CSC 12 ATAR Database Project - Community Connect

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Project Outline

The aim of this project is to design and develop a prototype web application named Community Connect, that facilitates communication between local volunteers and community organisations. The system will provide a platform where organisations can manage events and volunteers can discover and register for opportunities that align with their skills and availability. This project requires database design, implementation, and integration within a modern software development framework, while ensuring usability, reliability, and security.

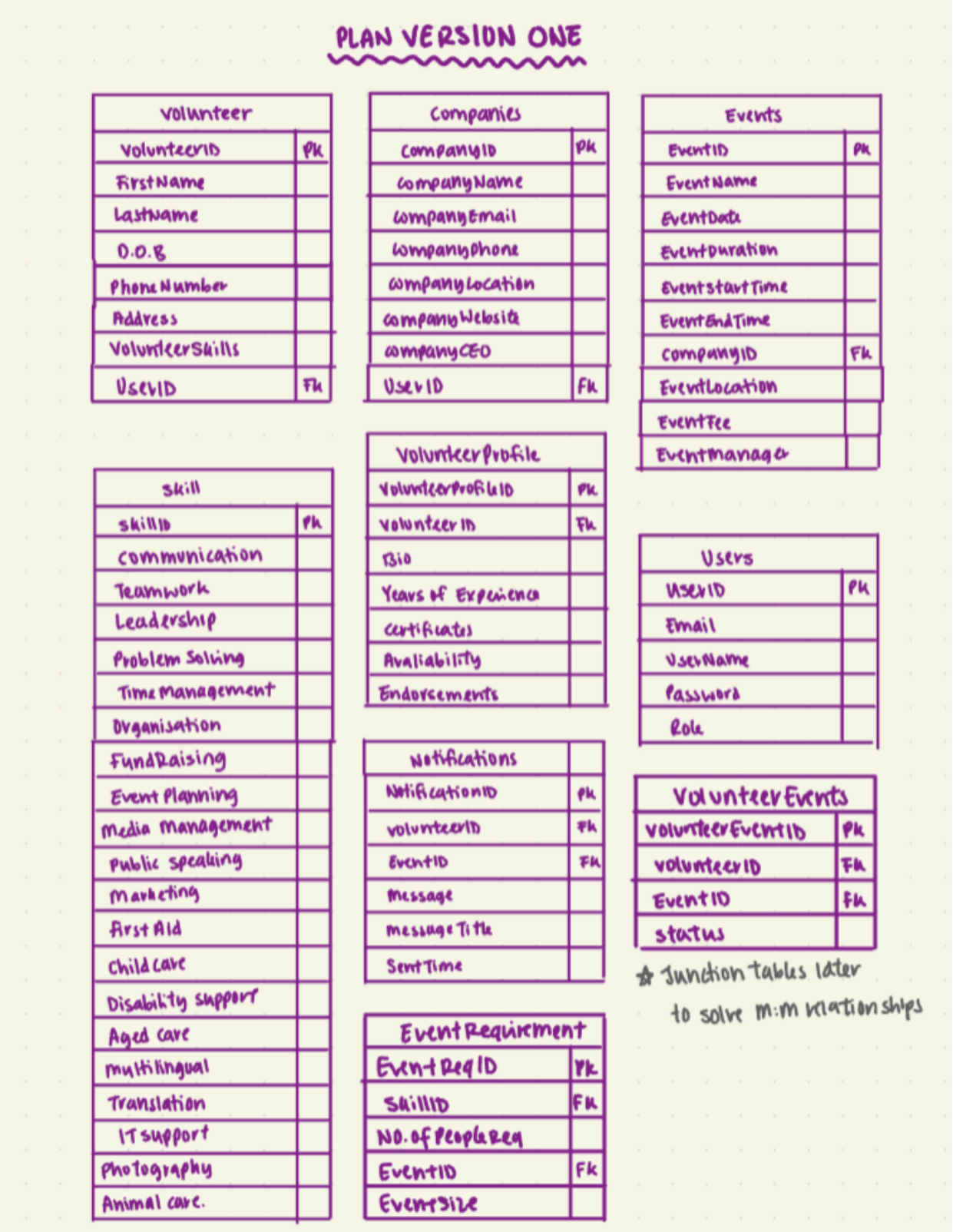
Problem Investigation & Existing Ideas

Volunteering in Australia has been declining steadily over recent decades, creating a significant gap between community needs and volunteer availability (Haghani, ABC 2025). Many potential volunteers face barriers such as unclear pathways to engagement, and uncertainty about which organisations require assistance which align with their skills. Data from the Australian Bureau of Statistics indicates that the rate of formal volunteering through organisations decreased from 36.2% in 2010 to 28.8% in 2019 . This trend continued during the COVID-19 pandemic, with the proportion of adults who had volunteered formally dropping from 36% in 2019 to 26.7% in April 2022. At the same time, community groups and non-profits struggle to recruit volunteers efficiently, resulting in under-supported events and programs.

Research indicates that younger generations are often willing to volunteer but require flexible options, such as micro-volunteering, part-time roles, or episodic commitments. Cultural diversity and lifestyle pressures also influence participation, highlighting the need for an inclusive, accessible, and user-friendly system. Traditional recruitment models, such as relying on family or local networks, are no longer sufficient, particularly for emergency services and large community events. To address these challenges, a centralised platform that connects volunteers with organisations, matches skills and availability, and provides flexible engagement pathways is essential.

Deconstruction of Entities, Attributes and Relationships

Entities and Attributes



For the purpose of this submission, skills have been stored as attributes in the Skill entity to provide set data for demonstration. In a future iteration, this would be normalized into a Skill table with SkillID and SkillName to allow scalability and reduce redundancy

Entities and Relationships

Volunteer:

- One-to-One with Users (each volunteer has one user account)
- Many-to-Many with Events via VolunteerEvents
- Many-to-Many with Skills via VolunteerSkill

Companies:

- One-to-One with Users (each company has one user account)
- One-to-Many with Events (a company/organisation can host many events)

Events:

- One-to-Many with VolunteerEvents (an event can have many volunteers signed up)
- Many-to-Many with Skills via EventRequirement (each event requires multiple skills, and each skill can belong to multiple events)

Skills:

- Many-to-Many with Volunteers (volunteers have skills)
- Many-to-Many with Events via EventRequirement (events need skills)

VolunteerProfile

- One-to-One with Volunteer (each volunteer has a profile)

Users

- One-to-One with Volunteer
- One-to-One with Companies

Notifications

- Many-to-One with Volunteer (a volunteer can receive many notifications)
- Many-to-One with Events (each notification relates to an event)

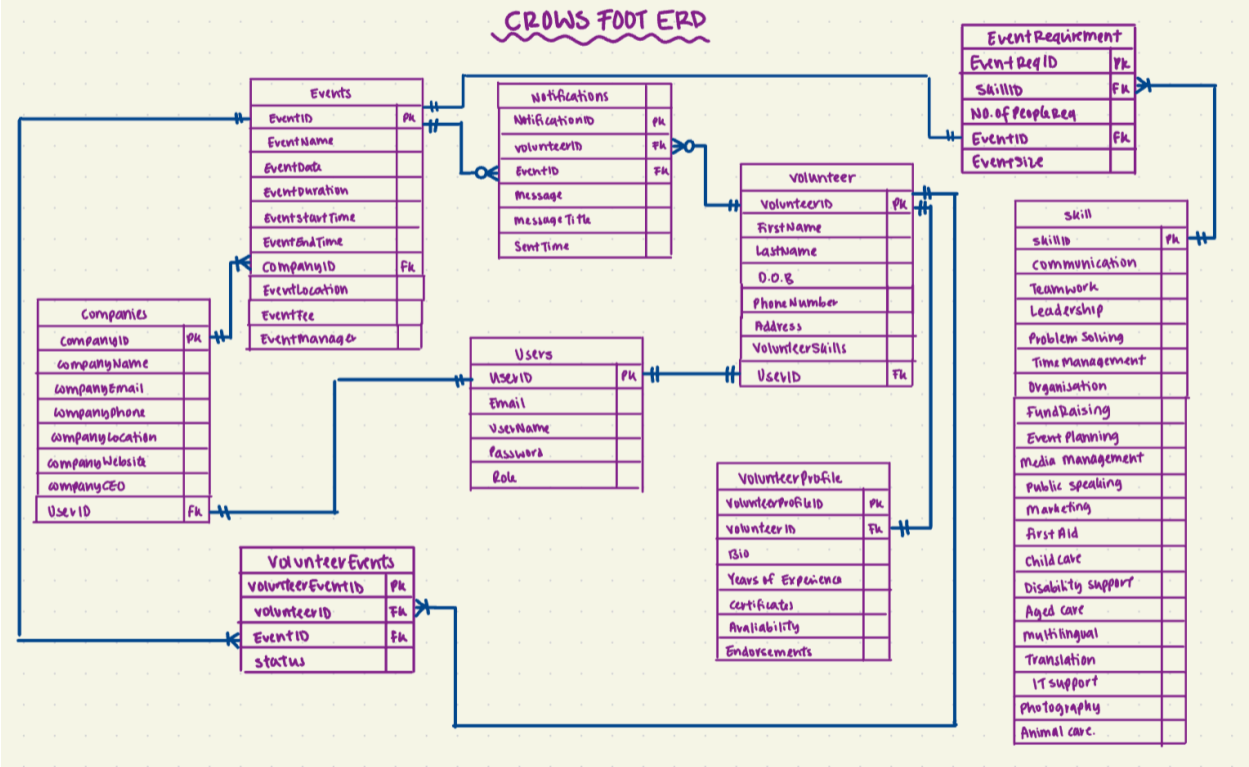
VolunteerEvents (junction table)

- Resolves Many-to-Many relationship between Volunteers and Events

EventRequirement (junction table)

- Resolves Many-to-Many relationship between Events and Skills

ERD with Crows Foot Notation



In my design, I resolved the many-to-many relationships using two junction tables:

- VolunteerEvents: A volunteer can participate in many events, and an event can have many volunteers. This is resolved through the VolunteerEvents table, which creates unique records linking each volunteer to each event.

- EventRequirement: An event can require many skills, and a skill can be required by many events. This is resolved through the EventRequirement table, which records which skills are needed for which events along with additional details such as the number of people required.

Normalisation Process

The following normalisation process is a **demonstration** of how I transformed an unstructured table into a fully normalised database design. For the sake of clarity, this example focuses on a simplified and broken-down subset of attributes from my project. It does not include every table or attribute that appears in my **final ERD and Data Dictionary**.

- The sample tables shown in this process are deliberately designed with **errors, redundancies, and repeating groups** to clearly illustrate why each normal form is required.
- At each stage (0NF, 1NF, 2NF, 3NF), I explain the issues and then show how they are resolved.
- This demonstration shows the **effect of normalisation** by zooming into particular areas such as Volunteers, Events, and Skills.

NORMALISATION ONF

Community connect (volunteerID, volunteerName, phone, email, firstName, LastName, D.O.B, Address, volunteerskills, userID, skillsID, communication, teamwork, ... (all skills listed), animalcare, companyID, companyName, companyEmail, userID, EventID, EventName, EventID, NotificationID, volunteerID, Message)

UserID	VolunteerName	Phone	Email	Skills	EventID	EventName	EventDate	CompanyName
V001	Sarah Lee	0412...	sarah@email.com ↗	Communication, Teamwork	E101	Beach Clean	10/09/25	Green Org
V001	Sarah Lee	0412...	sarah@email.com ↗	Communication, Teamwork	E102	Food Drive	12/09/25	Red Org

Issues:
- repeating attributes such as userID and volunteerID
- repeating groups such as all skills listed
- update, insert, delete anomalies
- non-atomic values.

To create 1NF:
- make all atomic values
- remove repeating attributes
- separate into tables

Normalisation 1NF

volunteers (volunteerID, firstName, LastName, D.O.B, phone number, Address, volunteerskills, userID, skillID)

Events (EventID, EventName, EventDate, CompanyName, Notification Message)

Volunteers Table

VolunteerID	VolunteerName	Phone	Email	Skill
V001	Sarah Lee	0412345	sarah@email.com ↗	Communication
V001	Sarah Lee	0412345	sarah@email.com ↗	Teamwork

Events Table

EventID	EventName	EventDate	CompanyName	NotificationMessage
E101	Beach Clean	10/09/25	Green Org	Reminder: bring hat
E102	Food Drive	12/09/25	Red Org	Reminder: wear gloves

Issues:
- partial dependencies
  volunteerName, phone, email → volunteerID
  skill → volunteerID AND skillID
- companyName stored with every event (redundancy)
- Notification message not "generic" to be able to "use in multiple case"

To create 2NF:
- create junction tables for M:M relationships
- split skills & notifications.

Normalisation 2NF

Volunteer (VolunteerID, VolunteerName, Phone, Email)
Skills (SkillID, SkillName).
Events (EventID, EventName, EventDate, CompanyID)
Companies (CompanyID, CompanyName)
Notifications (NotificationID, EventID, Message).
VolunteerSkills (VolunteerID, SkillID)

Events

EventID	EventName	EventDate
E101	Beach Clean	10/09/25
E102	Food Drive	12/09/25

VolunteerSkills

VolunteerID	SkillID
V001	S01
V001	S02
V002	S03

Skills

SkillID	SkillName
S01	Communication
S02	Teamwork
S03	Leadership

Issues:
- transitive dependency CompanyName → EventID

To create 3NF:
- create EventsRequirement Table
- create VolunteerEvents table

Normalisation 3NF

Volunteers (VolunteerID, FirstName, LastName, Email)
VolunteerProfile (ProfileID, VolunteerID, bio, availability).
Skills (skill ID, skill name, description)
Events (EventID, EventName, Location, Date, Duration).
Companies (CompanyID, CompanyName, Email)
Notifications (NotificationID, VolunteerID, Message, SentTime)
VolunteerEvents (VolunteerEventID, VolunteerID, EventID)
Events Requirements (Event RequirementID, EventID, SkillID)
Users (UserID, username, password, role, VolunteerID, CompanyID)

How 3NF?
- ☑ no repeating groups (1NF)
- ☑ no partial dependencies (2NF)
- ☑ no transitive dependencies (3NF)
- ☑ no m:m relationships

Sample Data

Volunteers

VolunteerID	VolunteerName	Phone	Email
V001	Sarah Lee	0412345	sarah@email.com
V002	Alex Chen	0434567	alex@email.com

Skills

SkillID	SkillName	SkillDescription
S01	Communication	Ability to share ideas
S02	Teamwork	Works well in a group

VolunteerEvents

VolunteerEventID	VolunteerID	EventID
VE01	V001	E101
VE02	V001	E102
VE03	V002	E101

EventRequirements

EventRequirementID	EventID	SkillID
ER01	E101	S01
ER02	E101	S02

Events

EventID	EventName	EventDate	EventLocation	CompanyID
E101	Beach Clean	10/09/25	Perth Beach	C01
E102	Food Drive	12/09/25	Perth Hall	C02

Companies

CompanyID	CompanyName	CompanyContact
C01	Green Org	0412123456
C02	Red Org	0499908776

Notifications

NotificationID	VolunteerID	Message	NotificationDate
N01	V001	Reminder: bring hat	05/09/25
N02	V002	Reminder: wear gloves	08/09/25

Data Dictionary

Volunteers

Element Name	Data Type	Description	Constraints
VolunteerID	INTEGER	Unique ID for each volunteer	Primary Key, Not Null, Unique
FirstName	TEXT	Volunteer's first name	Not Null
LastName	TEXT	Volunteer's last name	Not Null
D.O.B	DATE	Date of birth	Not Null
PhoneNumber	TEXT	Contact number	Not Null
Address	TEXT	Residential address	Not Null
UserID	INTEGER	Reference to the user account	Foreign Key → Users(UserID), Not Null

Companies

Element Name	Data Type	Description	Constraints
CompanyID	INTEGER	Unique ID for each company	Primary Key, Not Null, Unique
CompanyName	TEXT	Name of the company	Not Null
CompanyEmail	TEXT	Email address of the company	Not Null, Unique
CompanyPhone	TEXT	Contact phone	Not Null
CompanyLocation	TEXT	Physical location	Not Null
CompanyWebsite	TEXT	Website URL	Not Null
CompanyCEO	TEXT	CEO of the company	Not Null

UserID	INTEGER	Reference to user account	Foreign Key → Users(UserID), Not Null

Events

Element Name	Data Type	Description	Constraints
EventID	INTEGER	Unique event ID	Primary Key, Not Null, Unique
EventName	TEXT	Name of the event	Not Null
EventDate	DATE	Date of the event	Not Null
EventDuration	INTEGER	Duration in minutes	Not Null
EventStartTime	TIME	Start time of event	Not Null
EventEndTime	TIME	End time of event	Not Null
CompanyID	INTEGER	Hosting organisation	Foreign Key → Companies(CompanyID), Not Null
EventLocation	TEXT	Location of the event	Not Null
EventFee	REAL	Fee to participate (tickets)	Default 0
EventManager	INTEGER	Staff managing the event	Foreign Key → Users(UserID)

Skill

Element Name	Data Type	Description	Constraints
SkillID	INTEGER	Unique ID for each skill	Primary Key, Not Null, Unique
Communication	BOOLEAN	Communication skill	Default FALSE
Teamwork	BOOLEAN	Teamwork skill	Default FALSE
Leadership	BOOLEAN	Leadership skill	Default FALSE
ProblemSolving	BOOLEAN	Problem solving skill	Default FALSE

TimeManagement	BOOLEAN	Time management skill	Default FALSE
Organisation	BOOLEAN	Organisational skill	Default FALSE
Fundraising	BOOLEAN	Fundraising skill	Default FALSE
EventPlanning	BOOLEAN	Event planning skill	Default FALSE
MediaManage	BOOLEAN	Media management skill	Default FALSE
PublicSpeaking	BOOLEAN	Public speaking skill	Default FALSE
Marketing	BOOLEAN	Marketing skill	Default FALSE
FirstAid	BOOLEAN	First aid certification	Default FALSE
Childcare	BOOLEAN	Childcare skill	Default FALSE
DisabilitySupport	BOOLEAN	Disability support skill	Default FALSE
Multilingual	BOOLEAN	Multilingual skill	Default FALSE
Translation	BOOLEAN	Translation skill	Default FALSE
ITSupport	BOOLEAN	IT support skill	Default FALSE
Photography	BOOLEAN	Photography skill	Default FALSE
AnimalCare	BOOLEAN	Animal care skill	Default FALSE

VolunteerProfile

Element Name	Data Type	Description	Constraints
VolunteerProfileID	INTEGER	Unique ID for volunteer profile	Primary Key, Not Null, Unique
VolunteerID	INTEGER	Volunteer linked to profile	Foreign Key → Volunteer(VolunteerID), Not Null
Bio	TEXT	Short biography (LinkedIN style)	Optional
YearsOfExperience	INTEGER	Total volunteering experience	Optional

Certificates	TEXT	Certifications held	Optional
Availability	TEXT	Availability schedule	Optional
Endorsements	TEXT	Recommendations or references	Optional

Users

Element Name	Data Type	Description	Constraints
UserID	INTEGER	Unique user account ID	Primary Key, Not Null, Unique
Email	TEXT	User email address	Not Null, Unique
Username	TEXT	Username for login	Not Null, Unique
Password	TEXT	Password (hashed)	Not Null
Role	TEXT	Role in system (Volunteer/Admin/Company)	Not Null

Notifications

Element Name	Data Type	Description	Constraints
NotificationID	INTEGER	Unique ID	Primary Key, Not Null, Unique
VolunteerID	INTEGER	Volunteer receiving notification	Foreign Key → Volunteer(VolunteerID), Not Null
EventID	INTEGER	Event linked to notification	Foreign Key → Events(EventID)
Message	TEXT	Notification content	Not Null
MessageTitle	TEXT	Title of the notification	Default “Notification: Alert”

SentTime	DATETIME	Time sent	Default CURRENT_TIMESTAMP

VolunteerEvents

Element Name	Data Type	Description	Constraints
VolunteerEventID	INTEGER	Unique ID for record	Primary Key, Not Null, Unique
VolunteerID	INTEGER	Linked volunteer	Foreign Key → Volunteer(VolunteerID), Not Null
EventID	INTEGER	Linked event	Foreign Key → Events(EventID), Not Null
Status	TEXT	Registration status (Pending, Confirmed, Cancelled)	Default “Pending”

EventRequirements

Element Name	Data Type	Description	Constraints
EventReqID	INTEGER	Unique requirement record	Primary Key, Not Null, Unique
SkillID	INTEGER	Required skill for event	Foreign Key → Skill(SkillID), Not Null
N0.OfPeopleRequired	INTEGER	How many volunteers needed with this skill	Not Null
EventID	INTEGER	Event linked to requirement	Foreign Key → Events(EventID), Not Null
EventSize	INTEGER	Total expected volunteers for event	Not Null

I chose not to include specific data size limits (e.g., VARCHAR(50)) in my data dictionaries. Sizes such as VARCHAR lengths would be specified later at the SQL implementation stage, depending on the DBMS (practical SQL Lite vs paper for WACE exam) chosen. Instead, I focused on the essential design elements and logic:

- Element name
- Data type
- Description
- Constraints (e.g., Primary Key, Foreign Key, Not Null, Unique)

Ethical and Legal research

Australian Privacy Principle	Requirement	Community Connect Application
APP 1	Must have a clear privacy policy that explains which information is collected, why, and how it is stored.	Create a privacy page explaining that volunteer names, contact info, and skills are stored to match them with events.
APP 5	Individuals must be informed when their personal info is collected, the purpose, and who will access it.	Display a message when a volunteer signs up, explaining how their info will be used such as matching skills to events.
APP 6	Info collected can only be used for the stated purpose.	Only use volunteer info for managing events or sending notifications. Do not share with third parties for marketing.
APP 10	Ensure the info is accurate, complete, and up-to-date.	Allow volunteers to update their profiles; verify organisation info when creating accounts.
APP 11	Protect info from misuse, loss, or unauthorised access.	Use secure password storage (hashed).
APP 12	Individuals can request access to their info and correct errors.	Allow Volunteers to view and edit their profiles or delete account.

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