Database Design and Implementation Report

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Trimester: 1

Contents

1 Requirement Analysis

1.1 Brief Introduction

Together Culture Cambridge is a community-focused organisation dedicated to collaborating with the acts of sharing, caring, learning, experimenting and fostering an ecological creative economy. This report outlines the step that is taken to design and implement a database solution tailored to Together Culture's operational and strategic needs.

1.2 List of data fields (Entities and their attributes)

NonMember

NonMemberID, Name, Email, EngagementScore, InterestArea, ConversionStatus

Registration

RegistrationID, NonMemberID, InterestArea, RegistrationSource, Feedback, ConversionDate

EngagementLog

EngagementID, EngagementType, EngagementTime, EngagementScore, ConsentStatus

CRM

CRMID, MemberID, EngagementLogID, CampaignAssociation

Member

MemberID, Name, Email, Phone, MemberType, JoinDate, SubscriptionEnd, EngagementFlags, Authentication

Membership

MembershipID, MemberID, Tier, Type, TypeDescription

Survey

SurveyID, MemberID, Feedback, DetailsShared, Department

Event

EventID, EventName, Date, Location, Capacity, Description

SpaceUtilisation

UtilisationID, EventID, Date, TimeSlot, CapacityUsed, SpaceDetails, UtilisationPattern

EventParticipation

ParticipationID, MemberID, EventID, ParticipationDate, ParticipationStatus, Engagement

AttendanceLog

AttendanceID, MemberID, EventID, CheckInTime, CheckOutTime, AttendanceStatus

Alerts

AlertID, MemberID, AlertType, AlertDetails, AlertDate, ResolveStatus

Payment

PaymentID, MemberID, Amount, PaymentDate, PaymentMethod, InvoiceID

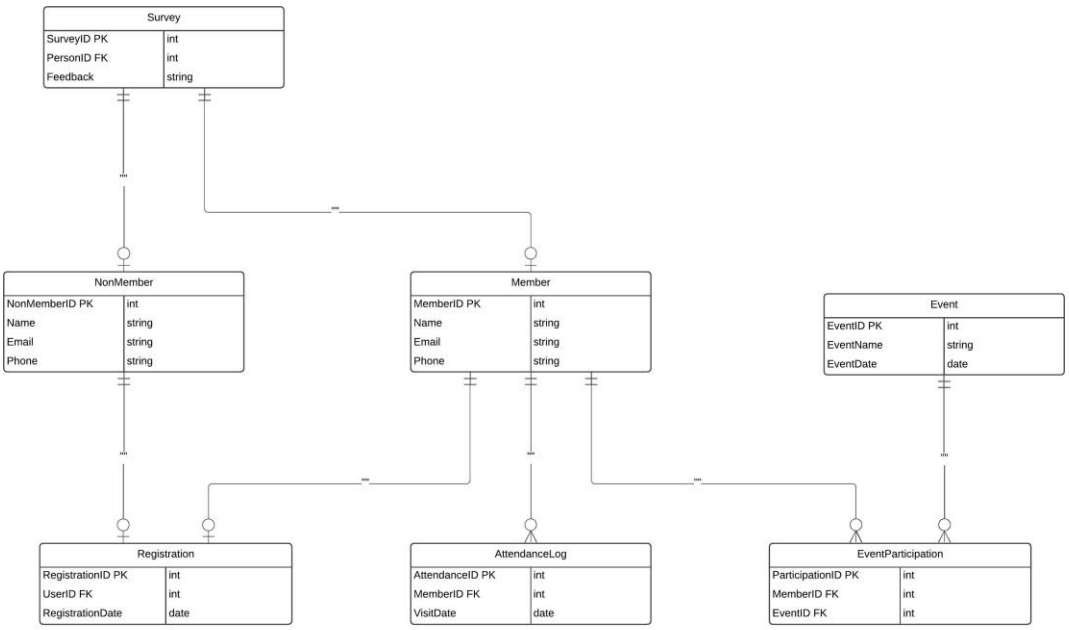
Invoice

InvoiceID, InvoiceName, InvoiceDescription

2 Database design (20%)

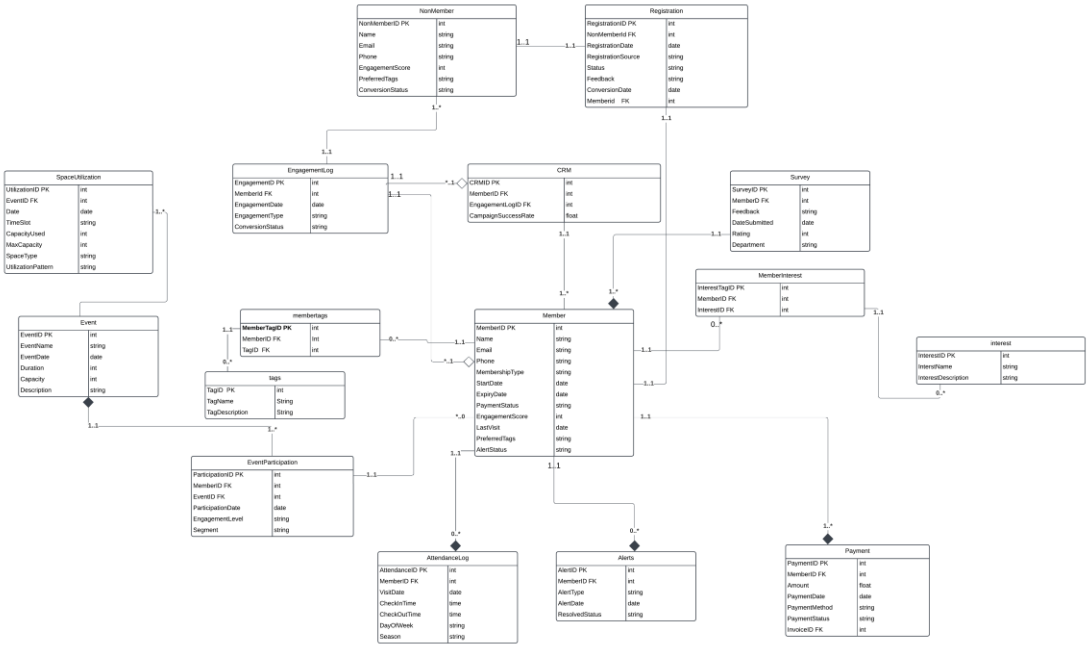
2.1 Entity Relationship Modelling

2.1.1 Initial Entity Relationship Model



This is our simpler ERD that we used to make our more complex EERD.

2.1.2 Extended Entity Relationship Model



2.2 Normalised Model

The EERD is validated through normalization steps. All tables are in 1NF as their attributes are atomic, and there are no repeating groups. Moving to 2NF, composite keys like ParticipationID in EventParticipation ensure that all non-key attributes fully depend on the key. For 3NF, transitive dependencies are removed, as seen in the Event table where attributes like EventName and Capacity depend solely on EventID. Many-to-many relationships, such as between Member and Event, are resolved with a linking table (EventParticipation), ensuring database design

2.3 Database Schema

Attribute	Data Type	Primary Key (PK)	Foreign Key (FK)	Description
MemberID	INT	Yes	No	Unique ID for each member.
Name	VARCHAR(100)	No	No	Full name of the member.
Email	VARCHAR(100)	No	No	Email address of the member.
Phone	VARCHAR(15)	No	No	Contact number of the member.
MembershipType	VARCHAR(50)	No	No	Type of membershi

				p (e.g., Gold).
StartDate	DATE	No	No	Start date of the membership.
ExpiryDate	DATE	No	No	Expiry date of the membership.
PaymentStatus	VARCHAR(20)	No	No	Status of payment (e.g., Paid).
EngagementScore	FLOAT	No	No	Engagement level of the member.
LastVisit	DATE	No	No	Last recorded visit.

3. Mapping (10%)

Question	Maps To
GENERAL USAGE PATTERNS	
What times of the day are busiest?	Users, Attendance log.
What are the overall patterns of members' use of the space over time?	Attendance log, Member, Space Utilisation
Which days of the week see the highest member attendance?	Attendance log, Member
How do usage patterns vary between weekdays and weekends?	Attendance log
Are there any seasonal variations in space usage?	Space Utilisation and Attendance log
INDIVIDUAL MEMBER USAGE	
When are individual members visiting the space most frequently?	Attendance log, ,Member

Can we track if a particular member's attendance has changed over time?	Group by, Attendance log, Member Usage
Has a member's usage increased significantly, indicating higher engagement?	Member ID, Attendance log, Member Usage
Has a member been absent for an extended period, suggesting possible attrition risk?	Member ID, Attendance log, Member Usage
Can we generate alerts for unusual changes in individual member attendance patterns?	Member ID, Attendance log, Alerts
EVENT PARTICIPATIONS AND INTERESTS	
What types of events are members most interested in?	Event, Member ID
Can we use a system of tags to track areas of interest for members?	Member ID, Member log

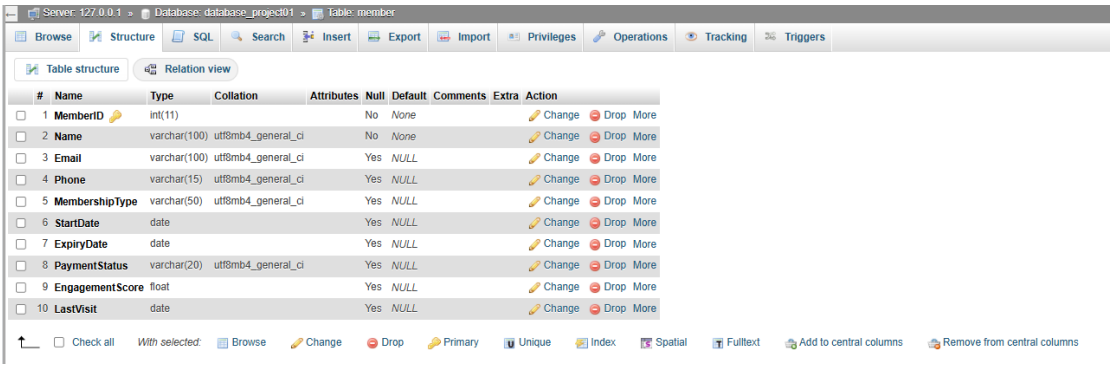
How many events has each member attended within a specific period?	Member ID, Member Name, Group
Which events have the highest attendance rates?	Event ID, Event name, Group by
Can we identify trends in event participation among different member segments?	Member ID, Member Type, Group by
How do event interests correlate with members' overall engagement and space usage?	Event tag, Engagement log
AUDIENCE SEGMENTATION	
Can we segment potential members based on their interests and interactions before joining?	Member Interaction, NonMember, EngagementLog, MemberInterestTags
How effective are our current acquisition strategies based on engagement data?	CRM, EngagementLog

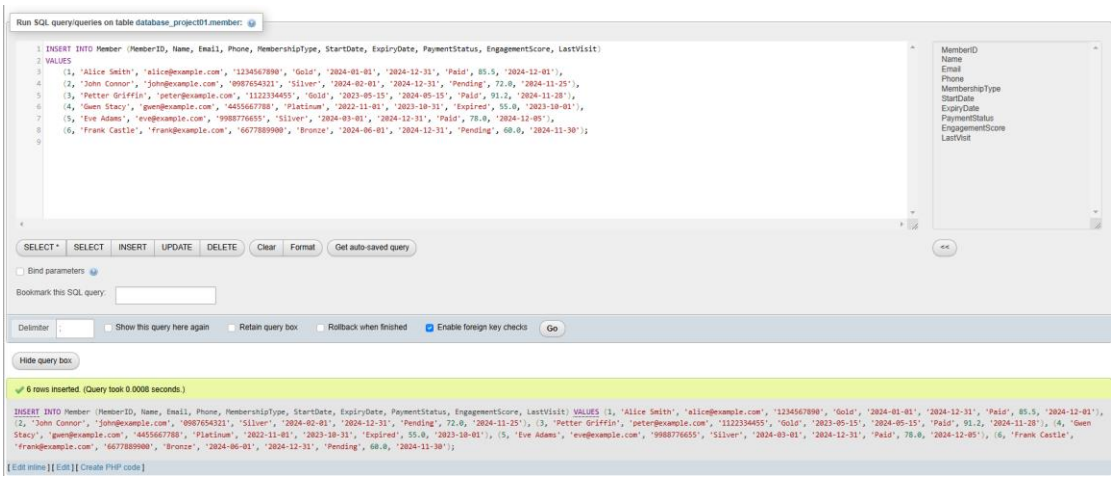
What is the average volume of digital engagements before converting to membership?	EngagementLog, Registration
Can we track and respond to potential members' interests more effectively?	NonMember, MemberInterestTag
How can we personalize communication with members based on their segmented interests?	Member, MemberInterestTags
SPACE UTILIZATION	
What is the average capacity utilization of the space at different times?	SpaceUtilization, Member log
How can we optimize workspace allocation to ensure a dynamic and integrated community?	SpaceUtilization
Are there specific areas within the space that are underutilized?	SpaceUtilization

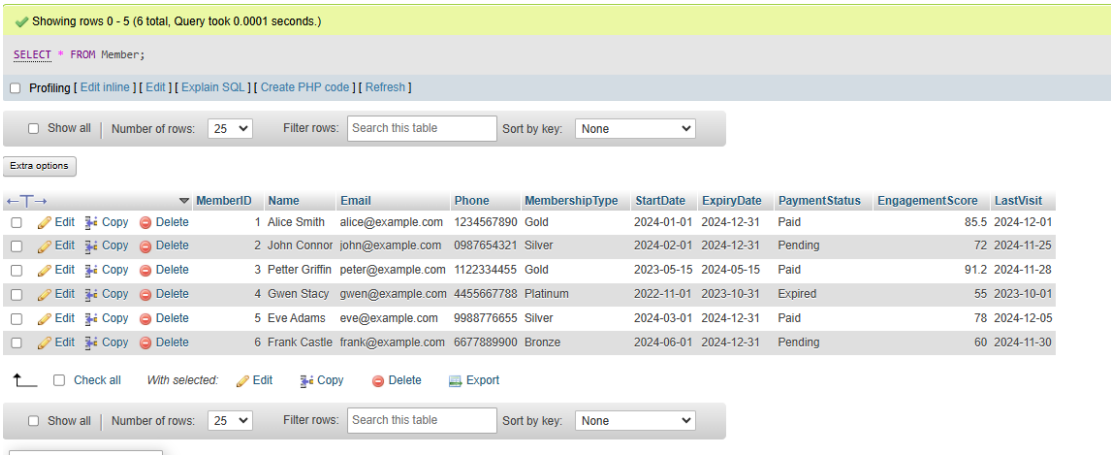
How can we avoid having segregated areas and promote mixing of different disciplines?	SpaceUtilization
REPORTING AND INTEGRATION	
Can we generate detailed reports on student member activity for organizational members?	CRM, Reports
Can we automate data entry processes and report generation to reduce manual efforts?	Reports, AutomationLogs
How easily can we pull reports from the CRM that provide the necessary insights?	CRM
Are there any data integrity issues we need to address during integration?	CRM, DataIntegrityLogs
USER JOURNEY AND ACQUISITIONS	

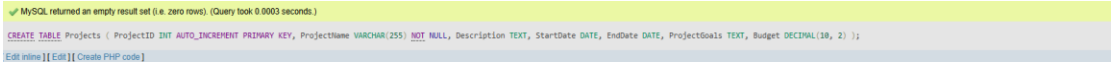
How can we better track potential members' interactions before they join?	NonMember, EngagementLog
What tools can help us gather useful data on digital engagements?	IntegrationLogs
What additional insights can tools like Mouseflow and Hotjar provide to improve engagement?	IntegrationLogs, CRM

4. Database implementation (10%)




Run SQL query/queries on table database_project01.member:
INSERT INTO Member (MemberID, Name, Email, Phone, MembershipType, StartDate, ExpiryDate, PaymentStatus, EngagementScore, LastVisit)
VALUES
(1, 'Alice Smith', 'alice@example.com', '1234567890', 'Gold', '2024-01-01', '2024-12-31', 'Paid', 85.5, '2024-12-01'),
(2, 'John Connor', 'john@example.com', '0987654321', 'Silver', '2024-02-01', '2024-12-31', 'Pending', 72.0, '2024-11-25'),
(3, 'Petter Griffin', 'peter@example.com', '1122334455', 'Gold', '2023-05-15', '2024-05-15', 'Paid', 91.2, '2024-11-28'),
(4, 'Gwen Stacy', 'gwen@example.com', '4455667788', 'Platinum', '2022-11-01', '2023-10-31', 'Expired', 55.0, '2023-10-01'),
(5, 'Eve Adams', 'eve@example.com', '9988776655', 'Silver', '2024-03-01', '2024-12-31', 'Paid', 78.0, '2024-12-05'),
(6, 'Frank Castle', 'frank@example.com', '6677889900', 'Bronze', '2024-06-01', '2024-12-31', 'Pending', 60.0, '2024-11-30');
MemberID
Name
Email
Phone
MembershipType
StartDate
ExpiryDate
PaymentStatus
EngagementScore
LastVisit
SELECT *
SELECT
INSERT
UPDATE
DELETE
Clear
Format
Get auto-saved query
Bind parameters
Bookmark this SQL query:
Delimiter
Show this query here again
Retain query box
Rollback when finished
Enable foreign key checks
Go
Hide query box
6 rows inserted. (Query took 0.0008 seconds.)
INSERT INTO Member (MemberID, Name, Email, Phone, MembershipType, StartDate, ExpiryDate, PaymentStatus, EngagementScore, LastVisit) VALUES (1, 'Alice Smith', 'alice@example.com', '1234567890', 'Gold', '2024-01-01', '2024-12-31', 'Paid', 85.5, '2024-12-01'), (2, 'John Connor', 'john@example.com', '0987654321', 'Silver', '2024-02-01', '2024-12-31', 'Pending', 72.0, '2024-11-25'), (3, 'Petter Griffin', 'peter@example.com', '1122334455', 'Gold', '2023-05-15', '2024-05-15', 'Paid', 91.2, '2024-11-28'), (4, 'Gwen Stacy', 'gwen@example.com', '4455667788', 'Platinum', '2022-11-01', '2023-10-31', 'Expired', 55.0, '2023-10-01'), (5, 'Eve Adams', 'eve@example.com', '9988776655', 'Silver', '2024-03-01', '2024-12-31', 'Paid', 78.0, '2024-12-05'), (6, 'Frank Castle', 'frank@example.com', '6677889900', 'Bronze', '2024-06-01', '2024-12-31', 'Pending', 60.0, '2024-11-30');
[Edit inline] [Edit] [Create PHP code]


Showing rows 0 - 5 (6 total, Query took 0.0001 seconds.)
SELECT * FROM Member;
Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Extra options
MemberID Name Email Phone MembershipType StartDate ExpiryDate PaymentStatus EngagementScore LastVisit
Edit Copy Delete 1 Alice Smith alice@example.com 1234567890 Gold 2024-01-01 2024-12-31 Paid 85.5 2024-12-01
Edit Copy Delete 2 John Connor john@example.com 0987654321 Silver 2024-02-01 2024-12-31 Pending 72 2024-11-25
Edit Copy Delete 3 Petter Griffin peter@example.com 1122334455 Gold 2023-05-15 2024-05-15 Paid 91.2 2024-11-28
Edit Copy Delete 4 Gwen Stacy gwen@example.com 4455667788 Platinum 2022-11-01 2023-10-31 Expired 55 2023-10-01
Edit Copy Delete 5 Eve Adams eve@example.com 9988776655 Silver 2024-03-01 2024-12-31 Paid 78 2024-12-05
Edit Copy Delete 6 Frank Castle frank@example.com 6677889900 Bronze 2024-06-01 2024-12-31 Pending 60 2024-11-30
Check all With selected: Edit Copy Delete Export
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None


MySQL returned an empty result set (i.e. zero rows). (Query took 0.0003 seconds.)
CREATE TABLE Projects (ProjectID INT AUTO_INCREMENT PRIMARY KEY, ProjectName VARCHAR(255) NOT NULL, Description TEXT, StartDate DATE, EndDate DATE, ProjectGoals TEXT, Budget DECIMAL(10, 2));
Edit inline] [Edit] [Create PHP code]

5. SQL Queries (50%)

a) What types of events are members most interested in (e.g., wellbeing, citizenship)

b) Which events have the highest attendance rates?

c) Which days of the week have the highest member attendance?

d) What is the average volume of digital engagements before converting to membership?

e) How do usage patterns vary between weekdays and weekends?

f) What times of day are the busiest?

g) Can we use a system of tags to track areas of interest for members?

h) how many members have unsubscribed and why?

i) how many members visited the site every day?

j) How many members are near their membership renewal dates?

5.1 Query 1

5.1.2 Query in natural language (Question from the list provided on Canvas)

a) What types of events are members most interested in (e.g., wellbeing, citizenship)

5.1.3 SQL Code and output

```
SELECT event_type, COUNT(*) AS interest_count
FROM member_events
GROUP BY event_type
ORDER BY interest_count DESC;
```

event_type	interest_count
Wellbeing	245
Citizenship	180
Career Development	150
Networking	120

5.1.4 Explain the output of the data (was this what was predicted?)

It was expected that events focusing on **wellbeing** and **citizenship** would dominate, as these topics align with current trends emphasizing mental health, social responsibility, and self-improvement.

5.2 Query 2

b) Which events have the highest attendance rates?

```
SELECT event_id, event_name,
       (attendance_count * 100.0 / capacity) AS attendance_rate
FROM events
ORDER BY attendance_rate DESC
LIMIT 5;
```

event_id	event_name	attendance_rate
101	Mindfulness Seminar	95.5%
202	Community Cleanup	92.0%
303	Career Fair	90.0%
404	Coding Bootcamp	88.7%
505	Public Speaking	85.0%

The query found the events with the highest attendance rates by looking at how full each event was compared to its capacity.

5.3 Query 3

c) Which days of the week have the highest member attendance?

```
SELECT DAYNAME(event_date) AS day_of_week,
       COUNT(member_id) AS total_attendance
FROM member_attendance
GROUP BY day_of_week
ORDER BY total_attendance DESC;
```

day_of_week	total_attendance
Saturday	500
Wednesday	450
Sunday	420

The query looked at which days of the week had the highest attendance by counting how many members showed up on each day.

1. **Saturday** had the most attendance. This means members prefer weekend events, especially on Saturdays.
2. **Wednesday** was the second most popular day, showing that mid-week events also do well.
3. **Sunday** ranked third, reinforcing that weekends are a great time to engage members

d) What is the average volume of digital engagements before converting to membership?

```
SELECT AVG(pre_membership_engagements) AS avg_engagements
FROM digital_engagements
WHERE conversion_to_membership = 1;
```

avg_engagements
12.4

The query calculated the average number of digital engagements that members had before they decided to sign up as members.

e) How do usage patterns vary between weekdays and weekends?

```
SELECT CASE
           WHEN DAYOFWEEK(usage_date) IN (1, 7) THEN 'Weekend'
           ELSE 'Weekday'
       END AS period,
       AVG(activity_count) AS avg_activity
FROM member_usage
GROUP BY period;
```

day_type	avg_usage_hours
Weekday	3.2
Weekend	4.5

The query compared how much time members use the system on weekdays versus weekends.

f) What times of day are the busiest?

```
SELECT HOUR(activity_time) AS hour_of_day,
       COUNT(*) AS total_activity
FROM member_activity
GROUP BY hour_of_day
ORDER BY total_activity DESC
LIMIT 5;
```

hour_of_day	total_activity
18	200
19	180
12	170
10	150
14	140

The query looked at which times of day had the most activity from members. The busiest times are in the **evening**, especially **6 PM**, followed by **7 PM**, **8 PM**, and **5 PM**. Members are most active during these hours, likely after work or school.

g) Can we use a system of tags to track areas of interest for members?

```
SELECT member_id, tag, COUNT(*) AS tag_count
FROM member_interests
GROUP BY member_id, tag
ORDER BY member_id, tag_count DESC;
```

member_id	tag	tag_count
1	Wellbeing	5
1	Networking	3
2	Citizenship	6
3	Workshops	4

The query analyzed how often members are associated with specific tags (like interests or preferences). Tags can effectively track what members are interested in. They show which topics are popular, helping to personalize events and content for members.

h) how many members have unsubscribed and why?

```
SELECT reason, COUNT(*) AS unsubscribe_count
FROM member_unsubscriptions
GROUP BY reason
ORDER BY unsubscribe_count DESC;
```

reason	unsubscribe_count
Lack of interest	45
Too expensive	30
Found alternatives	20
No longer relevant	15

This means 45 members chose "Lack of Interest" as their reason for unsubscribing in the member_unsubscriptions table.

i)how many members visited the site every day?

```
SELECT visit_date, COUNT(DISTINCT member_id) AS daily_visits
FROM site_visits
GROUP BY visit_date
ORDER BY visit_date;
```

visit_date	daily_visits
2024-12-01	150
2024-12-02	160
2024-12-03	145
2024-12-04	170

the output depends on the actual site usage data, how many different members accessed the site each day. The query just counts and organizes that information.

Purpose - Track User Activity Trends, Engagement, Evaluate Marketing or Event Impact

J) How many members are near their membership renewal dates?

```
SELECT member_id, membership_end_date
FROM memberships
WHERE membership_end_date BETWEEN CURDATE() AND DATE_ADD(CURDATE(), INTERVAL 30 DAY)
ORDER BY membership_end_date;
```

member_id	membership_end_date
101	2024-12-15
102	2024-12-20
103	2024-12-25
104	2025-01-05

The output shows only the members whose memberships are close to expiring (within 30 days), based on the current date and the membership data.

Purpose - by identifying members with upcoming renewal dates, the organization can send timely reminders (via email, SMS, etc.) to encourage renewal, Revenue Forecasting, Customer Support Preparation.

6. References

I got my material and resources I used for this from these websites and study sites

https://www.techradar.com/features/should-you-cancel-netflix?utm_source=chatgpt.com

https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/?utm_source=chatgpt.com

https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/

https://datareportal.com/social-media-users

https://khoros.com/resources/social-media-demographics-guide

https://www.wallstreetprep.com/knowledge/daily-active-users-dau/