MONASH University

MONASH INFORMATION TECHNOLOGY

程序代写代做 CS编程辅导

FIT3003 – Business Intelligence and Data Warehousing

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Week 3b – Average in Fact

Semester 1, 2021

Developed by:
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Agnes.Haryanto@monash.edu

Recall – Star Schema Components

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- There are **Three** main comp[illegible] of the Star Schema:
  1. Facts
  2. Dimensions
  3. Attributes

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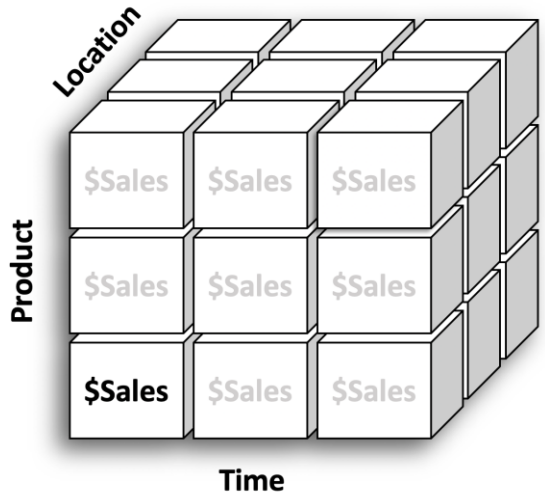

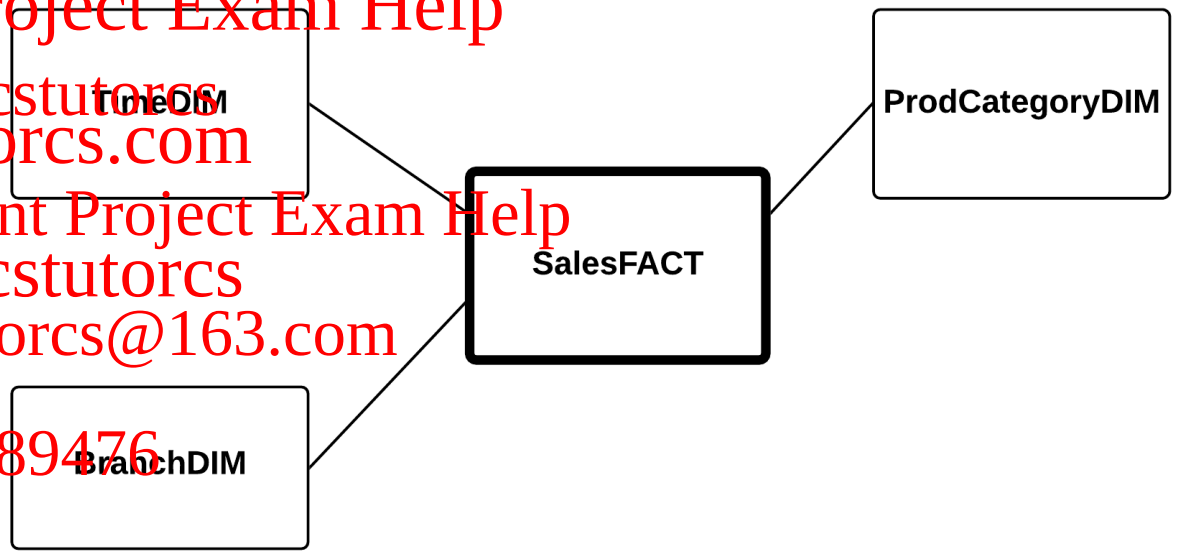

Recall – Fact

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- A Fact Table consists of keys from each dimension, and fact measures.
- A Fact Table is created by a join operation, that joins several tables from the operational database.
- Fact tables are created either through *TempFact* or directly retrieval from the tables in the operational database.
- The fact measure itself is an aggregated value.
  - In the SQL command, the fact measure attribute in the Fact Table is created using an aggregate function, such as `count` or `sum`, and the `group by` operation.

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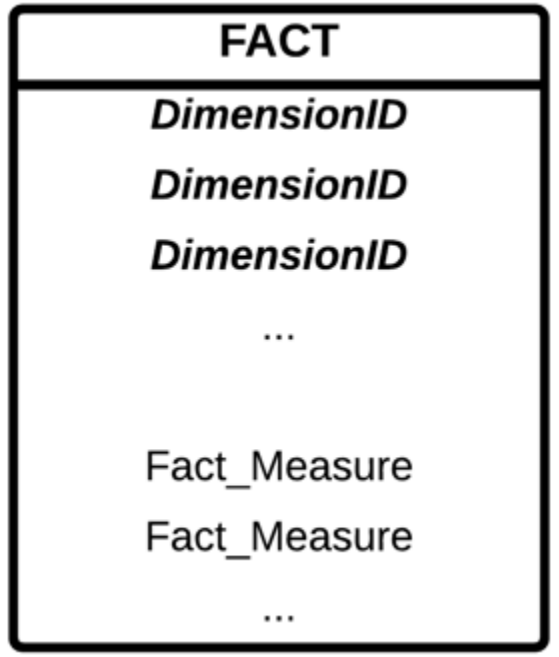

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Average in the Fact

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Unit Code	Unit Title	Semester	Student First Name	Score
IT001	Database	1	M	81
IT001	Database	1	A	41
IT001	Database	1	E	74
IT001	Database	1	K	85
IT001	Database	1	Larry	87
IT001	Database	1	Leonard	75
IT001	Database	2	Juan	64
IT001	Database	2	Andy	32
IT002	Java	1	Ally	65
IT002	Java	1	Menson	47
IT002	Java	2	Mirriam	78
IT002	Java	2	Ben	73
IT002	Java	2	Larry	64
IT003	SAP	1	Ally	63
IT004	Network	2	Juan	53
IT004	Network	2	Menson	52

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Average in the Fact

程序代写代做 CS编程辅导

Unit Code	Unit Title	Semester	Student First Name	Score
IT001	Database	1	[illegible]	81
IT001	Database	1	[illegible]	41
IT001	Database	1	[illegible]	74
IT001	Database	1	[illegible]	85
IT001	Database	1	Larry	87
IT001	Database	1	Leonard	75
IT001	Database	2	Juan	64
IT001	Database	2	Andy	32
IT002	Java	1	Ally	65
IT002	Java	1	Menson	47
IT002	Java	2	Mirriam	78
IT002	Java	2	Ben	73
IT002	Java	2	Larry	64
IT003	SAP	1	Ally	63
IT004	Network	2	Juan	33
IT004	Network	2	Menson	52

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The operational database contains:

- 9 records of Semester one
- 7 records of Semester two

Average in the Fact

程序代写代做 CS编程辅导

Unit Code	Unit Title	Semester	Student First Name	Score
IT001	Database	1		81
IT001	Database	1		41
IT001	Database	1		74
IT001	Database	1		85
IT001	Database	1	Larry	87
IT001	Database	1	Leonard	75
IT001	Database	2	Juan	64
IT001	Database	2	Andy	32
IT002	Java	1	Ally	65
IT002	Java	1	Menson	47
IT002	Java	2	Mirriam	78
IT002	Java	2	Ben	73
IT002	Java	2	Larry	64
IT003	SAP	1	Ally	63
IT004	Network	2	Juan	53
IT004	Network	2	Menson	52

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The operational database contains:

- 9 records of Semester one
- 7 records of Semester two
- 8 records of Database Unit (6 Semester one and 2 Semester two)

Average in the Fact

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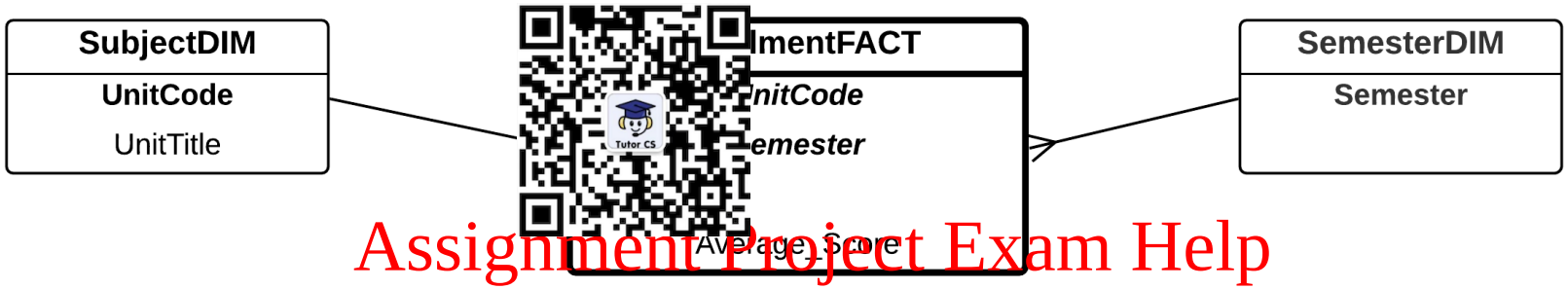

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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
IT002	1	56
IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

Semester
1
2

Average in the Fact

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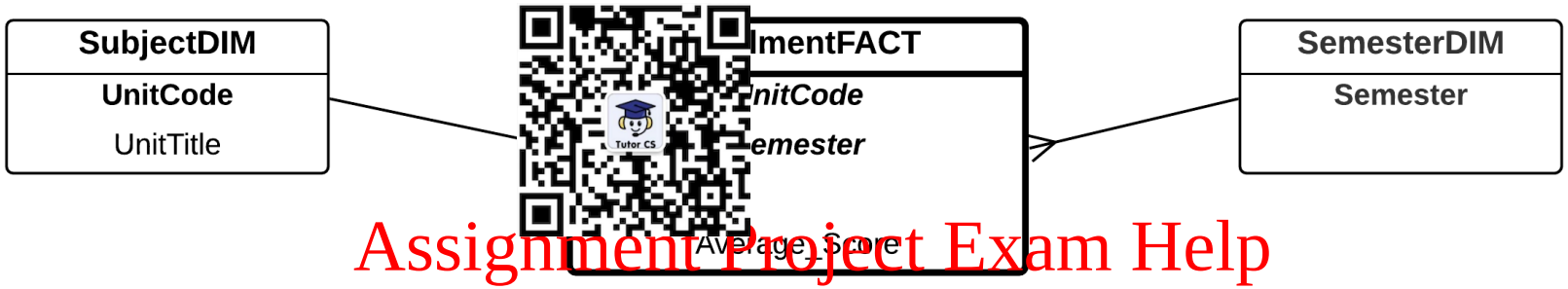

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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
IT002	1	56
IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

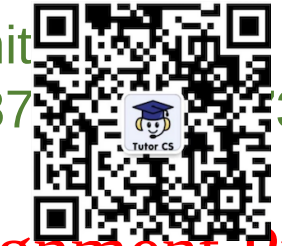
Semester
1
2

Average in the Fact

程序代写代做 CS编程辅导

Average Score for the Database Unit

- Semester one: (81+41+74+85+87 **3.833**



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(a) Fact

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IT001	1	73.833
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IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

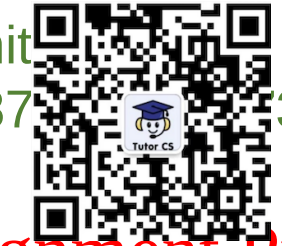
Semester
1
2

Average in the Fact

程序代写代做 CS编程辅导

Average Score for the Database Unit

- Semester one: (81+41+74+85+87+73.833)/6 = **73.833**
- Semester two: (64+32)/2 = **48**



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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
IT002	1	56
IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

Semester
1
2

Average in the Fact

程序代写代做 CS编程辅导

Average Score for the Database Unit

- Semester one: (81+41+74+85+87+63)/6 = **73.833**
- Semester two: (64+32)/2 = **48**

These are actually incorrect!

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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
IT002	1	56
IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

Semester
1
2

Average in the Fact

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Query: Calculate Average Score for Database Unit:

- (73.833 + 48) / 2 = 60.9165

The SQL command:

```
select avg(Average_Score)
from EnrolmentFact
where UnitCode = 'IT001';
```

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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
IT002	1	56
IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

Semester
1
2

Average in the Fact

程序代写代做 CS编程辅导

Query: Calculate Average Score for th e Unit.

Calculation using **Fact**:

- (73.833 + 48) / 2 = **60.9165**

Calculation based on the **Operational Database**:

- (81+41+74+85+87+75+64+32) / 8 = 539 / 8 = **67.375**

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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
IT002	1	56
IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Operational Database

Unit Code	Unit Title	Semester	Student First Name	Score
IT001	Database	1	Mirriam	81
IT001	Database	1	Allan	41
IT001	Database	1	Ben	74
IT001	Database	1	Kate	85
IT001	Database	1	Larry	87
IT001	Database	1	Leonard	75
IT001	Database	2	Juan	64
IT001	Database	2	Andy	32
IT002	Java	1	Ally	65
IT002	Java	1	Menson	47
IT002	Java	2	Mirriam	78
IT002	Java	2	Ben	73
IT002	Java	2	Larry	64
IT003	SAP	1	Ally	63
IT004	Network	2	Juan	53
IT004	Network	2	Menson	52

Average in the Fact

程序代写代做 CS编程辅导

Query: Calculate Average Score for th it in both Semesters.

Calculation using **Fact**:

- (56+71.667) / 2 = **63.833**

Calculation based on the **Operational Database**:

- (65+47+78+73+64) / 5 = **65.4**

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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
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IT002	2	71.667
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(b) Operational Database

Unit Code	Unit Title	Semester	Student First Name	Score
IT001	Database	1	Mirriam	81
IT001	Database	1	Allan	41
IT001	Database	1	Ben	74
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IT002	Java	2	Larry	64
IT003	SAP	1	Ally	63
IT004	Network	2	Juan	53
IT004	Network	2	Menson	52

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Average in the Fact

程序代写代做 CS编程辅导

Query: Calculate Average Score for S[illegible]ne.

Calculation using **Fact**:

- (73.833+56+63) / 3 = **64.287**

Calculation based on the **Operational Database**:

- (81+41+74+85+87+75+65+47+63) / 9 = **68.667**

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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
IT002	1	56
IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Operational Database

Unit Code	Unit Title	Semester	Student First Name	Score
IT001	Database	1	Mirriam	81
IT001	Database	1	Allan	41
IT001	Database	1	Ben	74
IT001	Database	1	Kate	85
IT001	Database	1	Larry	87
IT001	Database	1	Leonard	75
IT001	Database	2	Juan	64
IT001	Database	2	Andy	32
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IT002	Java	1	Menson	47
IT002	Java	2	Mirriam	78
IT002	Java	2	Ben	73
IT002	Java	2	Larry	64
IT003	SAP	1	Ally	63
IT004	Network	2	Juan	53
IT004	Network	2	Menson	52

Average in the Fact

程序代写代做 CS编程辅导

Query: Calculate Average Score for S[illegible]wo.

Calculation using **Fact**:

- (48+71.667+52.5) / 3 = **57.389**

Calculation based on the **Operational Database**:

- (64+32+78+73+64+53+53) / 7 = **59.4286**

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(a) Fact

Unit Code	Semester	Average_Score
IT001	1	73.833
IT001	2	48
IT002	1	56
IT002	2	71.667
IT003	1	63
IT004	2	52.5

(b) Operational Database

Unit Code	Unit Title	Semester	Student First Name	Score
IT001	Database	1	Mirriam	81
IT001	Database	1	Allan	41
IT001	Database	1	Ben	74
IT001	Database	1	Kate	85
IT001	Database	1	Larry	87
IT001	Database	1	Leonard	75
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IT002	Java	2	Ben	73
IT002	Java	2	Larry	64
IT003	SAP	1	Ally	63
IT004	Network	2	Juan	53
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Average in the Fact

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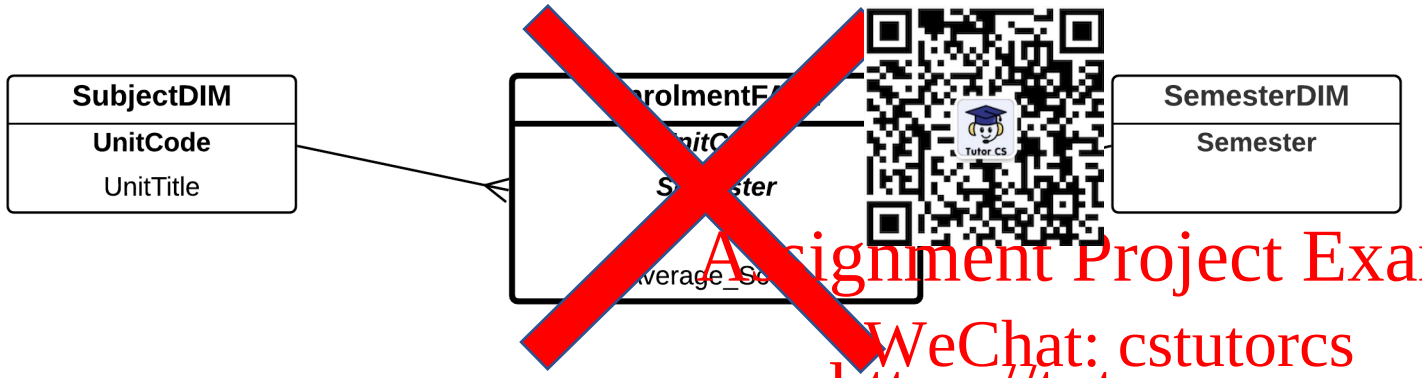

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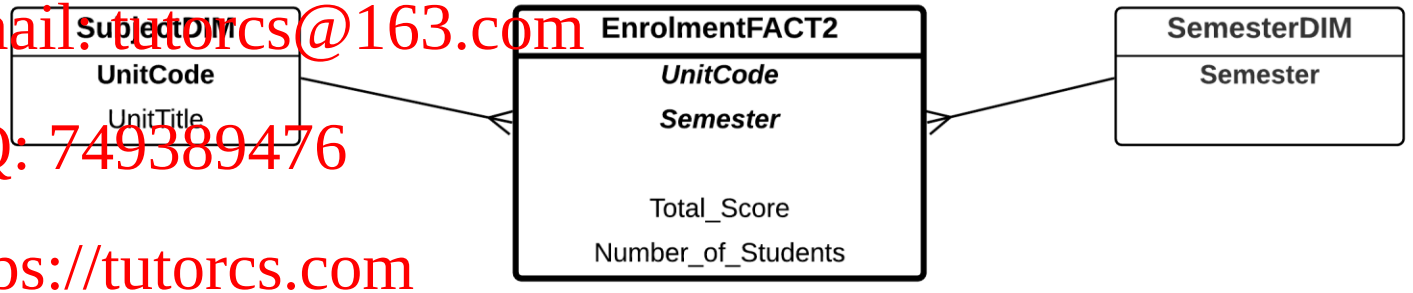

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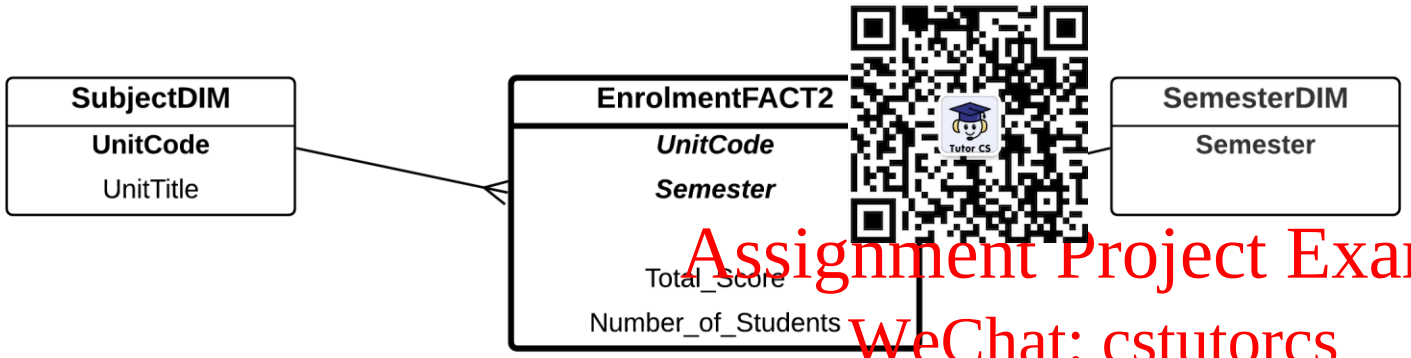

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(a) Fact Version 2

Unit Code	Semester	Total_Score	Number_of_Students
IT001	1	443	6
IT001	2	96	2
IT002	1	112	2
IT002	2	215	3
IT003	1	63	1
IT004	2	105	2

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

Semester
1
2

Average in the Fact

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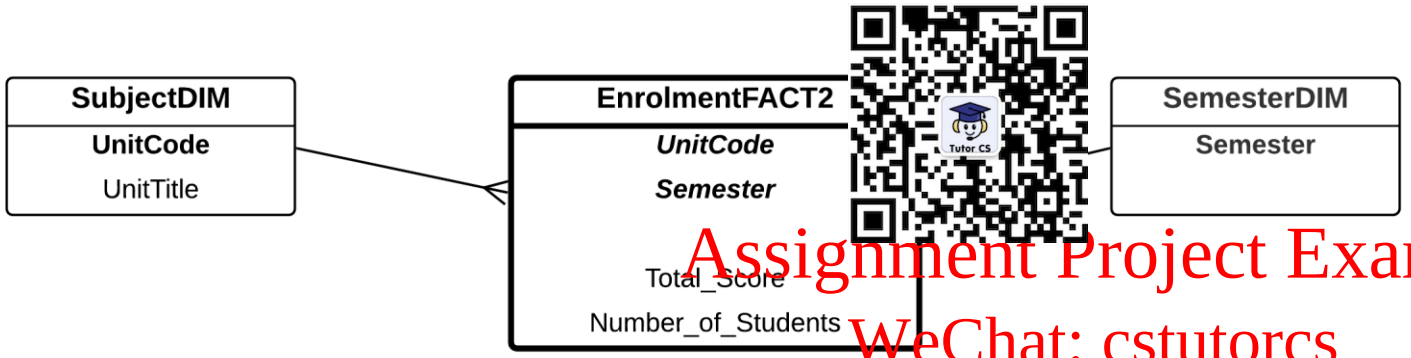

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(a) Fact Version 2

Unit Code	Semester	Total_Score	Number_of_Students
IT001	1	443	6
IT001	2	96	2
IT002	1	112	2
IT002	2	215	3
IT003	1	63	1
IT004	2	105	2

Query: Calculate Average Score for the Database Unit:

- (443+96)/(6+2) = 67.375

The SQL command:

```
select sum(Total_Score)/
    sum(Number_of_Students)
    as Average_Score
from EnrolmentFact2
where UnitCode = 'IT001';
```

Average in the Fact

程序代写代做 CS编程辅导

- The problem of Average in is known as the ***Average of an Average*** problem.
  - This problem is well known in Mathematics and Statistics.
  - Average of an average will simply produce an incorrect average result.

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- Hence, it is not desirable to have an average measure in the fact.
  - *Exceptional case*: when the analysis ALWAYS uses all the dimensions (e.g. Determinant Dimensions).

Min & Max in the Fact

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- If Average should not be use[illegible] fact, how about Min or Max?
  - Yes, we can.
  - Because Max of Max is always a global Max, and Min of Min is always a global Min.

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(a) Fact

Ucode	Semester	Min_Score	Max_Score
IT001	1	41	87
IT001	2	32	64
IT002	1	47	65
IT002	2	64	78
IT003	1	63	63
IT004	2	52	53

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

Semester
1
2

Min & Max in the Fact

程序代写代做 CS编程辅导

- Query: Find the Maximum S[illegible]Database Unit.
  - Max of {87, 64} is **87**.
- The SQL command:

```
select max(Max_Score) from EnrolmentFact
where UnitCode = 'IT001';
```

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(a) Fact

Ucode	Semester	Min_Score	Max_Score
IT001	1	41	87
IT001	2	32	64
IT002	1	47	65
IT002	2	64	78
IT003	1	63	63
IT004	2	52	53

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

Semester
1
2

Min & Max in the Fact

程序代写代做 CS编程辅导

- Query: Find the Minimum S[illegible]atabase Unit.
  - Min of {41, 32} is **32**.
- The SQL command:

```
select min(Min_Score) from EnrolmentFact
where UnitCode = 'IT001';
```

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(a) Fact

Ucode	Semester	Min_Score	Max_Score
IT001	1	41	87
IT001	2	32	64
IT002	1	47	65
IT002	2	64	78
IT003	1	63	63
IT004	2	52	53

(b) Subject Dimension

Unit Code	Unit Title
IT001	Database
IT002	Java
IT003	SAP
IT004	Network

(c) Semester Dimension

Semester
1
2

Average in the Fact – Conclusion

程序代写代做 CS编程辅导

- **Average in the Fact is not suitable**, although technically it satisfies the two criteria of the fact (e.g. must be numerical and aggregate value).
- *Min* and *Max* in the Fact can be used, since Min Score and Max Score are valid fact measures (e.g. they are numerical and aggregated values).
- In general, `count` and `sum` are more common.

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