MUHAMMAD HAMAD – ASSIGNMENT 3

ADVANCE DATABASE

Consider a database schema consisting of three relations as follows:

Student (StudentNumber, Name, Gender, Address, Mobile)	Entity
Student-Course (StudentNumber, CourseNumber, Attempt)	Relationship
Course (CourseNumber, CourseTitle, Credits)	Entity

SQL ALGEBRA OF QUERIES

(i) Which students are registered on all the courses taken by student 1001?

```
Select Name
From Student s, Course c, Student-course sc
Where s.StudentNumber=sc.StudentNumber
And  sc.CourseNumber=c.CourseNumber
And c.CourseTitle IN {select CourseTitle
                      From Student ss, Course cc, Student-course ssc
                      Where ss.StudentNumber=ssc.StudentNumber
                      And  ssc.CourseNumber=cc.CourseNumber
                      And StudentNumber='1001'
                      }
Group by StudentNumber
Having count(StudentNumber)>= {   select count(CourseTitle)
                                  From Student ss, Course cc, Student-course ssc
                                  Where ss.StudentNumber=ssc.StudentNumber
                                  And  ssc.CourseNumber=cc.CourseNumber
                                  And StudentNumber='1001'
                                  }
```

(ii) Which male students are registered on all the courses taken by student 1001?

```
Select Name
From Student s, Course c, Student-course sc
Where s.StudentNumber=sc.StudentNumber
And  sc.CourseNumber=c.CourseNumber
And s.Gender='Male'
And c.CourseTitle IN {select CourseTitle
                      From Student ss, Course cc, Student-course ssc
                      Where ss.StudentNumber=ssc.StudentNumber
                      And  ssc.CourseNumber=cc.CourseNumber
                      And StudentNumber='1001'
                      }
Group by StudentNumber
Having count(StudentNumber)>= {   select count(CourseTitle)
                                  From Student ss, Course cc, Student-course ssc
                                  Where ss.StudentNumber=ssc.StudentNumber
                                  And  ssc.CourseNumber=cc.CourseNumber
                                  And StudentNumber='1001'
                                  }
```

Relational Algebra of above stated queries

F is used for group by clause: source : http://www.databasteknik.se/webbkursen/relalg-lecture/

Part a - $(\pi\ (\text{Name})(_{\text{StudentNumber}}F\text{count}(\text{StudentNumber}= (\pi\ (\text{count}(\text{CourseTitle}))(\sigma\ (\text{StudentNumber}=1001)((\text{Student}) \bowtie_{\text{Student.StudentNumber}=\text{Student.Course.StudentNumber}} (\text{Student-Course}) \bowtie \text{Student.Course.StudentNumber}=\text{Course. StudentNumber}\ (\text{Course})))))((\sigma\ (\text{CourseTitle}=((\pi\ (\text{CourseTitle})(\sigma\ (\text{StudentNumber}=1001)((\text{Student}) \bowtie_{\text{Student.StudentNumber}=\text{Student.Course.StudentNumber}} (\text{Student-Course}) \bowtie \text{Student.Course.StudentNumber}=\text{Course. StudentNumber}\ (\text{Course})))))))(((\text{Student})$

⋈Student.StudentNumber=Student.Course.StudentNumber (Student-Course) ⋈ Student.Course.StudentNumber=Course. StudentNumber (Course))))

Part b - (π (Name)($_{StudentNumber}$Fcount(StudentNumber= (π (count(CourseTitle))(σ (StudentNumber=1001)((Student) ⋈Student.StudentNumber=Student.Course.StudentNumber (Student-Course) ⋈ Student.Course.StudentNumber=Course. StudentNumber (Course)))))((σ (CourseTitle=((π (CourseTitle)(σ (StudentNumber=1001)((Student) ⋈Student.StudentNumber=Student.Course.StudentNumber (Student-Course) ⋈ Student.Course.StudentNumber=Course. StudentNumber (Course)))))))(**σ (Gender='Male')**((Student) ⋈Student.StudentNumber=Student.Course.StudentNumber (Student-Course) ⋈ Student.Course.StudentNumber=Course. StudentNumber (Course))))

THE END