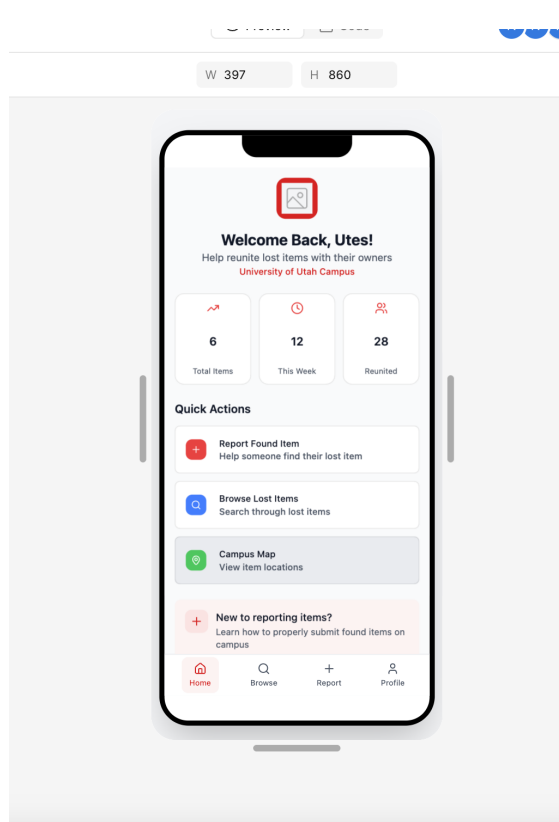
Physical DFD – Context Level:

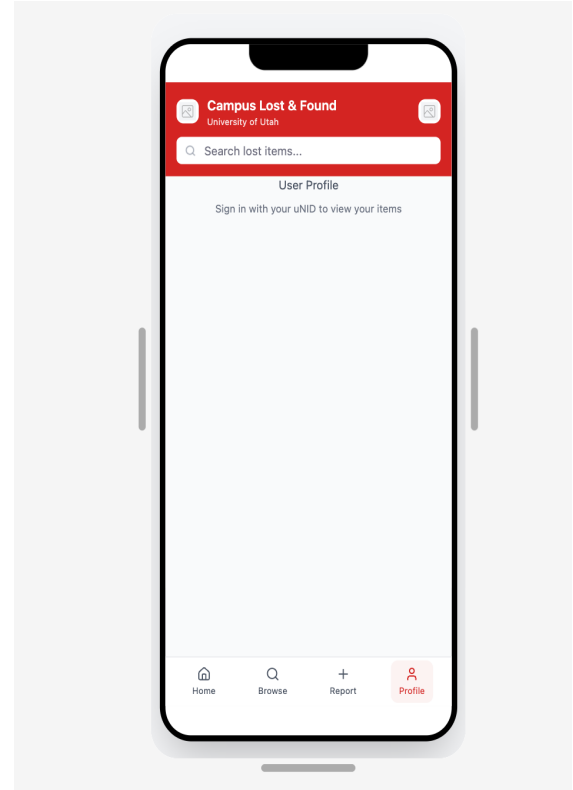
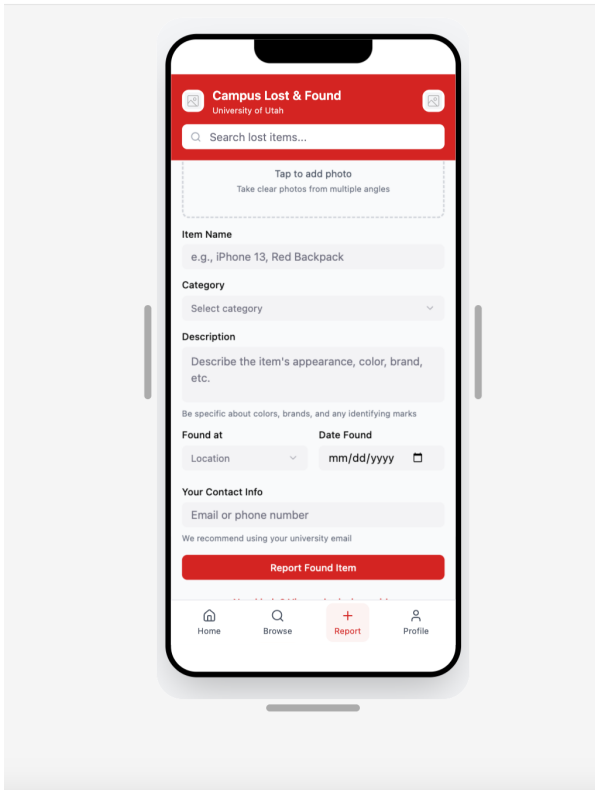


Physical DFD – Level 0:



Mock Interfaces & Prototypes:





Sources/Software Used:

1. Figma
2. Qualtri