

# **Journal / Conference Publication Management Systems**

UCS2404 – Database Management Systems

Mini Project Report

Submitted By

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**BONAFIDE CERTIFICATE**

Certified that this Assignment report titled “**Journal / Conference Publication Management Systems**” is the bonafide work of “Pranav Moorthi (3122 22 5001 092) , Rohan R (3122 22 5001 108) and Rohan R (3122 22 5001 109)” who carried out the project work in the UCS2404 – Database Management Systems Course during the academic year 2024-25.

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Date:

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## **1. PROBLEM STATEMENT**

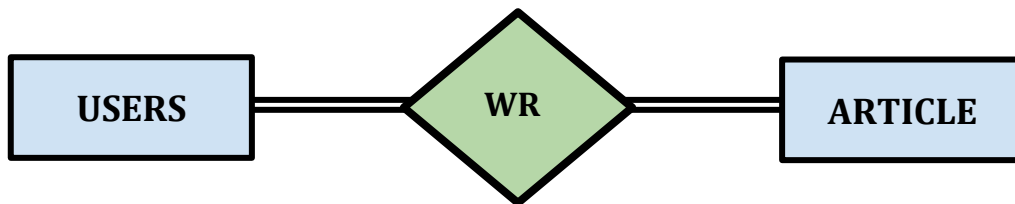
The objective of this project is to analyze the data utilized by a Journal / Conference Publication Management System, focusing on the identification of constraints and dependencies among the attributes. This includes a comprehensive understanding of the problem specifications, the interactions and dependencies among various attributes, and the user requirements for the specific real-time application. The analysis will involve documenting the list of attributes and identifying the various functional dependencies among these attributes to ensure data integrity and optimize the system's functionality.

## **2. ABSTRACT**

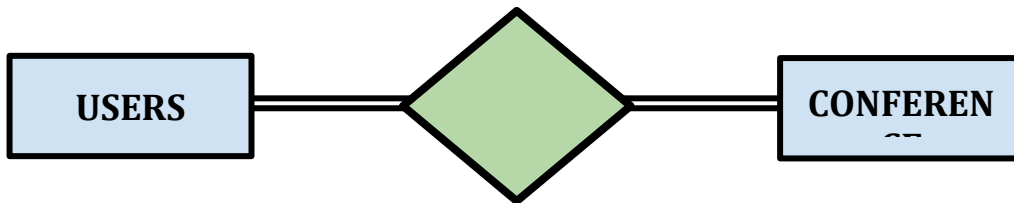
This project focuses on analyzing the data structure of a Journal/Conference Publication Management System by identifying constraints and dependencies among various attributes. The system encompasses a comprehensive set of entities, including Users, Organizations, Journals, Publishers, Articles, Conferences, Locations, References, Reviews, Topics, Submissions, and Presentations. By meticulously documenting the attributes and exploring their functional dependencies, the project aims to enhance data integrity and streamline the management processes. The analysis will provide insights into optimizing interactions and dependencies within the system, ultimately supporting efficient and reliable publication and conference management.

### 3. RELATIONS

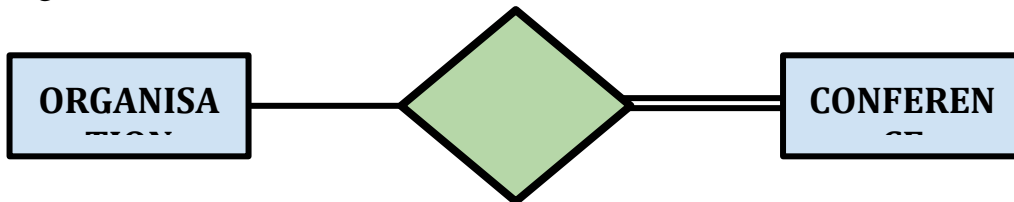
1. Users write Articles



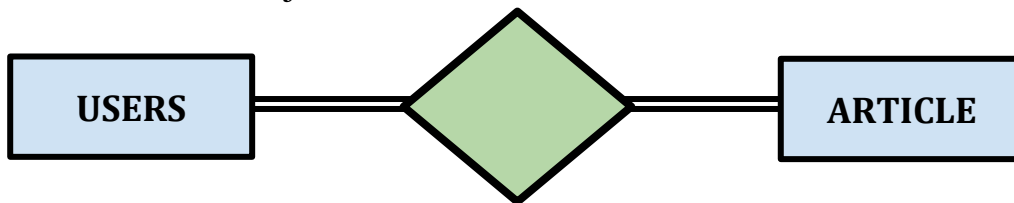
2. Users attend conferences



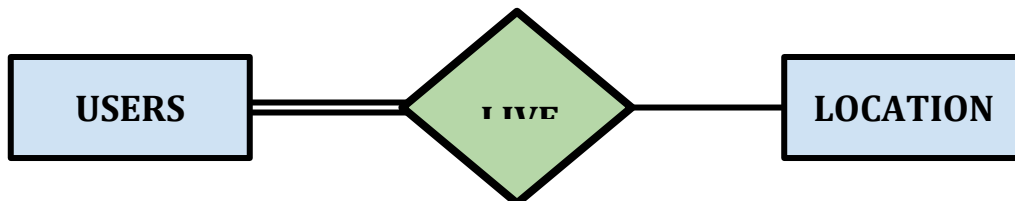
3. Organization host conferences



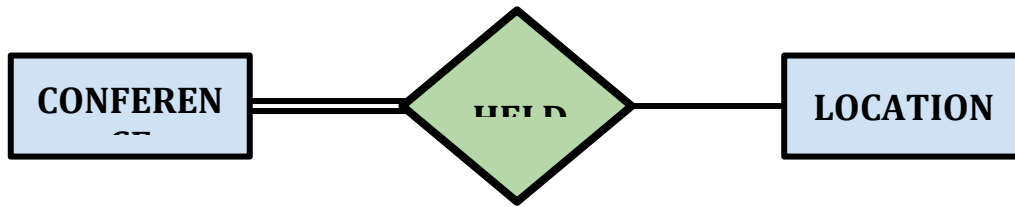
4. Reviewer reviews journals



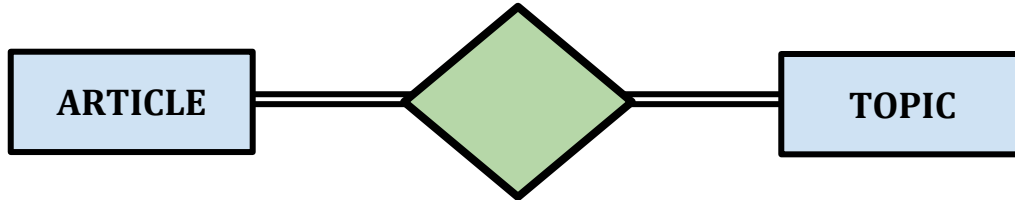
5. Users live in Location



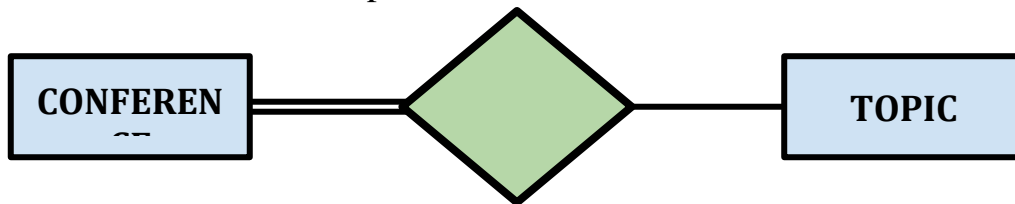
6. Conferences located in Location



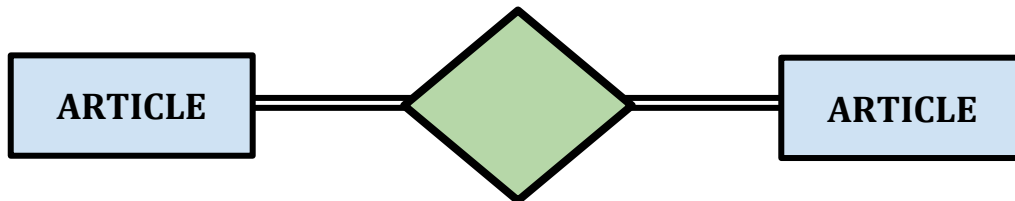
7. Journals belong to Topic



8. Conferences based on Topic



9. Article references References



10. Location belongs to State



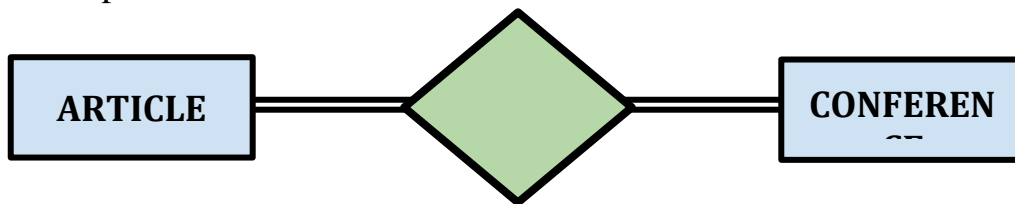
11. Journals contain Articles



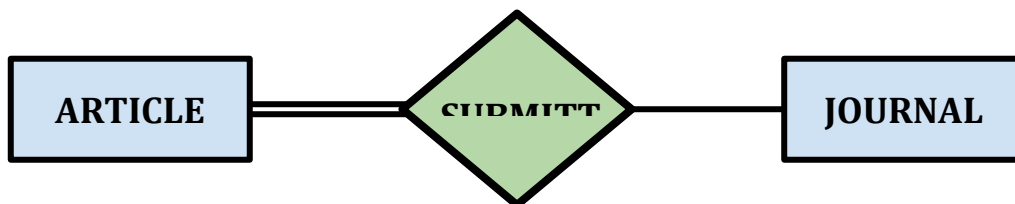
12. Publisher publishes Journal



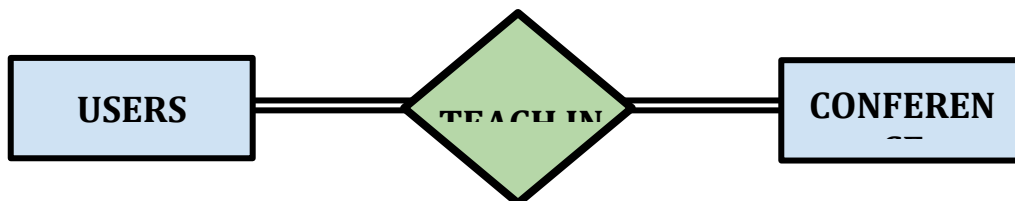
13. Article presented in Conferences



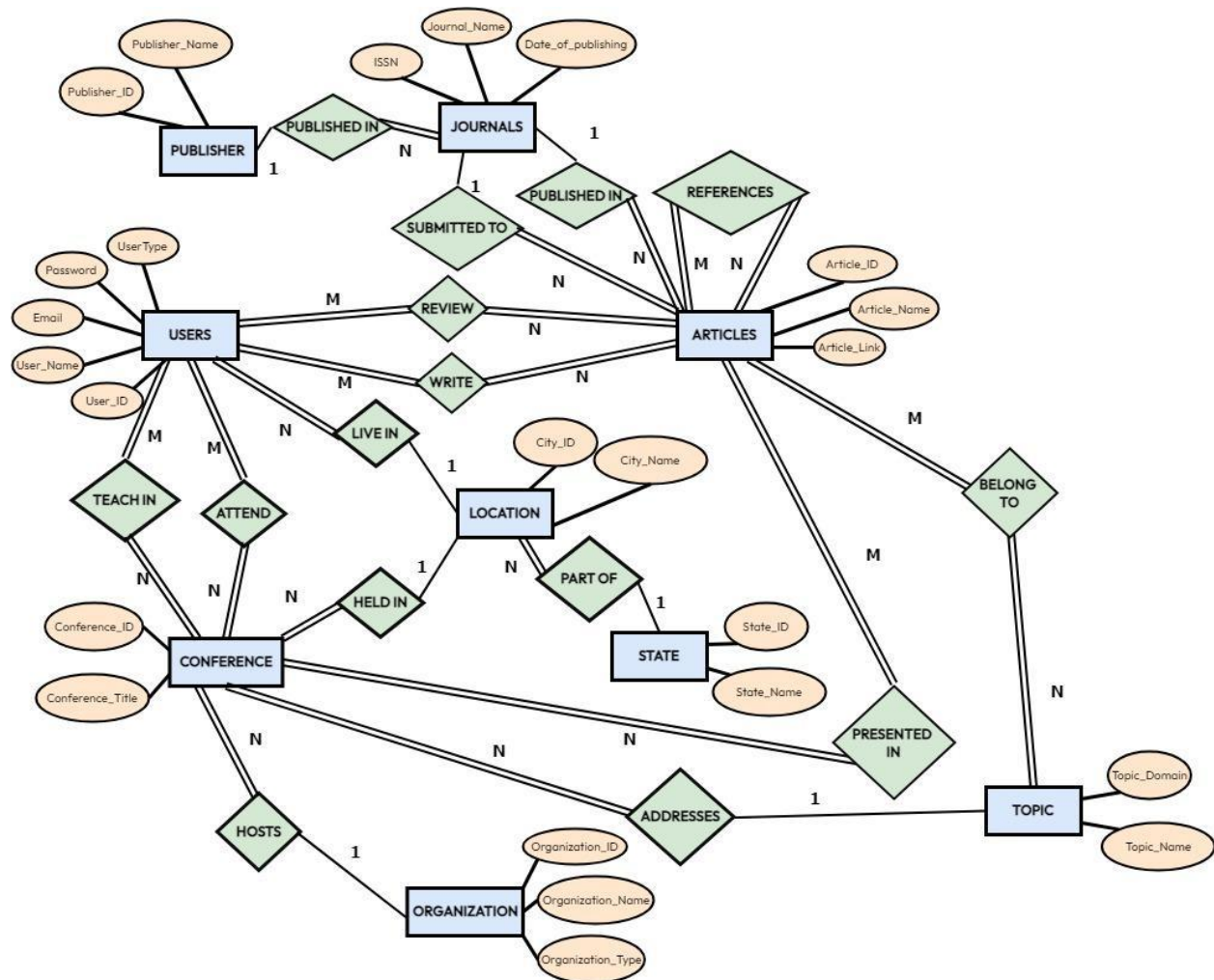
14. Article submitted to Journal



15. Lecturer teaches in Conference



## 4. ENTITY RELATIONSHIP DIAGRAM





## **5. TABLES**

### **R1 : Users**

The **Users** table stores user information with attributes such as User\_ID, User\_Name, Password, Email, UserType, Organization\_ID, and City\_ID. It manages user credentials and affiliations within the platform.

#### Attributes:

- A. User\_ID
- B. User\_Name
- C. Password
- D. Email
- E. UserType
- F. Organization\_ID
- G. City\_ID

#### Constraints:

- 1. User\_ID should begin with 'U'
- 2. Email should end with '@gmail.com'
- 3. UserType can be 'Student', 'Author' or 'Lecturer'

#### Functional Dependencies:

- 1. A->BCDEFG
- 2. D->ABCEFG

#### Irreducible Set of Functional Dependencies:

- 1. A->B
    - With FD
$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$
    - Without FD
$$\{A\}^+ = \{A, C, D, E, F, G\}$$
- A->B is an irreducible FD

2.  $A \rightarrow C$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{A\}^+ = \{A, B, D, E, F, G\}$$

$A \rightarrow C$  is an irreducible FD

3.  $A \rightarrow D$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, E, F, G\}$$

$A \rightarrow D$  is an irreducible FD

4.  $A \rightarrow E$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, F, G\}$$

$A \rightarrow E$  is an irreducible FD

5.  $A \rightarrow F$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, G\}$$

$A \rightarrow F$  is an irreducible FD

6.  $A \rightarrow G$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, F\}$$

A→G is an irreducible FD

7. D→A

- With FD

$$\{D\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{D\}^+ = \{B, C, D, E, F, G\}$$

D→A is an irreducible FD

8. D→B

- With FD

$$\{D\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{D\}^+ = \{A, C, D, E, F, G\}$$

D→B is an irreducible FD

9. D→C

- With FD

$$\{D\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{D\}^+ = \{A, B, D, E, F, G\}$$

D→C is an irreducible FD

10. D→E

- With FD

$$\{D\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{D\}^+ = \{A, B, C, D, F, G\}$$

D→E is an irreducible FD

11. D→F

- With FD

$$\{D\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{D\}^+ = \{A, B, C, D, E, G\}$$

$D \rightarrow F$  is an irreducible FD

12.  $D \rightarrow G$

- With FD

$$\{D\}^+ = \{A, B, C, D, E, F, G\}$$

- Without FD

$$\{D\}^+ = \{A, B, C, D, E, F\}$$

$D \rightarrow G$  is an irreducible FD

Final Set of Functional Dependencies:

1.  $A \rightarrow B$
2.  $A \rightarrow C$
3.  $A \rightarrow D$
4.  $A \rightarrow E$
5.  $A \rightarrow F$
6.  $A \rightarrow G$
7.  $D \rightarrow A$
8.  $D \rightarrow B$
9.  $D \rightarrow C$
10.  $D \rightarrow E$
11.  $D \rightarrow F$
12.  $D \rightarrow G$

Finding Closure:

$$\{A, B, C, D, E, F, G\}^+ = \{A, B, C, D, E, F, G\}$$

$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$

$\{A\}$  is a candidate key

$$\{A, B, C, D, E, F, G\}^+ = \{A, B, C, D, E, F, G\}$$

$$\{D\}^+ = \{A, B, C, D, E, F, G\}$$

$\{D\}$  is a candidate key

**Candidate Keys :** A , D

**Primary Key :** A(User\_ID) is chosen as the primary key of this Relation

## Normalization:

### 1. Check for 1NF

All the attributes are atomic.  
So, it is in 1NF.

### 2. Check for 2NF

FDs  $\Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow D, A \rightarrow E, A \rightarrow F, A \rightarrow G, \}$

$\{A B C D E F G\}^+ = \{A, B, C, D, E, F, G\}$

$\{A\}^+ = \{A, B, C, D, E, F, G\}$

$\{A\}$  is the candidate key

PA  $\Rightarrow \{A\}$

NPA  $\Rightarrow \{B, C, D, E, F, G\}$

Proper subsets of PA  $\Rightarrow \{\}$

It is in 2NF

### 3. Check for 3NF

FDs  $\Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow D, A \rightarrow E, A \rightarrow F, A \rightarrow G\}$

PA  $\Rightarrow \{A\}$

NPA  $\Rightarrow \{B, C, D, E, F, G\}$

FD1 :  $A \rightarrow BCDEFG$  ( PA  $\rightarrow$  NPA )

Transitive dependency doesn't exist

It is in 3NF

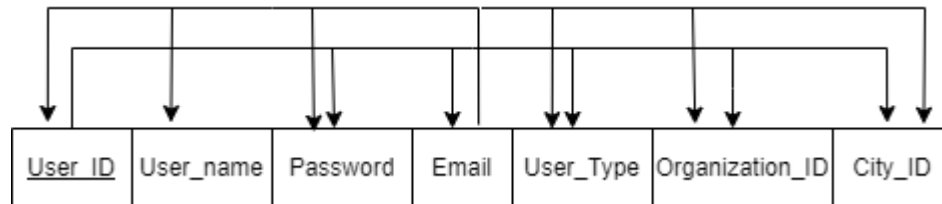
### 4. Check for BCNF

FDs  $\Rightarrow \{A \rightarrow BCDEFG\}$

{A} is a super key

A determines all other attributes

It is in BCNF



## **R2 : Organization**

The **Organization** table stores information about entities involved in the journal/conference publication system, including Organization\_ID, Organization\_Name, and Organization\_Type. This table helps categorize and manage organizations contributing to or participating in publications and conferences.

### Attributes:

- A. Organization\_ID
- B. Organization\_Name
- C. Organization\_type

### Constraints :

- 1. Organization\_ID should start with 'O'

### Functional Dependencies:

- 1. A->B
- 2. A->C

### Irreducible Set of Functional Dependencies:

1.  $A \rightarrow B$

- With FD

$$\{A\}^+ = \{A, B, C\}$$

- Without FD

$$\{A\}^+ = \{A, C\}$$

$A \rightarrow B$  is an irreducible FD

2.  $A \rightarrow C$

- With FD

$$\{A\}^+ = \{A, B, C\}$$

- Without FD

$$\{A\}^+ = \{A, B\}$$

$A \rightarrow C$  is an irreducible FD

### Final Set of Functional Dependencies:

1.  $A \rightarrow B$

2.  $A \rightarrow C$

### Finding Closure:

$$\{A \ B \ C\}^+ = \{A, B, C\}$$

$$\{A\}^+ = \{A, B, C\}$$

A is a candidate key

### **Candidate Keys : A**

**Primary Key :** A(Organization\_ID) is chosen as the primary key of this Relation

### Normalisation:

1. Check for 1NF:

All attributes are atomic. So, it is in 1NF

2. Check for 2NF:

$$\text{FDs} \Rightarrow \{A \rightarrow B, A \rightarrow C\}$$

$\{A\ B\ C\}^+ = \{A, B, C\}$

$\{A\}^+ = \{A, B, C\}$

$\{A\}$  is the candidate key

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B, C\}$

Proper subsets of  $PA \Rightarrow \{\}$

It is in 2NF

3. Check for 3NF:

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B, C\}$

FDs

1.  $A \rightarrow B$  (  $PA \rightarrow NPA$  )

2.  $A \rightarrow C$  (  $PA \rightarrow NPA$  )

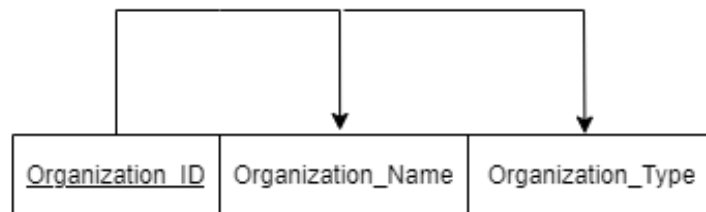
There is no transitive dependency

It is in 3NF

4. Check for BCNF:

FDs  $\Rightarrow \{A \rightarrow BC\}$  (  $NPA \rightarrow PA$  doesn't exist )

It is in BCNF





### **R3 : Journals**

The **Journals** table manages information about journals in the publication system, including ISSN, Journal\_Name, Publisher\_ID, Start\_Date, and Date\_of\_Publishing. It helps track and organize journal details and publication timelines.

#### **Attributes:**

- A. ISSN
- B. Journal\_Name
- C. Publisher\_ID
- D. Start\_Date
- E. Date\_of\_Publishing

#### **Constraints :**

- 1. ISSN should begin with 'J'

#### **Functional Dependencies:**

- 1.  $A \rightarrow BCDE$
- 2.  $BC \rightarrow ADE$
- 3.  $B \rightarrow C$

#### **Irreducible Set of Functional Dependencies:**

- 1.  $A \rightarrow B$ 
  - With FD
$$\{A\}^+ = \{A, B, C, D, E\}$$
  - Without FD
$$\{A\}^+ = \{A, C, D, E\}$$ $A \rightarrow B$  is an irreducible FD

- 2.  $A \rightarrow C$ 
  - With FD
$$\{A\}^+ = \{A, B, C, D, E\}$$
  - Without FD
$$\{A\}^+ = \{A, B, C, D, E\}$$

A→C is a reducible FD

3. A→D

- With FD

$$\{A\}^+ = \{A, B, C, D, E\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, E\}$$

A→D is an irreducible FD

4. A→E

- With FD

$$\{A\}^+ = \{A, B, C, D, E\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D\}$$

A→E is an irreducible FD

5. BC→A

- With FD

$$\{BC\}^+ = \{A, B, C, D, E\}$$

- Without FD

$$\{BC\}^+ = \{B, C, D, E\}$$

BC→A is an irreducible FD

6. BC→D

- With FD

$$\{BC\}^+ = \{B, C, D, E\}$$

- Without FD

$$\{BC\}^+ = \{B, C, E\}$$

BC→D is an irreducible FD

7. BC→E

- With FD

$$\{BC\}^+ = \{B, C, D, E\}$$

- Without FD  
 $\{BC\}^+ = \{B, C, D\}$   
BC->E is an irreducible FD

8. B->C  
- With FD  
 $\{B\}^+ = \{B, C, A, D, E\}$   
- Without FD  
 $\{B\}^+ = \{B\}$   
B->C is an irreducible FD

Final Set of Functional Dependencies:

1. A->BDE
2. BC->ADE
3. B->C

Finding Closure:

$\{A B C D E\}^+ = \{A, B, C, D, E\}$   
 $\{A\}^+ = \{A, B, C, D, E\}$   
A is a candidate key

$\{A B C D E\}^+ = \{A, B, C, D, E\}$   
 $\{BC\}^+ = \{A, B, C, D, E\}$

{B,C} is also a candidate key

**Candidate Keys :** A , BC

**Primary Key :** A(ISSN) is chosen as the primary key of this Relation

Normalization:

1. Check for 1NF:  
All attributes in the given relation are atomic.  
Therefore, it is in 1NF

2. Check for 2NF:

$PA \Rightarrow \{A, B, C\}$

$NPA \Rightarrow \{D, E\}$

Proper subsets of  $PA \Rightarrow \{A, B, C, AB, BC, AC\}$

$A \rightarrow DE, BC \rightarrow ADE$

The proper subsets of  $PA$  are fully functionally dependent on  $NPA$

It is in 2NF

3. Check for 3NF:

$FDs \Rightarrow \{A \rightarrow BCDE, BC \rightarrow ADE\}$

$FD1 : A \rightarrow BCDE$  (  $NPA \rightarrow NPA$  doesn't exist )

No transitive dependency

$FD2 : BC \rightarrow ADE$  (  $NPA \rightarrow NPA$  doesn't exist )

No transitive dependency

$FD3 : B \rightarrow C$  (  $NPA \rightarrow NPA$  doesn't exist )

No transitive dependency

It is in 3NF

4. Check for BCNF:

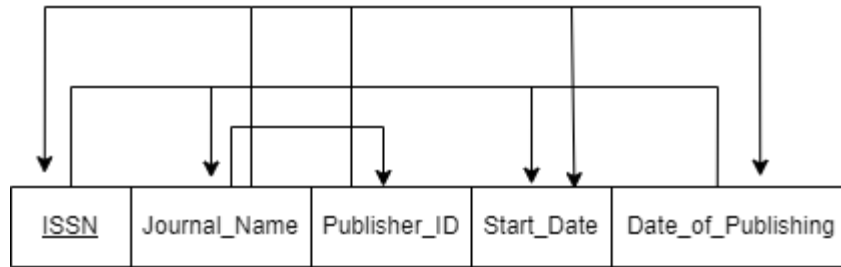
$FDs \Rightarrow \{A \rightarrow BCDE, BC \rightarrow ADE\}$

$PA \Rightarrow \{A, B, C\}$

$NPA \Rightarrow \{D, E\}$

Every attribute is determined by the super key

It is in BCNF



## **R4 : Publisher**

The **Publisher** table stores information about publishers in the journal/conference publication system. It includes Publisher\_ID, Publisher\_Name, and ISSN. This table helps manage publisher details and their associated journals.

### Attributes:

- A. Publisher\_ID
- B. Publisher\_Name
- C. ISSN (Multi-valued)

### Constraints :

- 1. Publisher\_ID should begin with 'P'

### Functional Dependencies:

- 1. A->B

### Irreducible Set of Functional Dependencies:

FDs: {A->B}

- 1. A->B

- With A->B  
 $\{A\}^+ = \{A, B\}$
- Without A->B  
 $\{A\}^+ = \{A\}$

A->B is an irreducible FD

Final Set of Functional Dependencies :  $\{A \rightarrow B\}$

Finding Closure:

$\{A B C\}^+ = \{A, B, C\}$

$\{A C\}^+ = \{A, B, C\}$

$\{A, C\}$  is the candidate key

**Candidate Keys :** AC

**Primary Key :** AC (A union of Publisher\_ID and ISSN) is the primary key in this relation

Normalisation:

1. Check for 1NF:

Journal is a multi valued attribute and hence violates 1NF

So we will split the relation into 2,

$R1 = \{A, B\}$

$R2 = \{A, C\}$

Candidate Key :

R1:

$\{A, B\}^+ = \{A, B\}$

Removing FDs  $A \rightarrow B$

$\{A\}^+ = \{A, B\}$

So, A is the candidate key

R2:

$\{A, C\}^+ = \{A, C\}$

Since, there is no FD pertaining to this relation

So, AC is the candidate key

2. Check for 2NF:

R1: {A} is the candidate key

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B\}$

Proper subset of  $PA \Rightarrow \{ \}$

No partial dependency

It is in 2NF

R2: {A, C} is the candidate key

$PA \Rightarrow \{A, C\}$

$NPA \Rightarrow \{ \}$

Proper subset of  $PA \Rightarrow \{A, C\}$

No partial dependency

It is in 2NF

3. Check for 3NF:

R1:

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B\}$

FDs  $\Rightarrow \{A \rightarrow B\}$

1.  $A \rightarrow B$  (  $PA \rightarrow NPA$  )

No transitive dependency

It is in 3NF

R2:

$PA \Rightarrow \{A, C\}$

$NPA \Rightarrow \{ \}$

FDs  $\Rightarrow \{ \}$

No transitive dependency

It is in 3NF

4. Check for BCNF:

R1:

FDs  $\Rightarrow \{ A \rightarrow B \}$

$\{A\}$  is the super key

It is in BCNF

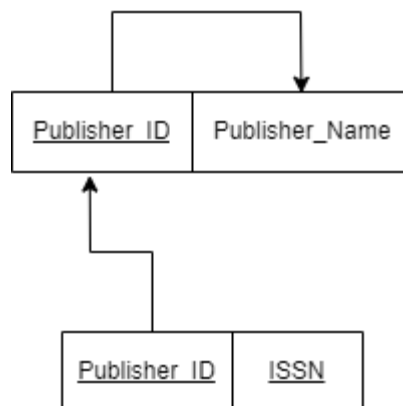
R2:

FDs  $\Rightarrow \{ \}$

It is in BCNF

Publishers  $\Rightarrow \{ \text{Publisher\_ID}, \text{Publisher\_Name} \}$

Journal\_Publishers  $\Rightarrow \{ \text{Publisher\_ID}, \text{ISSN} \}$



## R5 : Conferences

The **Conferences** table captures details of conferences in the publication system, including Conference\_ID, Conference\_Title, City\_ID, Organization\_ID, Start\_Date, End\_Date, Lecturer\_ID, and Attendee\_ID. It manages conference scheduling, location, and participant information.



Attributes:

- A. Conference\_ID
- B. Conference\_Title
- C. City\_ID
- D. Organization\_ID
- E. Start\_Date
- F. End\_Date
- G. Lecturer\_ID (multi valued)
- H. Attendee\_ID (multi valued)

Constraints :

- 1. Conference\_ID should begin with C
- 2. End\_Date should either be greater than or equal to the Start\_Date

Functional Dependencies:

- 1. A->BCDEFGH

Irreducible Set of Functional Dependencies:

- 1. A->B
  - With FD
$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$
  - Without FD
$$\{A\}^+ = \{A, C, D, E, F, G, H\}$$

A->B is an irreducible FD

- 2. A->C
  - With FD
$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$
  - Without FD
$$\{A\}^+ = \{A, B, D, E, F, G, H\}$$

A->C is an irreducible FD

3.  $A \rightarrow D$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, E, F, G, H\}$$

$A \rightarrow D$  is an irreducible FD

4.  $A \rightarrow E$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, F, G, H\}$$

$A \rightarrow E$  is an irreducible FD

5.  $A \rightarrow F$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, G, H\}$$

$A \rightarrow F$  is an irreducible FD

6.  $A \rightarrow G$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, F, H\}$$

$A \rightarrow G$  is an irreducible FD

7.  $A \rightarrow H$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$

$A \rightarrow H$  is an irreducible FD

Final Set of Functional Dependencies:

1.  $A \rightarrow B$
2.  $A \rightarrow C$
3.  $A \rightarrow D$
4.  $A \rightarrow E$
5.  $A \rightarrow F$
6.  $A \rightarrow G$
7.  $A \rightarrow H$

Finding Closure:

$\{A B C D E F G H\}^+ = \{A, B, C, D, E, F, G, H\}$

$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$

$\{A\}$  is the candidate key

**Candidate Keys : A**

**Primary Key :** A(Conference\_ID) is the primary key of this Relation

Normalization:

1. Check for 1NF :

G and H are multi valued attributes

It is not in 1NF

So we split it into 3 tables

R1:  $R1 \Rightarrow \{A, B, C, D, E, F\}$

FDs  $\Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow D, A \rightarrow E, A \rightarrow F\}$

Finding Closure

$\{A B C D E F\}^+ = \{A, B, C, D, E, F\}$

$\{A\}^+ = \{A, B, C, D, E, F\}$

$\{A\}$  is the candidate key

R2:  $R2 \Rightarrow \{A, G\}$

FDs  $\Rightarrow \{ \}$

Finding Closure

$\{A, G\}^+ = \{A, G\}$

$\{A, G\}$  is the candidate key

R3:  $R3 \Rightarrow \{A, H\}$

FDs  $\Rightarrow \{ \}$

Finding closure

$\{A, H\}^+ = \{A, H\}$

$\{A, H\}$  is the candidate key

2. Check for 2NF :

R1:  $\{A\}$  is the candidate key

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B, C, D, E, F\}$

FDs  $\Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow D, A \rightarrow E, A \rightarrow F\}$

No partial dependency

It is in 2NF

R2:  $\{A, G\}$  is the candidate key

$PA \Rightarrow \{A, G\}$

$NPA \Rightarrow \{ \}$

FDs  $\Rightarrow \{ \}$

No partial dependency

It is in 2NF

R3:  $\{A, H\}$  is the candidate key

$PA \Rightarrow \{A, H\}$

$NPA \Rightarrow \{\}$

$FDs \Rightarrow \{\}$

No partial dependency

It is in 2NF

3. Check for 3NF:

R1:

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B, C, D, E, F\}$

$FDs \Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow D, A \rightarrow E, A \rightarrow F\}$

1.  $A \rightarrow B$  (  $PA \rightarrow NPA$  )

No transitive dependency

2.  $A \rightarrow C$  (  $PA \rightarrow NPA$  )

No transitive dependency

3.  $A \rightarrow D$  (  $PA \rightarrow NPA$  )

No transitive dependency

4.  $A \rightarrow E$  (  $PA \rightarrow NPA$  )

No transitive dependency

5.  $A \rightarrow F$  (  $PA \rightarrow NPA$  )

No transitive dependency

It is in 3NF

R2:

$PA \Rightarrow \{A, G\}$

$NPA \Rightarrow \{ \}$

$FDs \Rightarrow \{ \}$

No transitive dependency

It is in 3NF

R3:

$PA \Rightarrow \{A, H\}$

$NPA \Rightarrow \{ \}$

$FDs \Rightarrow \{ \}$

No transitive dependency

It is in 3NF

#### 4. Check for BCNF:

R1:

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B, C, D, E, F\}$

$FDs \Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow D, A \rightarrow E, A \rightarrow F\}$

The LHS of each FD is a super key (A)

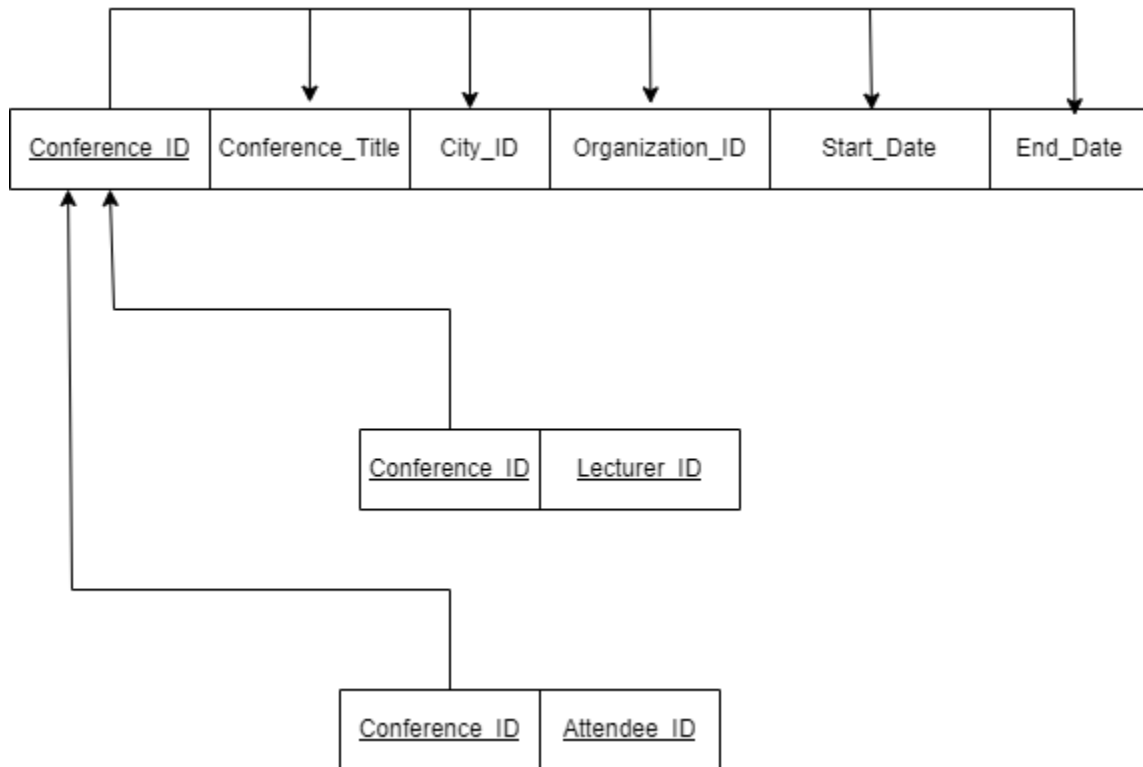
It is in BCNF

We name the relations as follows

$Conference \Rightarrow \{Conference\_ID, Conference\_Title, City\_ID, Organization\_ID\}$

$Conference\_Lecturers \Rightarrow \{Conference\_ID, Lecturer\_ID\}$

$Conference\_Attendees \Rightarrow \{Conference\_ID, Attendee\_ID\}$



## **R6 : Location**

The **Location** table captures geographical data related to the journal/conference publication system, including State\_ID, State, City\_ID, and City. This table helps in identifying and managing the locations of organizations, users, and events within the system, aiding in organizing and categorizing location-specific information.

### Attributes:

- A. State\_ID
- B. State
- C. City\_ID
- D. City

### Constraints :

1. City\_ID should begin with 'C'
2. State\_ID should begin with 'S'

Functional Dependencies:

1.  $A \rightarrow B$
2.  $C \rightarrow ABD$

Irreducible Set of Functional Dependencies:

1.  $A \rightarrow B$

- With FD

$$\{A\}^+ = \{A, B\}$$

- Without FD

$$\{A\}^+ = \{A\}$$

$A \rightarrow B$  is an irreducible FD

2.  $C \rightarrow A$

- With FD

$$\{C\}^+ = \{A, C, B, D\}$$

- Without FD

$$\{C\}^+ = \{B, C, D\}$$

$C \rightarrow A$  is an irreducible FD

3.  $C \rightarrow B$

- With FD

$$\{C\}^+ = \{A, B, C, D\}$$

- Without FD

$$\{C\}^+ = \{A, B, C, D\}$$

$C \rightarrow B$  is a reducible FD

4.  $C \rightarrow D$

- With FD

$$\{C\}^+ = \{A, C, B, D\}$$

- Without FD

$$\{C\}^+ = \{A, B, C\}$$

$C \rightarrow D$  is an irreducible FD

Final Set of Functional Dependencies:



1.  $A \rightarrow B$
2.  $C \rightarrow A$
3.  $C \rightarrow D$

Finding Closure:

$\{A\}^+ = \{A, B, C, D\}$

$\{C\}^+ = \{A, B, C, D\}$

$\{C\}$  is the candidate key

**Candidate Keys : C**

**Primary Key :** C(City\_ID) is the primary key of this Relation

Normalization:

1. Check for 1NF:

There are no atomic attributes. So the relation is in 1NF

2. Check for 2NF :

FDs  $\Rightarrow \{A \rightarrow B, C \rightarrow A, C \rightarrow D\}$

PA  $\Rightarrow \{C\}$

NPA  $\Rightarrow \{A, B, D\}$

Proper subset of PA  $\Rightarrow \{\}$

It is in 2NF

3. Check for 3NF :

FDs  $\Rightarrow \{A \rightarrow B, C \rightarrow A, C \rightarrow D\}$

PA  $\Rightarrow \{C\}$

NPA  $\Rightarrow \{A, B, D\}$

FD1 :  $A \rightarrow B$  ( NPA  $\rightarrow$  NPA )

It has transitive dependency

Reduce to 3NF :

We decompose the relation Location into 2 new relations

R1 : {A, B} ; FDs  $\Rightarrow$  { $A \rightarrow B$ }

R2 : {A, C, D} ; | FDs  $\Rightarrow$  { $C \rightarrow A$ ,  $C \rightarrow D$ }

4. Check for BCNF :

R1: {A, B}

FDs  $\Rightarrow$  { $A \rightarrow B$ }

NPA  $\rightarrow$  PA doesn't exist

It is in BCNF

R2 : {A, C, D}

FDs  $\Rightarrow$  { $C \rightarrow A$ ,  $C \rightarrow D$ }

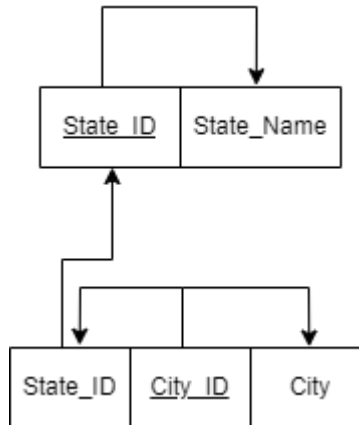
NPA  $\rightarrow$  PA doesn't exist

It is in BCNF

We name the 2 relations

States  $\Rightarrow$  {State\_ID, State}

Cities  $\Rightarrow$  {State\_ID, City\_ID, City}



## **R7 : Reviews**

The **Reviews** table in the journal/conference publication system stores details such as Reviewer\_ID, Article\_ID, Rating, and Review\_Link. This table facilitates the storage and retrieval of reviews provided by reviewers for various articles in the system.

### **Attributes:**

- A. Reviewer\_ID
- B. Article\_ID
- C. Rating
- D. Review\_Link

### **Constraints :**

- 1. Rating should be between 0 and 10
- 2. Review link should begin with 'https'

### **Functional Dependencies:**

- 1. AB->CD
- 2. D->C

### **Irreducible Set of Functional Dependencies:**

- 1. AB->C
  - With FD

$$\{AB\}^+ = \{A, B, C, D\}$$

- Without FD

$$\{AB\}^+ = \{A, B, D, C\}$$

AB→C is a reducible FD

## 2. AB→D

- With FD

$$\{AB\}^+ = \{A, B, C, D\}$$

- Without FD

$$\{AB\}^+ = \{A, B, C\}$$

AB→D is an irreducible FD

## 3. D→C

- With FD

$$\{D\}^+ = \{D, C\}$$

- Without FD

$$\{D\}^+ = \{D\}$$

D→C is an irreducible FD

Final Set of Functional Dependencies:

1. AB→D
2. D→C

Finding Closure:

$$\{A B C D\}^+ = \{A, B, C, D\}$$

$$\{A B\}^+ = \{A, B, C, D\}$$

{A, B} is a candidate key

**Candidate Keys :** AB

**Primary Key :** AB(Union of Reviewer\_ID and Article\_ID) is the primary key of this Relation

Normalization:

$$FDs \Rightarrow \{AB \rightarrow D, D \rightarrow C\}$$

$\{A, B\}$  is the candidate key

$PA \Rightarrow \{A, B\}$

$NPA \Rightarrow \{C, D\}$

1. Check for 1NF:

There are no atomic attributes in the relation.

Therefore, it is in 1NF

2. Check for 2NF:

Proper subset of  $PA \Rightarrow \{A, B\}$

Proper subset of  $PA$  doesn't determine  $NPA$

There is no partial dependency

It is in 2NF

3. Check for 3NF:

$PA \Rightarrow \{A, B\}$

$NPA \Rightarrow \{C, D\}$

FD1 :  $AB \rightarrow D$  (  $PA \rightarrow NPA$  )

There is no transitive dependency

FD2 :  $D \rightarrow C$  (  $NPA \rightarrow NPA$  )

There is transitive dependency

It is not in 3NF

Reduce to 3NF :

We decompose the relation into 2 relations

R1 : {A, B, D} FDs  $\Rightarrow$  {AB $\rightarrow$ D}

R2 : {D, C} FDs  $\Rightarrow$  {D $\rightarrow$ C}

Closure for relation R1

{A B D} $^+ =$  {A, B, D}

{A B} $^+ =$  {A, B, D}

{A,B} is the candidate key

PA  $\Rightarrow$  {A, B}

NPA  $\Rightarrow$  {D}

Transitive dependency doesn't exist

It is in 3NF

Closure for relation R2

{D C} $^+ =$  {A, C}

{D} $^+ =$  {D, C}

{D} is the candidate key

PA  $\Rightarrow$  {D}

NPA  $\Rightarrow$  {C}

Transitive dependency doesn't exist

It is in 3NF

4. Check for BCNF:

FDs  $\Rightarrow$  {AB $\rightarrow$ D, D $\rightarrow$ C}

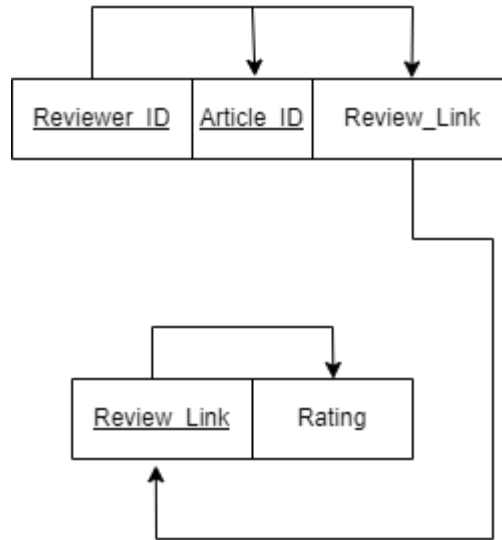
1. AB $\rightarrow$ D ( NPA  $\rightarrow$  NPA doesn't exist )

No transitive dependency

We name the 2 relations

Reviews  $\Rightarrow$  {Reviewer\_ID, Article\_ID, Review\_Link}

Review\_Rating  $\Rightarrow$  {Reviw\_Link, Rating}



## **R8 : Topics**

The **Topics** table categorizes articles and conferences in the journal/conference publication system. It includes Topic\_ID, Topic\_Name, and Topic\_Domain. This table organizes and manages topics, facilitating effective classification and search functionalities within the system.

### Attributes:

- A. Topic\_ID
- B. Topic\_Name
- C. Topic\_Domain

### Constraints :

- 1. Topic\_ID should begin with 'T'

### Functional Dependencies:

- 1. A->BC
- 2. B->C

### Irreducible Set of Functional Dependencies:

1.  $A \rightarrow B$

- With FD

$$\{A\}^+ = \{A, B, C\}$$

- Without FD

$$\{A\}^+ = \{A, C\}$$

$A \rightarrow B$  is an irreducible FD

2.  $A \rightarrow C$

- With FD

$$\{A\}^+ = \{A, C, B\}$$

- Without FD

$$\{A\}^+ = \{A, B, C\}$$

$A \rightarrow C$  is a reducible FD

3.  $B \rightarrow C$

- With FD

$$\{B\}^+ = \{B, C\}$$

- Without FD

$$\{B\}^+ = \{B\}$$

$B \rightarrow C$  is an irreducible FD

Final Set of Functional Dependencies:

1.  $A \rightarrow B$

2.  $A \rightarrow C$

3.  $B \rightarrow C$

Finding Closure:

$$\{A, B, C\}^+ = \{A, B, C\}$$

$$\{A\}^+ = \{A, B, C\}$$

$\{A\}$  is the candidate key

**Candidate Keys :** A

**Primary Key :** A(Topic\_ID) is the primary key of this Relation

Normalization :



1. Check for 1NF:

All attributes are atomic. So, it is in 1NF

2. Check for 2NF :

FDs  $\Rightarrow \{A \rightarrow B, B \rightarrow C\}$

$\{A\}$  is the candidate key

PA  $\Rightarrow \{A\}$

NPA  $\Rightarrow \{B, C\}$

Proper subsets of PA  $\Rightarrow \{\}$

It is in 2NF

3. Check for 3NF:

FD1 :  $A \rightarrow B$  ( PA  $\rightarrow$  NPA )

FD2 :  $B \rightarrow C$  ( NPA  $\rightarrow$  NPA )

There is Transitive Dependency

It is not in 3NF

We split the relation into two

R1 :  $\{A, B\}$

R2 :  $\{B, C\}$

Finding candidate keys :

R1 : FDs  $\Rightarrow \{A \rightarrow B\}$

$\{A B\}^+ = \{A, B\}$

$\{A\}^+ = \{A, B\}$

$\{A\}$  is the candidate key of relation R1

R2 : FDs  $\Rightarrow \{B \rightarrow C\}$

$\{B\}^+ = \{B, C\}$

$\{B\}^+ = \{B, C\}$

$\{B\}$  is the candidate key of relation R2

4. Check for BCNF :

R1 : {A, B}

FDs  $\Rightarrow \{A \rightarrow B\}$

The LHS of every FD is a super key (A)

It is in BCNF

R2 : {B, C}

FDs  $\Rightarrow \{B \rightarrow C\}$

The LHS of every FD is a super key (A)

It is in BCNF

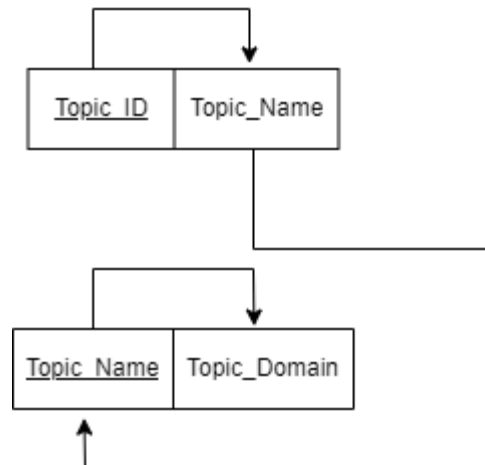
We can name the relations R1 and R2 as follows

Topic\_Names  $\Rightarrow \{Topic\_ID, Topic\_Name\}$

FDs  $\Rightarrow \{Topic\_ID \rightarrow Topic\_Name\}$

Topic\_Domains  $\Rightarrow \{Topic\_Name, Topic\_Domain\}$

FDs  $\Rightarrow \{Topic\_Name \rightarrow Topic\_Domain\}$



## **R9 : Submissions**

The **Submissions** table manages the submissions of articles to journals in the publication system. It includes Submission\_ID, Journal\_ID, and Article\_ID. This table facilitates tracking and management of article submissions for publication.

### Attributes:

- A. Submission\_ID
- B. Journal\_ID
- C. Article\_ID

### Constraints :

- 1. Submission\_ID should begin with 'S'

### Functional Dependencies:

- 1. A->BC
- 2. AB->C

### Irreducible Set of Functional Dependencies:

Consider AB->C

A->C is a valid FD

So AB->C is an extraneous FD

AB->C can be removed from the set of FDs

1. A->B

- With FD

$$\{A\}^+ = \{A, B, C\}$$

- Without FD

$$\{A\}^+ = \{A, C\}$$

A->B is an irreducible FD

2. A->C

- With FD

$$\{A\}^+ = \{A, B, C\}$$

- Without FD

$$\{A\}^+ = \{A, B, C\}$$

A->C is an irreducible FD

Final Set of Functional Dependencies:

1. A->B

2. A->C

Finding Closure:

$$\{A\}^+ = \{A, B, C\}$$

$$\{A\}^+ = \{A, B, C\}$$

{A} is the candidate key

**Candidate Keys :** A

**Primary Key :** A(Submission\_ID) is the primary key of this Relation

Normalization:

1. Check for 1NF :

All the attributes are atomic

Hence, It is in 1NF.

$\{A\}$  is the candidate key

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B, C\}$

2. Check for 2NF :

Proper subset of  $PA \Rightarrow \{ \}$

No partial dependency

It is in 2NF

3. Check for 3NF :

FD1 :  $A \rightarrow B$  (  $PA \rightarrow NPA$  )

FD2 :  $A \rightarrow C$  (  $PA \rightarrow NPA$  )

There is no transitive dependency

It is in 3NF

4. Check for BCNF :

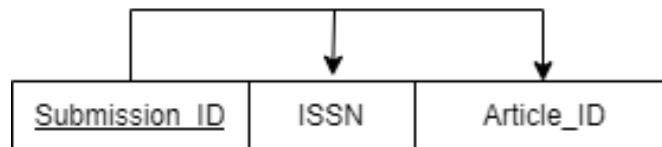
FDs  $\Rightarrow \{A \rightarrow B, A \rightarrow C\}$

1.  $A \rightarrow B$  (  $PA \rightarrow NPA$  )

2.  $A \rightarrow C$  (  $PA \rightarrow NPA$  )

The LHS of every FD is the super key (A)

It is in BCNF



## **R10 : Presentations**

The **Presentations** table records presentations of articles at conferences within the journal/conference publication system. It includes Presentation\_ID, Article\_ID, and Conference\_ID. This table links articles to conferences, facilitating the management of presentation events.

### Attributes:

- A. Presentation\_ID
- B. Article\_ID
- C. Conference\_ID

### Constraints :

- 1. Presentation\_ID should begin with 'P'

### Functional Dependencies:

- 1. A->BC

### Irreducible Set of Functional Dependencies:

- 1. A->B

- With FD

$$\{A\}^+ = \{A, B, C\}$$

- Without FD

$$\{A\}^+ = \{A, C\}$$

A->B is an irreducible FD

- 2. A->C

- With FD

$$\{A\}^+ = \{A, B, C\}$$

- Without FD

$$\{A\}^+ = \{A, B\}$$

A->C is an irreducible FD

Final Set of Functional Dependencies:

1.  $A \rightarrow B$
2.  $A \rightarrow C$

Finding Closure:

$\{A\}^+ = \{A, B, C\}$

$\{A\}^+ = \{A, B, C\}$

$\{A\}$  is the candidate key

**Candidate Keys :** A

**Primary Key :** A(Presentation\_ID) is the primary key of this Relation

Normalization:

1. Check for 1NF :

There are no atomic attributes  
It is in 1NF

$\{A\}$  is the candidate key

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B, C\}$

2. Check for 2NF :

Proper subset of  $PA \Rightarrow \{A\}$   
There is no partial dependency  
It is in 2NF

3. Check for 3NF :

$FD1 \Rightarrow A \rightarrow B ( PA \rightarrow NPA )$

$FD2 \Rightarrow A \rightarrow C ( PA \rightarrow NPA )$

There is no transitive dependency

It is in 3NF

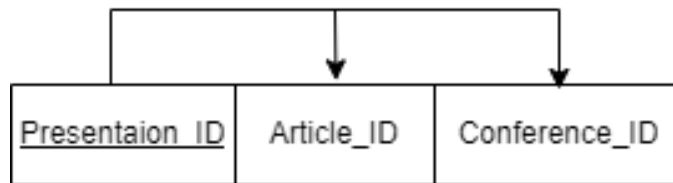
4. Check for BCNF :

FD1  $\Rightarrow A \rightarrow B$  ( PA  $\rightarrow$  NPA )

FD2  $\Rightarrow A \rightarrow C$  ( PA  $\rightarrow$  NPA )

The LHS of every FD is a super key (A)

It is in BCNF



## **R11 : References**

The **References** table in the journal/conference publication system tracks references made by articles to other articles .It includes Article\_ID and Referenced\_Article. This table helps establish connections and track citations between articles within the system.

### Attributes:

- A. Article\_ID
- B. Referenced\_Article (multi valued)

### Constraints :

- 1. The Referenced\_Article cannot be the same as Article\_ID

### Functional Dependencies:

- 1.  $A \rightarrow B$

### Irreducible Set of Functional Dependencies:

- 1.  $A \rightarrow B$ 
  - With FD



$$\{A\}^+ = \{A, B\}$$

- Without FD

$$\{A\}^+ = \{A\}$$

$A \rightarrow B$  is an irreducible FD

Final Set of Functional Dependencies:

1.  $A \rightarrow B$

Finding Closure:

$$\{A B\}^+ = \{A, B\}$$

$$\{A\}^+ = \{A, B\}$$

$\{A\}$  is the candidate key

**Candidate Keys :** A

**Primary Key :** A(Article\_ID) is the primary key of this Relation

Normalization:

$\{A\}$  is the candidate key

$$PA \Rightarrow \{A\}$$

$$NPA \Rightarrow \{B\}$$

1. Check for 1NF :

B is a multi valued attribute.

Hence it is not in 1NF

The FD  $A \rightarrow B$  must be removed to split the table

$$\text{Relation} \Rightarrow \{A, B\}$$

$$\text{FDs} \Rightarrow \{\}$$

$$\{A B\}^+ = \{A, B\}$$

$\{A, B\}$  is the candidate key of the relation 'References'

2. Check for 2NF :

{A, B} is the candidate key

$PA \Rightarrow \{A, B\}$

$NPA \Rightarrow \{\}$

There are no non prime attributes in the relation

Hence, it is in 2NF

3. Check for 3NF :

FDs = { }

It is in 3NF

4. Check for BCNF:

FDs  $\Rightarrow$  { }

It is in BCNF

<u>Article ID</u>	<u>Reference ID</u>
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## **R12 : Articles**

The **Articles** table in the journal/conference publication system stores detailed information about individual articles. It includes attributes such as Article\_ID, ISSN, Article\_Name, Author\_ID, Topic\_Domain, Topic\_Name, DOI, and Article\_Link. This table facilitates the management and retrieval of article data within the system.

Attributes:

A. Article\_ID

B. ISSN

C. Article\_Name

- D. Author\_ID (multi valued)
- E. Topic\_Domain
- F. Topic\_Name
- G. DOI
- H. Article\_Link

Functional Dependencies:

1.  $A \rightarrow BCDEFGH$
2.  $F \rightarrow E$
3.  $AB \rightarrow CDEFGH$

Irreducible Set of Functional Dependencies:

Consider  $AB \rightarrow CDEFGH$

$A \rightarrow CDEFGH$  are valid FDs

$AB \rightarrow CDEFGH$  is an extraneous FD

So it can be removed from the set of FDs

1.  $A \rightarrow B$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, C, D, E, F, G, H\}$$

$A \rightarrow B$  is an irreducible FD

2.  $A \rightarrow C$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, D, E, F, G, H\}$$

$A \rightarrow C$  is an irreducible FD

3.  $A \rightarrow D$

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, E, F, G, H\}$$

A→D is an irreducible FD

4. A→E

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

A→E is a reducible FD

5. A→F

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, G, H\}$$

A→F is an irreducible FD

6. A→G

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, F, H\}$$

A→G is an irreducible FD

7. A→H

- With FD

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

- Without FD

$$\{A\}^+ = \{A, B, C, D, E, F, G\}$$

A→H is an irreducible FD

8. F→E

- With FD

$$\{F\}^+ = \{F, E\}$$

- Without FD

$$\{F\}^+ = \{F\}$$

F→E is an irreducible FD

Final Set of Functional Dependencies:

1. A→B
2. A→C
3. A→D
4. A→F
5. A→G
6. A→H
7. F→E

Finding Closure:

$$\{A\ B\ C\ D\ E\ F\ G\ H\}^+ = \{A, B, C, D, E, F, G, H\}$$

$$\{A\}^+ = \{A, B, C, D, E, F, G, H\}$$

{A} is the candidate key

**Candidate Keys :** A

**Primary Key :** A(Article\_ID) is the primary key of this Relation

Normalization:

1. Check for 1NF:

The attribute Author\_ID (D) is a multi-valued attribute.

Hence, it is not in 1NF.

To reduce it to 1NF we split the relation into 2 tables,

R1 : {A, B, C, E, F, G, H}

R2 : {A, D}

Finding candidate keys :

R1:

$$\{A\ B\ C\ E\ F\ G\ H\}^+ = \{A, B, C, E, F, G, H\}$$

$$\{A\}^+ = \{A, B, C, E, F, G, H\}$$

$\{A\}$  is the candidate key of the relation R1

FDs of R1  $\Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow F, A \rightarrow G, A \rightarrow H, F \rightarrow E\}$

R2:

$\{A, D\}^+ = \{A, D\}$

$\{A, D\}$  is the candidate key of the relation R2

FDs of R2  $\Rightarrow \{\}$

2. Check for 2NF:

R1:

FDs  $\Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow F, A \rightarrow G, A \rightarrow H, F \rightarrow E\}$

$\{A\}$  is the candidate key

PA  $\Rightarrow \{A\}$

NPA  $\Rightarrow \{B, C, E, F, G, H\}$

Partial subset of PA  $\Rightarrow \{\}$

There is no partial dependency

It is in 2NF

R2:

FDs  $\Rightarrow \{\}$

$\{A, D\}$  is the candidate key

PA  $\Rightarrow \{A, D\}$

NPA  $\Rightarrow \{\}$

There is no partial dependency

It is in 2NF

3. Check for 3NF :

R1:

PA  $\Rightarrow \{A\}$

$NPA \Rightarrow \{B, C, E, F, G, H\}$

$FDs \Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow F, A \rightarrow G, A \rightarrow H, F \rightarrow E\}$

1.  $A \rightarrow B$  (  $PA \rightarrow NPA$  )
2.  $A \rightarrow C$  (  $PA \rightarrow NPA$  )
3.  $A \rightarrow F$  (  $PA \rightarrow NPA$  )
4.  $A \rightarrow G$  (  $PA \rightarrow NPA$  )
5.  $A \rightarrow H$  (  $PA \rightarrow NPA$  )
6.  $F \rightarrow E$  (  $NPA \rightarrow NPA$  )

A Transitive dependency exists

Hence, It is not in 3NF.

We split R1 into 2 tables

R1-1 :  $\{A, B, C, F, G, H\}$

$FDs \Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow F, A \rightarrow G, A \rightarrow H\}$

Finding Closure:

$\{A B C F G H\}^+ = \{A, B, C, F, G, H\}$

$\{A\}^+ = \{A, B, C, F, G, H\}$

$\{A\}$  is the candidate key

A is the primary key of the relation R1-1

$PA \Rightarrow \{A\}$

$NPA \Rightarrow \{B, C, F, G, H\}$

There is no transitive dependency

It is in 3NF

R1-2 :  $\{F, E\}$

$FDs \Rightarrow \{F \rightarrow E\}$

Finding Closure:

$\{F E\}^+ = \{F, E\}$

$\{F\}^+ = \{F, E\}$

$\{F\}$  is the candidate key

F is the primary key of the relation R1-2

$PA \Rightarrow \{F\}$

$NPA \Rightarrow \{E\}$

There is no transitive dependency

It is in 3NF

4. Check for BCNF :

R1-1:

$R1-1 \Rightarrow \{A, B, C, F, G, H\}$

FDs  $\Rightarrow \{A \rightarrow B, A \rightarrow C, A \rightarrow F, A \rightarrow G, A \rightarrow H\}$

$\{A\}$  is the candidate key

It is also the super key

The LHS of all FDs is a super key (A)

It is in BCNF

R1-2:

$R1-2 \Rightarrow \{F, E\}$

FDs  $\Rightarrow \{F \rightarrow E\}$

$\{F\}$  is the candidate key

It is also the super key

The LHS of all FDs is a super key (F)

It is in BCNF

R2:

$R2 \Rightarrow \{A, D\}$

FDs  $\Rightarrow \{\}$



It is in BCNF

We can call the relation

R1-1 => Articles

R1-2 is already a part of the relation 'Topics'. So it need not be changed

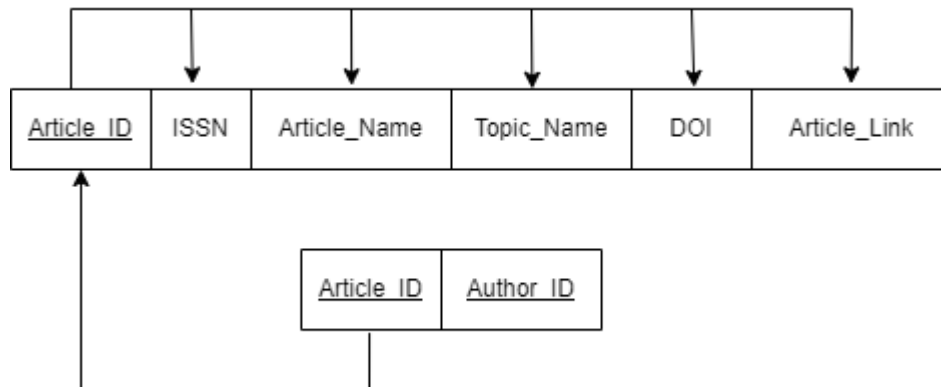
R2 => Article\_Authors

Articles  $\Rightarrow$  {Article\_ID, ISSN, Article\_Name, Topic\_Domain, DOI, Article\_Link}

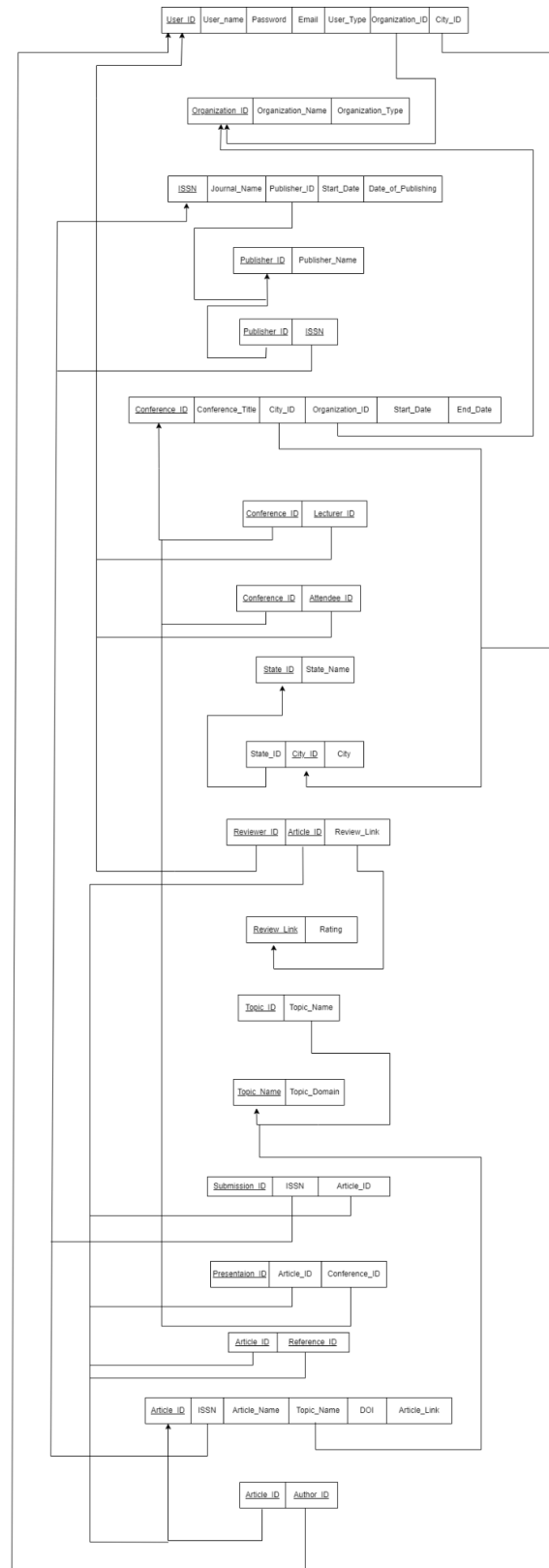
Candidate key  $\Rightarrow$  {Article\_ID}

Article\_Authors  $\Rightarrow$  {Article\_ID, Author\_ID}

Candidate key  $\Rightarrow$  {Article\_ID, Author\_ID}



## 6. SCHEMA DIAGRAM



## 7. IMPLEMENTATION

### Creating tables :

After normalization we got 19 tables. They should be created in an order such that the foreign key constraints are not violated

```
CREATE TABLE organization(  
    organization_id VARCHAR(10),  
    organization_name VARCHAR(100),  
    organization_type VARCHAR(100),  
    CONSTRAINT org_pk PRIMARY KEY(organization_id),  
    CONSTRAINT org_id_chk CHECK (organization_id LIKE 'O%')  
);
```

```
CREATE TABLE states(  
    state_id VARCHAR(10),  
    state_name VARCHAR(50),  
    CONSTRAINT state_pk PRIMARY KEY(state_id),  
    CONSTRAINT state_id_chk CHECK(state_id LIKE 'S%')  
);
```

```
CREATE TABLE cities(  
    state_id VARCHAR(10),  
    city_id VARCHAR(10),  
    city_name VARCHAR(30),  
    CONSTRAINT city_pk PRIMARY KEY(city_id),  
    CONSTRAINT city_fk FOREIGN KEY(state_id) REFERENCES states,  
    CONSTRAINT city_id_chk CHECK(city_id LIKE 'Ci%')  
);
```

```
CREATE TABLE users(  
    user_id VARCHAR(10),  
    user_name VARCHAR(20),  
    password VARCHAR(20),  
    email VARCHAR(45),  
    user_type VARCHAR(15),  
    organization_id VARCHAR(10),
```

```

        city_id VARCHAR(10),
        CONSTRAINT users_pk PRIMARY KEY(user_id),
        CONSTRAINT users_fk_1 FOREIGN KEY(organization_id) REFERENCES
organization,
        CONSTRAINT users_fk_2 FOREIGN KEY(city_id) REFERENCES cities,
        CONSTRAINT user_id_chk CHECK(user_id LIKE 'U%'),
        CONSTRAINT email_chk CHECK(email LIKE '%@gmail.com'),
        CONSTRAINT user_type_chk CHECK (user_type IN('Student', 'Author',
'Lecturer'))
);

```

```

CREATE TABLE publishers(
    publisher_id VARCHAR(10),
    publisher_name VARCHAR(20),
    CONSTRAINT pub_pk PRIMARY KEY(publisher_id),
    CONSTRAINT pub_id_chk CHECK (publisher_id LIKE 'P%')
);

```

```

CREATE TABLE journals(
    ISSN VARCHAR(20),
    journal_name VARCHAR(30),
    publisher_id VARCHAR(10),
    date_of_publishing date,
    CONSTRAINT journal_pk PRIMARY KEY(ISSN),
    CONSTRAINT journal_fk FOREIGN KEY(publisher_id) REFERENCES publishers,
    CONSTRAINT iss_chk CHECK (issn LIKE 'J%')
);

```

```

CREATE TABLE published_journals(
    publisher_id VARCHAR(10),
    ISSN VARCHAR(20),
    CONSTRAINT p_journals_fk PRIMARY KEY(publisher_id, ISSN),
    CONSTRAINT p_journal_fk FOREIGN KEY(publisher_id) REFERENCES
publishers
);

```

```

CREATE TABLE conferences(

```

```

conference_id VARCHAR(10),
conference_title VARCHAR(100),
city_id VARCHAR(10),
organization_id VARCHAR(10),
start_date date,
end_date date,
CONSTRAINT conferences_pk PRIMARY KEY(conference_id),
CONSTRAINT conferences_fk1 FOREIGN KEY(organization_id) REFERENCES
organization,
CONSTRAINT conferences_fk2 FOREIGN KEY(city_id) REFERENCES cities,
CONSTRAINT conf_id_chk CHECK(conference_id LIKE 'C%'),
CONSTRAINT dates_chk CHECK(end_date >= start_date)
);

```

```

CREATE TABLE conference_lecturers(
conference_id VARCHAR(10),
lecturer_id VARCHAR(20),
CONSTRAINT c_lec_pk PRIMARY KEY(conference_id, lecturer_id),
CONSTRAINT c_lec_fk1 FOREIGN KEY(conference_id) REFERENCES
conferences,
CONSTRAINT c_lec_fk2 FOREIGN KEY(lecturer_id) REFERENCES users
);

```

```

CREATE TABLE conference_attendees(
conference_id VARCHAR(10),
attendee_id VARCHAR(20),
CONSTRAINT c_att_pk PRIMARY KEY(conference_id, attendee_id),
CONSTRAINT c_att_fk1 FOREIGN KEY(conference_id) REFERENCES
conferences,
CONSTRAINT c_att_fk2 FOREIGN KEY(attendee_id) REFERENCES users
);

```

```

CREATE TABLE topics(
topic_id VARCHAR(10),
topic_name VARCHAR(40),
CONSTRAINT topics_pk PRIMARY KEY(topic_id),
CONSTRAINT topics_fk FOREIGN KEY(topic_name) REFERENCES topic_domains,
CONSTRAINT topic_id_chk CHECK(topic_id LIKE 'T%')
);

```

```
CREATE TABLE articles(
    article_id VARCHAR(10),
    ISSN VARCHAR(10),
    article_name VARCHAR(100),
    topic_name VARCHAR(40),
    DOI date,
    article_link VARCHAR(100),
    CONSTRAINT articles_pk PRIMARY KEY(article_id),
    CONSTRAINT articles_fk1 FOREIGN KEY(ISSN) REFERENCES journals,
    CONSTRAINT articles_fk2 FOREIGN KEY(topic_name) REFERENCES topics,
    CONSTRAINT article_id_chk CHECK(article_id LIKE 'A%'),
    CONSTRAINT article_link_chk CHECK(article_link LIKE 'https%')
);
```

```
CREATE TABLE article_authors(
    article_id VARCHAR(10),
    author_id VARCHAR(10),
    CONSTRAINT a_aut_pk PRIMARY KEY(article_id, author_id),
    CONSTRAINT a_aut_fk1 FOREIGN KEY(article_id) REFERENCES articles,
    CONSTRAINT a_aut_fk2 FOREIGN KEY(author_id) REFERENCES users
);
```

```
CREATE TABLE submissions(
    submission_id VARCHAR(10),
    ISSN VARCHAR(10),
    article_id VARCHAR(10),
    CONSTRAINT sub_pk PRIMARY KEY(submission_id),
    CONSTRAINT sub_fk1 FOREIGN KEY(ISSN) REFERENCES journals,
    CONSTRAINT sub_fk2 FOREIGN KEY(article_id) REFERENCES articles,
    CONSTRAINT sub_id_chk CHECK(submission_id LIKE 's%')
);
```

```
CREATE TABLE presentations(
    presentation_id VARCHAR(10),
    article_id VARCHAR(10),
    conference_id VARCHAR(10),
    CONSTRAINT pres_pk PRIMARY KEY(presentation_id),
    CONSTRAINT pres_fk1 FOREIGN KEY(article_id) REFERENCES articles,
```

```
CONSTRAINT pres_f12 FOREIGN KEY(conference_id) REFERENCES conferences,  
CONSTRAINT pres_id_chk CHECK(presentation_id LIKE 's%')  
);
```

```
CREATE TABLE references(  
  article_id VARCHAR(10),  
  referenced_id VARCHAR(10),  
  CONSTRAINT ref_pk PRIMARY KEY(article_id, referenced_id),  
  CONSTRAINT ref_fk1 FOREIGN KEY(referenced_id) REFERENCES articles,  
  CONSTRAINT ref_fk2 FOREIGN KEY(article_id) REFERENCES articles,  
  CONSTRAINT articles_chk CHECK(article_id != referenced_id)  
);
```

```
CREATE TABLE reviews_link(  
  review_link VARCHAR(100),  
  rating NUMBER(2,1),  
  CONSTRAINT r_link_pk PRIMARY KEY(review_link),  
  CONSTRAINT r_link_chk CHECK(review_link LIKE 'https%'),  
  CONSTRAINT rating_chk CHECK(rating >= 1 AND rating <= 10)  
);
```

```
CREATE TABLE reviews(  
  reviewer_id VARCHAR(10),  
  article_id VARCHAR(10),  
  review_link VARCHAR(100),  
  CONSTRAINT r_pk PRIMARY KEY(reviewer_id),  
  CONSTRAINT r_fk1 FOREIGN KEY(review_link) REFERENCES reviews_link,  
  CONSTRAINT r_fk2 FOREIGN KEY(article_id) REFERENCES articles  
);
```

## **NetBeans Implementation :**

To create the user interface for the application we used NetBeans. It provides the facility to connect JAVA with Oracle SQL and develop an application with Front end as JAVA and backend as Oracle SQL. Many tools are available in NetBeans. We used the following tools in NetBeans

- Labels - To indicate what a textfield or a panel points to
- Text Fields - To get data input from the user
- Buttons - To navigate to different menus or to perform operations such as insert, update, delete
- Pop up menus - To display table details when user gives a prompt
- Tables - To display the list of data on which the user can perform operations
- Panel - To give the user a pleasing view of the application

We used buttons to navigate from one page to another. The various pages created are as follows.

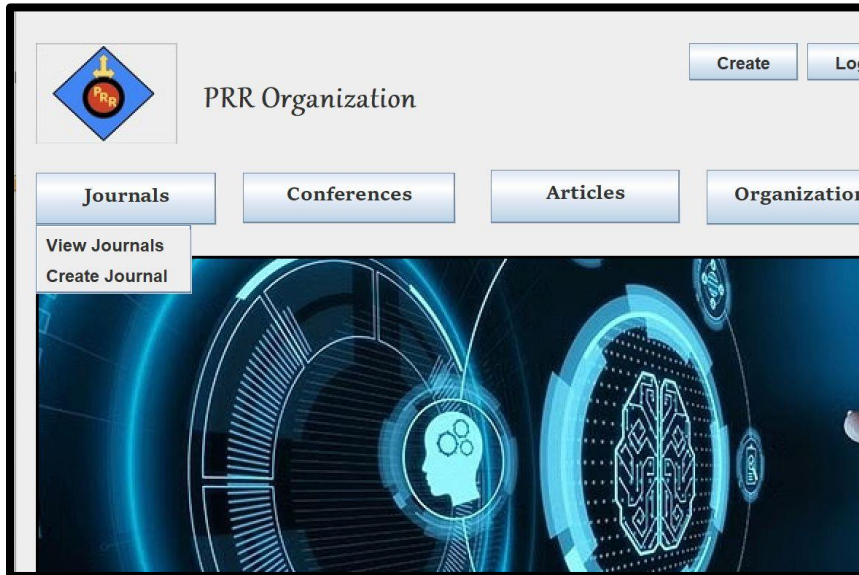
### **Front page :**





The Front page for our application consists of Our logo, Title and options for our different features such as Journals, Conferences, Articles and Organization as well as the Create and Login options.

This page opens when the application is run. From this page we can go to other pages which specifically handle Journal and Conference entries.



On hovering over the buttons we can see the various options for the user

## Journal page :

Journals
Biomedical Imaging
AI/ML Research Papers
Career development
Fiction
General
IAS/IPS
Unix Research Paper

On clicking on the Journals button, you go to the Journals Page. Each Journal consists of a unique ISSN , a name, its publisher and date of publishing .The Journals page gives you options to search for journals using their ISSN and their name. The left side of the page shows all available journals in a scrolling table. It mentions the titles of journals present.

The user can search for journals based on ISSN(Journal ID) and Journal name(which can also be a substring of the Journal Name)

It also contains a back button which helps the user to navigate to the main page.

Back

SEARCH: 

SEARCH

Journals

Biomedical Imaging
AI/ML Research Papers
Career development
Fiction
General
IAS/IPS
Unix Research Paper

J001	AI/ML Research Papers
J006	Unix Research Paper

Create Journal

Searching for Journal based on Journal Name

Back

SEARCH: 

SEARCH

Journals

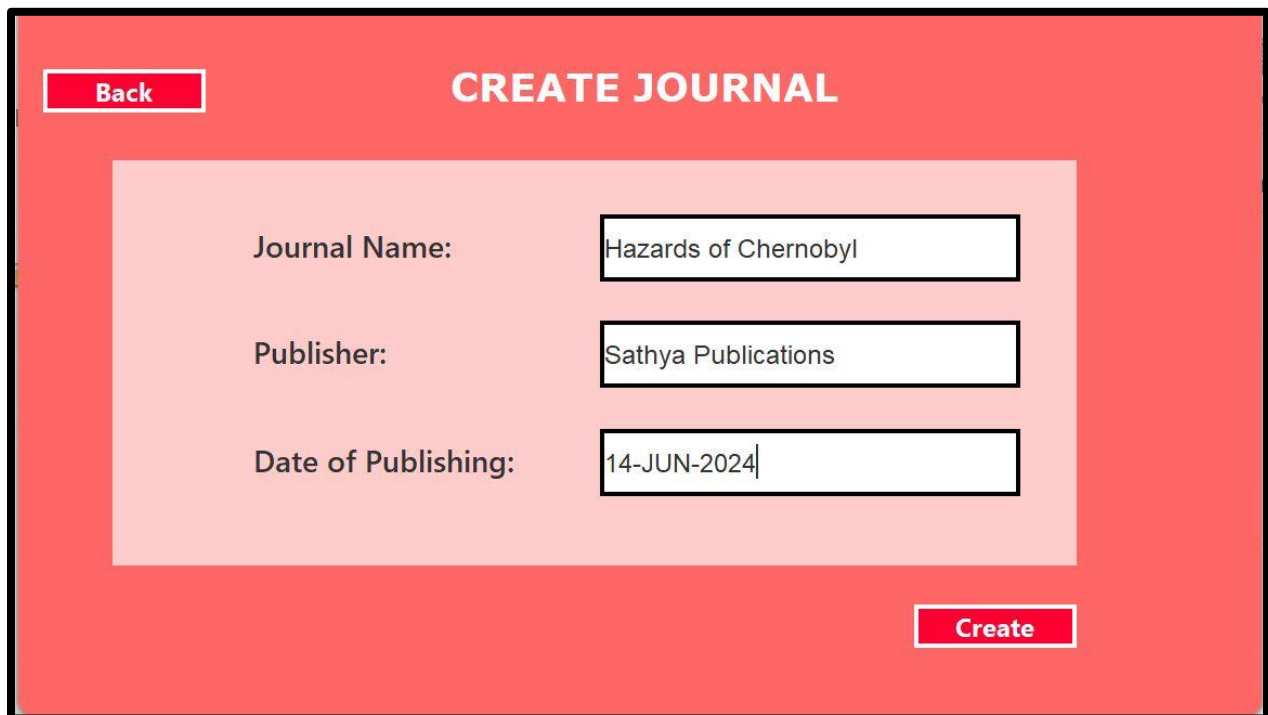
Biomedical Imaging
AI/ML Research Papers
Career development
Fiction
General
IAS/IPS
Unix Research Paper

J007	Biomedical Imaging
------	--------------------

Create Journal

Searching for journal based on ISSN

### Creating Journal page :



**Back**

**CREATE JOURNAL**

Journal Name: Hazards of Chernobyl

Publisher: Sathya Publications

Date of Publishing: 14-JUN-2024

**Create**

The Create Journal page allows you to add new journals to the base. On entering the journal name, publisher and date of publishing, the application generates a unique ISSN for the journal and stores it in the journal.

The journal also has a function to ensure that data entered is valid. Hence a validation check for elements such as date is done before inserting into the database.

It also contains a back button to go back to the main Journals page.

To avoid invalid entry of Journal ID's we have implemented an algorithm to calculate the Journals ID automatically whenever a record needs to be inserted.

The screenshot shows a web form titled "CREATE JOURNAL" on a red background. A modal message box is centered over the form, displaying a green information icon, the word "Success", and an "OK" button. The form behind the modal has a "Back" button in the top left and a "Create" button in the bottom right. The form fields are labeled "Journal", "Publish", and "Date of Publishing". The "Date of Publishing" field contains the text "14-MAY-2024".

Successfully inserted record. It is also reflected in the database.

Journals
Biomedical Imaging
Hazards of Chernobyl
Cuisine and Culture
AI/ML Research Papers
Career development
Fiction
General
IAS/IPS
Unix Research Paper

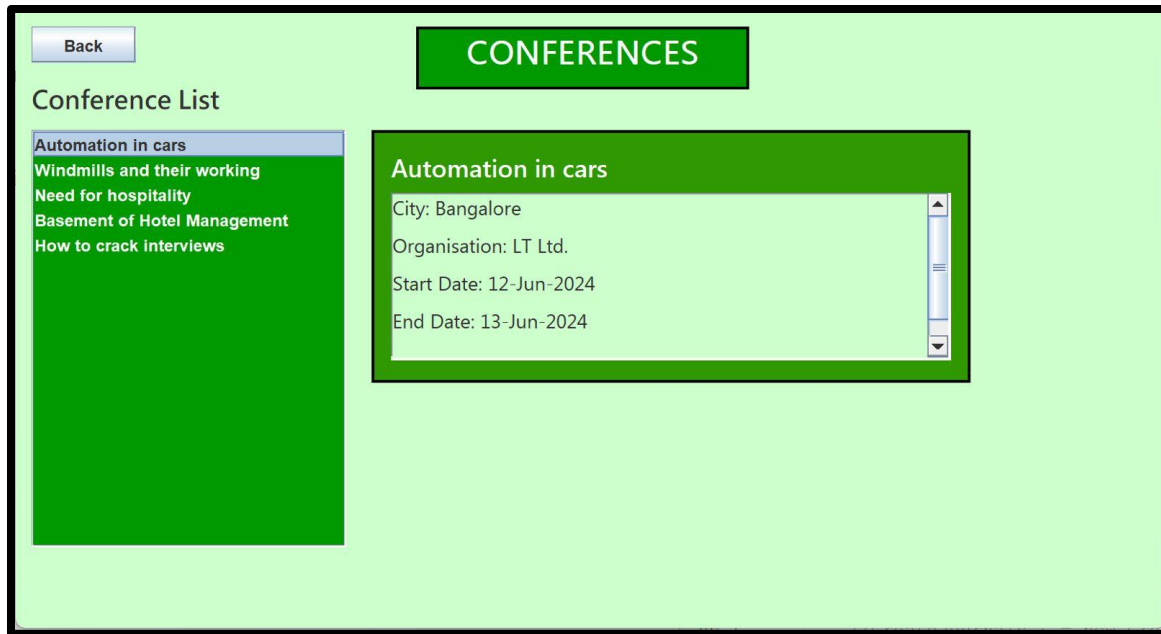
When we go back to the main Journals page we can see that the new record “Hazards of Chernobyl” is visible in the table.

## Conferences Page :

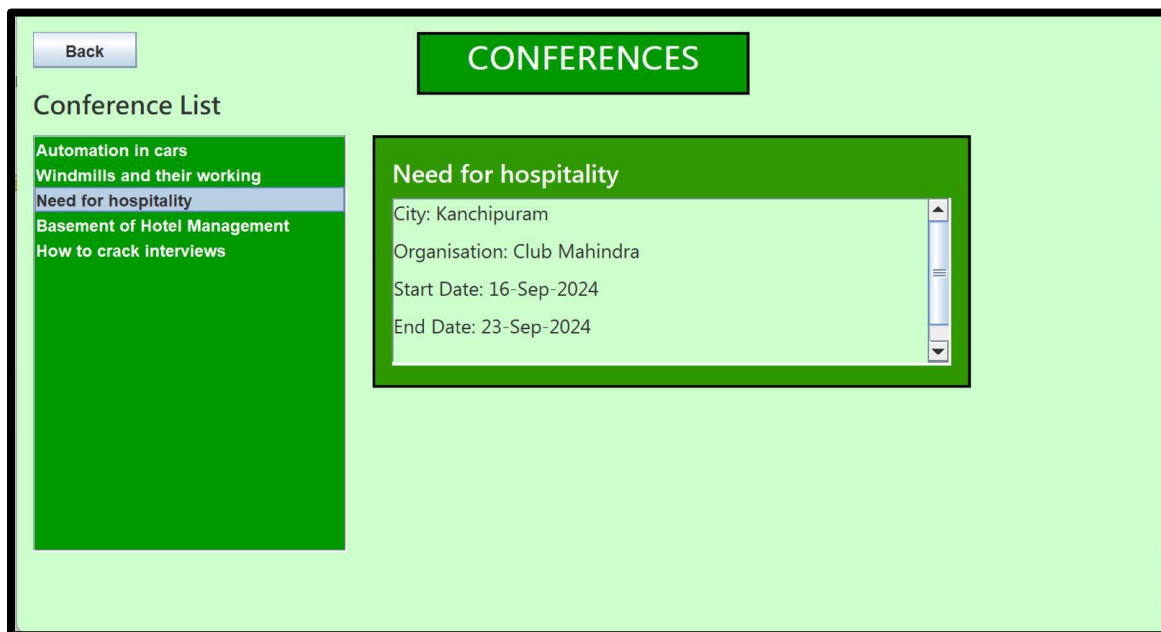


On clicking the conferences button, the Conferences page opens. The Conference page on the left side consists of a list of all conferences. It's a scroll list and you can scroll through the list to see all available conferences. On selecting a conference details of the selected conference will appear on the centre panel.

The unique ID is usually not shown as it is confidential. Necessary details such as location, Organization that conducted the conference and the start date and end date of the conference.



Selecting “Automation of Cars” displays information about the conference.



Similarly the details are displayed when “Need for Hospitality” is clicked.

## **8. CONCLUSION**

All tables have been successfully normalized, ensuring data integrity and eliminating redundancy. The implementation phase using NetBeans and SQL has begun, with database connections established and initial data management functionalities being developed, setting a strong foundation for the journal/conference publication system.