Northeastern University

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Database Management Systems
Final Project Presentation
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Community Service and Emergency Response Application

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Agenda

Project Overview & Introduction – Yash
User Persona's – Amit
Business Rules – Amit
ER Diagram – Nick
Major SQL examples – Ganya
Security & Privacy Concerns – Nick
Scope & Takeaway – Trusha

Project Overview

The Community Health Support and Emergency Response App is created to address the critical moments during medical emergencies when immediate action can save lives. The app connects people in need of urgent help with trained local volunteers who can step in and provide assistance until professional responders arrive. By using real-time location tracking and instant notifications, the app ensures a quick and effective response to emergencies such as cardiac arrests, accidents, or other life-threatening situations.

Introduction

- Community Health Support and Emergency Response App platform connects trained local volunteers with individuals in urgent need of assistance.

- Our app empowers communities to act swiftly by allowing users to report emergencies and notifying certified volunteers nearby who can provide aid until professional responders are on the scene.

- Our app is specifically designed for situations where rapid intervention is essential, such as cardiac arrests, accidents, or other medical crises.

Personas

Patients

Patients are those people in medical emergencies who need the help of the app to reach out for trained volunteers to help immediately until the professional medical responders arrive. Their goals are to ensure timely assistance and reduce response times during critical situations. Patients use the app to:

- Report emergencies by inputting key details such as symptoms, location, and type of help required.
- Track status updates, like the time of arrival of an assigned volunteer and the progress of assistance.
- Communicate directly with the assigned volunteer or dispatch center in case of changes or emergencies.

Personas

Volunteers

Volunteers are trained responders who are supposed to provide the first line of help during any medical emergency. Volunteers attempt to stabilize the patient and provide basic medical support. With volunteers, it may take a little longer before professional help can be extended to the patient. Volunteers use the app to:

- Receive push notifications of emergencies in their geographic area.

- Review case details, including patient symptoms, priority level, and location before accepting assignments.

- Update case progress, including arrival time, assistance provided, and case resolution status.

- Log any observations or additional details for future use by medical facilities.

Personas

Facilities

Facilities include hospitals, clinics, and emergency medical centers that are responsible for providing advanced medical care. The aim is to manage resources efficiently and coordinate with volunteers and dispatch centers for smooth patient handovers. Facilities use the app to:

- Monitor in real time the incoming cases, including patients' information, location, and expected arrival time.

- Allocate resources like beds, medical staff, and equipment based on the priority of the cases and volunteer inputs.

- Communicate with dispatch and volunteers to optimize response times and patient care.

- Log case outcomes, including treatment provided, for future analytics and reporting.

Business Rules

The application implements some of the business rules to manage the workflow efficiently while maintaining data with accuracy and security as follows:

Emergency Case Management:

- Patients can create an emergency case after authentication.
- Each case is assigned a unique identifier that links the patient and volunteer and facility records.

Volunteer Assignments:

- Notifications are sent to volunteers based on proximity to the location of the emergency.
- Volunteers are filtered and matched to cases based on their skillsets and availability.
- A case can only be accepted by one volunteer at a time to avoid conflicts

Business Rules

Facility Coordination:

- Facilities receive automatic notifications when a case escalates and requires their involvement.

- Cases are prioritized based on the severity of patient symptoms, volunteer feedback, and estimated arrival times.

- Facilities can update case outcomes and provide feedback for system improvements.

Data Access and Security:

- Patients can view their own case details and perform updates on them.

- Volunteers can view and update case information of the cases that are assigned to them.

- Facilities have explorer access to case data related to their incoming patients.

- All sensitive data is encrypted, and access is strictly according to policies.

ER Diagram
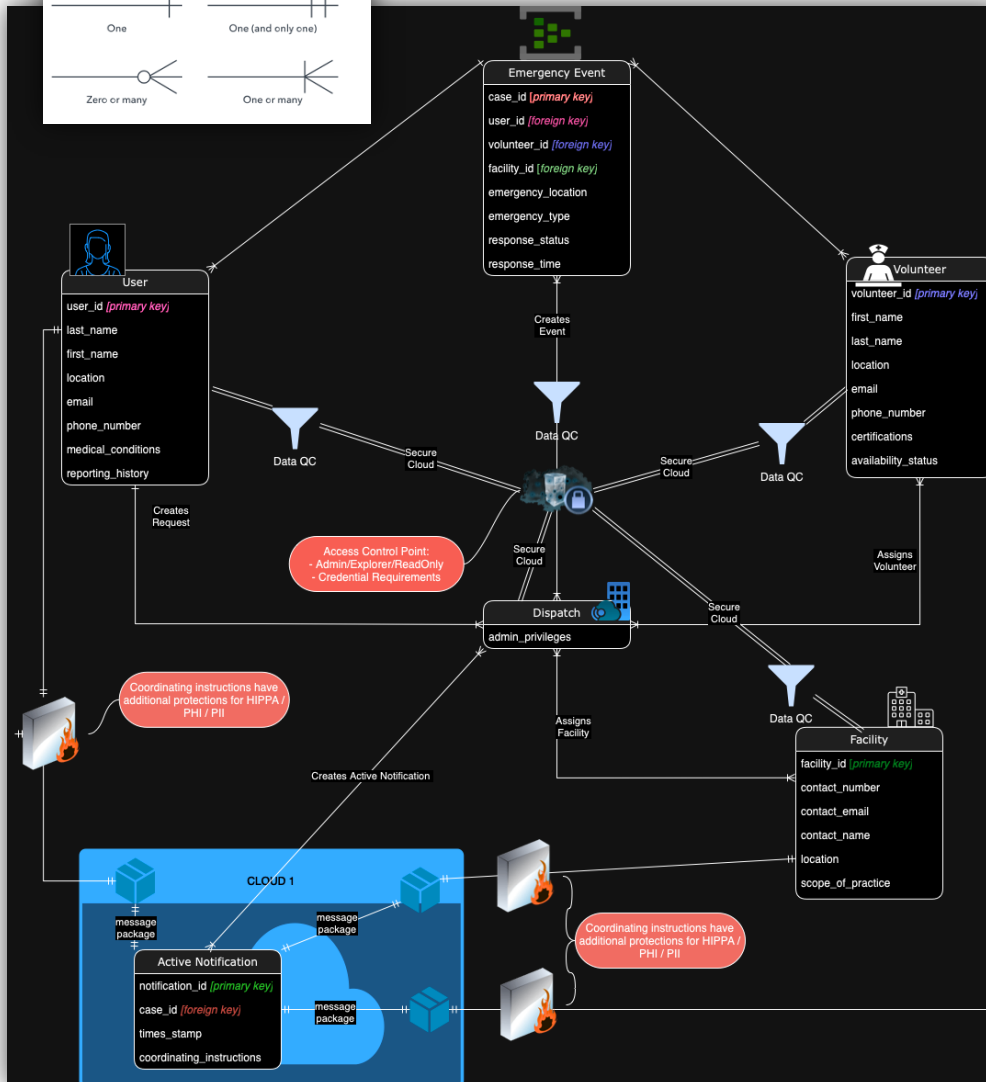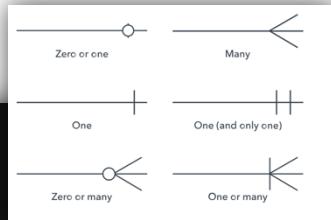
- 6 Primary Entities

- 5 Types of Local Storage

- 2 Cloud Servers

- Dispatch is the communication Hub

- Strict Data Governance

- Robust Security Protocols

Data	
case	99 obs. of 7 variables
facilities	200 obs. of 6 variables
notification	99 obs. of 4 variables
users	500 obs. of 8 variables
volunteer	250 obs. of 8 variables

facilities_column	cases_column	users_column	notification_column	volunteer_column
contact_email	case_id	email	case_id	availability_status
contact_name	emergency_location	first_name	instructions	certifications
contact_number	emergency_type	last_name	notification_id	email
facility_id	response_status	location	timestamp	first_name
location	response_time	medical_conditions	NULL	last_name
scope_of_practice	user_id	phone_number	NULL	location
NULL	volunteer_id	reporting_history	NULL	phone_number
NULL	NULL	user_id	NULL	volunteer_ID

SQL Examples

1. User Management:

- Add and update user profiles.

user_id	first_name	last_name	location	email	phone_number	medical_conditions	reporting_history
W00021h	Monroe	Zamora	29.97N 98.11W	Monroe.Zamora@fakemail.com	339-312-6524	1;3;4;6;7;9;10	NULL
D00031w	Quentin	Garner	44.28N 114.51W	Quentin.Garner@fakemail.com	932-597-5295	1;2;7;9	NULL
D00041m	Jacqueline	Freeman	44.04N 107.57W	Jacqueline.Freeman@fakemail.com	356-312-8769	2;4;9;10	NULL
V00051b	Jayce	Delarosa	27.24N 115.85W	Jayce.Delarosa@fakemail.com	322-780-4422	1;2;4;5;8	NULL
E00061z	Iyla	McGee	42.95N 102.97W	Iyla.McGee@fakemail.com	143-837-3644	1;2;5;6;7;9;10	NULL
H00071v	Conner	Carson	46.16N 95.29W	Conner.Carson@fakemail.com	566-367-7825	1;5;8;9;10	NULL
D00081u	Nalani	Cline	48.76N 70.62W	Nalani.Cline@fakemail.com	248-727-8306	2;3;4;8;10	NULL
P00091q	Cullen	Leonard	32.76N 75.85W	Cullen.Leonard@fakemail.com	626-917-3497	1;3;7;9	W00601j
Y00101c	Demi	Alfaro	47.4N 109.13W	Demi.Alfaro@fakemail.com	656-464-8404	1;3;6;7;8;9;10	NULL
Y00111a	Xzavier	Cano	33.86N 95.63W	Xzavier.Cano@fakemail.com	334-976-2076	3;4;5;6;7;10	NULL
O00121m	Egypt	Steele	26.09N 82.83W	Egypt.Steele@fakemail.com	463-374-3333	1;2;3;4;5;7;8;9	NULL

2. Case Management:

- Assign and track cases.
- Retrieve case history and details.

	case_id	emergency_location	reported_by	volunteer_assigned	case_status
1	P00021s	31.05N 119.24W	Araceli Long	Katie Beck	Closed
2	K00031w	32.94N 82.92W	Marceline Allen	Angela Cherry	Closed
3	M00041v	36.61N 121.3W	Ares Crosby	Royal Watts	Closed
4	R00051i	36.39N 81.59W	Promise Person	Kataleya Rangel	Closed
5	W00061k	44.45N 92.25W	Jane Huynh	Lilianna Bender	Closed
6	F00071w	29.15N 79.68W	Madalynn Richards	Niklaus McIntyre	Closed
7	K00081q	42.49N 73.91W	Tripp Mahoney	Kataleya Rangel	Closed
8	Y00091f	29.2N 91.71W	Angela Eaton	Salem Schmidt	Closed
9	S00101a	32.94N 82.92W	Marceline Allen	Lucille Stevenson	Closed
10	Z00111p	33.12N 111W	Catherine Hodge	Finnegan Copeland	Closed
11	H00121h	39.76N 70.06W	Legend Kim	Lexi Huerta	Closed

3. Volunteer Management:

- Register and manage volunteers.
- Track volunteer availability and workload.
- Retrieve volunteer assignment history.

4. Emergency Analytics:

- Identify trends and patterns in emergency reports.
- Analyze volunteer performance and workload.
- Analyze location-based emergency data.

5. Notification and Prioritization:

- Send notifications to volunteers.
- Prioritize high-priority emergency cases.

	volunteer_ID	first_name	last_name	availability_status	num_cases
1	A00161n	Jianna	Bonilla	available	0
2	A00211e	Stanley	Odom	available	1
3	A00461v	Leslie	Moon	available	0
4	A01081j	Kara	Krueger	available	2
5	A01491t	Juelz	Flowers	available	1
6	A01721o	Coraline	Daugherty	available	1
7	A02131n	Jameson	Yang	available	0
8	A02171j	Alvaro	Barnes	available	1
9	A02221r	Elora	Cobb	available	0
10	B00021p	Jaylah	Harris	available	1
11	B00331o	Enzo	Glenn	available	0

	volunteer_ID	first_name	last_name	case_id	emergency_type	response_time
1	T00051u	Niklaus	McIntyre	J00401d	Level 5	23:44:32
2	C00301d	Loretta	Church	Q00231h	Level 5	23:44:23
3	N00811r	Douglas	Baker	T00461t	Level 2	23:32:44
4	Q01321z	Danna	Rojas	L00561w	level 1	23:29:25
5	B00801u	Lexi	Huerta	H00121h	Level 5	23:23:49
6	A01721o	Coraline	Daugherty	Z00951c	Level 4	23:22:43
7	W01281f	Quinn	Fowler	J008111	level 1	23:18:41
8	Y00451t	Larry	Zuniga	L00961i	Level 1	23:15:52
9	F01991x	Keenan	Church	C00771u	Level 3	22:58:35
10	A00081h	Kataleya	Rangel	K00081q	Level 1	22:33:59
11	Q00321j	Jade	Wagner	L00721g	Level 2	22:09:35

	user_id	first_name	last_name	case_id	emergency_type	emergency_location
1	Y001311	Elian	Moyer	L00561w	level 1	31.66N 104.37W
2	Q00491p	Israel	Brown	B00281i	level 1	33.11N 75.61W
3	P00561w	Demi	Stephens	T00581h	level 1	35.39N 117.35W
4	Q01471a	Ares	Crosby	M00041v	level 1	36.61N 121.3W
5	O02361j	Maddison	Russo	F00571u	level 1	26.52N 120.41W
6	U02581c	Selene	Compton	N00291x	level 1	34.72N 82.06W
7	W02611s	Tomas	Weeks	L00721g	Level 2	34.98N 118.51W
8	R04111y	Moses	Simon	M00841k	level 1	44.09N 70.89W
9	L04421i	Zaniyah	Clayton	N00301c	level 1	45.82N 85.55W

6. Skill-Based Matching:

- Match volunteers to emergencies based on skills and certifications.

7. Operational Insights:

- Analyze overall system performance.
- Identify areas for improvement and resource allocation.

	case_id	emergency_type	emergency_location	response_status	user_name	volunteer_name
1	M00041v	level 1	36.61N 121.3W	Pending	Ares	Royal
2	T00141h	Level 5	42.03N 86.01W	Pending	Alec	Rio
3	R00151e	Level 4	26.88N 87.49W	Pending	Laney	Athena
4	F00161i	Level 5	41.92N 90.08W	Pending	Aarya	Abraham
5	B00281i	level 1	33.11N 75.61W	Pending	Israel	Nixon
6	N00291x	level 1	34.72N 82.06W	Pending	Selene	Truett
7	N00301c	level 1	45.82N 85.55W	Pending	Zaniyah	Colin
8	Y00421w	Level 5	26.37N 76.39W	Pending	Duke	Aaliyah
9	Q00431a	Level 4	41.32N 123.54W	Pending	Branson	Zavier
10	H00441q	Level 1	27.13N 107.52W	Pending	Mikaela	Ryan
11	L00561w	level 1	31.66N 104.37W	Pending	Elian	Danna

Security and Privacy

- Intrinsically Sensitive Data
  - Protected Health Information (PHI)
  - Personally Identifiable Information (PII)
  - Requirements to follow Health Insurance Portability and Accountability Act (HIPAA)
- High Hacker Probability
  - Identity Theft
  - Medical Fraud
  - Health Infrastructure Terrorism
- Key Take-Away For Security Team
  - The app has highly sensitive, legally protected data that pose significant risks, including identity theft, medical fraud, and potential exploitation for health infrastructure attacks.

Scope & Takeaway

The goal is to streamline how emergencies are reported, managed, and resolved.

- Bringing new users on board and keeping their contact info up-to-date.
- Efficiently assigning and tracking emergency cases.
- Recruiting, managing, and assigning volunteers based on their skills and availability.
- Analyzing historical data to spot trends, hotspots, and areas that need improvement.
- Quickly notifying the right people and prioritizing the most critical cases.
- Ensuring volunteers are matched with cases that fit their expertise and the specific needs of the emergency.

Scope & Takeaway

- Streamlined Emergency Response: The system improves the efficiency of emergency response processes.

- Enhanced Decision-Making: It provides valuable insights for better decision-making.

- Effective Management: By managing users, volunteers, and cases, the system aims to enhance community safety and well-being.