

SCHOOL OF COMPUTER SCIENCES  
UNIVERSITI SAINS MALAYSIA

CMT221/CMM222: Database Organization and Design  
Semester 1, Academic Session: 2023/2024

**System Implementation**

*Group Number 55*

*Case Study Number 15: ResearchPortal Academic Social Networking  
Database System*

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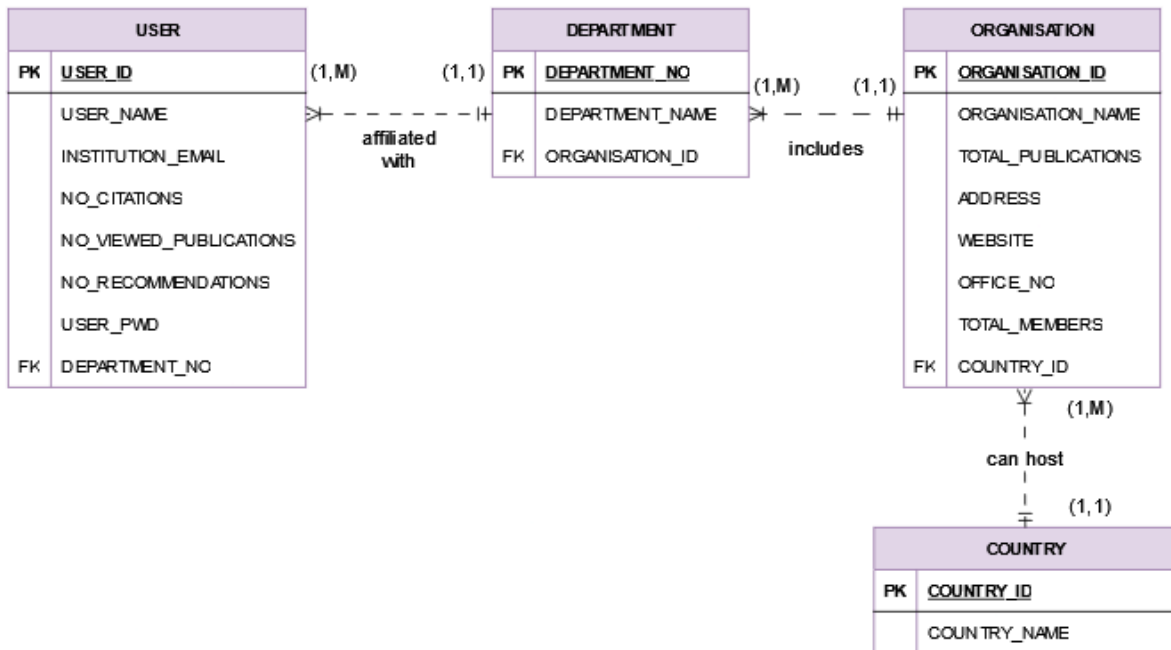
Date of Submission  
28 January2024

## 1.0 Business Rules and Partial ERDs

### Module 1: [USER- Mohsin Ali ]

- BR1: Each user is affiliated to one and only one department. Each department affiliates one or many users.
- BR2: Each organisation can include one or many departments. Each department can be included in one and only one organisation.
- BR3: Each country can host one or many organisations. Each organisation can be hosted in one and only one country.

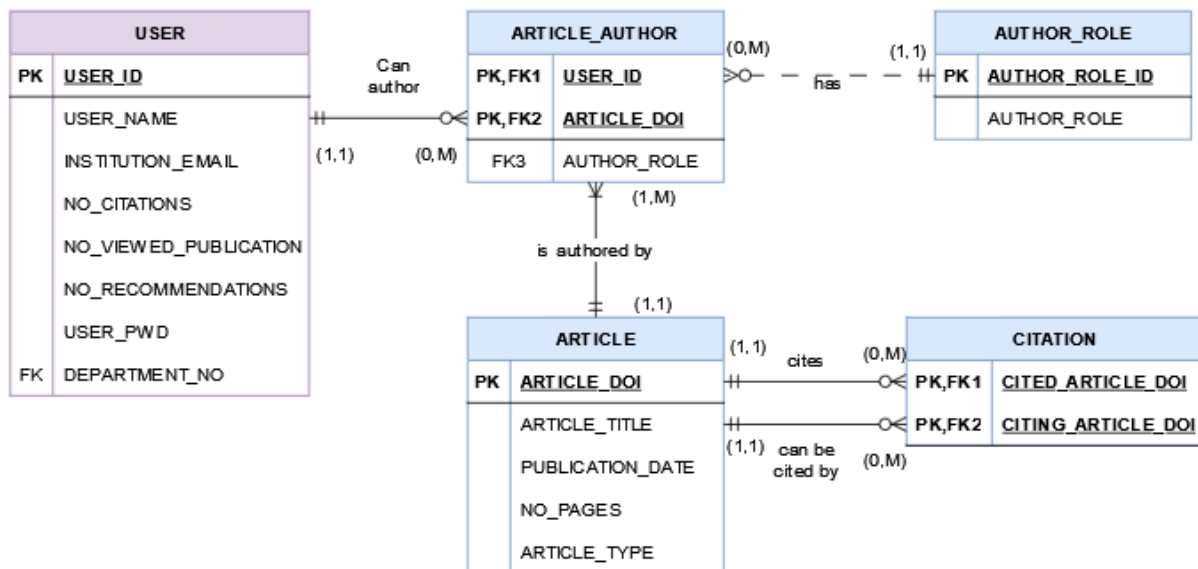
### Partial Entity Relationship Diagram of User Module:



## Module 2: ARTICLE- Azam Tamheed

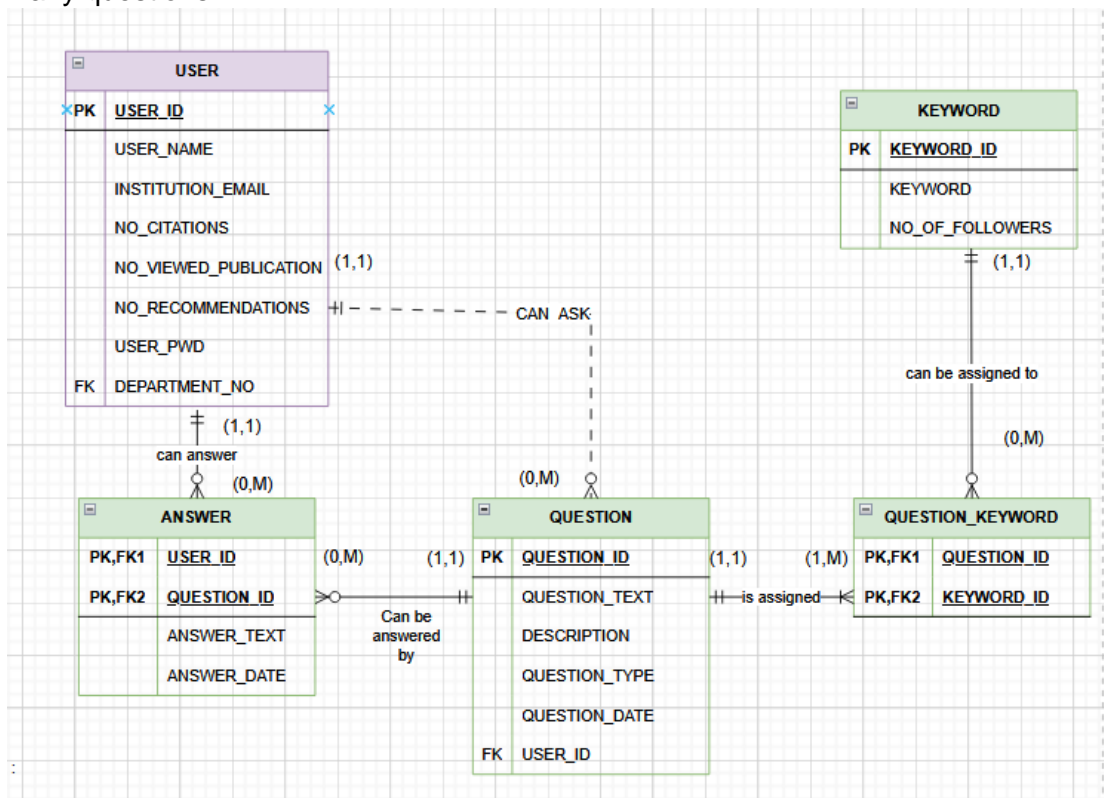
- BR4: Each user can author zero or many articles. Each article can be authored by one or many users.
- BR5: Each Article author has an author role. Each author role can have zero or many article authors.
- BR6: Each article can be cited in zero or more citing articles. Each citing article can cite zero or many cited articles.

Partial Entity Relationship Diagram of Article Module:



### Module 3: QUESTION

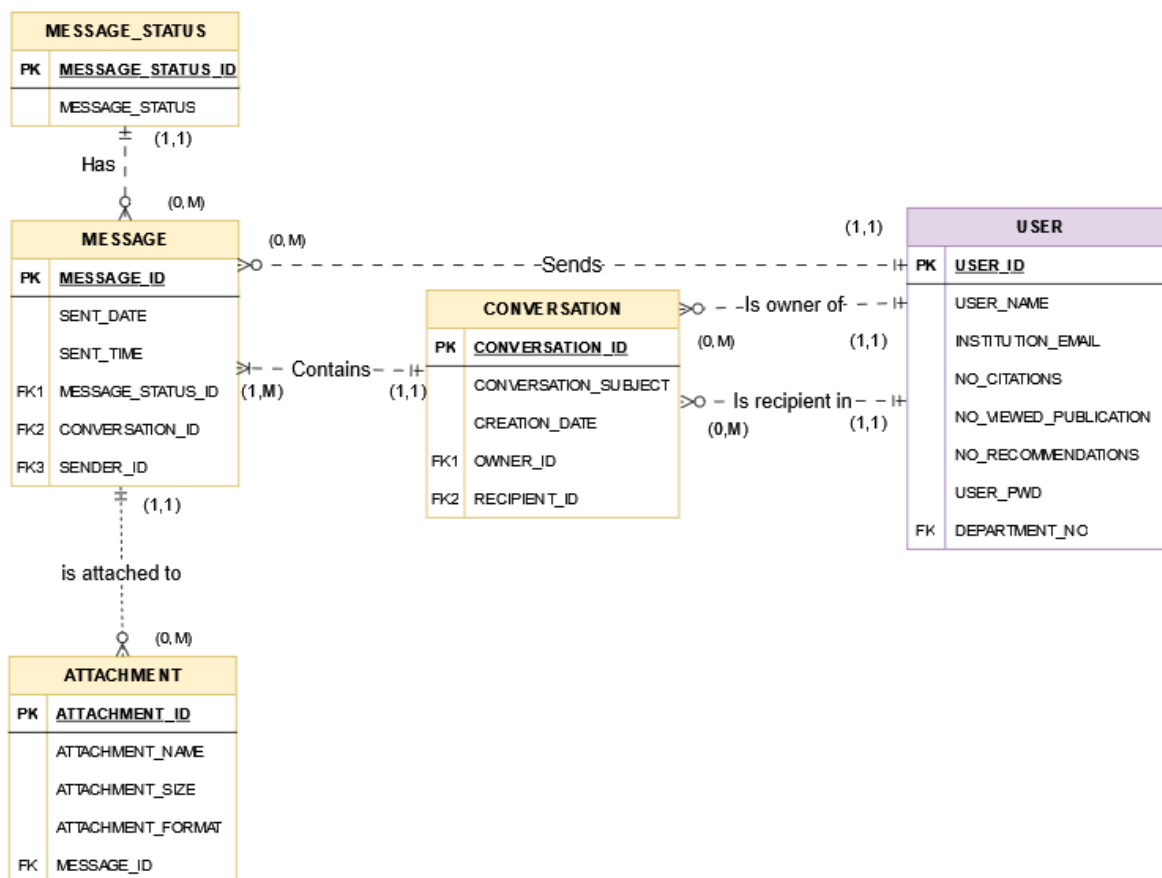
- BR7: Each user can ask zero or many questions. Each question can be asked by one and only one user.
- BR8: Each question can be answered by zero or many users. Each user can answer zero or many questions
- BR9: Each question can be assigned one or many keywords. Each keyword is assigned to one or many questions.



## Module 4: CONVERSATION- Sadeed

- BR10: Each user can own zero or many conversations. Each conversation is owned by one and only one user.
- BR11: Each user is recipient in zero or many conversations. Each conversation is received by one and only one user.
- BR12: Each conversation can contain one or many messages. Each message is contained in one and only one conversation.
- BR13: Each user can send zero or many messages. Each message is sent by one and only one user.
- BR14: Each message can attach zero or many attachments. Each attachment **is attached to one and only one message.**
- BR15: Each Message has one and only one message status. Each message status can have zero or many messages.

### Partial Entity Relationship Diagram of Conversation Module:



## Section 2.0

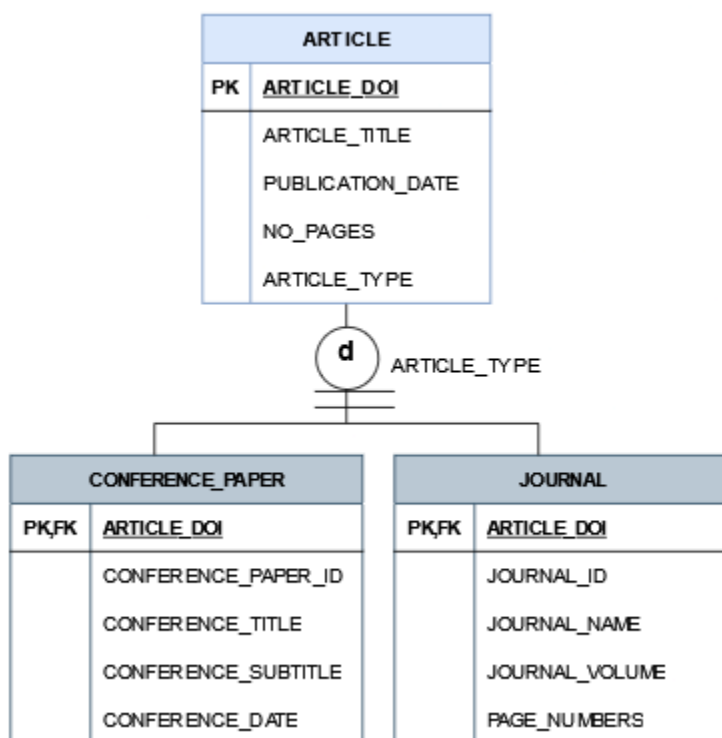
- BR16: An ARTICLE CAN EITHER BE A JOURNAL OR A CONFERENCE PAPER ONLY.

The specialization hierarchy has Article as the supertype and Conference paper type and Journal type as the subtypes.

The Conference paper type article must store the Conference paper ID , Conference Title , Conference Subtitle and conference date.

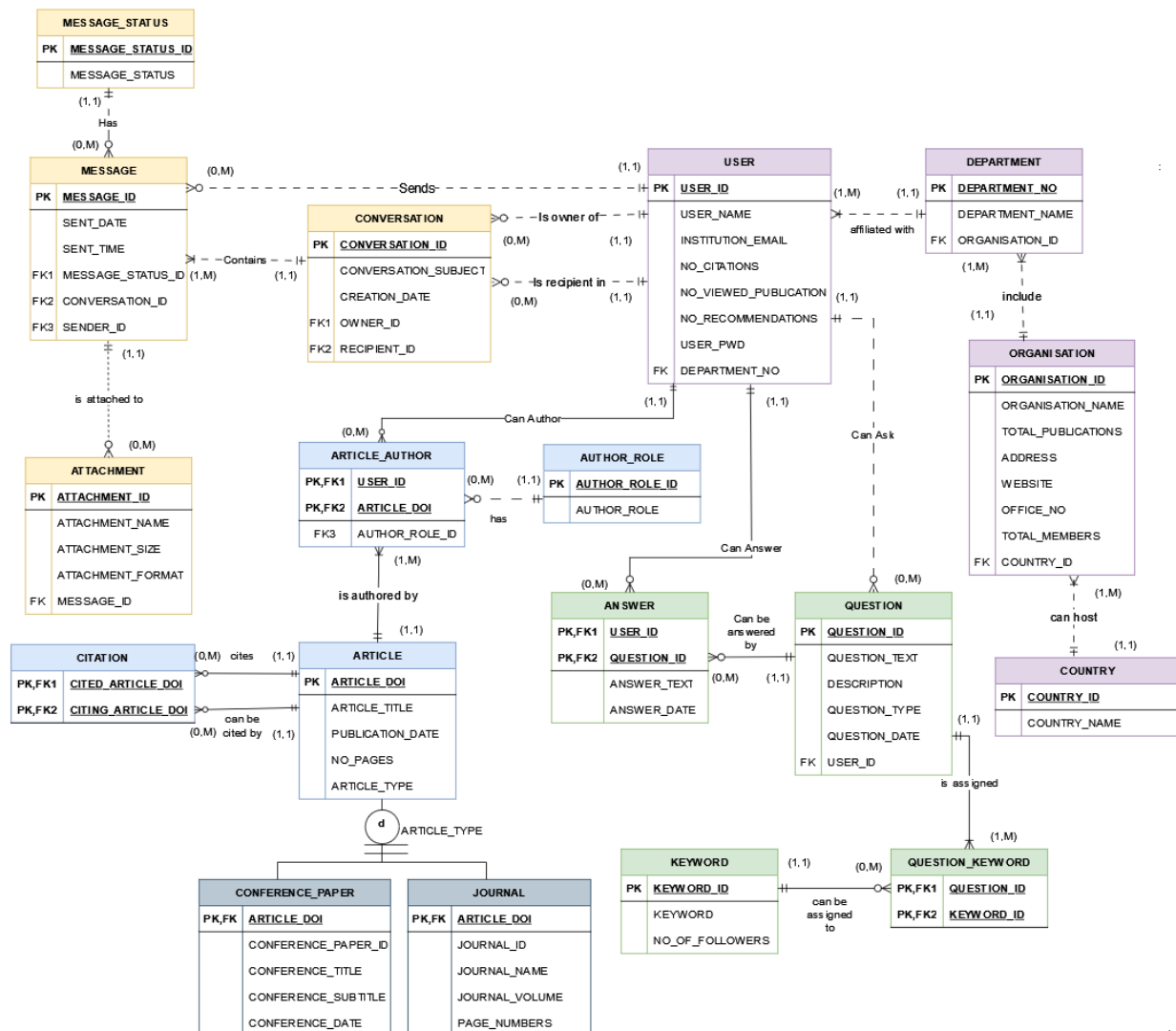
The Journal type article must store the Journal ID , journal name, journal volume and page numbers.

ERD:



## 2.0 Extended ERD (EERD)

[Present the full ERD integrating all parts from the four modules and Section 2.0 of the case study. Use four different colors to indicate the entities belonging to each module. Use a fifth color to indicate the entities belonging to Section 2.0. Please make sure your full ERD is readable especially the font size.]



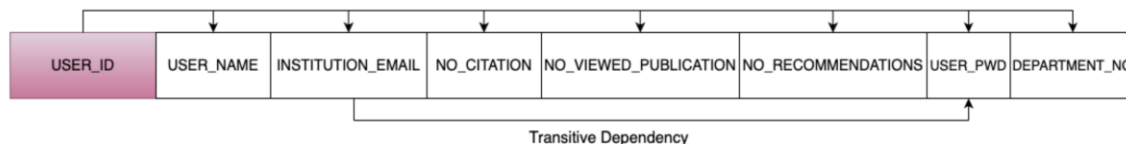
### 3.0 Normalization

Deciding the tradeoff between having lesser number of tables and lesser data anomalies the highest normal form that all modules in this case study should achieve is 3NF. This is because 3NF eliminates data anomalies. Most of our tables achieve 3NF (some may fit 4NF definition as well) except a few that are in 2NF(next highest). Some tables do not necessarily

have to be in 3NF to make it easier for data sorting and manipulation purposes for reports.

#### Module 1: [User Module – Mohsin Ali]

##### 2NF:TableName:USER ACCOUNT:



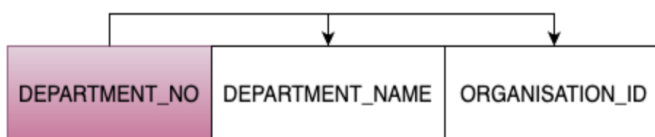
USER\_ACCOUNT (**USER\_ID**, USER\_NAME, INSTITUTION\_EMAIL, NO\_CITATION, NO\_VIEWED\_PUBLICATION, NO\_RECOMMENDATIONS, USER\_PWD, DEPARTMENT\_NO)

Transitive Dependency

(INSTITUTION\_EMAIL -----> USER\_PWD)

Table USER\_ACCOUNT is retained in 2NF form because keeping INSTITUTION\_EMAIL and USER\_PWD makes it easier to track, as the relationship between USER\_ID and INSTITUTION\_EMAIL is mandatory to be one to one which makes it unnecessary to form a separate entity.

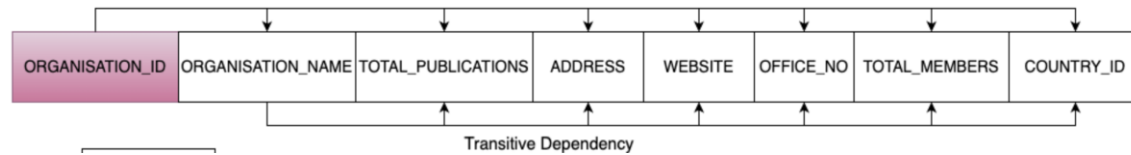
##### 3NF: Table Name: DEPARTMENT:



DEPARTMENT (**DEPARTMENT\_NO**, DEPARTMENT\_NAME, ORGANISATION\_ID)



**2NF: Table Name: ORGANISATION:**

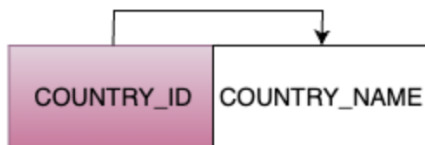


ORGANISATION (ORGANISATION\_ID, ORGANISATION\_NAME, TOTAL\_PUBLICATIONS, ADDRESS, WEBSITE, OFFICE\_NO, TOTAL\_MEMBERS, COUNTRY\_ID)

Transitive Dependency

ORGANISATION\_NAME---->TOTAL\_PUBLICATIONS, ADDRESS, WEBSITE, OFFICE\_NO, TOTAL\_MEMBERS, COUNTRY\_ID)

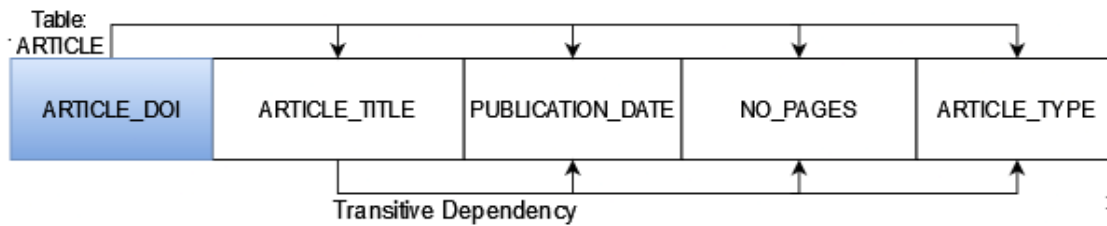
**3NF: Table Name: COUNTRY:**



COUNTRY (COUNTRY\_ID, COUNTRY\_NAME)

## Module 2: [Article Module – Azam Tamheed]

### 2NF: Table Name: ARTICLE:



ARTICLE (ARTICLE\_DOI, ARTICLE\_TITLE, PUBLICATION\_DATE, NO\_PAGES, ARTICLE\_TYPE)

Transitive Dependency

ARTICLE\_TITLE--->PUBLICATION\_DATE, NO\_PAGES, ARTICLE\_TYPE

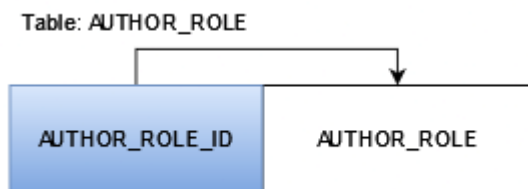
Table ARTICLE retains its 2NF form because there may be some articles with the same title so it will be easier to determine by the publication date, total number of pages and article type.

### 3NF: Table Name: ARTICLE\_AUTHOR:



ARTICLE\_AUTHOR (USER\_ID, ARTICLE\_DOI, AUTHOR\_ROLE\_ID)

### 3NF: Table Name: AUTHOR\_ROLE:



AUTHOR\_ROLE (AUTHOR\_ROLE\_ID, AUTHOR\_ROLE)

### **3NF: Table Name: CITATION:**



CITATION (CITED\_ARTICLE\_DOI, CITING\_ARTICLE\_DOI)

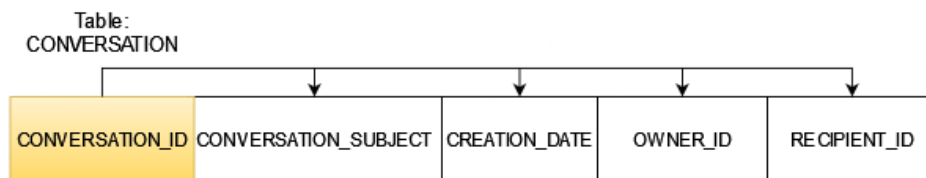
### **Module 3: [Module Name – Member Name]**

### **Module 4: [Conversation Module – Sadeed Farooqi]**

### **3NF: Table Name: CONVERSATION:**

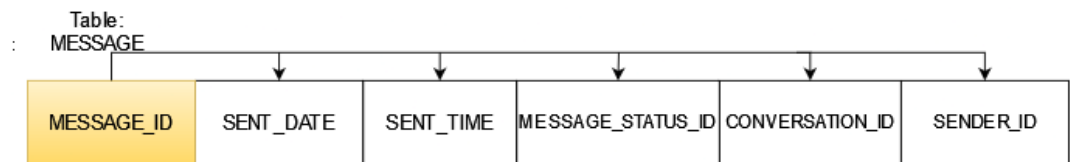
All four tables of this module are in at least 3NF as none of these has a transitive dependency.

Hence our main target is satisfied.



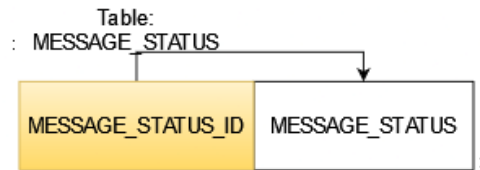
CONVERSATION(CONVERSATION\_ID, CONVERSATION\_SUBJECT, CREATION\_DATE, OWNER\_ID, RECIPIENT\_ID)

### **3NF: Table Name: MESSAGE:**



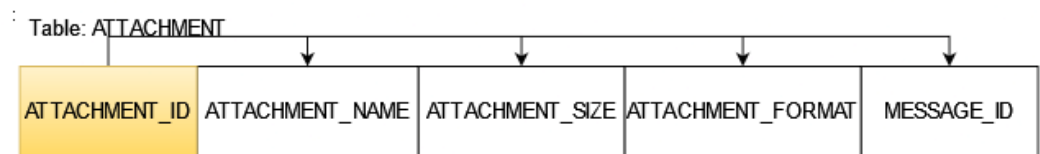
MESSAGE (MESSAGE\_ID, SENT\_DATE, SENT\_TIME, MESSAGE\_STATUS\_ID, CONVERSATION\_ID, SENDER\_ID)

### **3NF: Table Name: MESSAGE STATUS:**



MESSAGE\_STATUS(MESSAGE\_STATUS\_ID, MESSAGE\_STATUS)

### **4NF: Table Name: ATTACHMENT:**



ATTACHMENT(ATTACHMENT\_ID, ATTACHMENT\_NAME, ATTACHMENT\_SIZE, ATTACHMENT\_FORMAT, MESSAGE\_ID)

## **4.0 Data Dictionary**

Table Name	Attribute Name	Contents	Data Type	Format	Range	Required	PK or FK	FK Referenced Table
USER_ACCOUNT	USER_ID	Signed up user account Id	INTEGER	##	N/A	YES	PK	
	USER_NAME	User name	VARCHAR2	XXXX XXXX XXXX X	N/A	YES		
	INSTITUTION_EMAIL	Email of user	VARCHAR2	XXXX XXXX XXXX X	N/A	YES		

	NO_CITATIONS	Total Citations	INTEGER	##	N/A	NO		
	NO_VIEWED_PUBLICATIONS	Total viewed publications	INTEGER	##	N/A	NO		
	NO_RECOMMENDATIONS	Total Recommendation	INTEGER	##	N/A	NO		
	DEPARTMENT_NO	Department number	INTEGER	##	N/A	YES	FK	DEPARTMENT
	USER_PWD	Password to login	VARCHAR(20)	XXXX XXXX XXXX XX	N/A	YES		
DEPARTMENT	DEPARTMENT_NO	Department number	INTEGER	##	N/A	YES	PK	
	ORGANISATION_ID	The ID of the organisation	INTEGER	##	N/A	YES	FK	ORGANISATION
	DEPARTMENT_NAME	Name of the department	VARCHAR(255)	XXXX XXXX XXXX XX	N/A	YES		
ORGANISATION	ORGANISATION_ID	The ID of the organisation	INTEGER	##	N/A	YES		
	ORGANISATION_NAME	Name of the Organisation	VARCHAR(255)	XXXX XXXX XXXX XX	N/A	YES		
	TOTAL_MEMBERS	Total members in the organisation	INTEGER	##	N/A	NO		

	TOTAL_PUBLICATIONS	Total number of Publications	INTEGER	##	N/A	NO		
	ORGANISATION_ADDRESS	Address of the organisation	VARCHAR2(255)	XXXX XXXX XXXX XX	N/A	NO		
	WEBSITE	Organisation Website	VARCHAR2(1000)	XXXX XXXX XXXX XX	N/A	NO		
	OFFICE_NO	Office Number	INTEGER	##	N/A	NO		
	COUNTRY_ID	ID of Country	INTEGER	##	N/A	YES	FK	COUNTRY
COUNTRY	COUNTRY_ID		INTEGER	##	N/A	YES	PK	
	COUNTRY_NAME	Name of the Country	VARCHAR2(255)	XXXX XXXX XXXX XX	N/A	YES		
ARTICLE	ARTICLE_DOI	Article DOI	CHAR(20)	XXXX XXXX XX	N/A	YES	PK	
	ARTICLE_TITLE	Article Title	VARCHAR2(1000)	XXXX XXXX XXXX XX	N/A	YES		
	PUBLICATION_DATE	Date of Publication	DATE	MM-DD-YYYY	N/A	NO		
	NO_PAGES	Total Pages	INTEGER	##	N/A	NO		
	ARTICLE_TYPE	Type of Article	VARCHAR2(16)	XXXX XXXX XXXX XXXX	'Journal' and 'Co	NO		

					reference Paper'			
CITATION	CITING_ARTICLE_DOI	DOI of the article Citing	CHAR(20)	XXXX XXXX XXXX XX	N/A	YES	PK ,FK	ARTICLE
	CITED_ARTICLE_DOI	DOI of the cited article( already Published)	CHAR(20)	XXXX XXXX XXXX XX	N/A	YES	PK ,FK	ARTICLE
AUTHOR_ROLE	AUTHOR_ROLE_NO	Author role number	INTEGER	##	N/A	YES	PK	
	AUTHOR_ROLE	Role of the author	VARCHAR2(32)	XXXX XXXX XXXX XX	N/A	YES		
ARTICLE_AUTHOR	USER_ID		INTEGER	##	N/A	YES	PK ,FK	USER
	ARTICLE_DOI		CHAR(20)	XXXX XXXX XXXX XX	N/A	YES	PK ,FK	ARTICLE
	AUTHOR_ROLE_NO		INTEGER	#	N/A	YES	FK	AUTHOR_ROLE
JOURNAL	ARTICLE_DOI		CHAR(20)	XXXX XXXX XXXX XX	N/A	YES	PK ,FK	ARTICLE
	JOURNAL_ID	Journal ID	CHAR	X	N/A	YES		
	JOURNAL_NAME	Name of the Journal	VARCHAR2(255)	XXXX XXXX XXXX XX	N/A	NO		

	JOURNAL_VOLUME	Journal volume	INTEGER	##	N/A	NO		
	PAGE_NUMBERS	Total Pages	VARCHAR(16)	XX	N/A	NO		
CONFERENCE_PAPER	ARTICLE_DOI	Conference paper's DOI	CHAR(20)	XXXX XXXX XXXX XX	N/A	YES	PK, FK	ARTICLE
	CONFERENCE_PAPER_ID	Conference paper ID	CHAR	X	N/A	YES		
	CONFERENCE_TITLE	Conference paper Title	VARCHAR(255)	XXXX XXXX XXXX XX	N/A	NO		
	CONFERENCE_SUBTITLE	Conference Paper Subtitle	VARCHAR(255)	XXXX XXXX XXXX XX	N/A	NO		
	CONFERENCE_DATE	Date of Conference	DATE	MM-DD-YYYY	N/A	NO		
CONVERSATION	CONVERSATION_ID	Conversation ID	INTEGER	##	N/A	YES		
	CONVERSATION_SUBJECT	Conversation Subject	VARCHAR(255)	XXXX XXXX XXXX XX	N/A	NO		
	CREATION_DATE	Date of creation	DATE	MM-DD-YYYY	N/A	NO		
	OWNER_ID	User ID of conversation creator	INTEGER	##	N/A	YES	FK	USER



	RECIPIENT_ID	User ID of conversation receiver	INTEGER	##	N/A	YES	FK	USER
MESSAGE_STATUS	MESSAGE_STATUS_ID	Message status ID	INTEGER	##	N/A	YES		
	MESSAGE_STATUS	Status name	VARCHAR(255)	XXXX-XXXX-XXXXX	N/A	NO		
MESSAGE	MESSAGE_ID	Message ID	INTEGER	##	N/A	YES	PK	
	SENT_DATE	Message sent date	DATE	MM-DD-YYYY	N/A	YES		
	SENT_TIME	Message sent time	TIMESTAMP	YYYY-MM-DD HH24:MI:SS.FF	N/A	YES		
	CONVERSATION_ID	ID of container Conversation	INTEGER	##	N/A	YES		
	SENDER_ID	User ID of message sender	INTEGER	##	N/A	YES	FK	USER
	MESSAGE_STATUS_ID	Message status id	INTEGER	##	N/A	YES	FK	MESSAGE_STATUS
ATTACHMENT	ATTACHMENT_ID	Attachment ID	INTEGER	##	N/A	YES	PK	

	ATTACHMENT_NAME	Name of Attachment	VARCHAR2(255)	XXXX XXXX XXXX XX	N/A	NO		
	ATTACHEMNT_SIZE	Size of attachment	NUMBER(10,3)	1234567.981	N/A	NO		
	ATTACHMENT_FORMAT	Format of attachment	VARCHAR(32)	XXXX XXXX XXXX XX	N/A	NO		
	MESSAGE_ID	Message ID on which the attachment is attached	INTEGER	##	N/A	YES	FK	MESSAGE
QUESTION	QUESTION_ID	Question ID	INTEGER	##	N/A	YES	PK	
	QUESTION_TEXT	Question Text	VARCHAR(1000)			NO		
	DESCRIPTION	Question Description	VARCHAR(255)			NO		
	QUESTION_TYPE		VARCHAR(32)			NO		
	QUESTION_DATE		DATE			NO		
	USER_ID	USER ID of the one posting the question	INTEGER			YES	PK, FK	USER_ACCOUNT
ANSWER	USER_ID		INTEGER			YES	PK, FK	USER_ACCOUNT
	QUESTION_ID		INTEGER			YES	PK, FK	QUESTION

	ANSWER_TEXT		VARCHAR2(3000)			NO		
	ANSWER_DATE		DATE			NO		
KEYWORD	KEYWORD_ID		INTEGER			YES	PK	
	KEYWORD		CHAR(255)			YES		
	NO_OF_FOLLOWERS		INTEGER			NO		
QUESTION_KEYWORD	QUESTION_ID		INTEGER			YES	PK, FK	QUESTION
	KEYWORD_ID		INTEGER			YES	PK, FK	KEYWORD

## 5.0 Database Implementation

### 5.1 DDL

<b>1. Sequences creation and User Module</b> <pre>-- SEQUENCES CREATE SEQUENCE USER_SEQ START WITH 1 INCREMENT BY 1; CREATE SEQUENCE DEPARTMENT_SEQ START WITH 1 INCREMENT BY 1; CREATE SEQUENCE ORGANISATION_SEQ START WITH 1 INCREMENT BY 1; CREATE SEQUENCE COUNTRY_SEQ START WITH 1 INCREMENT BY 1; CREATE SEQUENCE AUTHOR_ROLE_SEQ START WITH 1 INCREMENT BY 1; CREATE SEQUENCE CONVERSATION_SEQ START WITH 1 INCREMENT BY 1;</pre>	<b>2. Article Module</b> <pre>-- ARTICLE MODULE TABLES (4+ 2 OF EEERD) ) CREATE TABLE ARTICLE (     ARTICLE_DOI CHAR(20) PRIMARY KEY,     ARTICLE_TITLE VARCHAR2(1000) NOT NULL,     PUBLICATION_DATE DATE NOT NULL,     NO_PAGES INTEGER,     ARTICLE_TYPE VARCHAR(16) ); CREATE TABLE CITATION (     CITING_ARTICLE_DOI CHAR(20) NOT NULL REFERENCES ARTICLE(ARTICLE_DOI) ON DELETE CASCADE,</pre>
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<pre> CREATE SEQUENCE MESSAGE_SEQ START WITH 1 INCREMENT BY 1; CREATE SEQUENCE ATTACHMENT_SEQ START WITH 1 INCREMENT BY 1; CREATE SEQUENCE QUESTION_SEQ START WITH 1 INCREMENT BY 1; CREATE SEQUENCE KEYWORD_SEQ START WITH 1 INCREMENT BY 1;  --USER MODULE TABLES (4) CREATE TABLE COUNTRY (     COUNTRY_ID INTEGER DEFAULT COUNTRY_SEQ.NEXTVAL PRIMARY KEY,     COUNTRY_NAME VARCHAR2(255) NOT NULL ); CREATE TABLE ORGANISATION (     ORGANISATION_ID INTEGER DEFAULT ORGANISATION_SEQ.NEXTVAL PRIMARY KEY,     ORGANISATION_NAME VARCHAR2(255) NOT NULL,     TOTAL_MEMBERS INTEGER,     TOTAL_PUBLICATIONS INTEGER,     ORGANISATION_ADDRESS VARCHAR2(255),     WEBSITE VARCHAR2(1000),     OFFICE_NO INTEGER,     COUNTRY_ID INTEGER NOT NULL,     CONSTRAINT ORG_COUNTRY_FK FOREIGN KEY(COUNTRY_ID) REFERENCES COUNTRY(COUNTRY_ID) ON DELETE CASCADE ); CREATE TABLE DEPARTMENT (     DEPARTMENT_NO INTEGER DEFAULT DEPARTMENT_SEQ.NEXTVAL PRIMARY KEY,     ORGANISATION_ID INTEGER NOT NULL,     DEPARTMENT_NAME VARCHAR2(255) NOT NULL,     CONSTRAINT DEPT_ORG_FK FOREIGN KEY(ORGANISATION_ID) REFERENCES ORGANISATION(ORGANISATION_ID) ); CREATE TABLE USER_ACCOUNT (     USER_ID INTEGER DEFAULT USER_SEQ.NEXTVAL PRIMARY KEY,     USER_NAME VARCHAR2(255) NOT NULL,     INSTITUTION_EMAIL VARCHAR2(255), </pre>	<pre> CITED_ARTICLE_DOI CHAR(20) NOT NULL REFERENCES ARTICLE(ARTICLE_DOI) ON DELETE CASCADE,     CONSTRAINT CITATION_PK PRIMARY KEY(CITING_ARTICLE_DOI, CITED_ARTICLE_DOI) ); CREATE TABLE AUTHOR_ROLE (     AUTHOR_ROLE_NO INTEGER DEFAULT AUTHOR_ROLE_SEQ.NEXTVAL PRIMARY KEY,     AUTHOR_ROLE VARCHAR2(32) NOT NULL ); CREATE TABLE ARTICLE_AUTHOR (     USER_ID INTEGER NOT NULL REFERENCES USER_ACCOUNT(USER_ID),     ARTICLE_DOI CHAR(20) NOT NULL REFERENCES ARTICLE(ARTICLE_DOI),     AUTHOR_ROLE_NO INTEGER NOT NULL REFERENCES AUTHOR_ROLE(AUTHOR_ROLE_NO),     CONSTRAINT ARTICLE_AUTHOR_PK PRIMARY KEY(USER_ID, ARTICLE_DOI) ); CREATE TABLE JOURNAL (     JOURNAL_ID CHAR NOT NULL,     JOURNAL_NAME VARCHAR2(255),     JOURNAL_VOLUME INTEGER,     PAGE_NUMBERS VARCHAR(16),     ARTICLE_DOI CHAR(20) PRIMARY KEY NOT NULL REFERENCES ARTICLE(ARTICLE_DOI) ); CREATE TABLE CONFERENCE_PAPER (     CONFERENCE_PAPER_ID CHAR NOT NULL,     CONFERENCE_TITLE VARCHAR2(255),     CONFERENCE_SUBTITLE VARCHAR2(255),     CONFERENCE_DATE DATE,     ARTICLE_DOI CHAR(20) PRIMARY KEY NOT NULL REFERENCES ARTICLE(ARTICLE_DOI) ); </pre>
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<pre> NO_CITATIONS INTEGER, NO_VIEWED_PUBLICATIONS INTEGER, NO_RECOMMENDATIONS INTEGER, DEPARTMENT_NO INTEGER NOT NULL, USER_PWD VARCHAR(20) NOT NULL, CONSTRAINT USER_DEPT_FK FOREIGN KEY(DEPARTMENT_NO) REFERENCES DEPARTMENT(DEPARTMENT_NO) ON DELETE CASCADE ); </pre>	
<p><b>3. Conversation Module</b></p> <pre> -- CONVERSATIONS MODULE TABLES (4) CREATE TABLE CONVERSATION (     CONVERSATION_ID INTEGER DEFAULT CONVERSATION_SEQ.NEXTVAL PRIMARY KEY,     CONVERSATION_SUBJECT VARCHAR2(255),     CREATION_DATE DATE,     OWNER_ID INTEGER NOT NULL REFERENCES USER_ACCOUNT(USER_ID) ON DELETE CASCADE,     RECIPIENT_ID INTEGER NOT NULL REFERENCES USER_ACCOUNT(USER_ID) ON DELETE CASCADE ); CREATE TABLE MESSAGE_STATUS (     MESSAGE_STATUS_ID INTEGER PRIMARY KEY,     MESSAGE_STATUS VARCHAR2(255) ); CREATE TABLE MESSAGE (     MESSAGE_ID INTEGER DEFAULT MESSAGE_SEQ.NEXTVAL PRIMARY KEY,     SENT_DATE DATE NOT NULL,     SENT_TIME TIMESTAMP NOT NULL,     CONVERSATION_ID INTEGER NOT NULL REFERENCES CONVERSATION(CONVERSATION_ID) ON DELETE CASCADE,     SENDER_ID INTEGER NOT NULL REFERENCES USER_ACCOUNT(USER_ID) ON DELETE CASCADE,     MESSAGE_STATUS_ID INTEGER REFERENCES </pre>	<p><b>4. Question Module</b></p> <pre> -- QUESTIONS MODULE TABLES(4) CREATE TABLE QUESTION (     QUESTION_ID INTEGER DEFAULT QUESTION_SEQ.NEXTVAL PRIMARY KEY,     QUESTION_TEXT VARCHAR2(1000),     DESCRIPTION VARCHAR2(255),     QUESTION_TYPE VARCHAR2(32),     QUESTION_DATE DATE,     USER_ID INTEGER REFERENCES USER_ACCOUNT(USER_ID) ON DELETE CASCADE ); CREATE TABLE ANSWER (     USER_ID INTEGER,     QUESTION_ID INTEGER,     ANSWER_TEXT VARCHAR2(3000),     ANSWER_DATE DATE,     CONSTRAINT ANSWER_PK PRIMARY KEY(USER_ID, QUESTION_ID),     CONSTRAINT ANSWER_FK1 FOREIGN KEY(USER_ID) REFERENCES USER_ACCOUNT(USER_ID) ON DELETE CASCADE,     CONSTRAINT ANSWER_FK2 FOREIGN KEY(QUESTION_ID) REFERENCES QUESTION(QUESTION_ID) ON DELETE CASCADE ); CREATE TABLE KEYWORD (     KEYWORD_ID INTEGER DEFAULT KEYWORD_SEQ.NEXTVAL PRIMARY KEY,     KEYWORD CHAR(255) NOT NULL,     NO_OF_FOLLOWERS INTEGER ); </pre>

<pre> MESSAGE_STATUS(MESSAGE_STATUS_ID) ON DELETE CASCADE ); CREATE TABLE ATTACHMENT (     ATTACHMENT_ID INTEGER DEFAULT ATTACHMENT_SEQ.NEXTVAL PRIMARY KEY,     ATTACHMENT_NAME VARCHAR2(255),     ATTACHMENT_SIZE NUMBER(10,3),     ATTACHMENT_FORMAT VARCHAR2(32),     MESSAGE_ID INTEGER NOT NULL REFERENCES MESSAGE(MESSAGE_ID) ON DELETE CASCADE ); </pre>	<pre> CREATE TABLE QUESTION_KEYWORD (     QUESTION_ID INTEGER REFERENCES QUESTION(QUESTION_ID) ON DELETE CASCADE,     KEYWORD_ID INTEGER REFERENCES KEYWORD(KEYWORD_ID) ON DELETE CASCADE,     CONSTRAINT QUESTION_KEYWORD_PK PRIMARY KEY(QUESTION_ID, KEYWORD_ID) ); </pre>
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### SQL statement for Section 3.0

#### SELECT

```

A.ARTICLE_DOI,
A.ARTICLE_TITLE,
UA.USER_NAME AS FIRST_AUTHOR_NAME,
COUNT(C.CITED_ARTICLE_DOI) AS NUMBER_OF_CITATIONS

```

#### FROM

```

ARTICLE A

```

#### JOIN

```

ARTICLE_AUTHOR AA ON A.ARTICLE_DOI = AA.ARTICLE_DOI

```

#### JOIN

```

USER_ACCOUNT UA ON AA.USER_ID = UA.USER_ID

```

#### LEFT JOIN

```

CITATION C ON A.ARTICLE_DOI = C.CITED_ARTICLE_DOI

```

#### WHERE

```

AA.AUTHOR_ROLE_NO = 1

```

#### GROUP BY

```

A.ARTICLE_DOI, A.ARTICLE_TITLE, UA.USER_NAME

```

ORDER BY

NUMBER\_OF\_CITATIONS DESC;

## 6.0 Reflection

Even though we felt some extra strictness in this course, we believe strictness depicts standard.

Pitfall: Slow functioning of Oracle SQL developer

SQL script made and run successfully on both SQL Developer and Oracle APEX.

Pitfall: Oracle SQL Developer doesn't work on one member's Mac Laptop.

He used oracle SQL Developer on CS Lab's computer and group members' laptop.

## 7.0 System Demo

Short Demo URL: [<https://youtu.be/-ivKO94huZQ>]

Oracle APEX Cloud Login Details

- **Workspace:** projectcmt
- **Username:** cmt221g552024@proton.me
- **Password:** 8almonds
- **App name:** Research Portal

**Sample User Login Details :**

**Username:** ryan@gmail.com

**Password :** 1234

**[This user has authored as well as co authored many articles on the portal**

**And also owns a few conversations with other users on the portal]**