**LAB-7**

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**Q1.**

**a)Assembly Election:**

Party( Party\_Name , Party\_Election\_Symbol, Projected\_CM)

Candidate( Candidate\_Name , Candidate\_Party\_Name, Assets)

Constituency( Constituency\_Name , Elected, NoOfVoters, VotesCasted)

Fights( Constituency\_Name , Candidate\_Name , Vote\_Count)

**Canonical Form of FD’s:**

Party\_Name → {Party\_Election\_Symbol, Projected\_CM}

Candidate\_Name → {Candidate\_Party\_Name, Assets}

Constituency\_Name → {Elected, NoOfVoters, VotesCasted}

{Constituency\_Name, Candidate\_Name} → Vote\_Count

**Minimal Set of FD’s:**

Party\_Name → Party\_Election\_Symbol

Party\_Name → Projected\_CM

Candidate\_Name → Candidate\_Party\_Name

Candidate\_Name → Assets

Constituency\_Name → Elected

Constituency\_Name → NoOfVoters

Constituency\_Name → VotesCasted

{Constituency\_Name, Candidate\_Name} → Vote\_Count

Key: {Constituency\_Name, Candidate\_Name}

**Each relation in the given database schema is in BCNF.**

**b)Lab-Projects.**

TA( TA\_ID , TA\_Name, TA\_Email, TA\_ContactNumber)

Group( GroupNo , ProjectTitle, TL\_ID, TL\_ContactNo, TA\_ID)

Student( StudentID , Student\_Name, StudentEmail, GroupNo)

StageParam( Stage\_Name, Parameter\_Name , MaxMarks)

Marks\_S( Stage\_Name, Parameter\_Name, Student\_ID , Marks)

Marks\_G( Stage\_Name, Parameter\_Name, GroupID , Marks)

**Minimal Set of FD’s:**

TA\_ID → TA\_Name

TA\_ID → TA\_Email

TA\_ID → TA\_ContactNumber

GroupNo → ProjectTitle

GroupNo → TL\_ID

TL\_ID → TA\_ID

TL\_ID → TL\_ContactNo

StudentID → Student\_Name

StudentID → StudentEmail

StudentID → GroupNo

{Stage\_Name, Parameter\_Name} → MaxMarks

{Stage\_Name, Parameter\_Name, Student\_ID} → Marks

{Stage\_Name, Parameter\_Name, GroupID} → Marks

**Canonical Form of FD’s:**

TA\_ID → {TA\_Name, TA\_Email, TA\_ContactNumber}

GroupNo → {ProjectTitle, TL\_ID}

TL\_ID → {TL\_ContactNo, TA\_ID}

StudentID → {Student\_Name, StudentEmail, GroupNo}

{Stage\_Name, Parameter\_Name} → MaxMarks

{Stage\_Name, Parameter\_Name, Student\_ID} → Marks

{Stage\_Name, Parameter\_Name, GroupID} → Marks

Key: {Stage\_Name, Parameter\_Name, StudentID}

FD’s TL\_ID → TL\_ContactNo,TL\_ID → TA\_ID violates the BCNF requirement. Hence we

decompose the relation using BCNF decomposition algorithm.

Compute TL\_ID + = {TL\_ID, TL\_ContactNo, TA\_ID}

Have R1( TL\_ID , TL\_ContactNo, TA\_ID) and R2( GroupNo , ProjectTitle, TL\_ID) and

projected FDs are F1 = {TL\_ID → TL\_ContactNo, TL\_ID → TA\_ID} and F2 = {GroupNo →

ProjectTitle, GroupNo → TL\_ID}.

**Clearly R1 and R2 are in BCNF.**

**c)Library:**

Book( ISBN , Title, Publisher, Year, Price)

Accession( AccessionNo , ISBN, Rack, Issue\_Status)

MemberCategory( Category , max\_books, max\_days)

Member( ID , Name, Email, Category)

Issue( MemberID, AccessionNo, IssueDate , Due\_Date, return\_date)

**Minimal Set of FD’s:**

ISBN → Title

ISBN → Publisher

ISBN → Year

ISBN → Price

AccessionNo → ISBN

AccessionNo → Rack

AccessionNo → Issue\_Status

Category → max\_books

Category → max\_days

ID → Name

ID → Email

ID → Category

{MemberID, AccessionNo, IssueDate} → Due\_Date

{MemberID, AccessionNo, IssueDate} → return\_date

**Canonical Form of FD’s:**

ISBN → {Title, Publisher, Year, Price}

AccessionNo → {ISBN, Rack, Issue\_Status}

Category → {max\_books, max\_days}

ID → {Name, Email, Category}

{MemberID, AccessionNo, IssueDate} → {Due\_Date, return\_date}

Key: {MemberID, AccessionNo, IssueDate}

**All the relations are in BCNF.** So, no decomposition algorithm is needed.

**Q2.**

Train\_Number

Train\_Run\_Day

Source\_Station\_Code

Destination\_Station\_Code

Station\_Code

Date\_of\_Run

Scheduled\_Arrival\_Time

Scheduled\_Departure\_Time

Expected\_Arrival\_Time

**Minimal set of FD’s:**

Train\_Number → Source\_Station\_Code

Train\_Number → Destination\_Station\_Code

Train\_Number - - >> Train\_Run\_Day

{Train\_Number ,Station\_Code} → Scheduled\_Arrival\_Time

{Train\_Number ,Station\_Code} → Scheduled\_Departure\_Time

{Train\_Number ,Station\_Code,Date\_of\_Run} → Expected\_Arrival\_Time

**Canonical Form of FD’s:**

Train\_Number → {Source\_Station\_Code, Destination\_Station\_Code}

Train\_Number - - >> Train\_Run\_Day

{Train\_Number ,Station\_Code} → {Scheduled\_Arrival\_Time,Scheduled\_Departure\_Time}

{Train\_Number ,Station\_Code,Date\_of\_Run} → Expected\_Arrival\_Time

**Key:** {Train\_Number ,Station\_Code, Date\_of\_Run}

Relation had FD’s and MVD’s .It is not in 4NF because their are FD’s and MVD’s which are

not trivial but don’t have key as the determinant.So ignoring the MVD first we decompose

using the BCNF algorithm.

Compute Train\_Number+ gives two relations

R1( Train\_Number ,Source\_Station\_Code, Destination\_Station\_Code}

R2{ Train\_Number , Station\_Code , Date\_of\_Run ,Scheduled\_Arrival\_Time,Scheduled\_Departu

re\_Time,Expected\_Arrival\_Time}

FD’s and MVD in

**F1** {Train\_Number → Source\_Station\_Code,Train\_Number → Destination\_Station\_Code}

and

**F2** {Train\_Number - - >> Train\_Run\_Day,

{Train\_Number ,Station\_Code} → Scheduled\_Arrival\_Time,

{Train\_Number ,Station\_Code} → Scheduled\_Departure\_Time,

{Train\_Number ,Station\_Code,Date\_of\_Run} → Expected\_Arrival\_Time}

Now Compute {Train\_Number ,Station\_Code} +

**R21** { Train\_Number , Station\_Code ,Scheduled\_Arrival\_Time ,Scheduled\_Departure\_Time} ,

**R22** { Train\_Number , Station\_Code , Date\_of\_Run ,Expected\_Arrival\_Time,Train\_Run\_Day }

FD’s and MVD in

**F21** {{Train\_Number ,Station\_Code} → Scheduled\_Arrival\_Time,

{Train\_Number ,Station\_Code} → Scheduled\_Departure\_Time}

**F22** {{Train\_Number ,Station\_Code,Date\_of\_Run} → Expected\_Arrival\_Time,Train\_Number

- - >> Train\_Run\_Day }

Compute Train\_Number + for MVD

Gives

R221{ Train\_Number , Train\_Run\_Day } and

R222{Train\_Number, Station\_Code , Date\_of\_Run , Expected\_Arrival\_Time}

F221{ Train\_Number - - >> Train\_Run\_Day } and

F222{{Train\_Number , Station\_Code , Date\_of\_Run } → Expected\_Arrival\_Time}

**Now all the relations are in 4NF.**