**Answers for Exercise Problem for Module 11**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **StdNo** | **StdCity** | **StdClass** | **OfferNo** | **OffTerm** | **OffYear** | **EnrGrade** | **CourseNo** | **CrsDesc** |
| s1 | seattle | jun | o1 | fall | 2017 | 3.5 | c1 | db |
| s1 | seattle | jun | o2 | fall | 2017 | 3.3 | c2 | vb |
| s2 | bothell | jun | o3 | SPRING | 2018 | 3.1 | c3 | oo |
| s2 | bothell | jun | o2 | fall | 2017 | 3.4 | c2 | vb |

Ans 1 –

*Rows which falsify the Functional Dependencies are as follows:*

|  |  |
| --- | --- |
| **FD** | **Falsifications** |
| *StdCity* → *OfferNo* | (1,2), (3,4) |
| *StdCity* → *OffTerm* | (3,4) |
| *StdCity* → *EnrGrade* | (1,2), (3,4) |
| *StdCity* → *CourseNo* | (1,2), (3,4) |
| *StdCity* → *CrsDesc* | (1,2), (3,4) |
| *StdCity* → *OffYear* | (3,4) |
| *StdCity* → *StdNo* | None |
| *StdCity* → *StdClass* | None |

Ans 2-

FDs with *Stdcity* as the determinant not falsified by Table 1 are listed below along with a reference to new rows that falsify the Functional Dependencies.

*StdCity* → *StdNo* is falsified by two pairs of rows: (1,5) and <2,5>

*StdCity* → *StdClass* is falsified by two pairs of rows: <1,5> and <2,5>

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **StdNo** | **StdCity** | **StdClass** | **OfferNo** | **OffTerm** | **OffYear** | **EnrGrade** | **CourseNo** | **CrsDesc** |
| s1 | seattle | jun | o1 | fall | 2017 | 3.5 | c1 | db |
| s1 | seattle | jun | o2 | fall | 2017 | 3.3 | c2 | vb |
| s2 | bothell | jun | o3 | SPRING | 2018 | 3.1 | c3 | oo |
| s2 | bothell | jun | o2 | fall | 2017 | 3.4 | c2 | vb |
| S3 | BOTHELL | SR | 01 | FALL | 2014 | 3.3 | C1 | DB |

Ans 3-



**Converting RED into Tables**

Student(StdId, Name, Email, Phone, Web, Major, Minor, GPA, AdviserNo, AdviserName)

Interview(Interviewid, BldgName, RoomNo, RoomType, Date, Time, *StdId*, *InterviewerId*)

FOREIGN KEY(InterviewerId) REFERENCES Interviewer

FOREIGN KEY(StdId) REFERENCES Student

Interviewer(InterviewerId, Name, Phone, Email, *CompId*)

FOREIGN KEY(CompId) REFERENCES Company

CompId NOT NULL

Company(CompId, CompName)

Position(PosId, Name)

CompPos(CompId, PosId, City, State)

FOREIGN KEY(CompId) REFERENCES Company

FOREIGN KEY(PosId) REFERENCES Position

**Normalization:**

1. The student table is not in BCNF because AdviserNo ® AdviserName. If this FD is significant, split student into 2 tables with AdviserNo and AdviserName in a new table. AdviserNo is the primary key of the new table.
2. The Interview table is not in BCNF because BldgName, RoomNo ® RoomType. If this FD is significant split interview into 2 tables with BldgName, RoomNo, and RoomType in a new table. The combination of BldgName and RoomNo is the primary key of the new table.
3. Another possible interpretation of the RoomNo attribute is that it contains both a building abbreviation and a room number. For example, AB212 means room 212 in the Anna building. If RoomNo contains both a room number and a building abbreviation, then RoomNo® BldgName, RoomType. If this FD is significant split the interview table into 2 tables with BldgName, RoomNo, and RoomType in a new table. The primary key of the new table is RoomNo.

Ans 4 –

AuthNo ® AuthName

AuthEmail ® AuthNo

PaperNo ® Primary-AuthNo

AuthNo ® AuthAddress

AuthNo ® AuthEmail

PaperNo ® PapTitle

PaperNo ® PapAbstract

PaperNo ® PapStatus

RevNo ® RevName

RevNo ® RevEmail

RevEmail ® RevNo

RevNo, PaperNo ® Auth-Comm

RevNo, PaperNo ® Prog-Comm

RevNo, PaperNo ® RevDate

RevNo, PaperNo ® Rating

RevNo ® RevAddress

**Step 1: Arrange the remaining FDs into groups by determinant**

AuthNo ® AuthName, AuthEmail, AuthAddress

AuthEmail ® AuthNo

PaperNo ® Primary-AuthNo, Title, Abstract, Status

RevNo ® RevName, RevEmail, RevAddress

RevEmail ® RevNo

RevNo, PaperNo ® Auth-Comm, Prog-Comm, Date, Rating1, Rating2, Rating3,

**Step 2: For each FD group, make a table with the determinant as the primary key. In the table list, the primary keys are underlined.**

Author(AuthNo, AuthName, AuthEmail, AuthAddress)

FOREIGN KEY (AuthEmail) REFERENCES Author

AuthEmail(AuthEmail, AuthNo)

FOREIGN KEY (AuthNo) REFERENCES Author

Paper(PaperNo, Primary-AuthNo, Title, Abstract, Status)

FOREIGN KEY (Primary-AuthNo) REFERENCES Author

Reviewer(RevNo, RevName, RevEmail, RevAddress)

FOREIGN KEY (RevEmail) REFERENCES ReviewerEmail

ReviewerEmail(RevEmail, RevNo)

FOREIGN KEY (RevNo) REFERENCES Reviewer

Review(PaperNo, RevNo, Auth-Comm, Prog-Comm, Date, Rating1, Rating2, Rating3, Rating4, Rating5)

FOREIGN KEY (PaperNo) REFERENCES Paper

FOREIGN KEY (RevNo) REFERENCES Reviewer

**Step 3 - Merge tables with the same columns. The Author and AuthEmail tables are merged. The Reviewer and ReviewerEmail tables are merged. UNIQUE constraints are added for AuthEmail and RevEmail**.

Author(AuthNo, AuthName, AuthEmail, AuthAddress)

UNIQUE (AuthEmail)

Paper(PaperNo, Primary-AuthNo, Title, Abstract, Status)

FOREIGN KEY (Primary-AuthNo) REFERENCES Author

Reviewer(RevNo, RevName, RevEmail, RevAddress)

UNIQUE (RevEmail)

Review(PaperNo, RevNo, Auth-Comm, Prog-Comm, Date, Rating1, Rating2, Rating3, Rating4, Rating5)

FOREIGN KEY (PaperNo) REFERENCES Paper

FOREIGN KEY (RevNo) REFERENCES Reviewer