FIT2094-FIT3171 Databases

Week 11 Tutorial Activities

SQL Part III (SQL Advanced)

FIT Database Teaching Team

Complete week 11 activities listed below

FIT2094-FIT3171 2021 S2

FIT2094-FIT3171 Databases

Author: FIT Database Teaching Team

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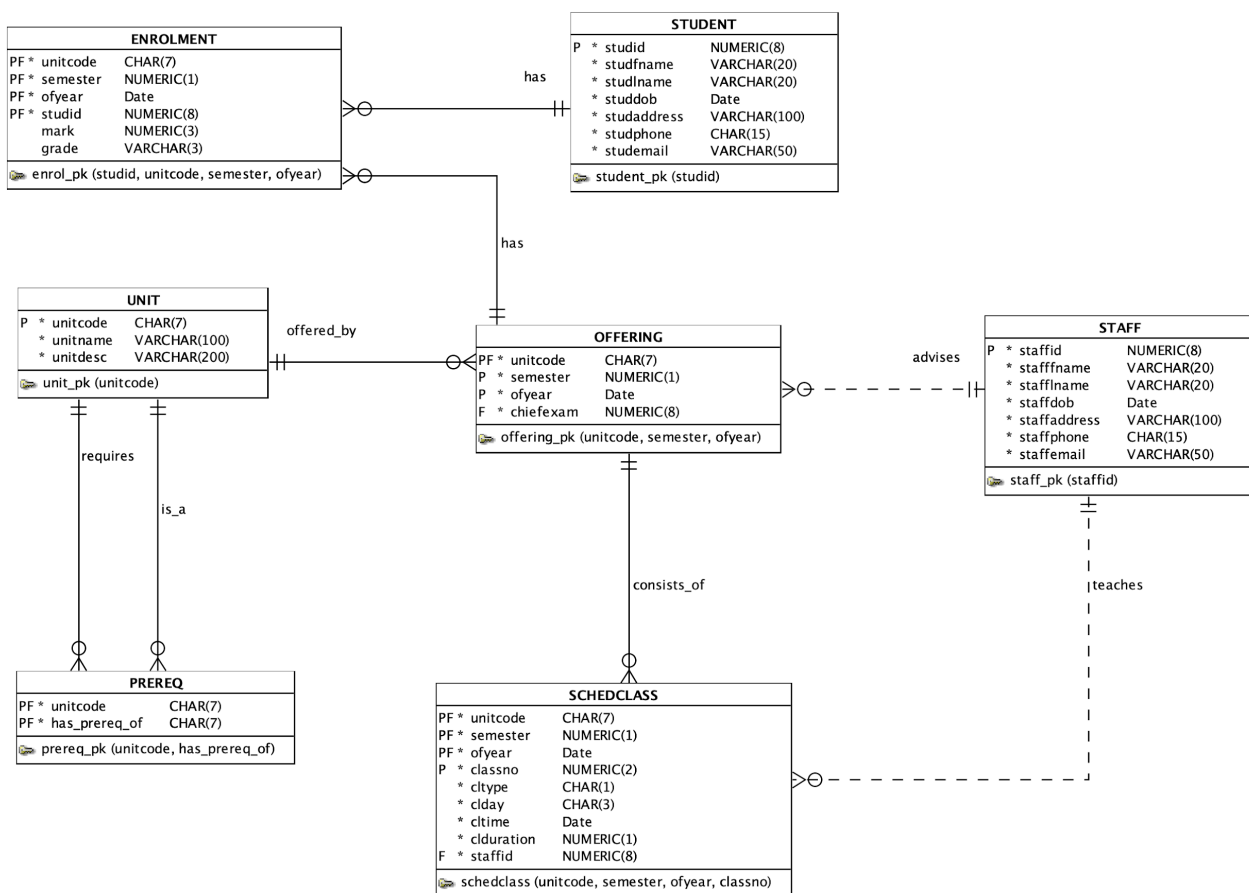

Learning Objectives

- be able to write subqueries
- be able to use CASE
- be able to use different Oracle's built-in functions.
- be able to use different set operators (INTERSECT, MINUS, UNION).
- be able to perform OUTER join and join between tables that have more than one relationship.

Important

Remember before starting any lab activity which involves working with files, first use SQL Developer to pull from FIT GitLab server to ensure your local files and the FIT GitLab server files are in sync. *During this activity, you will be creating a set of SQL scripts, these **MUST** be sent to the FIT GitLab server.*

This week we will continue to use the UNIVERSITY database model:

ENROLMENT

PF *	unitcode	CHAR(7)
PF *	semester	NUMERIC(1)
PF *	ofyear	Date
PF *	studid	NUMERIC(8)
*	mark	NUMERIC(3)
*	grade	VARCHAR(3)

🔑 enrol_pk (studid, unitcode, semester, ofyear)

STUDENT

P *	studid	NUMERIC(8)
*	studfname	VARCHAR(20)
*	studlname	VARCHAR(20)
*	studdob	Date
*	studaddress	VARCHAR(100)
*	studphone	CHAR(15)
*	studemail	VARCHAR(50)

🔑 student_pk (studid)

has

has

UNIT

P *	unitcode	CHAR(7)
*	unitname	VARCHAR(100)
*	unitdesc	VARCHAR(200)

🔑 unit_pk (unitcode)

offered_by

OFFERING

PF *	unitcode	CHAR(7)
P *	semester	NUMERIC(1)
P *	ofyear	Date
F *	chiefexam	NUMERIC(8)

🔑 offering_pk (unitcode, semester, ofyear)

advises

STAFF

P *	staffid	NUMERIC(8)
*	stafffname	VARCHAR(20)
*	stafflname	VARCHAR(20)
*	staffdob	Date
*	staffaddress	VARCHAR(100)
*	staffphone	CHAR(15)
*	staffemail	VARCHAR(50)

🔑 staff_pk (staffid)

requires

is_a

teaches

consists_of

PREREQ

PF *	unitcode	CHAR(7)
PF *	has_prereq_of	CHAR(7)

🔑 prereq_pk (unitcode, has_prereq_of)

SCHEDCLASS

PF *	unitcode	CHAR(7)
PF *	semester	NUMERIC(1)
PF *	ofyear	Date
P *	classno	NUMERIC(2)
*	cltype	CHAR(1)
*	clday	CHAR(3)
*	cltime	Date
*	clduration	NUMERIC(1)
F *	staffid	NUMERIC(8)

🔑 schedclass (unitcode, semester, ofyear, classno)

University Data model

11.1 Class Discussion

1. Assuming that the student name is unique, display Claudette Serman's academic record. Include the unit code, unit name, year, semester, mark and explained_grade in the listing. The Explained Grade column must show Fail for N, Pass for P, Credit for C, Distinction for D and High Distinction for HD. Order the list in increasing order of year, within the same year order the list in increasing order of semester, within the same semester order the list in increasing order of unit code order.

	UNITCODE	UNITNAME	YEAR	SEMESTER	MARK	EXPLAINED_GRADE
1	FIT9132	Introduction to databases	2019	1	56	Pass
2	FIT9136	Algorithms and programming foundations in Python	2019	1	16	Fail
3	FIT9136	Algorithms and programming foundations in Python	2019	2	81	High Distinction
4	FIT9137	Introduction to computer architecture and networks	2019	2	77	Distinction
5	FIT5196	Data wrangling	2020	1	64	Credit

2. Find the total number of prerequisite units for all units. Include in the list the unit code of units that do not have a prerequisite. Order the list in descending order of the number of prerequisite units. If two units have the same number of prerequisite units, order them by the unit code.

	UNITCODE	NO_OF_PREREQ
1	FIT5145	2
2	FIT2094	1
3	FIT3157	1
4	FIT3176	1
5	FIT5196	1
6	FIT1003	0
7	FIT1045	0
8	FIT1050	0
9	FIT9132	0
10	FIT9134	0
11	FIT9136	0
12	FIT9137	0

The sample output is shown for your guidance as to the displayed columns and formats. The data in the database is constantly changing and as a result your actual data displayed (the values in the rows of output) may be different. Therefore, it is important to:
- check whether your query is correct by manually checking the data in the table/s, and
- ensuring your query will work for any future possible cases/changes to the data.

11.2 SQL Advanced Questions

Download **week11_sql_advanced.sql** from the Week 11 block in Moodle, place this file in your working directory in your Tut11 folder. Write your answers for question 1 - 7 in the provided area. Test the select statements one by one, then when you finish all questions, run the whole script and save the output file as **week11_sql_advanced_output.txt**. To save the output, use the inbuilt Oracle SPOOL command.

1. Find the number of scheduled classes assigned to each staff member for each semester in 2019. If the number of classes is 2 then this should be labelled as a correct load, more than 2 as an overload and less than 2 as an underload. Include the staff id, staff first name, staff last name, semester, number of scheduled classes and load in the listing. Sort the list by decreasing order of the number of scheduled classes and when the number of classes is the same, sort by increasing order of staff id then by the semester.

	STAFFID	STAFFFNAME	STAFFLNAME	SEMESTER	NUMBERCLASSES	LOAD
1	419817	Windham	Ellard	2	6	Overload
2	412994	Gunar	Dutch	1	2	Correct load
3	412994	Gunar	Dutch	2	2	Correct load
4	415448	Sandro	Wethered	1	2	Correct load
5	415448	Sandro	Wethered	2	2	Correct load
6	418454	Lizabeth	Stubbings	2	2	Correct load
7	419421	Trixy	Warner	2	2	Correct load
8	434760	Xena	Epine	1	2	Correct load
9	434760	Xena	Epine	2	2	Correct load
10	436760	Tammi	Soane	1	2	Correct load
11	436760	Tammi	Soane	2	2	Correct load
12	439066	Kennie	Pickin	2	2	Correct load
13	459186	Papageno	Gayton	1	1	Underload
14	459186	Papageno	Gayton	2	1	Underload
15	467165	Deina	MacGarrity	1	1	Underload
16	467165	Deina	MacGarrity	2	1	Underload
17	470313	Gunar	Dutch	1	1	Underload
18	470313	Gunar	Dutch	2	1	Underload
19	475342	Mikol	Kohrt	2	1	Underload
20	475912	Mycah	Preddle	2	1	Underload
21	485533	Worden	Abel	2	1	Underload
22	487823	Benny	Plunket	1	1	Underload
23	487823	Benny	Plunket	2	1	Underload
24	494975	Hildy	Edyson	2	1	Underload
25	497227	Ashleigh	O'Bruen	2	1	Underload
26	498160	Martino	Boram	1	1	Underload
27	498160	Martino	Boram	2	1	Underload

2. Display the unit code and unit name for units that do not have a prerequisite. Order the list in increasing order of unit code. There are many approaches that you can take in writing an SQL statement to answer this query. You can use the SET OPERATORS, OUTER JOIN and a SUBQUERY. Write SQL statements based on *all* three approaches.

	UNITCODE	UNITNAME
1	FIT1003	IT in organisations
2	FIT1045	Algorithms and programming fundamentals in python
3	FIT1050	Web fundamentals
4	FIT9132	Introduction to databases
5	FIT9134	Computer architecture and operating systems
6	FIT9136	Algorithms and programming foundations in Python
7	FIT9137	Introduction to computer architecture and networks

3. List the unit code, year, semester, number of enrolments and the average mark for each unit offering. Include offerings without any enrolment in the list. Round the average to 2 digits after the decimal point. If the average result is 'null', display the average as 0.00. All values must be shown with two decimal digits. Order the list in increasing order of average mark.

	UNITCODE	YEAR	SEMESTER	NO_OF_ENROLMENT	AVERAGE_MARK
1	FIT3176	2019	2	0	0.00
2	FIT5196	2020	1	8	53.60
3	FIT5196	2019	2	2	57.00
4	FIT9132	2020	1	12	58.50
5	FIT5145	2020	1	10	60.30
6	FIT3176	2020	1	8	60.50
7	FIT2094	2020	1	11	63.73
8	FIT3157	2020	1	9	64.67
9	FIT9132	2019	1	10	65.20
10	FIT9136	2020	1	10	65.89
11	FIT1050	2019	1	10	66.10
12	FIT1045	2020	1	10	68.22
13	FIT1050	2019	2	12	68.50
14	FIT9132	2019	2	13	69.31
15	FIT9137	2020	1	10	70.43
16	FIT2094	2019	2	9	70.44
17	FIT9137	2019	2	8	71.88
18	FIT5145	2019	2	6	72.00
19	FIT1050	2020	1	12	72.91
20	FIT1045	2019	1	10	73.90
21	FIT9136	2019	1	10	74.90
22	FIT3157	2019	2	8	78.25
23	FIT9136	2019	2	11	80.00
24	FIT1045	2019	2	11	83.64

4. List all units offered in semester 2 2019 which do not have any enrolment. Include the unit code, unit name, and the chief examiner's name in the list. Order the list based on the unit code.

	UNITCODE	UNITNAME	CE_NAME
1	FIT3176	Advanced database design	Windham Ellard

5. List the id and full name of students who are enrolled in both 'Introduction to databases' and 'Introduction to computer architecture and networks' (note: both unit names are unique) in semester 1 2020. Order the list by the student id.

	STUDID	STUDENT_FULL_NAME
1	19633815	Tessie Rheam
2	20776000	Viviana Brewer

6. Given that the payment rate for a tutorial is $42.85 per hour and the payment rate for a lecture is $75.60 per hour, calculate the weekly payment per type of class for each staff member in semester 1 2020. In the display, include staff id, staff name, type of class (lecture or tutorial), number of classes, number of hours (total duration), and weekly payment (number of hours * payment rate). Order the list by increasing order of staff id and for a given staff id by type of class.

	STAFFID	STAFFNAME	TYPE	NO_OF_CLASSES	TOTAL_HOURS	WEEKLY_PAYMENT
1	412994	Gunar Dutch	Lecture	1	2	$151.20
2	412994	Gunar Dutch	Tutorial	1	2	$85.70
3	415448	Sandro Wethered	Lecture	1	2	$151.20
4	415448	Sandro Wethered	Tutorial	1	2	$85.70
5	418454	Lizabeth Stubbings	Lecture	1	2	$151.20
6	418454	Lizabeth Stubbings	Tutorial	1	2	$85.70
7	419421	Trixy Warner	Lecture	1	2	$151.20
8	419421	Trixy Warner	Tutorial	1	2	$85.70
9	419817	Windham Ellard	Lecture	3	4	$302.40
10	419817	Windham Ellard	Tutorial	3	6	$257.10
11	434760	Xena Epine	Lecture	1	1	$75.60
12	434760	Xena Epine	Tutorial	1	2	$85.70
13	436760	Tammi Soane	Lecture	1	1	$75.60
14	436760	Tammi Soane	Tutorial	1	2	$85.70
15	439066	Kennie Pickin	Lecture	1	1	$75.60
16	439066	Kennie Pickin	Tutorial	1	2	$85.70
17	459186	Papageno Gayton	Tutorial	1	2	$85.70
18	467165	Deina MacGarrity	Tutorial	1	2	$85.70
19	470313	Gunar Dutch	Tutorial	1	2	$85.70
20	475342	Mikol Kohrt	Tutorial	1	2	$85.70
21	475912	Mycah Preddle	Tutorial	1	2	$85.70
22	485533	Worden Abel	Tutorial	1	2	$85.70
23	487823	Benny Plunket	Tutorial	1	2	$85.70
24	494975	Hildy Edyson	Tutorial	1	2	$85.70
25	497227	Ashleigh O'Bruen	Tutorial	1	2	$85.70
26	498160	Martino Boram	Tutorial	1	2	$85.70

7. Given that the payment rate for a tutorial is $42.85 per hour and the payment rate for a lecture is $75.60 per hour, calculate the total weekly payment (the sum of both tutorial and lecture payments) for each staff member in semester 1 2020. In the display, include staff id, staff name, total weekly payment for tutorials, total weekly payment for lectures and the total weekly payment. If the payment is null, show it as $0.00. Order the list by increasing order of staff id.

	STAFFID	STAFFNAME	TUTORIAL_PAYMENT	LECTURE_PAYMENT	TOTAL_WEEKLY_PAYMENT
1	412994	Gunar Dutch	$85.70	$151.20	$236.90
2	415448	Sandro Wethered	$85.70	$151.20	$236.90
3	418454	Lizabeth Stubbings	$85.70	$151.20	$236.90
4	419421	Trixy Warner	$85.70	$151.20	$236.90
5	419817	Windham Ellard	$257.10	$302.40	$559.50
6	434760	Xena Epine	$85.70	$75.60	$161.30
7	436760	Tammi Soane	$85.70	$75.60	$161.30
8	439066	Kennie Pickin	$85.70	$75.60	$161.30
9	459186	Papageno Gayton	$85.70	$0.00	$85.70
10	467165	Deina MacGarrity	$85.70	$0.00	$85.70
11	470313	Gunar Dutch	$85.70	$0.00	$85.70
12	475342	Mikol Kohrt	$85.70	$0.00	$85.70
13	475912	Mycah Preddle	$85.70	$0.00	$85.70
14	485533	Worden Abel	$85.70	$0.00	$85.70
15	487823	Benny Plunket	$85.70	$0.00	$85.70
16	494975	Hildy Edyson	$85.70	$0.00	$85.70
17	497227	Ashleigh O'Bruen	$85.70	$0.00	$85.70
18	498160	Martino Boram	$85.70	$0.00	$85.70

8. Assume that all units are worth 6 credit points each, calculate each student's Weighted Average Mark (WAM) and GPA. Please refer to these Monash websites: https://www.monash.edu/exams/results/wam and https://www.monash.edu/exams/results/gpa for more information about WAM and GPA respectively. Do not include NULL, WH or DEF grade in the calculation.

Calculation example for student 14374036 (Claudette Serman):

	UNITCODE	YEAR	SEMESTER	MARK	GRADE
1	FIT9132	2019	1	56	P
2	FIT9136	2019	1	16	N
3	FIT9136	2019	2	81	HD
4	FIT9137	2019	2	77	D
5	FIT5196	2020	1	64	C

WAM = (56x6 + 16x6 + 81x6 + 77x6 + 64x6)/(6+6+6+6+6) = 58.80
GPA = (1x6+ 0.3x6 + 4x6 + 3x6 + 2x6)/(6+6+6+6+6) = 2.06

Calculation example for student 13119134 (Shandra Lindblom):

	UNITCODE	YEAR	SEMESTER	MARK	GRADE
1	FIT1045	2019	1	62	C
2	FIT1050	2019	1	91	HD
3	FIT2094	2019	2	64	C
4	FIT3157	2019	2	82	HD
5	FIT3176	2020	1	(null)	(null)

WAM = (62x3 + 91x3 + 64x6 +82x6)/(3+3+6+6) = 74.17
GPA = (2x6 + 4x6+ 2x6 + 4x6)/(6+6+6+6) = 3

Include student id, student full name (in a 40 characters wide column headed "Student Full Name"), WAM and GPA in the display. Order the list by descending order of WAM then descending order of GPA. If two students have the same WAM and GPA, order them by their respective id.

Only some data shown:

	STUDID	Student Full Name	WAM	GPA
1	12511467	Francyne Rigney	89.17	4.00
2	20648900	Aleda Whistan	85.67	3.67
3	14615430	Siffre Dibdale	85.25	3.50
4	21262436	Flss Cunio	84.00	3.50
5	25437072	Trace Abel	81.00	3.00
6	21472665	Heloise Tanti	79.50	3.50
7	13390148	Brier Kilgour	79.17	2.75
8	23094083	Margette Wethered	78.00	3.50
9	13028303	Herculie Mendus	77.33	3.00
10	18063424	Lynnell Cliburn	76.33	3.25
11	13453333	Pierrette Moynihan	75.88	3.00
12	17013887	Harv Wethered	75.83	3.25
13	14676780	Niki Sperrett	75.20	3.06
14	16929043	Billie Friedank	75.00	3.00
15	23545528	Benny Plunket	75.00	2.50
16	13880303	Shadow Lamberton	74.50	2.75
17	20752513	Aldwin MacGinney	74.50	2.75
18	18841033	Artus Swiffen	74.25	2.75
19	13119134	Shandra Lindblom	74.17	3.00
20	22329123	Archie Alessandretti	74.00	3.00
21	14635701	Cord Yard	73.80	2.80

Important

You need to get into the habit of establishing this as a standard FIT2094-FIT3171 workflow - pull at the start of your working session, work on the activities you wish to/are able to complete during this session, save the files, add all (stage), commit and then push the changes back to the FIT GitLab server