Database Management System – cs422 DE

Lab 2 – Week 5

This Lab is based on lecture 5 (chapters 14).

- Submit your *own work* on time. No credit will be given if the lab is submitted after the due date.
- Note that the completed lab should be submitted in .doc, .docx, .rtf or .pdf format only.
- If you think that your answer needs more explanation to get credit then please write it down.

Consider a relation with following attributes:

EmpNo: Employee Number
EmpName : Employee Name
EmpEmail : Employee Email
ProjNo : Project Number
ProjName : Project Name
EmpGrade : Employee Grade
HrlyRate : Hourly rate of compensation
Employees of the same grade receive the same hourly compensation
HrsWorked : Hours a particular employee worked on a particular project

1. Create this table and sample data in SQL Server. There must be at least 10 rows. There must be 3 to 6 Employees and 3 to 6 projects. You need to add the screenshot of the table showing all the rows.

EmpNo	EmpName	EmpEmail	ProjNo	ProjName	EmpGrade	HrlyRate	HrsWorked
1001	James	james@mum.edu	P1002	WAA Project	G2	10	8
1002	Samantha	samantha@mum.edu	P1001	Lab monitoring	M1	13	5
1002	Samantha	samantha@mum.edu	P1004	MWA	M1	13	7
1003	Katty	katty@mum.edu	P1003	Student Government	G1	8	25
1002	Samantha	samantha@mum.edu	P1003	Student Government	M1	13	15
1002	Samantha	samantha@mum.edu	P1002	WAA Project	M1	13	3
1003	Katty	katty@mum.edu	P1001	Lab monitoring	G1	8	20
1001	James	james@mum.edu	P1001	Lab monitoring	G2	10	6
1004	David	dave@mum.edu	P1001	Lab monitoring	G1	8	16
1001	James	james@mum.edu	P1004	MWA	G2	10	18

2. Find all functional dependencies.
   ANS:

   EmpNo: EmpName, EmpEmail, EmpGrade, HrlyRate
   EmpEmail: EmpNo, EmpName, EmpGrade, HrlyRate
   ProjNo: ProjName
   EmpGrade: HrlyRate
   (EmpNo, ProjNo): EmpName, EmpEmail, EmpGrade, HrsWorked, ProjName, HrlyRate

3. Find all Candidate Keys.
   ANS:

   (EmpNo, ProjNo), and
   (EmpEmail, ProjNo) are the candidate keys

4. Find a Primary Key.
   ANS: (EmpNo, ProjNo)

5. Find all partial dependencies.
   ANS:

   EmpNo: EmpName, EmpEmail, EmpGrade, HrlyRate
   ProjNo: ProjName

   Only HrsWorked is fully functionally dependent on the PK.

6. Normalize to 2NF.
   ANS:

   Employee (EmpNo, EmpName, EmpEmail, EmpGrade, HrlyRate)
   Project (ProjNo, ProjName)
   EmployeeProject (EmpNo, ProjNo, HrsWorked)

7. Show new tables after 2NF (based on the sample data you created in 1 above). Screenshots of all the tables are required.

   Employee

empno	empname	empemail	empgrade	hrlyrate
1001	James	james@mum.edu	G2	10
1002	Samantha	samantha@mum.edu	M1	13
1003	Katty	katty@mum.edu	G1	8
1004	David	dave@mum.edu	G1	8

   Project

ProjNo	ProjName
P1001	Lab monitoring
P1002	WAA Project
P1003	Student Government
P1004	MWA

   Employee_Project

empno	projno	projname	hrsworked
1001	P1002	WAA Project	8
1002	P1001	Lab monitoring	5
1002	P1004	MWA	7
1003	P1003	Student Government	25
1002	P1003	Student Government	15
1002	P1002	WAA Project	3
1003	P1001	Lab monitoring	20
1001	P1001	Lab monitoring	6
1004	P1001	Lab monitoring	16
1001	P1004	MWA	18

8. Normalize to 3NF.
   ANS:

   From the 2NF above, HrlyRate and/or EmpGade do not functionally determine EmpNo. Thus,

we can notice the transitive dependency between them:
EmpNo → EmpGrade → HrlyRate.

We can fix this transitive dependency by introducing a new table called Rate with the attributes EmpGrade and HrlyRate and use EmpGrade. In addition, we will break the Employee_Project table into Project and Employee_Project table.

Thus, the tables in 3NF are the following:

Employee (EmpNo, EmpName, EmpEmail, EmpGrade)
Rate (EmpGrade, HrlyRate)
Project (ProjNo, ProjName)
Employee_Project (EmpNo, ProjNo, HrsWorked)

9. Show new tables after 3NF (based on the sample data you created in 1 above). Screenshots of all the tables are required.

Employee

EmpNo	EmpName	EmpEmail	EmpGrade
1001	James	james@mum.edu	G2
1002	Samantha	samantha@mum.edu	M1
1003	Katty	katty@mum.edu	G1
1004	David	dave@mum.edu	G1

Rate

EmpGrade	HrlyRate
G2	10
M1	13
G1	8

Project

projno	projname
P1002	WAA Project
P1001	Lab monitoring
P1004	MWA
P1003	Student Government

Employee_Project

empno	projno	hrsworked
1001	P1002	8
1002	P1001	5
1002	P1004	7
1003	P1003	25
1002	P1003	15
1002	P1002	3
1003	P1001	20
1001	P1001	6
1004	P1001	16
1001	P1004	18