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-

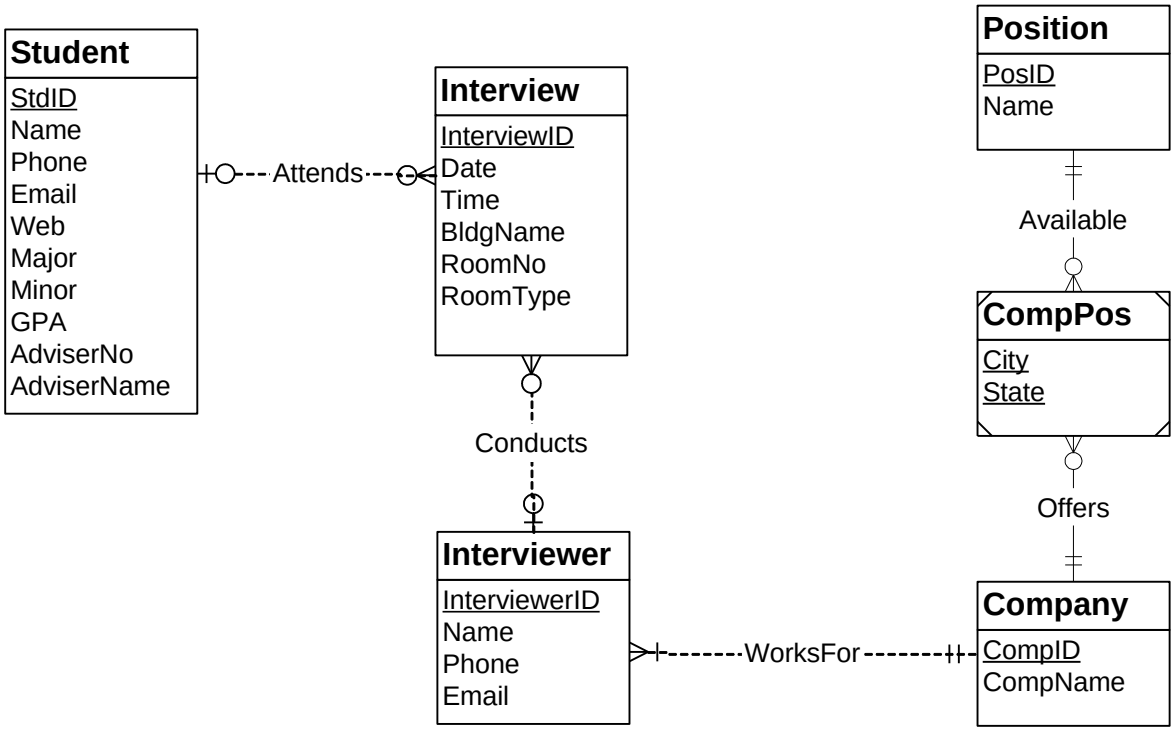
FDs with *Stdcity* as the determinant not falsified by Table 1 are listed below along with a reference to new rows that falsify the Functional Dependencies.

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

StdCity $\rightarrow$ *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(<u>StdId</u>, Name, Email, Phone, Web, Major, Minor, GPA, AdviserNo, AdviserName)

Interview(<u>Interviewid</u>, BldgName, RoomNo, RoomType, Date, Time, *StdId*, *InterviewerId*)

FOREIGN KEY(InterviewerId) REFERENCES Interviewer

FOREIGN KEY(StdId) REFERENCES Student

Interviewer(<u>InterviewerId</u>, Name, Phone, Email, *CompId*)

FOREIGN KEY(CompId) REFERENCES Company

CompId NOT NULL

Company(<u>CompId</u>, CompName)

Position(PosId, Name)

CompPos(CompId, PosId, City, State)

FOREIGN KEY(CompId) REFERENCES Company

FOREIGN KEY(PosId) REFERENCES Position

Normalization:

- The student table is not in BCNF because AdviserNo $\rightarrow$ 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.
- The Interview table is not in BCNF because BldgName, RoomNo $\rightarrow$ 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.
- 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$\rightarrow$ 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