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程序代写 代做 CS 编程 辅导



# FIT3003 – Business Intelligence and Data Warehousing

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Semester 2, 2021

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# Agenda

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## 1. Hierarchies

1. Hierarchy vs. Non-Hierarchy



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## 2. Determinant Dimensions

1. Determinant vs. Non-Determinant Dimensions
2. Determinant Dimension vs. Pivoted Fact Table

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# Using FLUX

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1. Visit <http://flux.qa/> on your internet connected device
2. Log in using your Monash account if required if you are already logged in to Monash
3. Click on the “+” to join audience
4. Enter the Audience Code:
  - Clayton – **Z9J7MT**
  - Malaysia – **PMYBD6**
5. Select FIT3003 in the Active Presentation menu



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The screenshot shows a web browser window titled "FLUX" with the URL <https://flux.qa/#/feeds/5d368...>. The page is titled "Lecture 0". Below the title, there are four icons: a document, a presentation slide, a trophy, and a clock. The main content area is titled "Current Polls". A single poll is displayed, labeled "Multiple Choice". The question is "What did you have for dinner?". There are five options: A) Pasta, B) Rice, C) Pizza, D) Salad, and E) Nothing. Each option has a corresponding input field.

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Hierarchies

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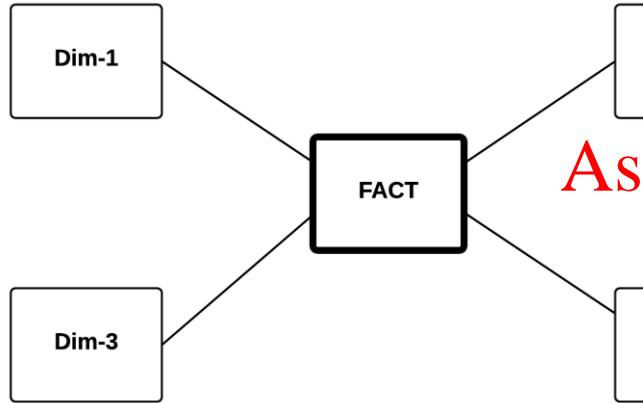
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# Hierarchies

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(b) A Snowflake with Hierarchy

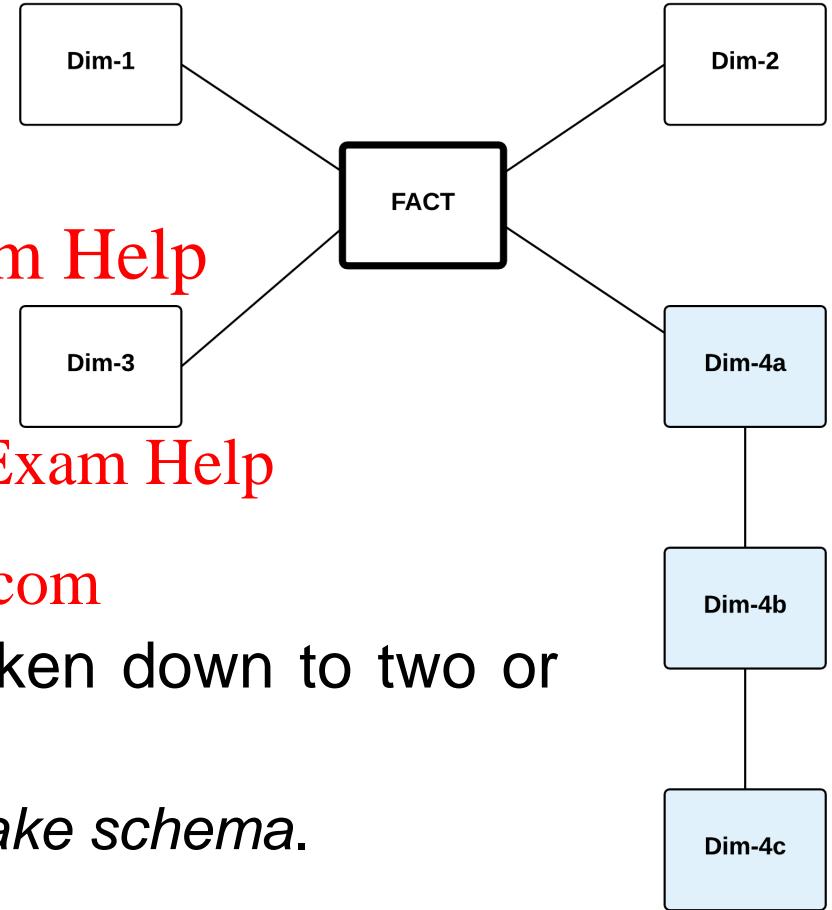
(a) A simple Star Schema



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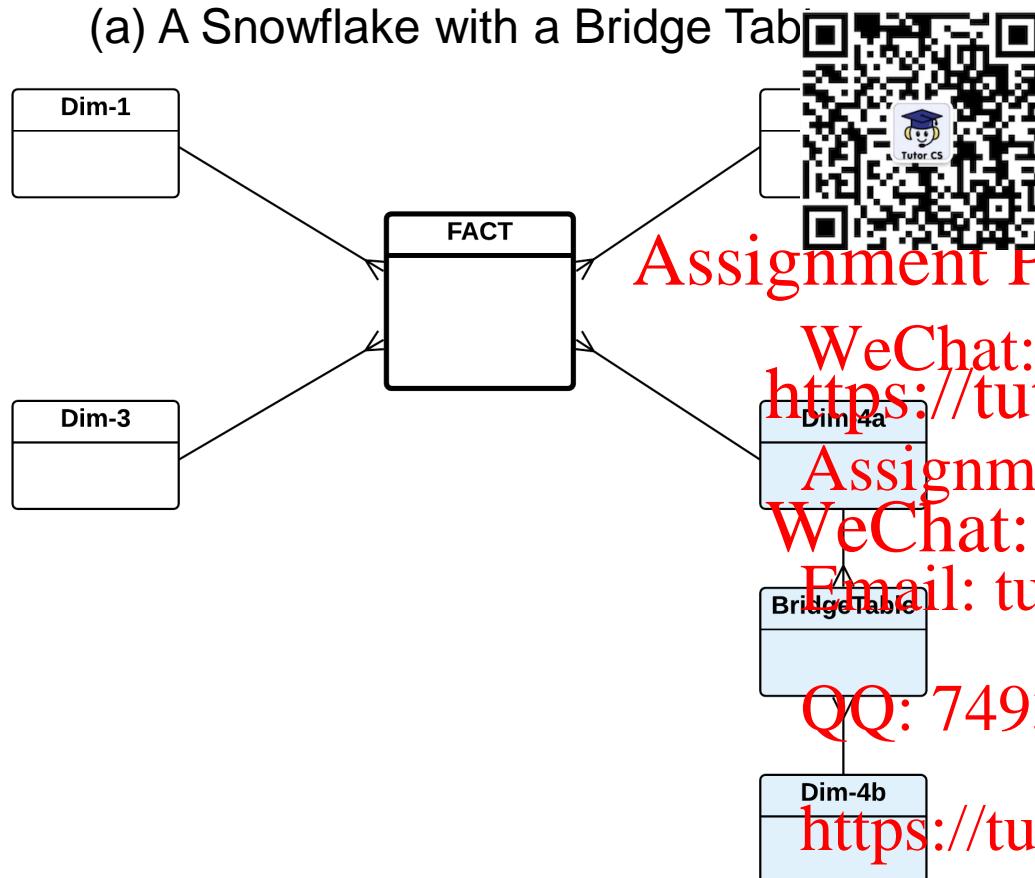
- A *Hierarchy* is formed when a dimension is broken down to two or more dimensions in a hierarchical manner.

➤ As a result, the star schema ~~https://tutorcs.com~~ becomes a *snowflake schema*.

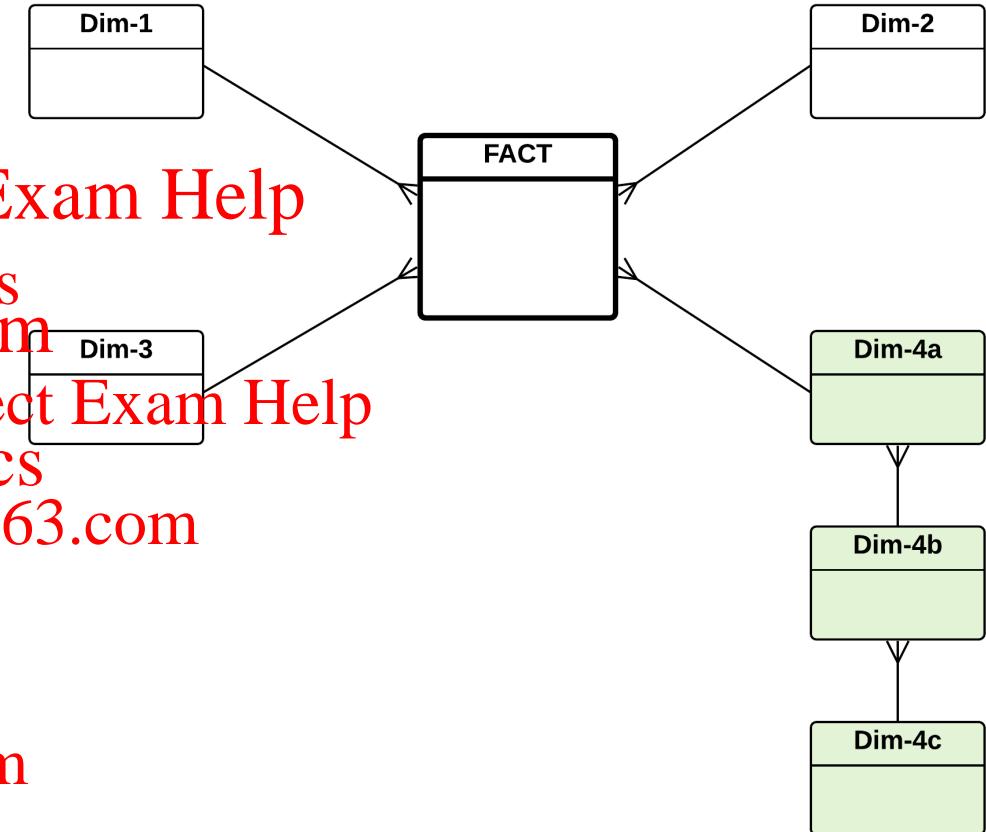
# Hierarchies

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(a) A Snowflake with a Bridge Tab



(b) A Snowflake with Hierarchy



# Hierarchy vs. Non-Hierarchy

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CampusDIM
CampusID
CampusName
Address
Suburb
City
State
Postcode
Country



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CourseDIM
CourseCode
CourseName
Duration

SemYearDIM
SemesterID
Semester
Year



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# Hierarchy vs. Non-Hierarchy

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CampusID	CampusName	Address	City	State	Postcode	Country
CL	Clayton Campus	Wellington Rd	Clayton	Melbourne	Victoria	Australia
CA	Caulfield Campus	Dandenong Rd	Caulfield East	Melbourne	Victoria	Australia
PA	Parkville Campus	Royal Parade	Parkville	Melbourne	Victoria	Australia
SY	Sydney Campus	Opera Boulevard	Sydney	Sydney	New South Wales	Australia
MUM	Malaysia Campus	Jalan Lagoon	Bandar Sunway	Kuala Lumpur	Selangor	Malaysia
MSA	South Africa Campus	Peter St	Johannesburg	Johannesburg	Johannesburg	South Africa

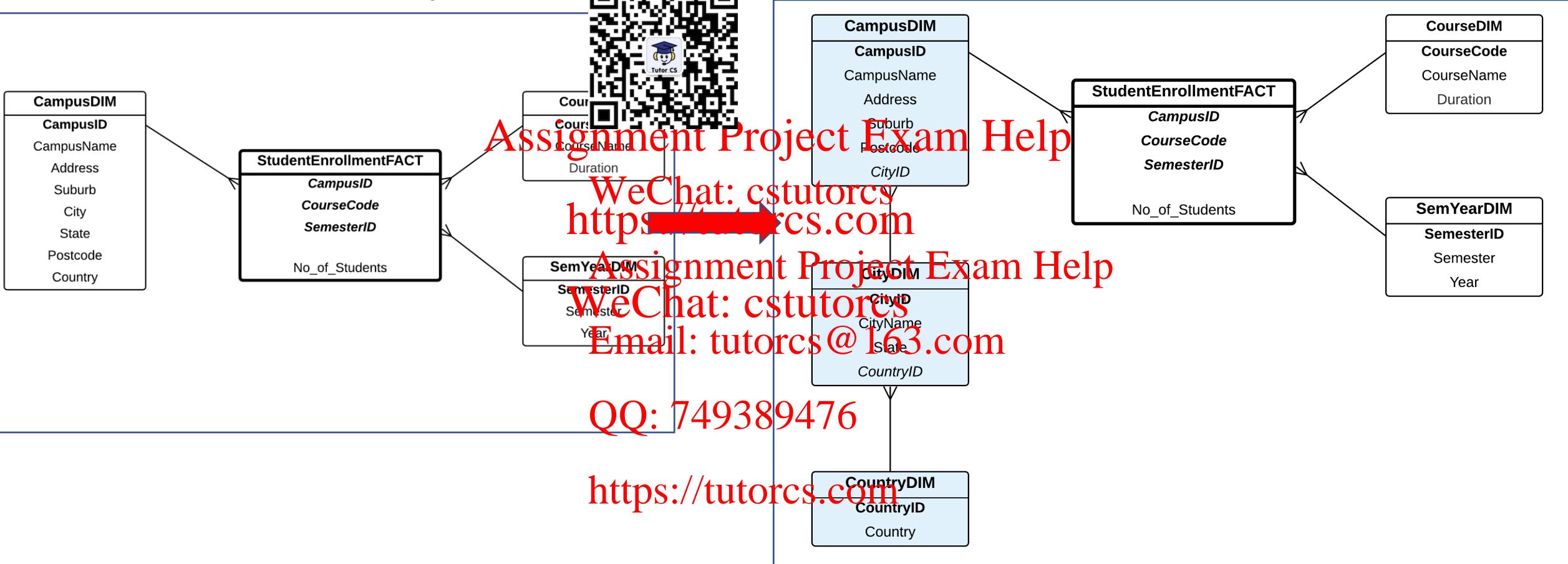
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# Hierarchy vs. Non-Hierarchy

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Non-Hierarchy



# Hierarchy vs. Non-Hierarchy

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(a) Campus Dimension Table

CampusID	CampusName	Address	Suburb	Postcode	CityID
CL	Clayton Campus	Wellington Street	Clayton	3800	MEL
CA	Caulfield Campus	Dandenong Road	Caulfield East	3145	MEL
PA	Parkville Campus	Royal Parade	Parkville	3052	MEL
SY	Sydney Campus	Opera Boulevard	Sydney	2001	SYD
MUM	Malaysia Campus	Jalan Lagoon	Bandar Sunway	47500	KUL
MSA	South Africa Campus	Peter St	Johannesburg	1725	JNB



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(b) City Dimension Table

CityID	City Name	State	CountryID
MEL	Melbourne	Victoria	AU
SYD	Sydney	New South Wales	AU
KUL	Kuala Lumpur	Selangor	MA
JNB	Johannesburg	Johannesburg	SA

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(c) Country Dimension Table

CountryID	Country Name
AU	Australia
MA	Malaysia
SA	South Africa

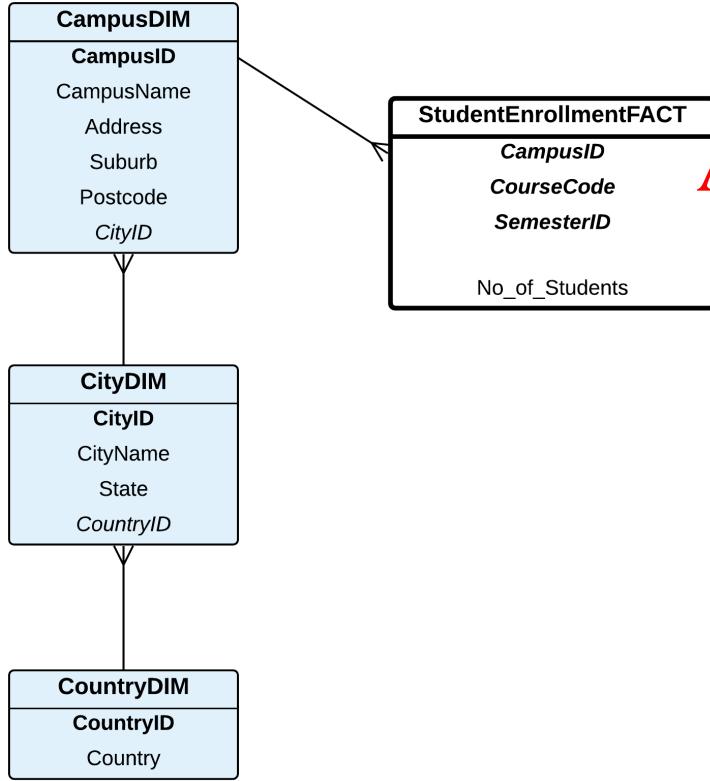


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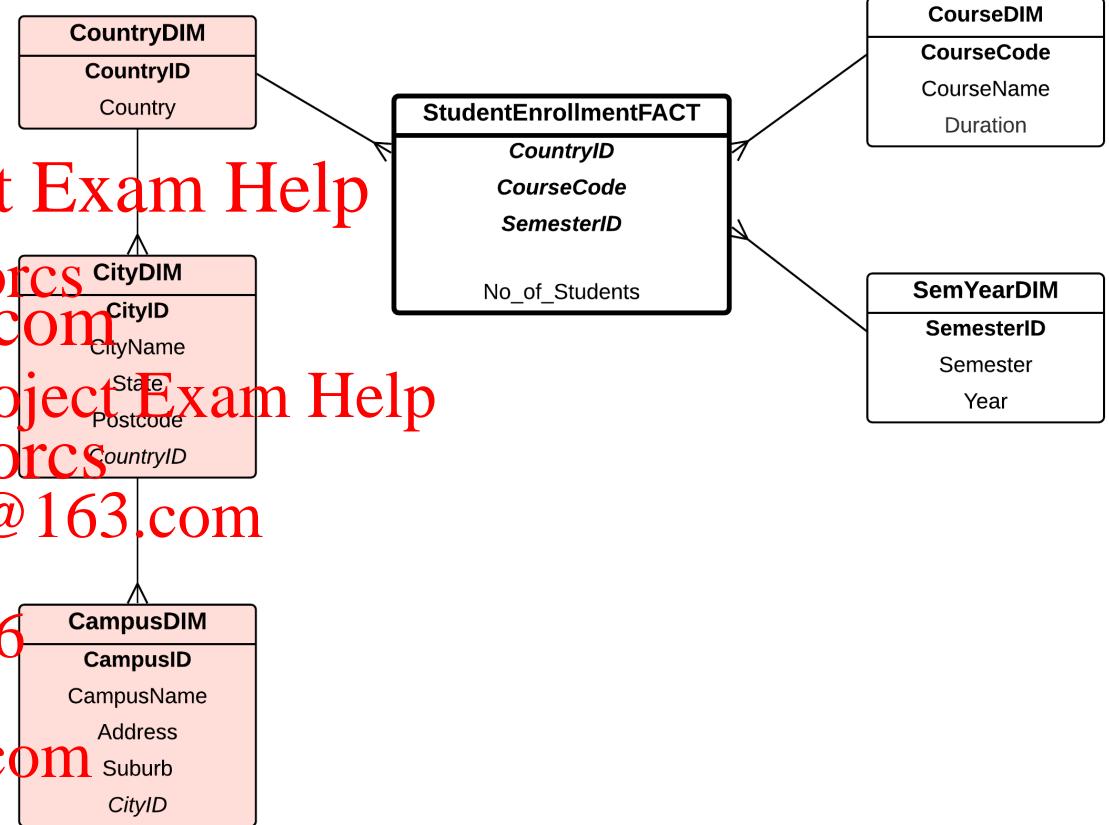
# Hierarchy vs. Non-Hierarchy

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(a) Correct Hierarchy



(b) A Wrong Hierarchy



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# Hierarchy vs. Non-Hierarchy

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## 1. One table vs. many tables



The consequence is in the joins and query processing when producing reports.

## 2. Normalized vs. Un-normalized

With the hierarchy option, the tables are normalized, which follows the relational model. In contrast, the non-hierarchy option, the table (e.g. the Campus Dimension table) is unnormalized, which is basically 1NF with visible replication on information, which is prone to anomalies (e.g. insert, update, and delete anomalies).

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## 3. Drilling down and rolling up

The hierarchy model is not about drilling down information exploration.

# Hierarchy vs. Non-Hierarchy – Summary

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- From the **query point of view**, the hierarchy version needs two queries.
- From the **query processing point of view**, the non-hierarchy version uses one join operation only, because it only needs to join the fact and one dimension.
- From the **conceptual point of view**, the hierarchy model does not actually offer a better roll up or drill down features.



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# Determinant Dimensions



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# Dimensions and Fact Tables - Recap

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TimeDIM
QuarterID
Quarter
Year

BranchDIM
BranchID
Address
Phone



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# Querying Fact Table

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Example #1:

```
select
    T.Year, P.ProductName,
    sum(Total_Sales) as TotalSales
from
    SalesFact S,
    TimeDim T,
    ProductDim P,
    LocationDim L
where S.TimeID = T.TimeID
and S.ProductNo = P.ProductNo
and S.LocationID = L.LocationID
and T.Year = 2019 and T.Year = 2020
and P.ProductName in ('Shoes', 'Jeans')
and L.Country = 'Australia'
group by cube(T.Year, P.ProductName),
```



Year	Product Name	Total Sales
2019	Shoes	1359800
2019	Jeans	941330
2019	Shoes	2301130
2020	Shoes	2861450
2020	Jeans	1827480
2020	Shoes	4688930
2020	Jeans	4221250
	Shoes	2768810
	Jeans	6990060

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# Querying Fact Table (cont.)

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Example #2:

```
select  
    T.Year, P.  
    sum(Total) as TotalSales  
from SalesFact S,  
     TimeDim T,  
     ProductDim P  
where S.TimeID = T.TimeID  
and S.ProductNo = P.ProductNo  
and T.Year = 2019 and T.Year = 2020  
and P.ProductName in ('Shoes', 'Jeans')  
group by cube(T.Year, P.ProductName);
```

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# Determinant Dimensions

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A star schema may have a **special dimension**

all data retrieval from this dimension

else, the retrieved data will be meaningless



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Special dimension

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Key identifier

# Introducing a Determinant Dimension – Petrol Station Case Study

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Sample operational database containing company about petrol prices from all petrol stations in Victoria:



Petrol station	Company	Address	Fuel Type	Price	Date	Day of Week	Suburb
Caltex Star Mart Box Hill	Caltex	793-797 Whitehorse Road, Box Hill	Unleaded	120.9	1/08/16	Monday	Box Hill
Caltex Star Mart Box Hill	Caltex	793-797 Whitehorse Road, Box Hill	Diesel	118.9	1/08/16	Monday	Box Hill
Caltex Star Mart Box Hill	Caltex	793-797 Whitehorse Road, Box Hill	LPG	58.9	1/08/16	Monday	Box Hill
Caltex Star Mart Box Hill	Caltex	793-797 Whitehorse Road, Box Hill	U95	132.9	1/08/16	Monday	Box Hill
Caltex Star Mart Box Hill	Caltex	793-797 Whitehorse Road, Box Hill	Premium Unleaded	129.9	1/08/16	Monday	Box Hill
7-Eleven Clayton	7-Eleven	187-191 Clayton Road, Clayton	unleaded	122.7	1/08/16	Monday	Clayton
7-Eleven Clayton	7-Eleven	187-191 Clayton Road, Clayton	LTG	56.7	1/08/16	Monday	Clayton
7-Eleven Clayton	7-Eleven	187-191 Clayton Road, Clayton	diesel	115.9	1/08/16	Monday	Clayton
United Fitzroy	United	390 Nicholson Street, Fitzroy	Unleaded	119.9	1/08/16	Monday	Fitzroy
United Fitzroy	United	390 Nicholson Street, Fitzroy	Diesel	109.9	1/08/16	Monday	Fitzroy
United Fitzroy	United	390 Nicholson Street, Fitzroy	LPG	59.7	1/08/16	Monday	Fitzroy
7-Eleven Hawthorn	7-Eleven	747-755 Toorak Road, Hawthorn East	Unleaded	121.9	1/08/16	Monday	Hawthorn East

# Petrol Station - Star Schema Version-1

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The requirements for the data warehouse  
are to answer the questions r

- (a) average petrol price,
- (b) minimum petrol price, and
- (c) maximum petrol price



Chosen Dimensions:

- (i) day of week,
- (ii) suburb, and
- (iii) petrol company.

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Category	Day of week	Total Petrol Price	Num of Petrol Station	Min Petrol Price	Max Petrol Price
	Monday				
	Tuesday				
	...				

Two-column Table for Petrol Prices based on Day of Week

# Petrol Station - Star Schema Version-1 (cont.)

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Minimum price for which petrol type?

Day of week	Total Petrol Price	Num of Stn		Min Petrol Price	Max Petrol Price
Monday					
Tuesday					
...					

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Day of week	Total Petrol Price	Num of Petrol Station	Mon Petrol Price						Max Petrol Price
			Unleaded	P95	P98	E10	Diesel	LPG	
Monday			119.9c	132.9c	139.9c	114.9c	115.9c	55.7c	
Tuesday			118.9c	131.9c	136.9c	114.9c	115.9c	56.9c	
...									

# Petrol Station - Star Schema Version-1 (cont.)

程序代写代做 CS 编程辅导

Day of Week	Total Petrol Price					Num of Station	Min Petrol Price					Max Petrol Price					
	U	95	98	E	D		U	95	98	E	D	LPG	U	95	98	E	D
Monday																	
Tuesday																	

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- Not all petrol stations sell <https://tutorpc.com>, e.g. Premium 98.
- Calculating the average price for Premium 98 Exam Monday cannot be:  
$$\text{Total\_Petrol\_Price}_{\text{P98}} / \text{Number\_of\_Petrol\_Station}$$

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# Petrol Station - Star Schema Version-1 (cont.)

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- Solution: Split the Number of Petrol Station column into six columns – one for each petrol type.
- Question:** How many columns total?



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Suburb	Total Petrol Price						No. of Petrol Station						Min Petrol Price						Max Petrol Price					
	U	95	98	E10	D	L	U	95	98	E10	D	L	U	95	98	E10	D	L	U	95	98	E10	D	L
Box Hill																								
Clayton																								

Two-column Table for Petrol Prices based on Suburb

Company	Total Petrol Price						No. of Petrol Station						Min Petrol Price						Max Petrol Price					
	U	95	98	E	D	L	U	95	98	E	D	L	U	95	98	E	D	L	U	95	98	E	D	L
Caltex																								
7-Eleven																								

Two-column Table for Petrol Prices based on Company

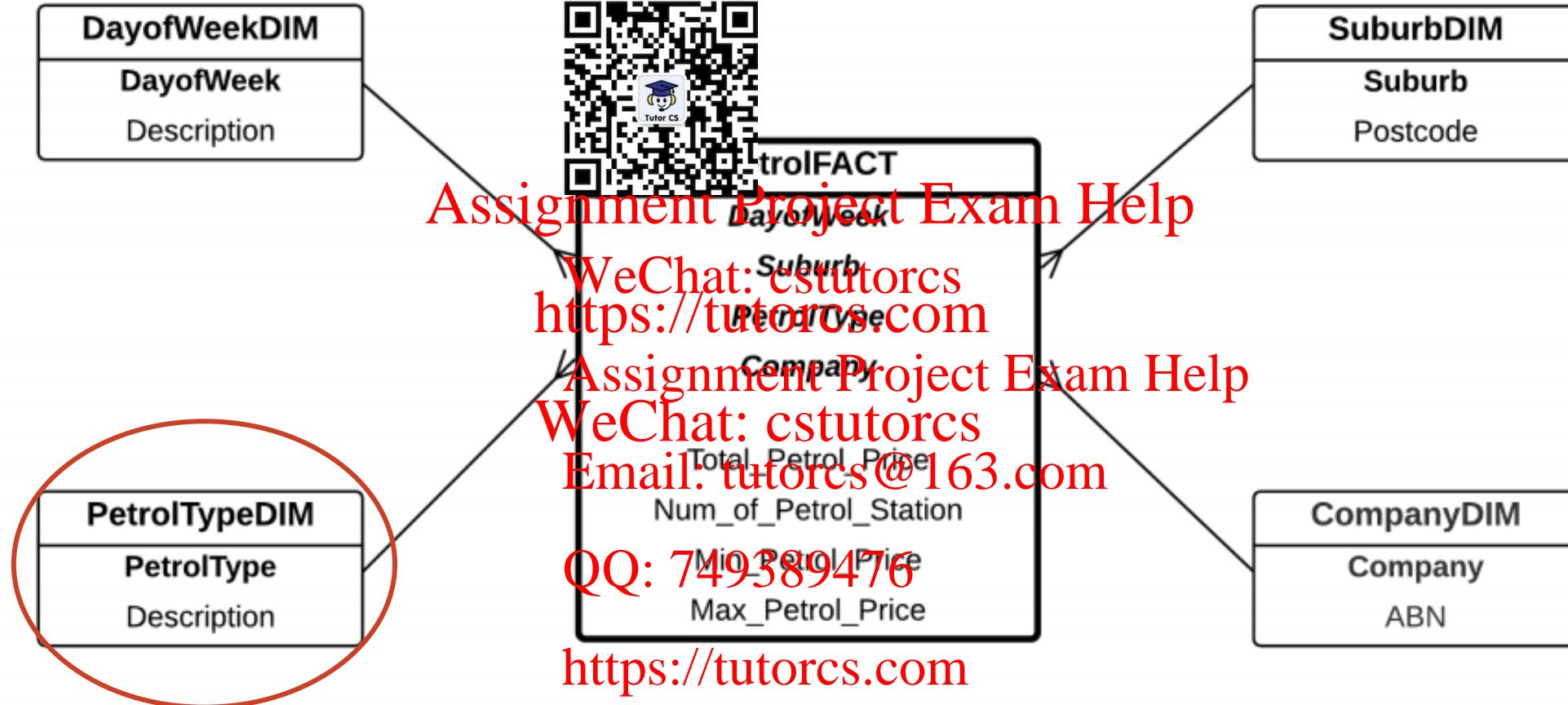
# Petrol Station - Star Schema Version-1 (cont.)

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# Petrol Station - Star Schema Version-2

程序代写代做 CS编程辅导



# Petrol Station - Star Schema Version-2

程序代写代做 CS编程辅导

```
select DayofWeek, Min_Petrol_Price  
from PetrolFact  
where DayofWeek = 'Monday'
```

Day of Week	Min Petrol Price
Monday	117.9 cents
Monday	56.7 cents
Monday	109.9cents
Monday	125.9 cents
Monday	133.9 cents
Monday	114.9 cents



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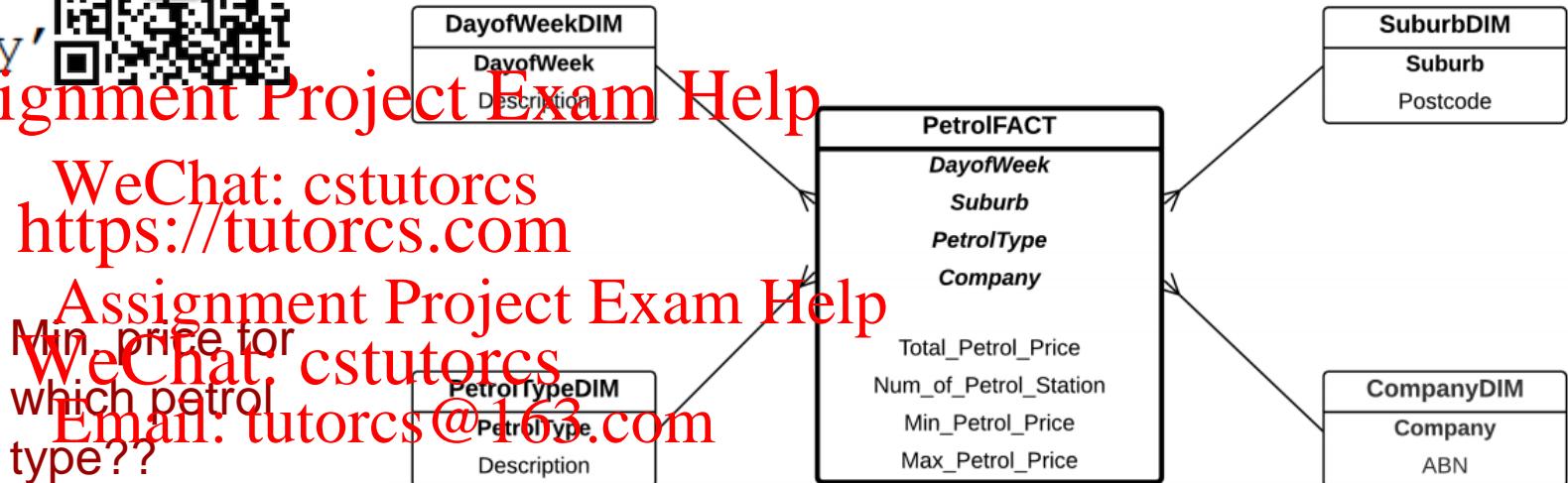
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Min price for  
which petrol  
type??

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# Petrol Station - Star Schema Version-2

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```
select      DayofWeek,  
            Min_Petrol_Price  
from PetrolFact  
where DayofWeek = 'Monday'  
and PetrolType = 'Unleaded';
```



Day of Week	Min Petrol Price
Monday	117.9 cents

```
select      DayofWeek, PetrolType,  
            Min_Petrol_Price  
from PetrolFact  
where DayofWeek = 'Monday' ;
```

DayofWeek	PetrolType	Min Petrol Price
Monday	Unleaded	117.9 cents
Monday	LPG	56.7 cents
Monday	Diesel	109.9cents
Monday	E10	125.9 cents
Monday	Premium 95	133.9 cents
Monday	Premium 98	114.9 cents

# Petrol Station - Star Schema Version-2

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Determinant Dimension uses dotted box in the star schema.

DayofWeekDIM
DayofWeek
Description



SuburbDIM
Suburb
Postcode

PetrolTypeDIM
PetrolType
Description

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Total\_Petrol\_Price

Num\_of\_Petrol\_Station

Min\_Petrol\_Price  
Max\_Petrol\_Price

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CompanyDIM
Company
ABN

The new star schema with a Determinant Dimension for Petrol Case Study

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# Determinant vs. Non-Determinant Dimensions

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# Determinant vs. Non-Determinant Dimensions

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## The Olympic Games Case

- The Olympic Games committee maintains an operational database that stores all **matches**, **game results**, as well as the **medal winners** of the Olympic Games **over the years**
- Let's build a data warehouse to analyse the medal counts, by each country, sport, and at which Olympic Games



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# The Olympic Games Case Study - The Star Schemas

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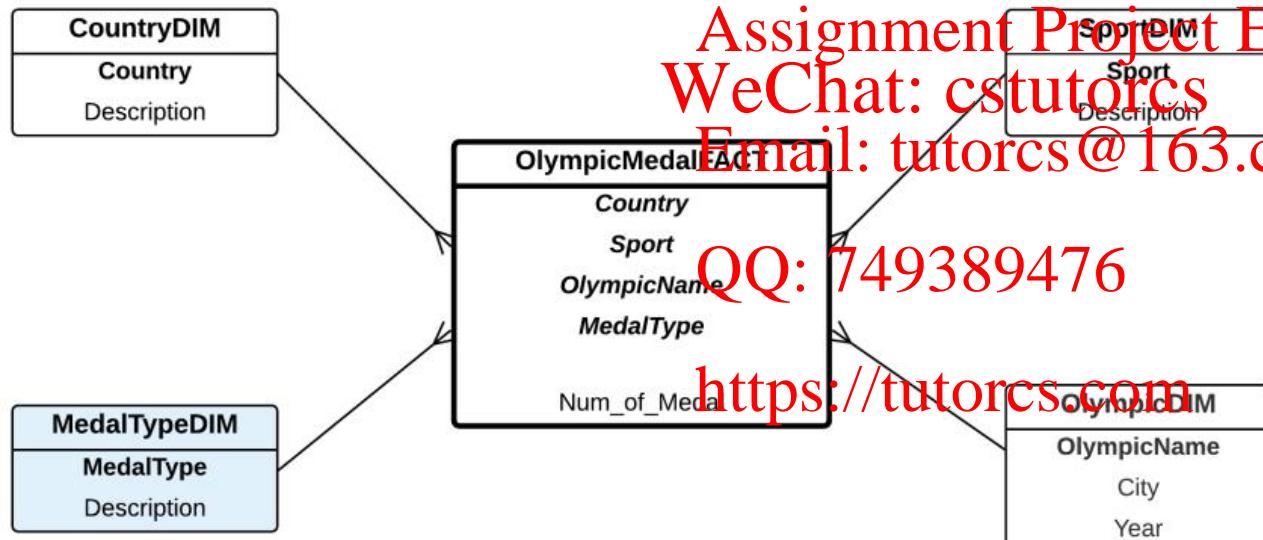
Version-1



**The questions are:**

1. What is the difference between these two versions of star schema?
2. Is Medal Type Dimension a Determinant Dimension?

Version-2



# The Olympic Games Case Study - The Star Schema Version-1

Two-column tables  
(pivot tables) for each  
dimension category in  
star schema version-1

Country	Num of Gold	Num of Silver	Num of Bronze
USA	502	602	488
China	143	133	
Australia	170	189	



Sport	Assignment Project Exam Help	Num of Gold	Num of Silver	Num of Bronze
Swimming 100m Butterfly Men	WeChat: cstutorcs <a href="https://tutorcs.com">https://tutorcs.com</a>	20	20	20
Swimming 400m Freestyle Women	Assignment Project Exam Help	20	20	20
Swimming 4x100m Medley Relay Men	WeChat: cstutorcs Email: tutorcs@163.com	20	20	20

Olympic Name	Num of Gold	Num of Silver	Num of Bronze
London 2012	302	304	356
Beijing 2008	303	303	353
Athens 2004	301	301	327

# The Olympic Games Case Study - The Star Schema Version-2

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Country	Num of Medals
USA	1823
China	475
Australia	526



Sport	Num of Medals
London 2012	962
Beijing 2008	958
Athens 2004	929

Sport	Num of Medals
Swimming 100m Butterfly Men	60
Swimming 400m Freestyle Women	60
Swimming 4x100m Medley Relay Men	60

Medal Type	Num of Medals
Gold	4115
Silver	4095
Bronze	4474

# Determinant vs. Non-Determinant Dimensions

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- Is MedalTypeDIM a determinant dimension?  
QQ: 749389470
- To retrieve the data from version-2 star schema, must we have the information from Medal Type Dimension?  
<https://tutorcs.com>

# The Olympic Games Case Study - The Star Schema Version-1 vs Version-2

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Country	Sport	Olympic Name	Num of Gold	Num of Silver	Num of Bronze
USA	Swimming	London 2012	16	9	6
China	Swimming	London 2012	5	1	4
Australia	Swimming	London 2012	6	6	3

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Fact Table for Version-2  
<https://tutorcs.com>

Country	Sport	Olympic Name	Medal Type	Num of Medals
USA	Swimming	London 2012	Gold	16
USA	Swimming	London 2012	Silver	9
USA	Swimming	London 2012	Bronze	6
China	Swimming	London 2012	Gold	5
China	Swimming	London 2012	Silver	1
China	Swimming	London 2012	Bronze	4
Australia	Swimming	London 2012	Gold	1
Australia	Swimming	London 2012	Silver	6
Australia	Swimming	London 2012	Bronze	3

# The Olympic Games Case Study - The Star Schema Version-1 vs Version-2

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Differences	Version 1 (without MedalTypeDIM)	Version 2 (with MedalTypeDIM)
Storage	Lower with Assignment Project Exam Help	No records
Modelling	The schema looks more complex and crowded; but the storage cost is lower	More concise and compact with less number of measures in the fact, easier to understand
Query Processing	Less join processing between dimension tables and the fact table.	Requires additional join with MedalTypeDIM



# Determinant Dimensions vs. Pivoted Fact Table



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# Determinant Dimensions vs. Pivoted Fact Table

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PTE ACADEMIC™

Official Test Centre

PEARSON

## The PTE Academic Test Case Study

- PTE Test consists of four main components: Listening, Reading, Speaking, and Writing
- There are many test venues (in cities in Australia, and overseas as well), each country may have a different price setting
- A student taking a PTE test will have one score for each of these four components, as well as one overall score
- The score is a numerical score, ranging from 10 to 90
- The results will normally be released five days after the actual test date
- A student may take a PTE Academic Test several times, in order to improve the score
- A student is identified by his/her RegistrationID, which stays the same student stays the same



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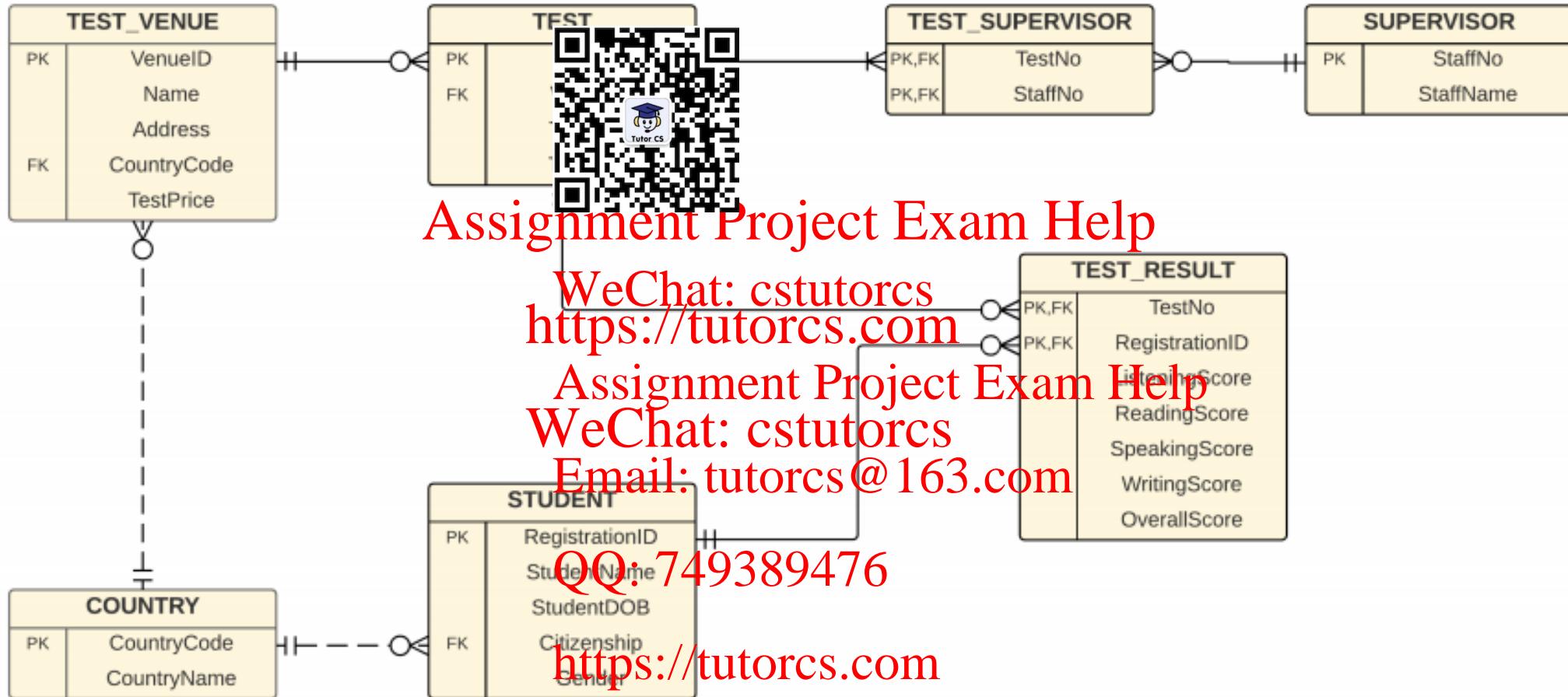
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# ERD for PTE Academic Test

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# The PTE Academic Test Case Study - Sample Records for 8 Students

Table Test Venue					Table Test			
Venue ID	Name	Address	Price	Country Code	Test No	Test Date	Test Time	Venue ID
1	RMIT English Worldwide	Level 10 235-251 Bourke Street Melbourne Victoria 3000	300AUD 	AU AU	1 2 3	01/AUG/17 01/AUG/17 10/AUG/17	10:00am 11:00am 10:00am	1 1 2
2	Pearson Professional Centers San Francisco	Suite 200 201 Filbert Street San Francisco, California	300AUD 	US	4 5	10/AUG/17 17/AUG/17	11:00am 10:00am	2 3
3	PLT at Cliftons Sydney	Level 12 60 Margaret Street Sydney New South Wales 2000	300AUD 	AU	6 7 8	17/AUG/17 17/AUG/17 25/AUG/17	11:00am 10:00am 10:00am	3 1 1

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Registration ID	Student Name	Date of Birth	Gender	Citizenship
318678895	Ying Chang	27/AUG/89	F	CN
312124682	Ryo Kato	23/MAR/94	M	JP
117609895	Susi Bambang	19/FEB/91	F	ID
891186588	Su-yeon Park	07/JUL/94	F	KR
387160595	Hong Lei	16/DEC/90	M	CN
312905800	Tim Yeoh	08/OCT/91	M	SG
311765711	Berta Ferrari	27/DEC/87	F	IT
392837402	Wenbo Lin	27/AUG/92	M	CN

# The PTE Academic Test Case Study - Sample Records for 8 Students

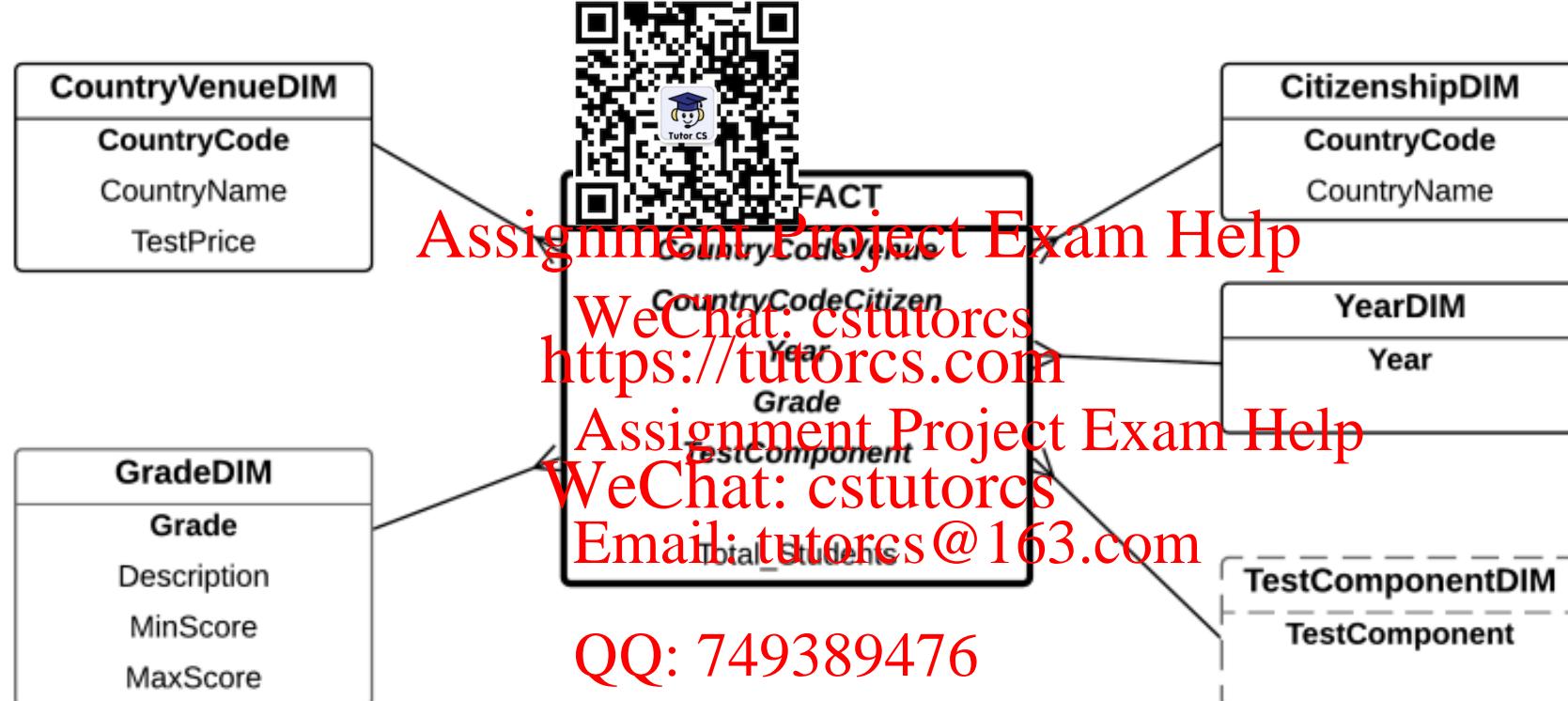
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Table Test Result

Test No	Registration ID	Listening Score	Speaking Score	Writing Score	Overall Score
1	318678895	69	77	78	74
1	312124682	55	57	60	60
2	117609895	68	67	69	68
2	891186588	62	WeChat: cstutorcs	57	61
3	387160595	67	<a href="https://tutorcs.com">https://tutorcs.com</a>	78	72
3	312905800	66	Assignment Project Exam Help	67	70
4	311765711	57	WeChat: cstutorcs	59	57
7	117609895	75	Email: tutorcs@163.com	78	75
7	891186588	69	QQ: 749389476	76	72
8	318678895	80	79	78	78
8	312124682	55	<a href="https://tutorcs.com">https://tutorcs.com</a>	47	47

# The PTE Academic Test Case Study - Star Schema with Determinant Dim.

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# The PTE Academic Test - Star Schema with Determinant Dim. (cont.)

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To implement the star schema in SQL:

```
create table CountryVenueDim
as
select distinct C.CountryCode, C.CountryName, T.TestPrice
from Test_Venue T, Country C
where T.CountryCode = C.CountryCode;

create table CitizenshipDim
as
select distinct C.CountryCode as Citizenship, C.CountryName
from Student S, Country C
where S.Citizenship = C.CountryCode;

create table YearDim
as
select distinct to_char(TestDate, 'YYYY') as Year from Test;
```



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# The PTE Academic Test - Star Schema with Determinant Dim. (cont.)

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```
create table GradeDim (
    Grade varchar2(3),
    Description varchar2(20),
    MinScore number,
    MaxScore number
);
insert into GradeDim values ('4.5', 'Functional', 30, 35);
insert into GradeDim values ('5', 'Vocational', 36, 49);
insert into GradeDim values ('6', 'Competent', 50, 64);
insert into GradeDim values ('7', 'Proficient', 65, 78);
insert into GradeDim values ('8-9', 'Superior', 79, 90);
```



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PTE band-scale			
Proficiency Level	Grade	Test Component	Test Score
Functional	4.5	Overall score	30-35
Vocational	5	Listening Reading Writing Speaking	36-49
Competent	6	Listening Reading Writing Speaking	50-64
Proficient	7	Listening Reading Writing Speaking	65-78
Superior	8-9	Listening Reading Writing Speaking	79-90

# The PTE Academic Test - Star Schema with Determinant Dim. (cont.)

程序代写代做 CS 编程辅导

```
create table TestComponentDim (
    TestComponent varchar2(20)
);

insert into TestComponentDim values ('Listening');
insert into TestComponentDim values ('Reading');
insert into TestComponentDim values ('Writing');
insert into TestComponentDim values ('Speaking');
insert into TestComponentDim values ('Overall');
```



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Create temporary fact table:

```
create table TempFact
as
select TV.CountryCode, S.Citizenship,
       to_char(T.TestDate, 'YYYY') as Year,
       TR.ListeningScore, TR.ReadingScore,
       TR.WritingScore, TR.SpeakingScore,
       TR.OverallScore, TR.RegistrationID
from Test_Venue TV, Test T, Student S,
      Test_Results TR
where TV.VenueID = T.VenueID
and T.TestNo = TR.TestNo
and TR.RegistrationID = S.RegistrationID;
```

# The PTE Academic Test - Star Schema with Determinant Dim. (cont.)

```
alter table TempFact  
add (  
    GradeOverall varchar2(3),  
    GradeListening varchar2(3),  
    GradeReading varchar2(3),  
    GradeWriting varchar2(3),  
    GradeSpeaking varchar2(3)  
) ;
```

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```
update TempFact  
set GradeOverall = (   
case when OverallScore >= 30 and  
        OverallScore <= 35 then '4.5'  
        when OverallScore >= 36 and  
        OverallScore <= 49 then '5'  
        when OverallScore >= 50 and  
        OverallScore <= 64 then '6'  
        when OverallScore >= 65 and  
        OverallScore <= 78 then '7'  
        when OverallScore >= 79 and  
        OverallScore <= 90 then '8-9'  
        end);
```

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Repeat for  
GradeListening, GradeReading,  
GradeWriting, and GradeSpeaking

PTE band-scale			
Proficiency Level	Grade	Test Component	Test Score
Functional	4.5	Overall score	30-35
Vocational	5	Listening Reading Writing Speaking	36-49
Competent	6	Listening Reading Writing Speaking	50-64
Proficient	7	Listening Reading Writing Speaking	65-78
Superior	8-9	Listening Reading Writing Speaking	79-90

# The PTE Academic Test - Star Schema with Determinant Dim. (cont.)

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- The TempFact table has to collect grades for each student.
- The problem now is to break the grades for a student into multiple test components
  - Create another temporary fact of each of the test components, eg. a temporary fact called 'OverallFact' for the Overall Score, and so on so forth



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```
create table OverallFact
as
select    CountryCode, Citizenship, Year,
          GradeOverall As Grade, 'Overall' as TestComponent,
          count(RegistrationID) as Total_Students_Overall
from TempFact
group by CountryCode, Citizenship, Year, GradeOverall, 'Overall';
```

# The PTE Academic Test - Star Schema with Determinant Dim. (cont.)

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- There were eleven students who took the test which are now grouped into nine records in Table OverallFact.



OverallFact Table					
Country Code	Citizenship	Year	Grade	Test Component	Total Students Overall
AU	JP	2017	6	Overall	1
AU	KR	2017	6	Overall	2
AU	ID	2017	7	Overall	1
US	IT	2017	6	Overall	1
AU	JP	2017	5	Overall	1
US	CN	2017	7	Overall	1
US	SG	2017	7	Overall	1
AU	KR	2017	7	Overall	1
AU	CN	2017	7	Overall	2

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ListeningFact Table						
Country Code	Citizenship	Year	Grade	Test Component	Total Students	Listening
AU	CN	2017	7	Listening	1	
AU	ID	2017	7	Listening	2	
US	IT	2017	6	Listening	1	
AU	KR	2017	6	Listening	1	
US	CN	2017	7	Listening	1	
US	SG	2017	7	Listening	1	
AU	JP	2017	6	Listening	2	
AU	CN	2017	8-9	Listening	1	
AU	KR	2017	7	Listening	1	

# The PTE Academic Test - Star Schema with Determinant Dim. (cont.)

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- There are also three other fact tables: ReadingFact, WritingFact, and SpeakingFact, with identical structures
- These five fact tables can be 'combined' to form one final fact table using a *union* operator



```
create table FinalFact as
select CountryCode, Citizenship, Year, Grade, TestComponent,
Total_Students_Overall as Total_Students
from OverallFact
union select * from ListeningFact
union select * from ReadingFact
union select * from WritingFact
union select * from SpeakingFact,
```

# The PTE Academic Test - Star Schema with Determinant Dim. (cont.)

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- The final fact table contains records



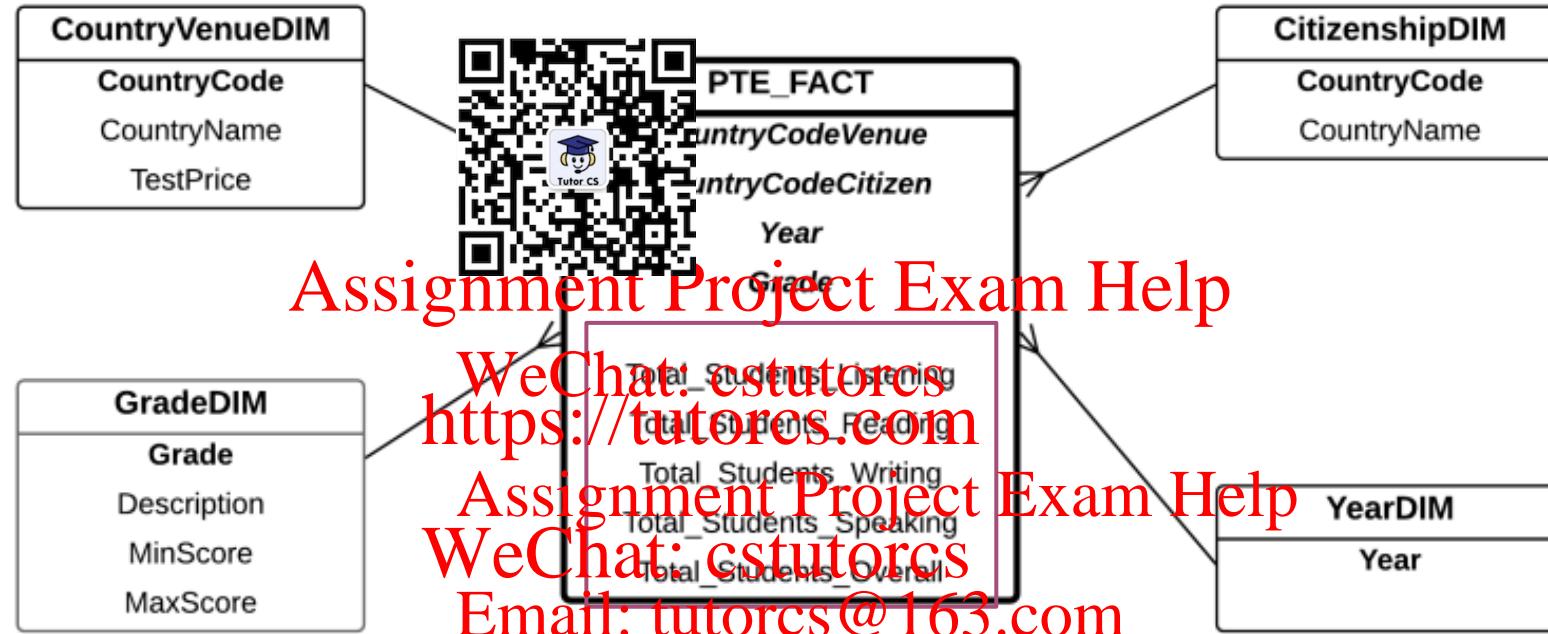
- Conclusion:

- When the input record in the operational database contains the scores of all the test components as one record, it will be challenging to break down the records into multiple records in the final fact table, because there is a Test Component dimension.

Final Fact Table						
Country Code	Citizenship	Year	Grade	Test Component	Total Students	
AU	CN	2017	7	Listening	1	
AU	CN	2017	7	Overall	2	
AU	CN	2017	7	Reading	1	
AU	CN	2017	7	Speaking	2	
AU	CN	2017	7	Writing	2	
AU	CN	2017	8-9	Listening	1	
AU	CN	2017	8-9	Reading	1	
...	...	...	...	...	...	...
US	SG	2017	7	Listening	1	
US	SG	2017	7	Overall	1	
US	SG	2017	7	Reading	1	
US	SG	2017	7	Speaking	1	
US	SG	2017	7	Writing	1	

# The PTE Academic Test - Star Schema without Determinant Dim.

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- Fact measure for all the test components
- This means that the fact table is a Pivoted Fact Table
  - Shifts the Test Component into the fact measure:
  - The Determinant Dimension - TestComponentDim is then removed from the star schema

# The PTE Academic Test - Star Schema without Determinant Dim. (cont.)

程序代写代做 CS编程辅导

- How many records do we have in fact table with five fact measures?



**Answer:**

60 records in the final fact table

= 2 countries of test venues \* 6 countries of citizenship \* 1 year \* 5 grades

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- However, since our test result data is incomplete, we will have problems with the final fact, because in the non-determinant dimension version, **we need to keep track the zeroes**
  - Even if the data is the test result is a lot, but still does not cover all possible combinations from the dimension

# The PTE Academic Test - Star Schema without Determinant Dim. (cont.)

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Table Test Result

Test No	Registration ID	Listening Score	Reading Score	Speaking Score	Writing Score	Overall Score
1	318678895	69	77		70	74
1	312124682	55	57		75	60
2	117609895	68	68		69	68
2	891186588	62	63		68	61
3	387160595	67	72		66	72
3	312905800	66	73	71	67	70
4	311765711	57	55	59	60	57
7	117609895	75	68	78	78	75
7	891186588	69	70	76	75	72
8	318678895	80	79	78	78	78
8	312124682	55	45	47	58	47

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- ‘Superior’ grade is only available for Listening and Reading scores
- Using the normal fact table, there ~~will not be entry in the fact table~~ for Superior-Speaking, and for Superior-Writing;
- There ~~will not be zero value in Total Students~~, where the Grade column is ‘Superior’ and the Test Component column is either ‘Speaking’ or ‘Writing’ → less than 60 rows of records in the fact table

PTE band-scale			
Proficiency Level	Grade	Test Component	Test Score
Functional	4.5	Overall score	30-35
Vocational	5	Listening	36-49
		Reading	
		Writing	
		Speaking	
Competent	6	Listening	50-64
		Reading	
		Writing	
		Speaking	
Proficient	7	Listening	65-78
		Reading	
		Writing	
		Speaking	
Superior	8-9	Listening	79-90
		Reading	
		Writing	
		Speaking	

# The PTE Academic Test - Star Schema without Determinant Dim. (cont.)

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## Solution: Step1

Get all possible combinations for all dimensions using Cartesian product between all dimensions:



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```
create table AllDimensions
as
select CO.CountryCode, CI.Citizenship, Y.Year, G.Grade
from CountryVenueDim CO, CitizenshipDim CI,
YearDim Y, GradeDim G;
```

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# The PTE Academic Test - Star Schema without Determinant Dim. (cont.)

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## Solution: Step 2

Re-create five temporary fact tables for each test component, using **Outer Join operation** between AllDimensions table and each of the temporary fact tables created in the previous step (see slide #35).

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```
create table OverallFactNew as
select A.CountryCode, A.Citizenship,
       A.Year, A.Grade,
       nvl(O.Total_Students_Overall, 0)
       as Total_Students_Overall
from AllDimensions A, OverallFact O
where A.CountryCode = O.CountryCode(+)
and A.Citizenship = O.Citizenship(+)
and A.Year = O.Year(+)
and A.Grade = O.Grade(+);
```

```
create table ListeningFactNew as
select A.CountryCode, A.Citizenship,
       A.Year, A.Grade,
       nvl(O.Total_Students_Listening, 0)
       as Total_Students_Listening
from AllDimensions A, ListeningFact O where
A.CountryCode = O.CountryCode(+)
and A.Citizenship = O.Citizenship(+)
and A.Year = O.Year(+)
and A.Grade = O.Grade(+);

create table ReadingFactNew as select ...;

create table WritingFactNew as select ...;

create table SpeakingFactNew as select ...;
```

# The PTE Academic Test - Star Schema without Determinant Dim. (cont.)

## Solution: Step 3

Create the final fact table using  operation

```
create table FinalFact2 as
select O.CountryCode, O.Citizenship, O.Year, O.Grade, O.Total_Students_Overall, L.Total_Students_Listening,
       R.Total_Students_Reading, W.Total_Students_Writing, S.Total_Students_Speaking
from OverallFactNew O, ListeningFactNew L, ReadingFactNew R, WritingFactNew W, SpeakingFactNew S
where O.CountryCode = L.CountryCode
and L.CountryCode = R.CountryCode and R.CountryCode = W.CountryCode
and W.CountryCode = S.CountryCode and O.Citizenship = L.Citizenship
and L.Citizenship = R.Citizenship and R.Citizenship = W.Citizenship and W.Citizenship = S.Citizenship
and O.Year = L.Year and L.Year = R.Year and R.Year = W.Year and W.Year = S.Year
and O.Grade = L.Grade and L.Grade = R.Grade and R.Grade = W.Grade and W.Grade = S.Grade;
```

# The PTE Academic Test - Star Schema without Determinant Dim. (cont.)

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## Solution: Step 4

Because our sample data is small, there are many records with zeroes values in the Total Students columns. Delete records where Total Students in all of the five test components are equal.



```
delete from FinalFact2  
where Total_Students_Overall = 0  
and Total_Students_Listening = 0  
and Total_Students_Reading = 0  
and Total_Students_Writing = 0  
and Total_Students_Speaking = 0;
```

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Final Fact Table									
Country	Citizenship	Year	Grade	Test Students	Total Students				
					Overall	Listening	Reading	Writing	Speaking
AU	KR	2017	6	1	1	1	0	1	1
US	IN	2017	6	1	1	1	1	1	1
AU	EN	2017	7	2	1	1	2	2	2
AU	JP	2017	6	1	2	1	1	1	1
AU	ID	2017	7	2	2	2	2	2	2
AU	KR	2017	7	1	1	1	2	2	1
IS	CO	2017	7	1	1	1	1	1	1
AU	JP	2017	5	1	0	1	0	0	1
US	SG	2017	7	1	1	1	1	1	1
AU	IN	2017	8	0	1	1	0	0	0
AU	JP	2017	7	0	0	0	1	0	0

# Determinant Dimension - Conclusion

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A Determinant Dimension (or a Determinant Attribute) must be used in retrieving the fact, in order to make the resulting data more meaningful.

In other words, it is critical to include a Determinant Attribute in the query, either as a filtering mechanism (in the where clause) or in the display (in the select clause) in the SQL command.



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