SW Engineering CSC648-848-05 Spring 2025

Crisis Relief

Team #5

Team Members:

1. **Anshaj Vats** - Team Lead (avats@sfsu.edu)
2. **Francis Aviles** - Backend Lead
3. **Ayesha Irum** - Frontend Lead
4. **Geoart Corral** - GitHub Master
5. **Karla Cardenas Andrade** - Database Administrator
6. **Kyle Nguyen** - Technical Writer

Milestone 1

Date: February 20, 2025

Milestone	Version	Date
Milestone 1	Version 1	February 20, 2025

Table of Contents

Executive Summary

Disasters and emergency situations cause distress as people are displaced from their homes, in need of shelter, food, and medical attention. Unfortunately, much crisis relief comes from outdated registries that have one-off guesses of what's needed and/or available. People cannot easily get what they need when they need it because there are no up-to-date sources of what's being offered and where, until now, with CrisisRelief. CrisisRelief seeks to serve as a portal for everything one needs to find temporary shelter, food banks, medical help, and natural disaster assistance, all in one place at the same time with real-time information. CrisisRelief fulfills the need for access in a timely fashion through utilizing APIs and hopes to include crowd sourced information in the future.

CrisisRelief utilizes the Google Maps API for geolocation, mapping, and emergency routing, to direct users to available resources. In addition, it also uses OpenWeatherMap API, for weather reporting and notifications that can warn users of bad weather that would hinder access to certain resources. What makes CrisisRelief unique is its live resource location and crisis direction. CrisisRelief has an ease-of-access interface for its web version so that those in distress don't have to parse through technology to receive help sooner and better.

Funding this project will enable the development for scalable, cloud-based infrastructure that ensures high availability and responsiveness in areas most needed. CrisisRelief also wants to enable community updates, allowing users and relief workers to report real time changes in things such as shelter capacity and food availability. CrisisRelief is set to become the default and only application required for any users in distress to find the help they need. Investing in CrisisRelief means investing in a smarter and more efficient way of providing aid to people in need of assistance.

Use Cases

Use Case 1: Finding Nearby Emergency Resources

Actors: John(Customer), CrisisRelief(My Company)

Assumptions:

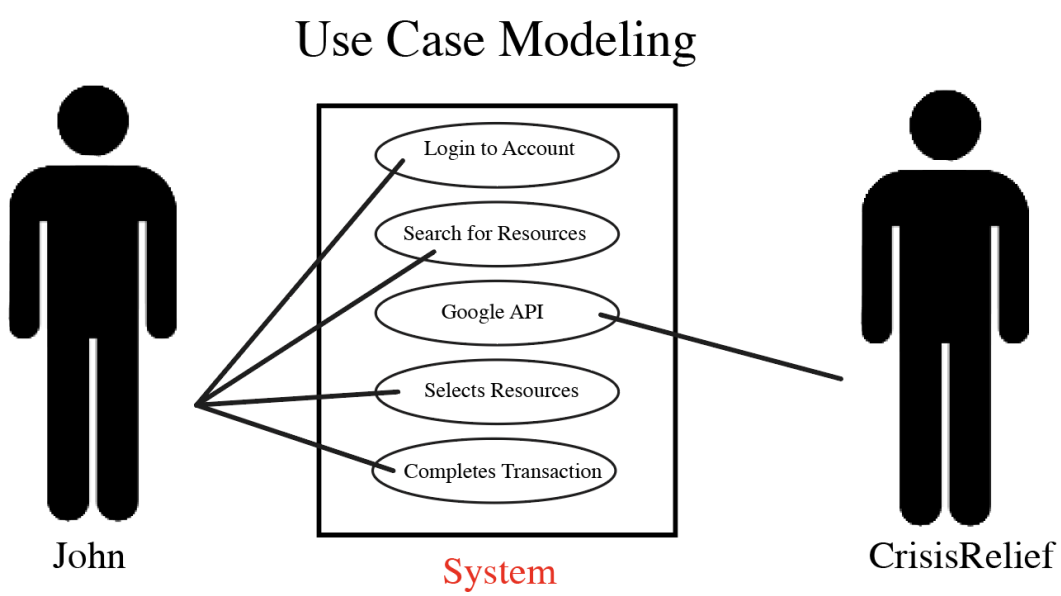
- John has internet access.
- John is in a stressful situation and needs quick help

Use Case:

John, who was affected by the first in LA, is looking for the nearest emergency shelter after his house has burned down. John decides to access CrisisRelief, which using GoogleMaps API, helps display to him with an interactive map of shelters, foodbanks, and medical centers that are nearby to him. After John selects a location, CrisisRelief will navigate John to that location in the quickest and safest way possible.

Benefits:

- Enables John to quickly locate emergency resources
- Provides clear navigation through Google Maps API
- Gives real-time accessibility, helping to reduce anxiety.



Use Case 2: Real Time Updates

Actors: Mark (Relief Worker), General Public , CrisisRelief(My company)

Assumptions:

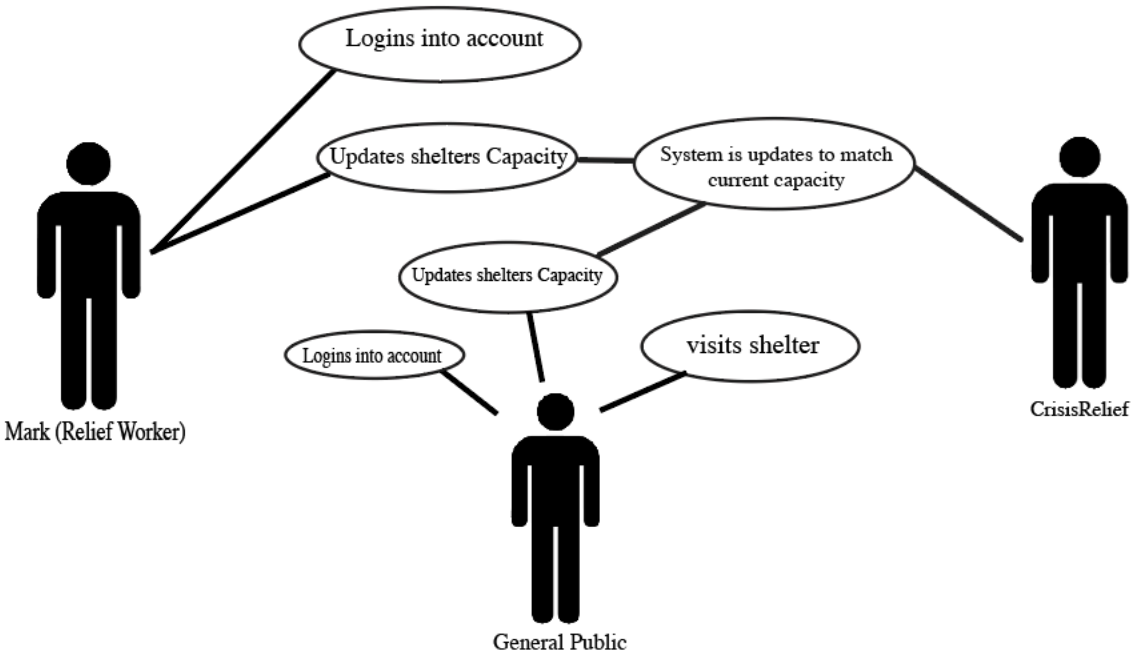
- Mark administrative access to update resource information
- Shelters and resource centers have internet access.

Use Case:

Mark, who is a relief worker at a local shelter, sees that the shelter capacity is almost at max. He goes in and logs into the system(CrisisRelief), and updates the capacity available from 60 down to 10. This real time update helps prevent miscommunication from word of mouth and also helps other people in need find available shelters. Mark also decides to mark that there is a water bottle shortage, which can prompt nearby relief locations to restock on supplies.

Benefits:

- Keeps emergency resource information accurate and up to date.
- Helps communication between shelters and the general public.



Use Case 3: Shelter Locator using API

Actors: James (Customer) CrisisRelief (My Company)

Assumptions:

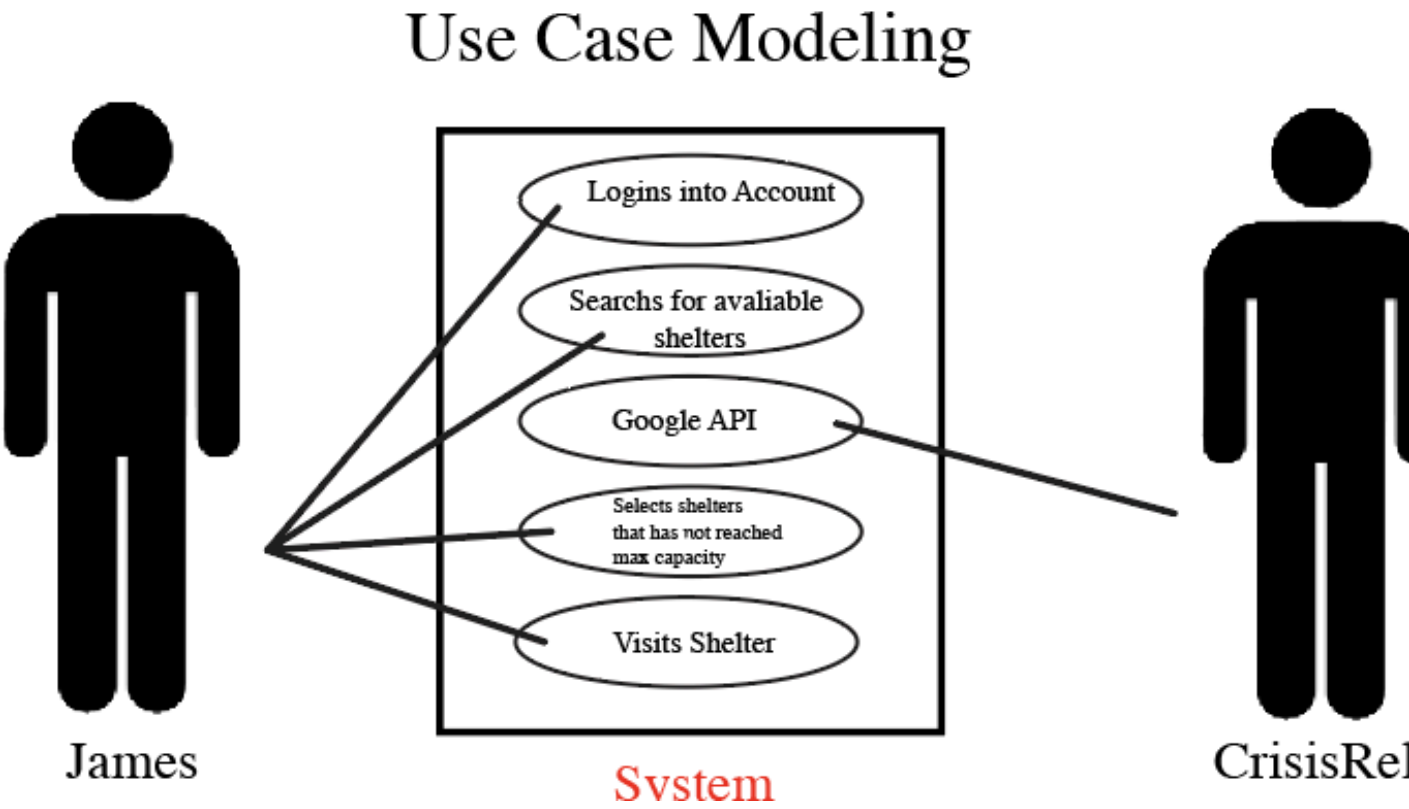
- James is houseless and currently does not have shelter
- Concerned about incoming weather emergency
- James does not have stable living condition

Use Case:

James has currently been evicted from his apartment and is now houseless. Due to cold winters in San Francisco, James wants a secure place to sleep so he logs onto CrisisRelief where a googleAPI directs him to an open shelter. for the night. Thus, James will access CrisisRelief and is directed to a nearby shelter by a googleAPI. James can now sleep in an available bed with blankets and update the website on availability.

Benefits:

- Access to immediate shelter and provide emotional relief
- James is now safe and reduces possible medical risks from not being in the storm.
- A sense of security from harsh weather conditions



Use Case 4: Medical Assistance using Google API

Actors: Lisa (An individual struggling with Diabetes) CrisisRelief (My Company)

Assumptions:

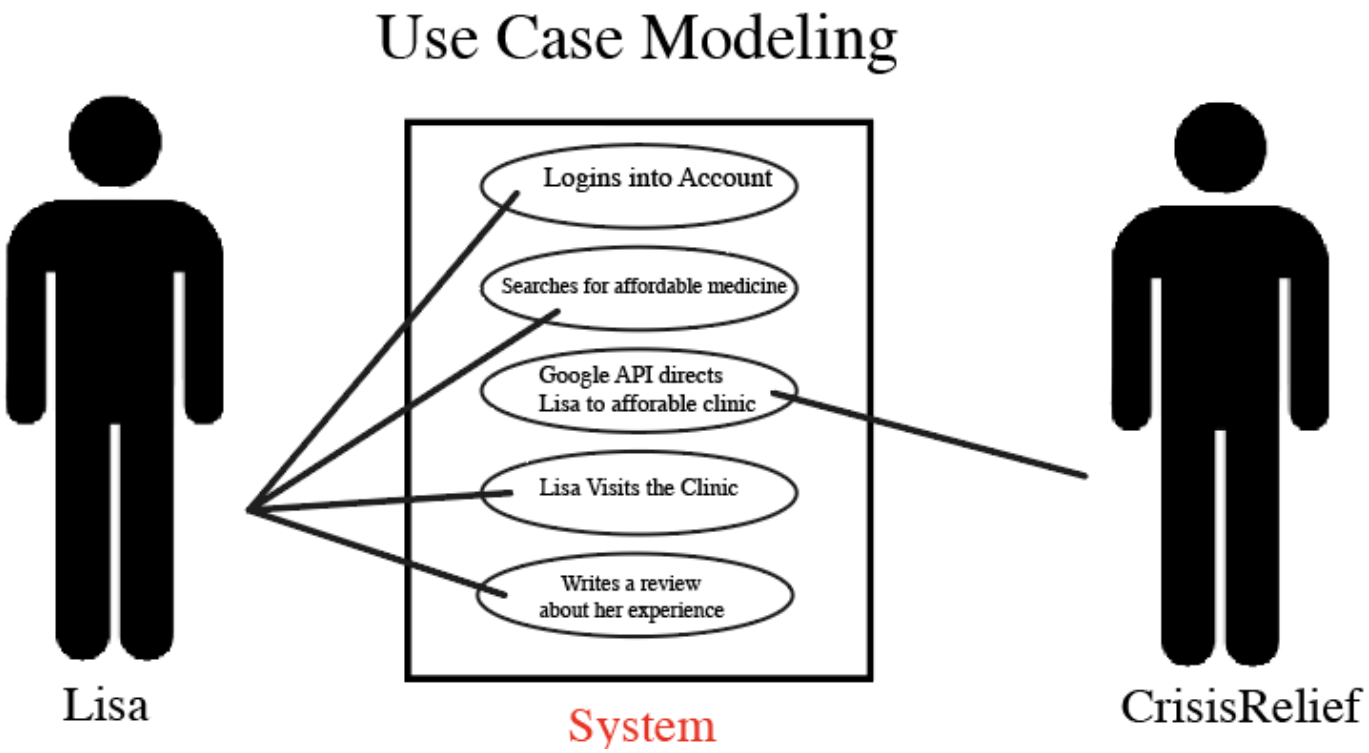
- Lisa has been diagnosed but does not have the finances to afford insulin
- Lacks a stable job and is struggling to find ways to pay for insulin and supplies
- Lisa has access to a mobile device and internet

Use Case:

Lisa, a 25-year-old struggling to manage her diabetes, often finds herself unable to afford insulin. Lately, she has noticed that buying one bottle of insulin requires her to compromise a week's worth of groceries. Lisa uses her smartphone and CrisisRelief, and is directed by a Google API to a clinic that provides insulin at an affordable price. She goes to the location and buys the medicine she requires and submits a review about her experience at the clinic.

Benefits:

- Access to free medical care and immediate medical relief by a professional health provider.
- Gains a long term support system and reduce medical risks



Use Case 5: Real-Time Weather Warnings on Resource Pages

Actors: Kyle (Customer), CrisisRelief(My Company)

Assumptions:

- Kyle has access to internet
- Weather conditions impact shelter accessibility and operations.

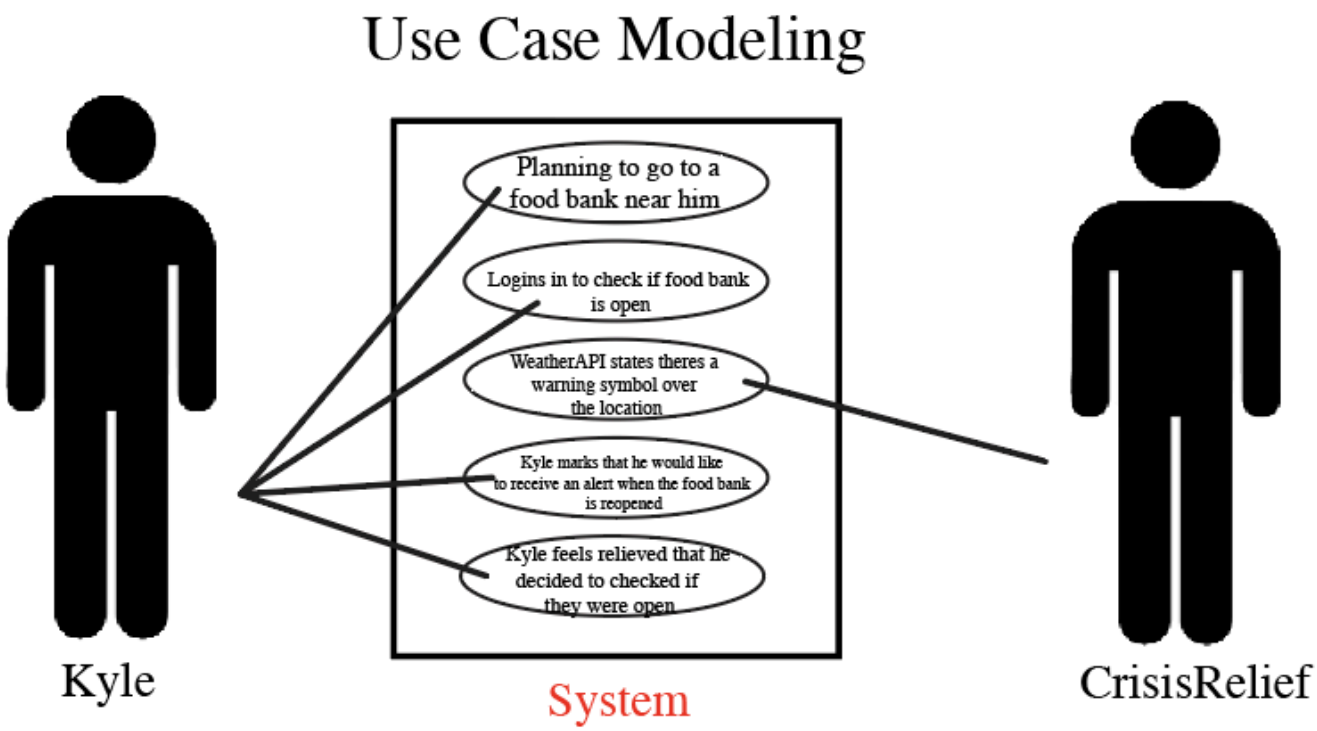
Use Case:

Kyle is planning to go to a food bank near him, but after taking a quick glance outside, he realizes that maybe the weather may not permit him to do so. He is concerned that if he was to go to the food bank, maybe it would be closed. Kyle decides to open a crisis relief platform(CrisisRelief), which allows him to search for the status of his food bank. After typing in

his food bank, he sees that there is a warning symbol over the location. After clicking on it, Kyle realizes that his food bank is closed due to weather alerts. Kyle decides to mark that he would like to receive an alert when the food bank is reopened. Kyle now feels relieved that he decided to check whether or not the food bank was open, knowing that he would have risked his safety.

Benefits:

- Informs users about weather conditions that impact access to resources.
- Uses OpenWeatherMap API for real-time weather alerts.
- Prevents unnecessary travel to closed or unsafe locations.



Use Case 6: Identifying High Risk Areas and Safe Zones

Actors: Samantha (Customer), CrisisRelief(My Company)

Assumptions:

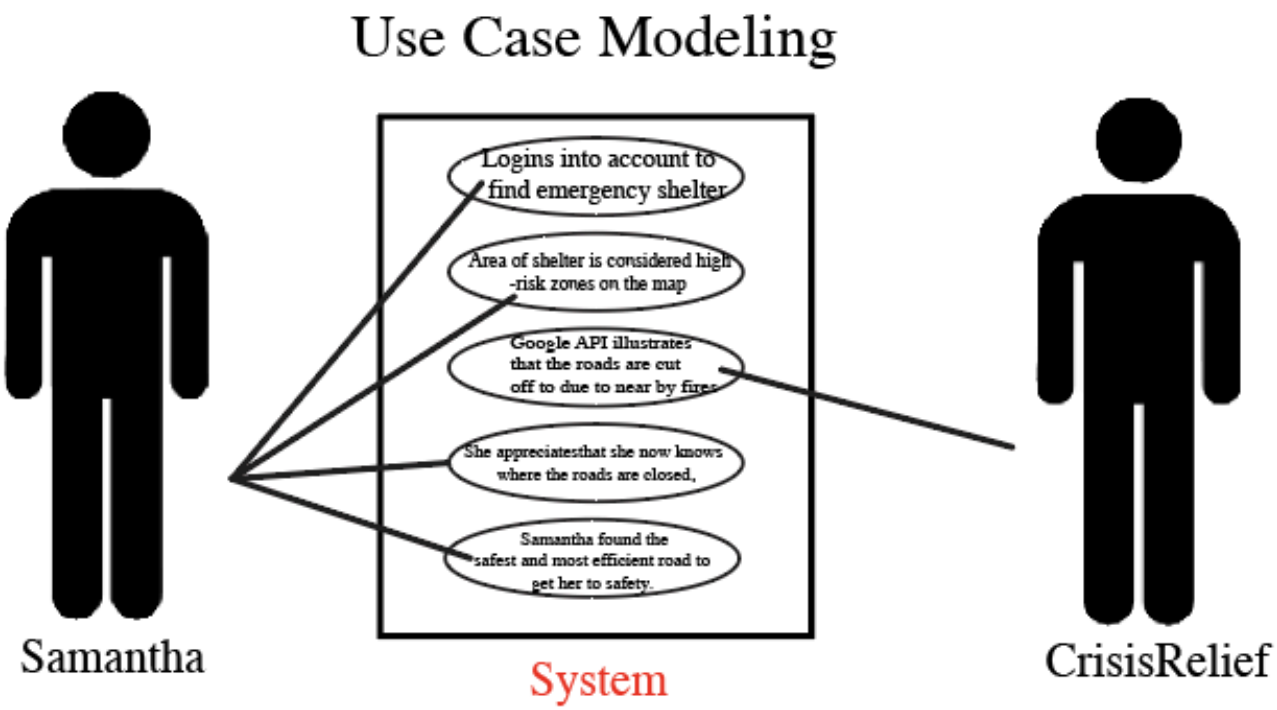
- Samantha has access to a smartphone with internet access
- Roads are closed due to hazards

Use Case:

Samantha needs to reach an emergency shelter, but due to the fires, she doesn't know what area is safe to go through. Samantha is concerned if the emergency shelter she is used to going to has roads cut off that would hinder her getting there. That is when she decides to use CrisisRelief. CrisisRelief shows Samantha areas that are considered high-risk zones on the map, using the Google Maps API. She appreciates that she now knows where the roads are closed, and which is the safest way to get there. Reassured, she begins to drive, but gets a warning that another hazard is coming up, so she is redirected to a better road to get to her local shelter. By using real time traffic and hazard data, Samantha found the safest and most efficient road to get her to safety.

Benefits:

- Helps users avoid hazardous areas during an emergency.
- Provides real time updates on road closures and risks.
- Offers safer alternative routes that avoid hazards



Use Case 7: Mental Health Support Review

Actors: Jennie (Customer), CrisisRelief(My Company)

Assumptions:

- Jennie has access to a smartphone or to the internet.
- Jennie feels overwhelmed and does not know where to seek help.
- Has no support system to turn to in a time of need.

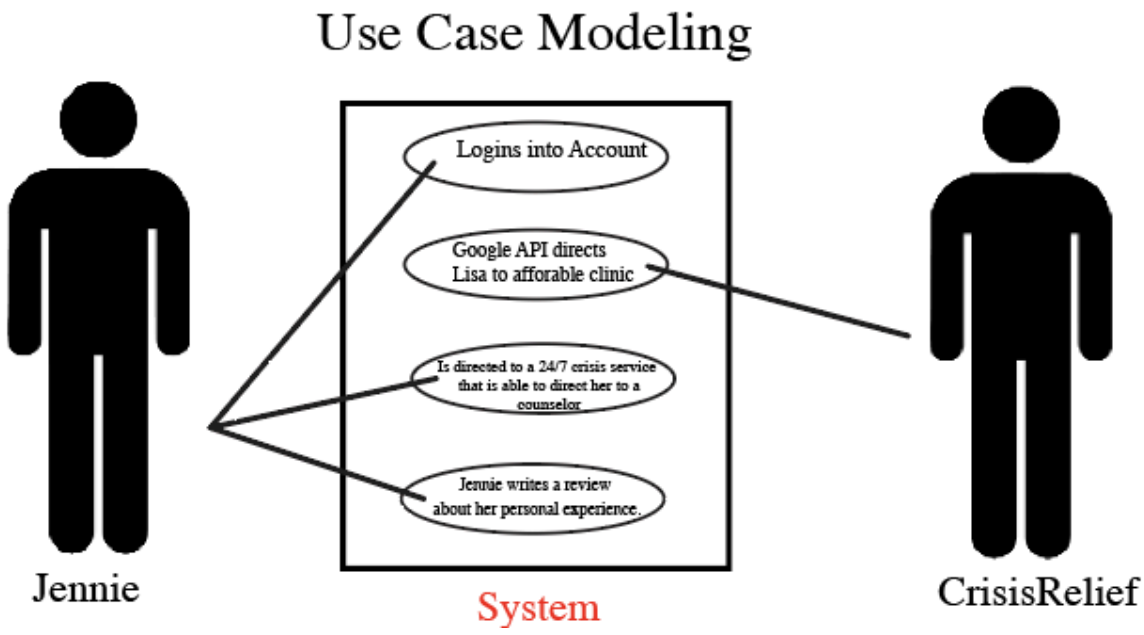
Use Case:

Jennie has just been notified that she will be evicted from her current apartment by the end of week if she is unable to pay rent by the end of the week. Jennie is feeling stressed and anxious about the situation as she does not know if her upcoming pay will be enough to cover the cost of

rent. She has not been able to sleep for the past few days and is really affecting her work abilities. Jennie searches on CrisisRelief and is directed to a 24/7 crisis service that is able to direct her to a counselor that provides Jennie the space to talk about her situation. Jennie is able to address her concerns and now has access to a counselor to provide her emotional relief. Jennie writes a review about her personal experience.

Benefits:

- Provides emotional support and creates a long term support system
- Free access to medical help and reduces future distress



Use Case 8: Food Bank Real-Time Update

Actors: Olivia (Customer), CrisisRelief(My Company),and James (food bank coordinator)

Assumptions:

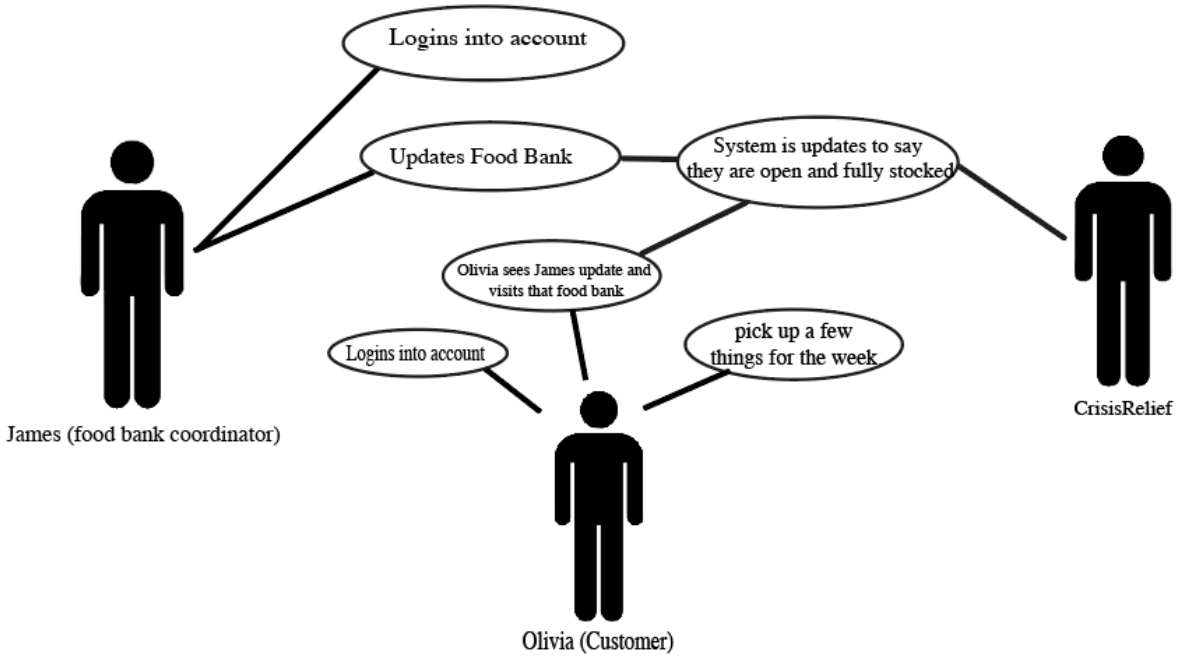
- Olivia had access to internet
- James is able to monitor the inventory in real time

Use Case:

Olivia is currently struggling to find a way to buy groceries for the upcoming week. She wants to visit a food bank to see if she is able to take any groceries home. She goes online and uses CrisisRelief to see if there are any food banks available near her that are open. James is currently working at the food bank and updates the website to state that not only are they open but full stocked as well. Olivia sees James update and is able to visit that food bank and pick up a few things for the week.

Benefits:

- Reduce food waste and people are able to get resources they need
- Real time tracking improves efficiency and allows more people to access resources faster


Logins into account
Updates Food Bank
System is updates to say they are open and fully stocked
Olivia sees James update and visits that food bank
Logins into account
pick up a few things for the week
James (food bank coordinator)
CrisisRelief
Olivia (Customer)

List of Main Data Items and Entities

1. Users

Description: Individuals who interact with the CrisisRelief platform.

Types of Users:

- **General Public**: Users in need of emergency assistance, food, medical help.
- **Relief Workers**: Verified personnel responsible for updating resource availability.
- **System Administrators**: Individuals with full access to monitor and manage the platform.

Main Attributes:

- **user_id** (Unique Identifier)
- **name**
- **email**
- **phone_number**
- **user_type** (Public, Relief Worker, Admin)
- **location** (Optional for personalized alerts)

2. Emergency Resources

Description: Essential resources available for individuals affected by a crisis.

Types of Resources:

- **Shelters**: Locations providing temporary housing.
- **Food Banks**: Centers distributing free food to those in need.
- **Medical Facilities**: Clinics and hospitals offering medical aid.
- **Mental Health Support Centers**: Places providing psychological assistance.
- **Supply Stations**: Centers distributing emergency items (e.g., water, blankets).

Main Attributes:

- **resource_id** (Unique Identifier)
- **name**
- **type** (Shelter, Food Bank, Medical Facility, etc.)
- **location** (Address/Coordinates)
- **capacity** (Number of people the resource can serve)
- **availability_status** (Open, Full, Limited Supply)
- **contact_info** (Phone Number, Email)

3. Weather Alerts

Description: Real-time weather notifications affecting emergency resources.

Types of Alerts:

- **Severe Storms**
- **Hurricanes**
- **Flood Warnings**
- **Heatwaves**

- **Wildfires**

Main Attributes:

- **alert_id** (Unique Identifier)
- **type** (Storm, Hurricane, Flood, etc.)
- **severity** (Low, Moderate, High)
- **affected_area** (Region affected)
- **issued_time** (Timestamp of alert)
- **expiry_time** (When the alert expires)

Functional Requirements

Functional Requirements for Users

1. The system shall allow users to search for nearby emergency shelters.
2. The system shall display real-time availability of emergency shelters to users.
3. The system shall provide directions to the nearest emergency shelters for users.
4. The system shall notify users of real-time updates on shelter capacity.
5. The system shall show estimated travel times to shelters for users.
6. The system shall enable users to search for nearby food banks.
7. The system shall display real-time availability of food banks to users.
8. The system shall provide directions to the nearest food banks for users.
9. The system shall notify users of real-time updates on food bank inventory.
10. The system shall allow users to search for nearby medical centers.
11. The system shall display real-time availability of medical centers to users.
12. The system shall provide directions to the nearest medical centers for users.
13. The system shall notify users of real-time updates on medical center capacity.
14. The system shall show estimated travel times to medical centers for users.
15. The system shall alert users with real-time weather updates.
16. The system shall display high-risk areas on the map for users.
17. The system shall suggest alternative safe zones to users.
18. The system shall allow users to set alerts for weather condition improvements.
19. The system shall provide access to mental health support services for users.
20. The system shall notify users of real-time updates on food bank restocking.
21. The system shall allow users to view historical data on resource availability.
22. The system shall provide users with the ability to save favorite locations.
23. The system shall enable users to receive notifications on new shelters or food banks in their area.
24. The system shall allow users to view user reviews and ratings of shelters and food banks.

25. The system shall provide users with the ability to filter search results by resource type (e.g., shelter, food bank, medical center).

Functional Requirements for Relief Workers

26. The system shall allow relief workers to log in.
27. The system shall enable relief workers to update the capacity of emergency shelters.
28. The system shall allow relief workers to update the inventory of food banks.
29. The system shall enable relief workers to mark shortages of supplies.
30. The system shall allow relief workers to update the availability of medical centers.
31. The system shall enable relief workers to update the status of high-risk areas.
32. The system shall allow relief workers to update the status of alternative safe zones.
33. The system shall enable relief workers to provide real-time updates on weather conditions.
34. The system shall allow relief workers to update the status of mental health support services.
35. The system shall notify relief workers when users access their updates.
36. The system shall allow relief workers to view historical data on resource usage.
37. The system shall enable relief workers to generate reports on resource availability and usage.
38. The system shall allow relief workers to manage user contributions and reports.
39. The system shall enable relief workers to communicate with other relief workers through the platform.
40. The system shall allow relief workers to set up automated notifications for resource updates.
41. The system shall provide multilingual support for users.
42. The system shall allow users to access the platform via web browsers and mobile applications.
43. The system shall provide accessibility features for users with disabilities.
44. The system shall allow users to customize notification preferences.
45. The system shall provide a feedback mechanism for users to report issues or suggest improvements.

46. The system shall allow users to view detailed information about each resource (e.g., address, contact information, operating hours).
47. The system shall enable users to share resource information via social media or email.
48. The system shall provide a search history feature for users.
49. The system shall allow users to view real-time traffic conditions affecting travel to resources.
50. The system shall notify users of critical updates on resource availability and conditions.
51. The system shall allow users to view user reviews and ratings of shelters and food banks.

Functional Requirements for System Administrators

52. The system shall allow system administrators to manage user accounts.
53. The system shall enable system administrators to monitor system performance.
54. The system shall allow system administrators to update system settings.
55. The system shall enable system administrators to manage API integrations.
56. The system shall allow system administrators to generate reports on system usage.
57. The system shall enable system administrators to manage database backups.
58. The system shall allow system administrators to handle user feedback and complaints.
59. The system shall enable system administrators to manage system security.
60. The system shall allow system administrators to update the system with new features.
61. The system shall enable system administrators to manage system maintenance schedules.
62. The system shall allow system administrators to configure user roles and permissions.
63. The system shall enable system administrators to monitor and manage API usage.
64. The system shall allow system administrators to manage third-party integrations.
65. The system shall enable system administrators to configure notification settings for users.
66. The system shall allow system administrators to manage user contributions and reports.

Non-Functional Requirements

1. Usability:
    1.1. Users with high stress or tension shall be able to complete their task.
    1.2. Registered Users with no formal training shall be able to change the status of locations.
    1.3. Registered Users with no formal training shall be able to mark shortages.
    1.4. Users within poor environments, like tents, shall be able to complete their tasks.
2. System requirements:
    2.1. Users shall be able to complete their tasks through their smartphone, laptop, or desktop.
    2.2. CrisisRelief shall use Google Maps API to suggest locations of food banks, or emergency shelters.
    2.3. CrisisRelief shall use OpenWeatherMap API to gather information about the weather.
3. Performance requirements:
    3.1. Users shall be able to access the status of locations within 5 minutes.
    3.2. Registered Users shall be able to change the status of locations within 5 minutes.
    3.3. Weather information from CrisisRelief shall be in real time.
    3.4. Food bank information from CrisisRelief shall be in real time.
4. Storage
    4.1. CrisisRelief shall store data with MySQL.
    4.2. CrisisRelief servers shall be hosted with Amazon EC2.
5. Privacy
    5.1. The data of the user shall not be sold.
6. Content
    6.1. The information given shall be easily read through text.
7. Marketing
    7.1. CrisisRelief shall easily be found by people looking for CrisisRelief.

Competitive Analysis

Identify and Compare Features

Feature/ Company	2-1-1 Bay Area	FindHelp.org	San Francisco-Marin Food Bank	SF.gov	Weather.com
Strengths	Privacy, major emphasis on customer service and providing direct help	Very direct, brings information forward immediately, organized	Beautiful design, detailed means for donating and receiving, localization	Informational, official with SF	In-depth information for different needs, nicely customizable
Weaknesses	Menus and information are intimidating at a glance	Menu/search heavy, too broad of results	Location restricted, site heavily caters to donators despite an emphasis on finding food	Awkward navigation, surface level	Inconsistent or hidden feature placement
Pricing	N/A	N/A	Permits one-time and monthly donations	N/A	N/A
Social Media	N/A	Instagram, X, Facebook, Youtube, LinkedIn	On-site blog, Instagram, X, Facebook, YouTube	Facebook, X	Instagram, X, Facebook, Youtube
Onboarding Experience	Direct with phone calls but menu-heavy otherwise	Concise	Informational but requires some digging for services	Concise but harder to navigate	Simple, clear, and smooth

High-Level Comparison

Feature	2-1-1 Bay Area	FindHelp.org	San Francisco-Marin Food Bank	SF.gov	Weather.com	Our Feature Product
User Registration	-	++	+	-	++	++
Food Bank Information	+	+	++	+	-	+
Real-Time Updates	-	-	+	-	+	++
Weather Alerts	-	-	-	-	+	+
Medical Resources	+	+	-	+	-	+

Summary of Advantages and Competitive Edge

Much of what is currently provided on the web in regard to crisis-related services either serves one specific niche or too broadly displays surface-level information sacrificing specifics and convenience. Where CrisisRelief excels and separates itself in this field is underlined with its one-stop-shop aspect refined to be keener on an individual's needs. User registration is typically restricted to a simple email newsletter or a personal database, however, CrisisRelief aims to help individuals quickly through live updates in a way they want to be updated. Rather than periodic site visits, skimming through lists, or cell phone services as seen in its competitors, CrisisRelief's real-time notifications bring help to its users. This user-first focus also opens the door to more active community-driven contributions, especially as a platform so present in one's day-to-day. CrisisRelief doesn't just improve quality of life, it protects it.

Checklist

- ☑ The team has found a time slot to meet outside of class.
- ☑ GitHub Master has been chosen.
- ☑ The team has collectively decided on and agreed to use the listed software tools and deployment server.
- ☑ The team is ready to use the chosen front-end and back-end frameworks, and those who need to learn are actively working on it.
- ☑ The Team Lead has ensured that all members have read and understand the final M1 before submission.
- ☑ GitHub is organized as discussed in class (e.g., master branch, development branch, folder for milestone documents, etc.).

High Level System Architecture and Technology Used

- Server: AWS EC2
- Operating System: Amazon Linux 2023
- Database: MySQL 8.0.37 (maybe in future PostgreSQL with PostGIS for geospatial data handling)
- Backend Language: TypeScript
- Frontend Language: TypeScript

Additional Technologies

- Google Maps API
- OpenWeatherMap API (Weather Alerts)
- Frontend Framework: React
- Backend Framework: Node.js
- IDE: Visual Studio Code
- SSL Certificate: Let’s Encrypt (Cert Bot)
- Docker: Docker Container on the EC2 instance
- Database Design Framework: DataGrip 2024.3.4
- Redis
- WebSockets
- DuckDNS

List of Team Contributions:(Team Lead)

Kyle Nguyen (Documentation Lead) - 10/10

- Led the documentation efforts, ensuring the structure and content were well-organized.
- Assigned sections to team members and oversaw the completion of Milestone 1 Documentation.
- Authored the Use Case section, ensuring clarity and completeness.
- Attended all team meetings and actively participated in discussions.
- Incorporated all feedback provided and made necessary corrections to improve the documentation.

Karla Cardenas Andrade (Database Management Lead) - 10/10

- Took charge of database design and management.
- Contributed to use case development and created diagrams that enhanced clarity in documentation.
- Attended every meeting and took suggestions positively, building upon them.
- Provided guidance on database implementation and approved the final database setup.

Geoart Corral (GitHub Master) - 10/10

- Managed GitHub branches, ensuring smooth version control and collaboration.
- Regularly updated the README file and maintained project structure.

- Authored the Competitive Analysis section in the documentation, which was thoroughly detailed and well-researched.

Ayesha Irum (Frontend Lead) - 10/10

- Led the frontend development efforts.
- Completed the Functional Requirements section with precision.
- Designed the UI for the “About Us” pages.
- Proposed the idea to separate the “About Us” page into two:
- One page listing all members.
- A second page with individual team member details.

Francis Aviles (Backend Lead) - 7.5/10

- Led the backend development, focusing on core functionality.
- Authored the Non-Functional Requirements section.
- Attended all team meetings and actively participated in discussions.
- Incorporated all feedback provided and made necessary corrections to improve the documentation.
- Tried to set up the Database but was not able to complete it under the internal team deadline.
- No database was set up. For Milestone 1.