**FTEC 6310 Financial Information and Analytics**

**Fall 2021**

**Instructor: Dr. James Scott**

**Assignment #4 – SQL & NoSQL Problems**

**Each question is worth 5 points – Total 100 points**

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|  | **General Instructions** |
|  | Students may study together for the assignment and review each other’s completed work |
|  | Students must each complete the assignment by their own hand |
|  | Please use the provided word document template |
|  | Please save the completed word document into PDF format before uploading |
|  | Please submit the PDF file electronically through eLearning before the due date and time |
|  | Do not worry about variations among database vendors – you may write SQL to any vendor’s dialect |
|  | Do not include output – only the SQL and NoSQL code |
|  | Use table aliases for all tables in all queries (unless otherwise specified) |
|  | Column aliases are required for all derived columns including aggregate columns (unless otherwise specified) |
|  | Do not use column aliases unless required as stated previously |
|  | If a problem does not ask for a specific sort order, use your best judgement to add a sort order |

**THIS HOMEWORK IS BROKEN INTO TWO SECTIONS: SQL and NoSQL**

**This assignment is not due until December 10th at COD.**

# Problem #1 – Join not involving a Primary Key to a Foreign Key

List faculty who are also students. Include all student columns in the result.

**SELECT**

StdNo,

StdFirstName,

StdLastName,

StdCity,

StdState,

StdZip,

StdMajor,

StdClass,

StdGPA

**FROM** Student, Faculty

**WHERE** StdFirstName = FacFirstName;

# Problem #2 – Self Join

List faculty members who have a higher salary than their supervisor

List the faculty number, last and first names, and salary for both

**SELECT**

f1.FacNo,

**CONCAT**(f1.FacFirstName, ' ', f1.FacLastName) **AS** Name,

f1.FacSalary

**FROM** Faculty **as** f1, Faculty **as** f2

**WHERE** f2.FacNo = f1.FacSupervisor

**AND** f1.FacSalary > f2.FacSalary;

# Problem #3 – Multiple Joins involving a Table more than once

List the last and first names of faculty members and the course number for which the faculty member taught the same course number as their supervisor in 2013

**SELECT**

f.FacFirstName,

f.FacLastName,

c.CourseNo

**FROM** Faculty **as** f

**join** Offering **as** o

**on** f.FacNo = o.FacNo

**join** Course **as** c

**on** o.CourseNo = c.CourseNo

**WHERE** o.OffYear = 2013;

# Problem #4 – Left Outer Join

List all courses and their offerings

Include courses without offerings

List all columns of courses and offerings

(use a Left Outer Join)

**SELECT** \* **FROM** Course **as** c

**LEFT** **JOIN** Offering **as** o

**ON** c.CourseNo = o.CourseNo;

# Problem #5 – Right Outer Join

List all offerings and the faculty assigned to teach them

Also include courses without a faculty assigned to them

List year, term, course number, offering number, faculty last and first name (use a Right Outer Join)

**SELECT**

o.OffYear,

o.OffTerm,

o.CourseNo,

o.OfferNo,

f.FacLastName,

f.FacFirstName

**FROM** Faculty **as** f

**RIGHT** **JOIN** Offering **as** o

**ON** o.FacNo = f.FacNo

**ORDER** **BY** o.OffYear;

# Problem #6 – Mixing Left Outer Join with Inner Joins

List information for all IS courses offered in 2013 with at least 1 student enrolled

Include offerings without a faculty assigned

List the offer number, course number, term, description, faculty number, faculty last and first names

Suppress duplicates when more than 1 student is enrolled

**SELECT**

o.OfferNo,

c.CourseNo,

o.OffTerm,

c.CrsDesc,

f.FacNo,

f.FacFirstName,

f.FacLastName

**FROM** Course **as** c

**LEFT** **JOIN** Offering **as** o

**ON** o.CourseNo = c.CourseNo

**JOIN** Faculty **as** f

**ON** f.FacNo = o.FacNo

**WHERE** o.CourseNo **LIKE** 'IS%'

**GROUP** **BY** f.FacFirstName, f.FacLastName

**ORDER** **BY** f.FacLastName;

**Problem #7 – Examining the difference between UNION and UNION ALL**

Retrieve all faculty and students

Only show common columns in the result

Remove duplicates

Repeat query allowing duplicates

# Problem #8 – Type 1 Subquery (nested one level)

List student last and first names and majors for students who had at least one high grade (>=

3.5) in at least one course offered in fall of 2012

(use a Type 1 Subquery)

**SELECT** s.StdLastName, s.StdFirstName, s.StdMajor **FROM** Student **AS** s

**JOIN** Enrollment **AS** e

**ON** s.StdNo = e.StdNo

**WHERE** e.EnrGrade >= 3.5

**AND** e.OfferNo **IN**

(**SELECT** o.OfferNo **FROM** Offering **AS** o

**WHERE** o.OffTerm = 'FALL' **AND** o.OffYear = 2012);

# Problem #9 – Type 1 Subquery (nested multiple levels)

List student last and first names and majors for students who had at least one high grade

(>= 3.5) in at least one course offered in winter of 2013 which was not taught by Leonard Vince (Use nested Type 1 Subqueries)

**SELECT** s.StdLastName, s.StdFirstName, s.StdMajor **FROM** Student **AS** s

**JOIN** Enrollment **AS** e

**ON** s.StdNo = e.StdNo

**WHERE** e.EnrGrade >= 3.5

**AND** e.OfferNo **IN**

(**SELECT** o.OfferNo **FROM** Offering **AS** o

**WHERE** o.OffTerm = 'WINTER' **AND** o.OffYear = 2013

**AND** o.FacNo **NOT** **IN** (**SELECT** f.FacNo **FROM** Faculty **AS** f

**WHERE** f.FacFirstName = 'LEONARD' **AND** f.FacLastName = 'VINCE'));

# Problem #10 – Type 2 Subquery

Retrieve the faculty last and first names of faculty who are not students

(use a Type 2 Subquery)

**SELECT** f.FacLastName, f.FacFirstName **FROM** Faculty **AS** f

**WHERE** **NOT** **EXISTS** (**SELECT** \* **FROM** Student **AS** s **WHERE** s.StdNo = f.FacNo);

# Problem #11 – Division Problem using Type 2 Subquery

List faculty last and first names of faculty who taught all of the fall of 2012 IS offerings

**SELECT** \* **FROM** Faculty **AS** f **INNER** **JOIN** Offering **AS** o **ON** f.FacNo = o.FacNo **WHERE** o.OffTerm = 'FALL' **AND** o.OffYear= 2012 **AND** o.CourseNo **LIKE** 'IS\*'

**GROUP** **BY** f.FacLastName, f.FacFirstName **HAVING** **COUNT**(\*) = (**SELECT** **COUNT**(\*) **FROM** Offering **AS** o1

**WHERE** o1.OffTerm = 'FALL' **AND** o1.OffYear = 2012 **AND** o1.CourseNo **LIKE** 'IS\*');

# Problem #12 – Subquery in the FROM Clause aka “Table on the fly”

List the course number, course description, number of offerings, and the average enrollment across offerings

**SELECT** t.CourseNo, t.CrsDesc, **COUNT**(\*) **AS** NumOfferings, **AVG**(t.EnrollCount) **AS** AvgEnroll

**FROM** (**SELECT** c.CourseNo, c.CrsDesc, o.OfferNo, **COUNT**(\*) **AS** EnrollCount

**FROM** (Course AS c **INNER** **JOIN** Offering AS o **ON** c.CourseNo = o.CourseNo)**INNER** **JOIN** Enrollment AS e **ON** o.OfferNo = e.OfferNo

**GROUP** **BY** c.CourseNo, c.CrsDesc, o.OfferNo) t **GROUP** **BY** t.CourseNo, t.CrsDesc

**ORDER** **BY** 1,2;

**Second portion of this assignment is to work on NoSQL queries. Using the Restaurants database write the following queries using NoSQL syntax.**

1. Write a MongoDB query to find the restaurants that do not prepare any cuisine of 'American' and their grade score more than 70 and latitude less than -65.754168.

|  |
| --- |
| db.restaurants.find( |
|  | {$and: |
|  | [ |
|  | {"cuisine":{$ne:"American "}}, |
|  | {"grades.score":{$gt:70}}, |
|  | {"address.coord":{$lt:-65.754168}} |
|  | ]}, |

{"name":1,"address.coord":1,"cuisine":1, "\_id":0});

1. Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American' and achieved a score more than 70 and located in the longitude less than -65.754168. Note : Do this query without using $and operator.

db.restaurants.find(

{

"cuisine" : {$ne : "American "},

"grades.score" :{$gt: 70},

"address.coord" : {$lt : -65.754168}

}

);

1. Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American ' and achieved a grade point 'A' not belongs to the borough Brooklyn. The document must be displayed according to the cuisine in descending order.

db.restaurants.find( {

"cuisine" : {$ne : "American "},

"grades.grade" :"A",

"borough": {$ne : "Brooklyn"}

}

).sort({"cuisine":-1});

1. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Wil' as first three letters for its name.

db.restaurants.find({"name":/^Wil/},{"restaurant\_id":1,"name":1, "borough":1,"cuisine":1, "\_id":0});

1. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'ces' as last three letters for its name.

db.restaurants.find({"name":/ces$/},{"restaurant\_id":1,"name":1, "borough":1,"cuisine":1, "\_id":0});

1. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Reg' as three letters somewhere in its name.

db.restaurants.find({"name":{$regex:".\*Reg.\*"}},{"restaurant\_id":1,"name":1, "borough":1,"cuisine":1, "\_id":0});

1. Write a MongoDB query to find the restaurants which belong to the borough Bronx and prepared either American or Chinese dish.

db.restaurants.find({

"borough":"Bronx",

$or:[

{"cuisine":"American "},

{"cuisine":"Chinese"}

]

});

1. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which belong to the borough Staten Island or Queens or Bronx or Brooklyn.

db.restaurants.find(

{

"borough":{

$in:[

"Staten Island", "Queens","Bronx","Brooklyn"

]

}

},

{"restaurant\_id":1, "name":1, "borough":1, "cuisine":1, "\_id":0});