

#### Week 2





#### Housekeeping

A Sevent and the lab that to had registered for on My Time Table. Lab ellip Sevents are not allowed unless there is a special consideration and in the paper approval.

- From Week 2 to Week 11, weekly online quiz is always due 23:59 Wednesday after you watch the online lectures.
- After Let 1 of you still lake any questions of issues about the lab environment, please bring your questions to the online drop-in sessions (Thu 5pm-7pm and Fri 10am-12pm) in Week 2.
- An optional exercise website is available for our course https://c.anr.edu.ad/dab/encl./dd exercises/
- Make effective use of Wattle discussion forum.
  - We strongly encourage you to ask your questions on the forum, and everyone in the class can benefit from the discussions and answers.
  - You should not post any solutions/results/ideas/interpretations related to assessment items (including assignments, quizzes, tests, exams).



#### Thanks for your feedback!





## Assignment Project-Exam Help



https://maths.anu.edu.au/news-events/news/australian-women-mathematics-exhibition



#### Set - Example

## Assignment Project Exam Help

A set is a collection of distinct elements.

https://tutorcs.com

WeChat: cstutorcs



#### Set - Example

## Assignment Project Exam Help

A set is a collection of distinct elements.

• Collection the celements in the set here so order me.g., {A, B} = {B, A}

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#### Set - Example

- A set is a collection of distinct elements.
- Collection the elements in the travers or order mee.g., {A, B} = {B, A}
- Distinct: each element can not be in the set more than once.
  e.g. \ \ \Ap\ \ap\ \ap\ \\ \ap\ \ap\ \\ \ap\ \\ \ap\ \\ \ap\ \\ \ap\ \



#### Set – Example

- A set is a collection of distinct elements.
- Collection the elements in the set have so order mee.g., {A, B = {B, A}
- Cardinality: the cardinality of a set is the number of elements of the set.



#### **Tuple – Example**

## Assignment Project Exam Help

• A tuple is an **ordered** list of *n* elements.

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#### **Tuple – Example**

## Assignment Project Exam Help

• A tuple is an **ordered** list of *n* elements.

### https://tutorcs.com

• ordered: the elements in a tuple have an order. e.g.,  $(A, B) \neq (B, A)$ 

### WeChat: cstutorcs



#### **Tuple – Example**

## Assignment Project Exam Help

• A tuple is an **ordered** list of *n* elements.

### https://tutorcs.com

• ordered: the elements in a tuple have an order. e.g.,  $(A, B) \neq (B, A)$ 

• The same element can be in a tuple more than once.

e.g., (A, A, B)is a tuple.



## Assignment Project Exam Help

A set of tuples is a collection of distinct tuples.

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## Assignment Project Exam Help

- A set of tuples is a collection of distinct tuples.
- - the tiple of the set to the set more than once.

### WeChat: cstutorcs



- A set of tuples is a collection of distinct tuples.
- Set:
  - the tiple on this set tay to open S. COM each tuple can not be in the set more than once.
- Tuple:
  - the elements in a tuple have an order WeChat: cstutorcs



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- Tuple:
  - the elements in a tuple have an order
  - hat: cstutorcs
- Question 1:  $\{(A,B),(A,C)\} = \{(A,C),(A,B)\}$ ?



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- Tuple:
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    - hat: cstutores
- Question 1:  $\{(A,B),(A,C)\} = \{(A,C),(A,B)\}$ ? Yes!



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- Tuple:
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- Question 1:  $\{(A,B),(A,C)\} = \{(A,C),(A,B)\}$ ? Yes!
- Questino 2:  $\{(A,B),(A,C)\} = \{(B,A),(A,C)\}$ ?



- A set of tuples is a collection of distinct tuples.
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- A set of tuples is a collection of distinct tuples.
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  - the elements in a tuple have an order
    - hat: cstutorcs
- Question 1:  $\{(A,B),(A,C)\} = \{(A,C),(A,B)\}$ ? Yes!
- Questino 2:  $\{(A,B),(A,C)\} = \{(B,A),(A,C)\}$ ? No!



#### Cartesian product – Examples

Assigns and Room be typets:

Room = {RT1, CT1}

What is the Cartesian product of Class × Room?

https://tutorcs.com

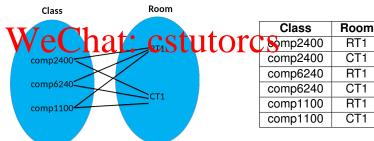
WeChat: cstutorcs



#### **Cartesian product – Examples**

# Assignment to the top ets: Room = {RT1, CT1}

- What is the Cartesian product of Class × Room?
- Class  $\times$  Room = {(c,r)|c \in Class, r \in Room} = { comp6240, R7/1}, comp12400 C715 (comp6241, R71), (comp6240, C71), (comp1100, R71), (comp1100, C71)}







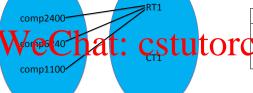


Class	Room
comp2400	RT1
mp6240	RT1
comp1100	CT1



## Assignment, Project Exam Help

https://tutorcs.com



Class	Room
comp2400	RT1
mp6240	RT1
comp1100	RT1



# region in the two ject Exam Help Class = {comp2400, comp6240, comp1100}

- Room = {RT1, CT1}
- · Class to Proport { (c/ 1) | F | Classe, re @000 } = {(comp2400, RT1), (comp2400, CT1), (comp6240, RT1), (comp6240, CT1), (comp1100, RT1), (comp1100, CT1)}
- $R_1 = \{(comp2400, RT1), (comp6240, RT1), (comp1100, CT1)\}$   $R_2 = \{(comp2400, RT1), (comp6240, RT1), (comp1100, RT1)\}$
- What is the relationship of  $R_1$  and  $R_2$  with  $Class \times Room$ ?



## Elass = {comp2400, comp6240, comp1100}

- Room = {RT1, CT1}
- Class k Reonc= { (c, n) | F Class, C Goom} = 111 (comp2400, RT1), (comp2400, CT1), (comp6240, RT1), (comp6240, CT1), (comp1100, RT1), (comp1100, CT1)}
- $R_1 = \{(comp2400, RT1), (comp6240, RT1), (comp1100, CT1)\}$   $R_2 = \{(comp2400, RT1), (comp6240, RT1), (comp1100, RT1)\}$
- What is the relationship of  $R_1$  and  $R_2$  with  $Class \times Room$ ?

Answer:  $R_1$ ,  $R_2$  are the subsets of  $Class \times Room$ .  $R_1$ ,  $R_2$  and  $Class \times Room$  are all sets of tuples.



# AssignmentioPstojecttieExamsHelp and Relation Database State







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	INFORMAL TERMS	FORMAL TERMS		
	Table	Relation		
	Column	Attribute		
<b>TT</b> - C1	Data type	Domain		
weur	Rov			
* * • • •	Table definition	Relation schema		



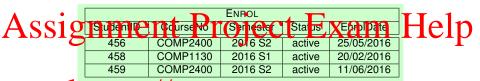


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	INFORMAL TERMS	FORMAL TERMS		
	Table	Relation		
	Column	Attribute		
111-01	Data type	Domain		
weur	Rov	Tiple S		
, , 5	Table definition	Relation schema		

How many tuples and attributes does the table ENROL have?





Colraspontione of informal and formal germs: 0111

	INFORMAL TERMS	FORMAL TERMS		
	Table	Relation		
	Column	Attribute		
117-01	Data type	Domain		
weur	Rov	Tuple S		
	Table definition	Relation schema		

How many tuples and attributes does the table ENROL have?
 3 tuples and 5 attributes.



A		ENROL ,				
ASS19	Sutente	Course No	Ser nester	Starus	XEDADI Date	Hein
0016	456	COMP2400	20 6 S2	active	25/05/2016	P
	458	COMP1130	2016 S1	active	20/02/2016	
	459	COMP2400	2016 S2	active	11/06/2016	

Table definition Relation schema
 How many tuples and attributes does the table ENROL have?
 3 tuples and 5 attributes.

• In the relational data model, the order of tuples in a relation is not important but the order of the attributes in a relation is important?



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ASS19	Studen Ite	Course No	Serie	Starus	Eprol Date	Hein
00	456	COMP2400	20 6 S2	active	25/05/2016	P
	458	COMP1130	2016 S1	active	20/02/2016	
	459	COMP2400	2016 S2	active	11/06/2016	

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Trop of	INFORMAL TERMS	FORMAL TERMS		
	Table	Relation		
	Column	Attribute		
XX / _ (1)	Data type	Domain		
weur	Rov	Tuple S		
	Table definition	Relation schema		

- How many tuples and attributes does the table ENROL have?
   3 tuples and 5 attributes.
- In the relational data model, the order of tuples in a relation is not important but the order of the attributes in a relation is important?
   Yes.



#### Relation Schema - Example

## Assignment Project Exam Help

Consider a relation schema ENROL

THINK COLLEGE STRING, STRING, EnrolData: DATE).





#### Relational Database Schema – Example

## Assignment Project Exam Help

• a set of relation schemas  $S = \{R_1, \dots, R_m\}$ , and

hatst p integrity to striking fees. com

STUDENT

StudentID | Name | DoB | Email

WeChat: cstatorcs

		ENROL		
StudentID	CourseNo	Semester	Status	EnrolDate
0100011112	000.00.10	0000.0.	o tatao	



#### Relational Database State - Example

# Association and atabase state of Sis a set of felalion scuch than Help all the relations satisfy the integrity constraints IC.

Studentif Name 1098 Email 1098 Studentif 1 Name 2098 Email 1099 Studentif 1 Name 2005 St



ENROL					
StudentID	CourseNo	Semester	Status	EnrolDate	
456	COMP2400	2016 S2	active	25/05/2016	
458	COMP1130	2016 S1	active	20/02/2016	
459	COMP2400	2016 S2	active	11/06/2016	



#### Relational Database State – Example

## Assignment Project Exam Help

ullet there is just one relation for each relation schema in S



Relation





#### **Relational Database State – Example**

## Assignment Project Exam Help

ullet there is just one relation for each relation schema in S





• Can there be multiple relations that correspond to the same relation schema in a relational database state?



#### **Relational Database State – Example**

## Assignment Project Exam Help

ullet there is just one relation for each relation schema in S



Relation



 Can there be multiple relations that correspond to the same relation schema in a relational database state?
 No.



## Assignment Project Fxam, Help



(Ashmolean Museum @ the University of Oxford www.ashmolean.org/)



## Assignment Project Exam Help

https://tutorcs.com



# Associated in the attributes of relation schema fits a superkey if it in the project Exam Help

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### Associated in the attributes of relation schema fits a superkey if it in the project Exam Help

 A superkey K is called a candidate key if no proper subset of K is a superkey.

https://tutorcs.com



## As Scheme Assubset of the attributes of relation schema Fiss a superkey if it in queit p

 A superkey K is called a candidate key if no proper subset of K is a superkey. That is, if you take any of the attributes out of K, then it is not enough to uniquely identify typles.

https://tutorcs.com



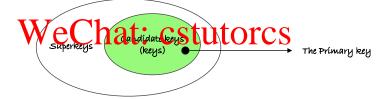
### As Side at the attributes of relation schema fits a superkey if it in queit p

- A superkey K is called a candidate key if no proper subset of K is a superkey. That is, if you take any of the attributes out of K, then it is not enough to uniquely identify typles.
- The trinary key is one of the candidate keys.



## Asside at the attributes of relation schema Fisa superkey if it unique to Asside at files and use in IRP TO JECT Exam Help

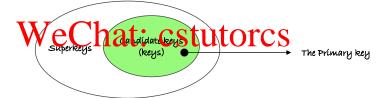
- A superkey K is called a candidate key if no proper subset of K is a superkey. That is, if you take any of the attributes out of K, then it is not enough to uniquely identify typles.
- The principles of its principle candidate keys and the primary key is one of the candidate keys.





## As Side at the attributes of relation schema fis a superkey if it unique to the Asside and the interpretation of the attributes of relation schema fis a superkey if it unique to the attributes of the attributes of relation schema fis a superkey if it unique to the attributes of the attributes of relation schema fis a superkey if it unique to the attributes of the attributes of relation schema fis a superkey if it unique to the attributes of the attributes of relation schema fis a superkey if it unique to the attributes of the attributes of relation schema fis a superkey if it unique to the attributes of the attribute

- A superkey K is called a candidate key if no proper subset of K is a superkey. That is, if you take any of the attributes out of K, then it is not enough to uniquely identify typles.
- The principles of the sandidate keys.

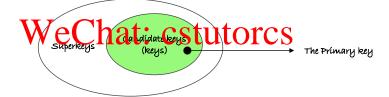


Every candidate key must be a superkey in the same relation schema?



### As Scheme attributes prelation schema fits a superkey if it in the property of the attributes prelation schema fits a superkey if it in the property of the attributes prelation schema fits a superkey if it in the property of the attributes in the prelation schema fits a superkey if it is a superkey if it

- A superkey K is called a candidate key if no proper subset of K is a superkey. That is, if you take any of the attributes out of K, then it is not enough to uniquely jdentify tuples.
- The rinary by is one set from the cardidate keys and the primary key is one of the candidate keys.



Every candidate key must be a superkey in the same relation schema?
 Yes.



#### Superkey – Example

# Assignment Project Exam Help

	No	Cname	Unit
	COMP1130	Introduction to Advanced Computing I	6
1_44	COMP2400/	Relational Databases	6
nu			



#### Superkey – Example

# Assignment Project Exam Help

	No	Cname	Unit
	COMP1130	Introduction to Advanced Computing I	6
1_4	COMP2400/	Relational Databases	6
nu			

 No two students have the same StudentID ⇒ {StudentID} is a SK of STUDENT.

No We stude its have the same Email → {Email} is a SK of STUDENT.

	STUDENT													
StudentID	Name	DoB	Email											
456	Tom	25/01/1988	tom@gmail.com											
458	Peter	23/05/1993	peter@gmail.com											
459	Fran	11/09/1987	frankk@gmail.com											



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$\smile$								
	StudentID	Name	DoB	Email				
	456	Tom	25/01/1988	tom@gmail.com				
1.44	458/ /4	Peter	23/05/1993	peter@gmail.com				
ntti	08://1	ULO	ICS.C					



Assignment Project Exam Help

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	St	ud	ent	ID		Ν	laı	ne	Э				0	В			Email							
	456 Tom										25	/0	1/	19	386	3	tom@gmail.com							
	458/ / Peter								3	23	/0	5/	19	993	3	peter@gmail.com								
r	)S	_	$\cdot /$				Ĺ			1			<u> </u>	5			I		1					

What are all SKs of STUDENT?



Assignment Project Exam Help

	StudentID	Name	DoB	Email						
	456	Tom	25/01/1988	tom@gmail.com						
	458/ /	Peter	23/05/1993	peter@gmail.com						
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What are all SKs of STUDENT?

For STUDENT, a SK can be any subset of attributes which includes StudentiD or any subset of attributes which includes Email, e.g., {StudentiD, \StudentiD, \Studen



Assignment Project Exam Help

	StudentID Name												)ol	3			Email						
	456 Tom										25	/0	1/	19	88	;	tom@gmail.com						
		458	3/	/4		Р	et	eı	r		23	/0	5/	19	93		ı	mail.com					
ſ			//							1	$\tilde{}$		Ϊ.				I		1				

What are all SKs of STUDENT?

For STUDENT, a SK can be any subset of attributes which includes StudentID or any subset of attributes which includes Email, e.g., {StudentID, \StudentID, \Studen

What are candidate keys of STUDENT?



Assignment Project Exam Help

	StudentID	Name	DoB	Email						
	456	Tom	25/01/1988	tom@gmail.com						
	458/ /	Peter	23/05/1993	peter@gmail.com						
ſ			TCSTC	<b>()</b> M.						

What are all SKs of STUDENT?

For STUDENT, a SK can be any subset of attributes which includes Student D or any subset of attributes which includes Email, e.g., {Student D. {Student D. Email ...

What are candidate keys of STUDENT?
 For STUDENT, {StudentID} and {Email} are two candidate keys.



Assignment Project Exam Help

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	St	udeı	ntl	D		N	ar	ne	Э				)o	В				Email							
	456 Tom										25	/0	1/	19	98	В	T	tom@gmail.com							
		458	3/	14		Р	et	eı	r_	:	23	/0	5/	19	99	3	T	peter@gmail.com							
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What are all SKs of STUDENT?

For STUDENT, a SK can be any subset of attributes which includes Student D or any subset of attributes which includes Email, e.g., {Student D. {Student D. Student D. Email ...

- What are candidate keys of STUDENT?
   For STUDENT, {StudentID} and {Email} are two candidate keys.
- What about the primary key of STUDENT?



Assignment Project Exam Help

			O JOB LIVI								
	StudentID	Name	DoB	Email							
	456	Tom	25/01/1988	tom@gmail.com							
	458/ /4	Peter	23/05/1993	peter@gmail.com							
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What are all SKs of STUDENT?

For STUDENT, a SK can be any subset of attributes which includes StudentiD or any subset of attributes which includes Email, e.g., {StudentiD, {StudentiD, StudentiD, Email, ...

- What are candidate keys of STUDENT?
   For STUDENT, {StudentID} and {Email} are two candidate keys.
- What about the primary key of STUDENT?
   For STUDENT, the primary key can be chosen as either {StudentID} or {Email}.



#### Superkey – Example

### Assignment Project Exam Help

 No two enrolments have the same StudentID, the same CourseNo in the same Semester ⇒ {StudentID, CourseNo, Semester} is a SK of ENROL.

h	https://tutorcs.com														
	StudentID	CourseNo	Semester	Status	EnrolDate										
	456	COMP2400	2016 S2	active	25/05/2016										
77	7 45811	COMP1130	2016 S1	active	20/02/2016										
M	<b>6</b> 59 1	COMP2(00)	2)16 S2	active	11/06/2016										
<b>,</b>		0													



# Assignment Project Exam Help

	StudentID	CourseNo	Semester	Status	EnrolDate
	456	COMP2400	2016 S2	active	25/05/2016
ht	458 •		2016 S1	active	20/02/2016
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# Assignment Project Exam Help

	StudentID	CourseNo	Semester	Status	EnrolDate
	456	COMP2400	2016 S2	active	25/05/2016
ht	1-458	/49MP4-130 -	2016 S1	active	20/02/2016
111	(D2./	tutoi	.C3.C	OIII	

What are all SKs of ENROL?



# Assignment Project Exam Help

	StudentID	CourseNo	Semester	Status	EnrolDate
	456	COMP2400	2016 S2	active	25/05/2016
h	4-458 - /	/GGMP4-130 -	2016 S1	active	20/02/2016
111		tuto1	<b>C3.C</b>	OIII	

What are all SKs of ENROL?

For ENROL, a SK can be any subset of attributes which includes all Student Decourse of artificial series of a d. [Student D., Course No., Semester], {Student D., Course No., Semester, Status}, ...



# Assignment Project Exam Help

	StudentID	CourseNo	Semester	Status	EnrolDate
	456	COMP2400	2016 S2	active	25/05/2016
ht	4-458	/49MP4-130	2016 S1	active	20/02/2016
111	<b>LD2.</b> /	tuto	.C3.C	OIII	

What are all SKs of ENROL?

For ENROL, a SK can be any subset of attributes which includes all Studenti Decourse No and Seriester 4.4. [Studenti D., Course No, Semester, Status], . . .

What are candidate keys of ENROL?



# Assignment Project Exam Help

	StudentID	CourseNo	Semester	Status	EnrolDate
	456	COMP2400	2016 S2	active	25/05/2016
ht	458 •	GMP4-130	2016 S1	active	20/02/2016
111	$r_{D}$	tuto	.C3.C	OIII	

What are all SKs of ENROL?

For ENROL, a SK can be any subset of attributes which includes all Student Decourse of anti-Series et al. (Student D. Course No. Semester), {Student D. Course No. Semester, Status},...

What are candidate keys of ENROL?
 For ENROL, {StudentID, CourseNo, Semester} is the only candidate key.



# Assignment Project Exam Help

	StudentID	CourseNo	Semester	Status	EnrolDate
	456	COMP2400	2016 S2	active	25/05/2016
ht	458	/GGMP4-130 -	2016 S1	active	20/02/2016
111	LDS./	lului	(C3.C	OIII	

What are all SKs of ENROL?

For ENROL, a SK can be any subset of attributes which includes all Student Decourse of anti-Series et al. (Student D. Course No. Semester), {Student D. Course No. Semester, Status},...

- What are candidate keys of ENROL?
   For ENROL, {StudentID, CourseNo, Semester} is the only candidate key.
- What about the primary key of ENROL?



# Assignment Project Exam Help

	StudentID	CourseNo	Semester	Status	EnrolDate
	456	COMP2400	2016 S2	active	25/05/2016
ht	458	/49MP4-130 -	2016 S1C	active	20/02/2016
111	tps://	tuto	CS.C	OIII	

What are all SKs of ENROL?

For ENROL, a SK can be any subset of attributes which includes all Student Decourse of artificial series of a stributes which includes all Student Decourse No. Semester, Student Decourse No. Semester, Status St....

- What are candidate keys of ENROL?
   For ENROL, {StudentID, CourseNo, Semester} is the only candidate key.
- What about the primary key of ENROL?
   For ENROL, the primary key can only be {StudentID, CourseNo, Semester}.



Find out candidate keys of BOOKING from the following schema of The SAC SACE HOTEL (hotelNo, hotelName, city) with the primary key {hotelNo},

ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo, hotelNo}.

Guest No, buest land, poest Address) with the primary key guest No.

BOOKING(guestNo, hotelNo, date, roomNo).



Find out candidate keys of BOOKING from the following schema of The SAC SACE HOTEL (hotelNo, hotelName, city) with the primary key {hotelNo},

ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo, hotelNo}.

questive, presivent, poestAddress) with the primary key

- BOOKING(guestNo, hotelNo, date, roomNo).
- Some additional constraints are as follows:



Find out candidate keys of BOOKING from the following schema of an Help SACSANDON Database held in Cational IBMS: alm Help HOTEL (hotelNo, hotelName, city) with the primary key {hotelNo},

ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo, hotelNo}.

questive, presivent, poestAddress) with the primary key

- BOOKING(guestNo, hotelNo, date, roomNo).
- Some additional constraints are as follows:

Welchart. estutores



ASSACE INCOME (all base his in a cational DBMS: and The property) HotelNo, hotelName, city) with the primary key {hotelNo},

- ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo, hotelNo}.
- questive, presivent, poestAddress) with the primary key
- BOOKING(guestNo, hotelNo, date, roomNo).
- Some additional constraints are as follows:

booking can be made for one day only.

Aguest can make several bookings the hotel for different days.



ASSACE INCOME (all base his in a cational DBMS: and The property) HotelNo, hotelName, city) with the primary key {hotelNo},

- ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo, hotelNo}.
- questive, presivent coestAddress) with the primary key
- BOOKING(guestNo, hotelNo, date, roomNo).
- Some additional constraints are as follows:
  - ooking can be made for one day only.

    Aguest can make every bookings manble to different days.
  - A guest cannot make two or more bookings in the same hotel for the same day.



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    Aguest can make several bookings manufactured different days.
  - A guest cannot make two or more bookings in the same hotel for the same day.
  - A guest can make two or more bookings in different hotels for the same day.



#### Find out candidate keys of BOOKING from the forowing schema of an SACSONNODATION database held in a Geation at DBMX: HOTEL(hotelNo, hotelName, city) with the primary key {hotelNo},

- ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo,
- hotelNo}.
- Far guest No, prest Name, guest Address) with the primary key
- BOOKING(guestNo, hotelNo, date, roomNo).
- Some additional constraints are as follows:
  - I booking can be made for one day only. Alguest can make tever Ubookings in a hot Utoo different days.
  - A guest cannot make two or more bookings in the same hotel for the same day.
  - A guest can make two or more bookings in different hotels for the same day.
  - A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.



# BOOKING (guest No. hotel No. date, room No.). Exam Help A guest can make several bookings in a hotel for different days.

A guest cannot make two or more bookings in the same hotel for the same day.

the sear make two progreposkings in different hotels for the

A booking cannot be in joint names. In other words a booking can only be held in the name of one quest.



## ASSI ABBING CAN London District Control Exam Help

- A guest can make several bookings in a hotel for different days.
- A guest cannot make two or more bookings in the same hotel for the same day.
- Aghes can make two progressings in different hotels for the same day.
- 3 A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
- Is truestNo, loteNo, date) a minimal SK and hence a candidate key?.



## ASSI ABBING CAN London District Control Exam Help

- A guest can make several bookings in a hotel for different days.
- A guest cannot make two or more bookings in the same hotel for the same day.
- Agency can make two progressings in different hotels for the same day.
- **5** A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
- Is {nuestNo, note No, date} a minimal SK and hence a candidate key?.
   Vis {guestNo. hoe No. date} be skt OTCS



### ASSI ABBINICAN Limited FOOT EACH Exam Help

- A guest can make several bookings in a hotel for different days.
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- Is {questNo, note!No, date} a minimal SK and hence a candidate key?.
   Is {questNo hoe!No, date}) a SK t (es because of (3).



## Assignation and the bold as Color Exam Help

- A guest can make several bookings in a hotel for different days.
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- 3 A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
- Is {nuestNo, note No, date} a minimal SK and hence a candidate key?.
  - VIV (que the hocano, date) be 6kt (e) because of (3).
  - Is {guestNo, hotelNo} a SK?



### ASSI ABBINICAN Limited FOOT EACH Exam Help

- A guest can make several bookings in a hotel for different days.
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- Is {nuestNo, note No, date} a minimal SK and hence a candidate key?.
  - •VIS (questNo horano, date) a 6KL (es because of (3).
  - Is {guestNo, hotelNo} a SK? No because of (2).



### Assign Abbling and the following the composition of the contraction of the contract of the con

- A guest can make several bookings in a hotel for different days.
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  - Is {guestNo, hotelNo} a SK? No because of (2).
  - Is {guestNo, date} a SK?



### Assignabling and made to the control of the control

- A guest can make several bookings in a hotel for different days.
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  - Is {guestNo, hotelNo} a SK? No because of (2).
  - Is {guestNo, date} a SK? No because of (4).



### ASSI ABBINICAN Limited FOOT EACH Exam Help

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  - Is {hotelNo, date} a SK?



### ASSI Abbin Can I made 600 Tay City. Exam Help

- A guest can make several bookings in a hotel for different days.
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- Afghes can make two progressings in different hotels for the same day.
- A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
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   Is {questNo hockNo, date} a skt (es because of (3).
  - Is {guestNo, hotelNo} a SK? No because of (2).
  - Is {guestNo, date} a SK? No because of (4).
  - Is {hotelNo, date} a SK? No because a hotel usually has multiple rooms (indicated by the fact that ROOM(roomNo, hotelNo, type, price) has the primary key {roomNo, hotelNo}).



## ASSI Abbin Can I made 600 TaxCity. Exam Help

- A guest can make several bookings in a hotel for different days.
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- Thus {guestNo, hotelNo, date} a minimal SK and hence a candidate key.



### Assignation of the state of the

- A guest can make several bookings in a hotel for different days.
- A guest cannot make two or more bookings in the same hotel for the
   same day.
- Addition make two processings in the same day.
- **6** A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
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## Assign Court of the Court of th

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### Assign Course No. hotel production of Exam Help

- A guest can make several bookings in a hotel for different days.
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- After San make the temperoperation of the same day.
- A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
- Is {guestNo, date, roomNo} a candidate key?



### Assign Course No. hotel production of Exam Help

- A guest can make several bookings in a hotel for different days.
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- After San make the temperopolities of the same day.
- **6** A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
- Is { Useft No note No note No note No. it is not even a sk because of 2).
- Is {guestNo, date, roomNo} a candidate key?
   No, it is not even a SK because of (4).



### Assign (quest No. hotel podate room No.) . Exam Help

- A guest can make several bookings in a hotel for different days.
- A guest cannot make two or more bookings in the same hotel for the same day.
- Action make the time tooking in the same day.
- **6** A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
- Is { Usefulto note No note No note No. it is not even a sk because of 2.
- Is {guestNo, date, roomNo} a candidate key?
   No, it is not even a SK because of (4).
- Is {hotelNo, date, roomNo} a candidate key?



## Assign (quest No. hotel production of Exam Help

- A guest can make several bookings in a hotel for different days.
- A guest cannot make two or more bookings in the same hotel for the same day.
- A cuts an make the proofe booking in lifterent hotels for the same day.
- **6** A booking cannot be in joint names. In other words a booking can only be held in the name of one guest.
- Is { Useft No note No note No note No. it is not even a sk because of 2).
- Is {guestNo, date, roomNo} a candidate key?
   No, it is not even a SK because of (4).
- Is {hotelNo, date, roomNo} a candidate key?
   Yes, it is a SK because of (3) and (5) and no proper subset of {hotelNo, date, roomNo} is a SK, hence {hotelNo, date, roomNo} is a candidate key.



## Assign (quest No. hotel production of Exam Help

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   No, it is not even a SK because of (4).
- Is {hotelNo, date, roomNo} a candidate key?
   Yes, it is a SK because of (3) and (5) and no proper subset of {hotelNo, date, roomNo} is a SK, hence {hotelNo, date, roomNo} is a candidate key.



SSI Abbling (quest No., hotel Np.) date, room No.). Exam Help

A guest can make several bookings in a hotel for different days.

A guest is not allowed to make more than one booking for the same day even in the different hotels.

A tooking cannot be in impromed. In other mans a booking can only be held in the name of one guest.

Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.



### SS BOOKING (quest No., hotel No.) date, room No.) 4. Exam Help

- A guest can make several bookings in a hotel for different days.
- A guest is not allowed to make more than one booking for the same day even in the different hotels.
- A tooking carnot be in in names. In other mans a booking can only be need in the name of one guest.
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.

# • Is {guestNo, hotelNo, date} is a SK? WeChat: cstutorcs



### SS PARDSHingCall Lande LON Exchy. Exam Help

- A guest can make several bookings in a hotel for different days.
- A guest is not allowed to make more than one booking for the same day even in the different hotels.
- A tooking carnot be in in names. In other mans a booking can only be need in the name of one guest.
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.

# • Is {guestNo, hotelNo, date} is a SK? Yes because of (3). WeChat: cstutorcs



- A guest can make several bookings in a hotel for different days.
- A guest is not allowed to make more than one booking for the same day even in the different hotels.
- The particular from the pa
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.
  - Is {guestNo, hotelNo, date} is a SK? Yes because of (3).
  - Wood Not break a executores



### Assignation and the population of the common and th

- TA guest can make several bookings in a hotel for different days.
- A guest is not allowed to make more than one booking for the same day even in the different hotels.
- The transfer of the property of the party of
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.
  - Is {guestNo, hotelNo, date} is a SK? Yes because of (3).
    - (2) (questivo hotalino) a 8K3 no betausero (2)



- TA guest can make several bookings in a hotel for different days.
- A guest is not allowed to make more than one booking for the same day even in the different hotels.
- The particular from the pa
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.
  - Is {guestNo, hotelNo, date} is a SK? Yes because of (3).
  - Is {guestNo, totel No} a SK? No betause of (2);



- TA guest can make several bookings in a hotel for different days.
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- The particular from the pa
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.
  - Is {guestNo, hotelNo, date} is a SK? Yes because of (3).
  - Is {questNo hotelifo} a SK? Morbetauserof (2);



- TA guest can make several bookings in a hotel for different days.
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- The particular from the pa
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.
  - Is {guestNo, hotelNo, date} is a SK? Yes because of (3).
  - Is {questNo totel flo} a SK? Mo betause of (2)



### Assignation of the property of the composition of the property of the property

- A guest can make several bookings in a hotel for different days.
- A guest is not allowed to make more than one booking for the same day even in the different hotels.
- The transfer of the property of the parts a booking can only be need in the name of one guest.
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.
  - Is {guestNo, hotelNo, date} is a SK? Yes because of (3).
  - (2) (greet No hotel Mo) a SK2 Mo betauser of (2)
  - Vis {guéstNo, date} a SK: Yes because of (9).
- Thus {guestNo, hotelNo, date} is no longer a minimal SK and hence cannot be a candidate key.



### BOOKING (quest No., hotel No date, room No.). Exam Help

- A guest can make several bookings in a hotel for different days.
- A guest is not allowed to make more than one booking for the same day even in the different hotels.
- A tooking carnot be in in names. In other mans a booking can only be need in the name of one guest.
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.
  - Is {guestNo, hotelNo, date} is a SK? Yes because of (3).

  - Vis {questNo, date} a SK : Yes because of (SY.
- Thus {guestNo, hotelNo, date} is no longer a minimal SK and hence cannot be a candidate key.
- Now {guestNo, date} is a minimal SK and hence a candidate key.



#### BOOKING(questNo, hotelNo, date, roomNo). Steam Help

- A guest can make several bookings in a hotel for different days.
- A guest is not allowed to make more than one booking for the same day even in the different hotels.
- Appropriation of the infiguration of the parts a booking can only be need in the name of one guest.
- Is {guestNo, hotelNo, date} a minimal SK and hence a candidate key?.
  - Is {guestNo, hotelNo, date} is a SK? Yes because of (3).
  - (2) great No. Hotel Mo) a SK2 Morbetause of (2)
  - Vis {questNo, date} a SK : Yes because of (SY.
- Thus {guestNo, hotelNo, date} is no longer a minimal SK and hence cannot be a candidate key.
- Now {guestNo, date} is a minimal SK and hence a candidate key.
- Note that {hotelNo, date, roomNo} is also a minimal SK and hence a candidate key.



## Assume that a relation screen a R(A,B, C,D) hat only two candidate levs 1p

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## Assume that a relation screen R(A, B, C, D) hat only two candidate levs 1p

• Is in possible that { \alpha\} / tutores.com



## Assume that a relation screen R(A,B,C,D) hat only two candidate level p

• Is it possible that {\A} /s a SK?

Answer: I prossible, otherwise (A, b) is not a candidate key (minimal SK).



## Assume that a relation science Project Exam Help

• Is it possible that {\A} /s a SK?

Answer: I prossible, otherwise (A, b) is not a candidate key (minimal SK).

• Is it with a large of the lar



## Assume that a relation science Project Exam Help

- Is it possible that {*A*} is a SK?

  Answer: Impossible, otherwise (A,B) is not a candidate key (minimal SK).
- Is it pissible mal IB, C} is a SK?

  Answer: B, C} must be a SK because { C | s a care date key.



## Assume that a relation screen R(A,B,C,D) hat only two candidate levs 1p

- Is it possible that { A} /s a SK?

  Answer: I possible, otherwise (A, b) is not a candidate key (minimal SK).
- Is it by stible mail B, C} is a SK?

  Answer: B, S} must be a SK because { E is a carreldate key.
- If it possible that {B, D} is a SK? (tricky)



## Assume that a relation science Project Exam Help

- Is it possible that {A}/s a SK?

  Answer: I prossible, otherwise (A,b) is not a candidate key (minimal SK).
- Is it by stible mail B, C} is a SK?

  Answer: B, S} must be a SK because { E is a carreldate key.
- If it possible that {B, D} is a SK? (tricky)
   Answer: {B, D} cannot be a SK because {B, D} does not has any candidate key as its subset.



## Assume that a relation science Project Exam Help

- Is it possible that {A}/s a SK?

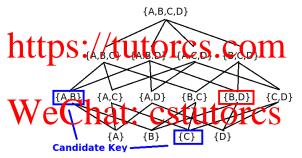
  Answer: I prossible, otherwise (A,b) is not a candidate key (minimal SK).
- Is it by stible mail B, C} is a SK?

  Answer: B, S} must be a SK because { E is a carreldate key.
- If it possible that {B, D} is a SK? (tricky)
   Answer: {B, D} cannot be a SK because {B, D} does not has any candidate key as its subset.



#### Superkey, Candidate key and Primary key – Exercise

### Assigne that a relation is character as R(A, B, C, D) hat only two candidate levs 1p



• If it possible that {B, D} is a SK? (tricky)

**Answer:** {B, D} cannot be a SK because {B, D} does not has any candidate key as its subset.



Assignment Project Exam Help (4) Dorgain constraints, Key constraints, Entity integrity constraints and Referential integrity constraints.





# Assignment Project Exam Help

 Domain constraints: every value in a tuple must be from the domain of its attribute.

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# Assignment Project Exam Help

- Domain constraints: every value in a tuple must be from the domain of its attribute.
  e.g., NTTYPSHAR, TATE, NOT NOT SET COM
- Key constraints: a bunch of keys (superkey, candidate key and primary keys)
   Chat: cstutorcs



# Assignment Project Exam Help

- Domain constraints: every value in a tuple must be from the domain of its attribute.

  e.g., NTTVARSHAR, TATE, NOT NOTE Set COM
- Key constraints: a bunch of keys (superkey, candidate key and primary keys)
   Chat: cstutorcs
- Entity integrity constraints: no primary key value can be NULL.



# Assignment Project Exam Help

- Domain constraints: every value in a tuple must be from the domain of its attribute.

  e.g., NTTVARSHAR, TATE, NOT NOTE Set COM
- Key constraints: a bunch of keys (superkey, candidate key and primary keys)
   Chat: cstutorcs
- Entity integrity constraints: no primary key value can be NULL.



# Assignment an Project, Examue Help

- HOTEL(hotelNo, hotelName, city) with the primary key {hotelNo},
- ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo,
- The file of the fi
- BOOKING(guestNo, hotelNo, date, roomNo).



# Assignment an Project, Examue Help

- HOTEL(hotelNo, hotelName, city) with the primary key {hotelNo},
- PROOM(roomNo, hotelNo, type, price) with the primary key {roomNo,
- GUEST (guestNo, guestName, guestAddress) with the primary key {guestNo}.
- BOOKING(guestNo, hotelNo, date, roomNo).

### • Answer eChat: cstutorcs

ROOM: [hotelNo] ⊆ HOTEL[hotelNo];



## Assignment Project, Example Help

- HOTEL(hotelNo, hotelName, city) with the primary key {hotelNo},
- ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo,

hptelko S // tiltores com Guest (guestNo, guestName, guestAddress) with the primary key

- GUEST (guestNo, guestName, guestAddress) with the primary key {guestNo},
- BOOKING(guestNo, hotelNo, date, roomNo).

### • Answer eChat: cstutorcs

- ROOM: [hotelNo] ⊆ HOTEL[hotelNo];
- BOOKING: [hotelNo] ⊆ HOTEL[hotelNo],
   [guestNo] ⊆ GUEST[guestNo],
   [roomNo, hotelNo] ⊆ ROOM[roomNo, hotelNo].



## Assignment Project, Example Help

- HOTEL(hotelNo, hotelName, city) with the primary key {hotelNo},
- ROOM(roomNo, hotelNo, type, price) with the primary key {roomNo,

hptelko S // tiltores com Guest (guestNo, guestName, guestAddress) with the primary key

- GUEST (guestNo, guestName, guestAddress) with the primary key {guestNo},
- BOOKING(guestNo, hotelNo, date, roomNo).

### • Answer eChat: cstutorcs

- ROOM: [hotelNo] ⊆ HOTEL[hotelNo];
- BOOKING: [hotelNo] ⊆ HOTEL[hotelNo],
   [guestNo] ⊆ GUEST[guestNo],
   [roomNo, hotelNo] ⊆ ROOM[roomNo, hotelNo].



## Assignment Project Exam Help

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 $Assest [hotelNo] \subseteq \text{HotelpotelNo]}; \\ \text{Eventual HotelpotelNo]}; \\ \text{[roomNo, hotelNo]} \subseteq \text{Room[roomNo, hotelNo]}.$ 

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A SSED ROOM: [hotelNo] C HOTELD TELL NO. | COMMON COMMON COMMON (NOTE NO.) C ROOM [room No., hotelNo].

Is it possible to make a booking in the BOOKING relation in the name of a person, who is not listed in the GUEST relation?
 TUDS://tutorcs.com



A SSED ROOM: [hotelNo] C HOTELDOTEINO]: LECTION OF THE COMPONION OF THE CO

Is it possible to make a booking in the BOOKING relation in the name of a person who is not listed in the GUEST relation?

Answer lippossible because neorginal guestion and GUEST (guesting), i.e., the guestino value of BOOKING must exist as a guestino value of GUEST.



A SSED IN [Indexed] & HOTE TO STEP (Indexed) &

- Is it possible to make a booking in the BOOKING relation in the name of a person who is not listed in the GUEST relation?

  Answer: Introssible because new relation?

  Answer: Introssible because new relation?

  GUEST[guestNo], i.e., the guestNo value of BOOKING must exist as a guestNo value of GUEST.
- Is it possible to add a new room in the ROOM relation to a hotel that is not liste why the HOTE Telation? CSTIITOTCS



A SSED IN [Indexed] & HOTE TO STEP (Indexed) &

- Is it possible to make a booking in the BOOKING relation in the name of a person who is not listed in the GUEST relation?

  Answer: Introssible because new relation?

  Answer: Introssible because new relation?

  GUEST[guestNo], i.e., the guestNo value of BOOKING must exist as a guestNo value of GUEST.
- Is it possible to add a new room in the ROOM relation to a hotel that is not lister by the lote peating? CSTUTOTCS
   Answer: Impossible because in ROOM: [hotelNo] ⊆ HOTEL[hotelNo], i.e., the hotelNo value of ROOM must exist as a hotelNo value of HOTEL.



# A SSED IN [Includ] LHOTE IN THE LINE IN TH

- Is it possible to make a booking in the BOOKING relation in the name of a person, who is not listed in the GUEST relation?

  An Mar University of Cause of BOOKING must exist as a guestNo value of GUEST.
- Is it possible to add a new room in the ROOM relation to a hotel that is not lister by the lote peating? CSTUTOTCS
   Answer: Impossible because in ROOM: [hotelNo] ⊆ HOTEL[hotelNo], i.e., the hotelNo value of ROOM must exist as a hotelNo value of HOTEL.
- Is it possible to add a new hotel without any bookings or room information to the ACCOMMODATION database?



### ROOM: [hotelNo] C HOTE TO TEND TEND CONTROL TO THE [roomNo, hotelNo] ⊆ ROOM[roomNo, hotelNo].

- Is it possible to make a booking in the BOOKING relation in the name of a person, who is not listed in the GUEST relation? Answer Lingus ib/e/occuse n Bocking, ques No 1 Guest [guestNo], i.e., the guestNo value of BOOKING must exist as a guestNo value of GUEST.
- Is it possible to add a new room in the ROOM relation to a hotel that is not liste Whythe HOTE Delation? CSTIITOTCS Answer: Impossible because in ROOM: [hotelNo] ⊂ HOTEL[hotelNo], i.e., the hotelNo value of ROOM must exist as a hotelNo value of HOTEL.
- Is it possible to add a new hotel without any bookings or room information to the ACCOMMODATION database?

**Answer**: Possible because none of the attributes in HOTEL(hotelNo, hotelName, city) references to any attribute in ROOM, GUEST and BOOKING.



### ROOM: [hotelNo] C HOTE TO TEND TEND CONTROL TO THE [roomNo, hotelNo] ⊆ ROOM[roomNo, hotelNo].

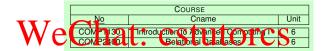
- Is it possible to make a booking in the BOOKING relation in the name of a person, who is not listed in the GUEST relation? Answer Lingus ib/e/occuse n Bocking, ques No 1 Guest [guestNo], i.e., the guestNo value of BOOKING must exist as a guestNo value of GUEST.
- Is it possible to add a new room in the ROOM relation to a hotel that is not liste Whythe HOTE Delation? CSTIITOTCS Answer: Impossible because in ROOM: [hotelNo] ⊂ HOTEL[hotelNo], i.e., the hotelNo value of ROOM must exist as a hotelNo value of HOTEL.
- Is it possible to add a new hotel without any bookings or room information to the ACCOMMODATION database?

**Answer**: Possible because none of the attributes in HOTEL(hotelNo, hotelName, city) references to any attribute in ROOM, GUEST and BOOKING.



### Assignification Problems Exam Help

		Student										
	StudentID	Name	DoB	Email								
1_44	456	Tom	25/01/1988	tom@gmail.com								
nm	458	Pote:	13 05 1995	eter@g n. il. or i								
TILL	469/	Flan	1 17097 + 387	•frankk@gmail.com								



	ENROL											
<u>StudentID</u>	<u>CourseNo</u>	<u>Semester</u>	Status	EnrolDate								
456	COMP2400	2016 S2	active	25/05/2016								
456	COMP1130	2016 S1	active	20/02/2016								
459	COMP2400	2016 S2	active	11/06/2016								



## Assignment Project Exam Help

23/05/1993

11/09/1987

peter@gmail.com

frankk@gmail.com

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	458	COMP1130	2016 S1	active	20/02/2016
	458	COMP2400	2016 S2	active	11/06/2016

Question: Does the above database satisfy the foreign key of ENROL: [StudentID] STUDENT[StudentID]?



## Assignment Project Exam Help

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peter@gmail.com

frankk@gmail.com

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	458	COMP1130	2016 S1	active	20/02/2016
	458	COMP2400	2016 S2	active	11/06/2016

**Question:** Does the above database satisfy the foreign key of ENROL: [StudentID] STUDENT[StudentID]?

Yes.



### Assignment Project Exam Help

23/05/1993

Introduction to Advanced Computing I

Relational Databases

peter@gmail.com

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		150		00	MADOCA	$\overline{}$	20	500	Ī	Ootii		11/06	/2016

Question: Does the above database satisfy the foreign key of ENROL: [CourseNo]⊆ COURSE[No]?



## Assignment Project Fax Help

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		458		CC	MP113	0	201	6 S1		active	20/02/2016
		458		CC	MP360	0	201	6 S2		active	11/06/2016

Question: Does the above database satisfy the foreign key of ENROL:

[CourseNo]⊆ Course[No]?

No, because COMP3600 does not exist as a No value in Course.



### Assignment Project Fax Melp

23/05/1993

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peter@gmail.com frankk@gmail.com

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	COMP2	400		Re	latior	nal Da	tabas	es			6

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Question: Can we delete the first tuple in STUDENT?



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peter@gmail.com

frankk@gmail.com

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		458		CC	MP113	0	2016	S S1	а	ctive	20	0/02/2	2016
		458		CC	MP240	0	2016	S2	а	ctive	1	1/06/2	2016

Question: Can we delete the first tuple in STUDENT?

No, because it will violate the foreign key of ENROL: [StudentID]⊆

STUDENT[StudentID]



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peter@gmail.com

frankk@gmail.com

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<b>* * * (</b>	456	CCMB240	2062	active	25KO: /2016				
	458	COMP1130	2016 S1	active	20/02/2016				
	458	COMP2400	2016 S2	active	11/06/2016				

Question: Can we delete the first tuple in ENROL?

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23/05/1993

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peter@gmail.com

frankk@gmail.com

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<b>* * * *</b>	456	CCMB240	2062	active	25KO: /2016				
	458	COMP1130	2016 S1	active	20/02/2016				
	458	COMP2400	2016 S2	active	11/06/2016				

**Question:** Can we delete the first tuple in ENROL? **Yes.** 

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		458		CC	MP113	0		6 S1	a	active	20/02/	
		458		CC	MP240	0	201	6 S2	a	active	11/06/	2016

Question: Can we update COMP2400 to be COMP6240 in Course?



#### Assignment Project Exam Help tom@gmail.com 22/05/1002

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	COMP2400	Relational Databases	6

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		458		CC	MP113	0		6 S1	a	active	20/02/	
		458		CC	MP240	0	201	6 S2	a	active	11/06/	2016

Question: Can we update COMP2400 to be COMP6240 in Course? No, because it will violate the foreign key of ENROL: [CourseNo]⊂ Course[No].



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peter@gmail.com

frankk@gmail.com

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	458	COMP1130	2016 S1	active	20/02/2016
	458	COMP2400	2016 S2	active	11/06/2016

**Question:** Can we insert a new course COMP3600 Algorithms with 6 units in COURSE?



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peter@gmail.com

frankk@gmail.com

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	COMP2400	Relational Databases	6

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**Question:** Can we insert a new course COMP3600 Algorithms with 6 units in COURSE?

Yes.



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peter@gmail.com

frankk@gmail.com

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**Question:** The foreign key StudentID in Enrol references StudentID in Student. The StudentID values in Enrol must be distinct?



### Assignment Project Exam Help

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* * *	456	COMP 2400	2016 52	active	25/05/2016
	458	COMP1130	2016 S1	active	20/02/2016
	458	COMP2400	2016 S2	active	11/06/2016

**Question:** The foreign key StudentID in Enrol references StudentID in Student. The StudentID values in Enrol must be distinct?

No.



#### Foreign Key (referential integrity) – A Common Pitfall

### ssignment Project Exam Help

ROOM(roomNo, hotelName, type, price) with the primary key {roomNo, hotelName},

BODKING (guest No., date, room No., hotel Name)

	<u> </u> ROOM		
roomNo	hotelName	type	price
01	Sydney	twin	200
02	Sydney	single	100
	Canberr	single	150

	TIOOW					Bool	CINIC	
mNo	hotelName	type	price	1				
					guestNo	date	roomNo	hotelName
)1	Sydney	twin	200		D.4	00/07/0040	20	0 1
)2	Sydney	single	100	1	P1	30/07/2018	02	Sydney
12		Sirigle	100		P2	31/07/2018	01	Canberra
<b>T</b>	Canberr	single	150		· · -	01/01/2010	0.	Odriberia
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#### Foreign Key (referential integrity) – A Common Pitfall

### Assignment Project Exam Help

ROOM(roomNo, hotelName, type, price) with the primary key {roomNo, hotelName},

BOOKING (guest No. date, room No. hotel Name).

HOOM					BOOKING			
roomNo	hotelName	type	price					
10010	1101011101110	1,700	p00		guestNo	o   date	roomNo	hotelName
01	Svdnev	twin	200					
	-,,				P1	30/07/2018	02	Sydney
02	Sydney	single	100		P2	31/07/2018	01	Canberra
	Canberr	single	150	i	F2	31/07/2016	UI	Camberra
	Qui iooyi			44	F==4	0400		

Now we add the following foreign key constraint:

BOOKING[roomNo, hotelName]⊆ROOM[roomNo, hotelName]



### Assignment Project Exam Help

ROOM(roomNo, hotelName, type, price) with the primary key {roomNo, hotelName},

BOOKING (guest No., date, room No., hotel Name).

	I ROOM							
							Booi	KING
roomNo	hotelName	type	price		auestNo	<u>1</u>	date	roomNo
01	Sydney	twin	200	1	3			
00	-,,	******	100	1	P1		30/07/2018	02
02	Sydney	single		1	P2	$\neg$	31/07/2018	01
	Canberr	single	150	L,	<del></del>	_	10.720.0	<u> </u>

Now we add the following foreign key constraint:

- BOOKING[roomNo, hotelName]⊆ROOM[roomNo, hotelName]
- Is the above equivalent to: BOOKING[roomNo]⊆ROOM[roomNo], and BOOKING[hotelName]⊂ROOM[hotelName]?

Sydney
Canberra



### Assignment Project Exam Help

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### Assignment Project Exam Help

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- The above relations satisfy the foreign keys:
  - BOOKING[roomNo]⊆ROOM[roomNo], and
  - BOOKING[hotelName]⊆ROOM[hotelName]



### Assignment Project Exam Help

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Booking												
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- The above relations satisfy the foreign keys:
  - BOOKING[roomNo]⊆ROOM[roomNo], and
  - BOOKING[hotelName]⊆ROOM[hotelName]

but does not satisfy the foreign key:

BOOKING[roomNo, hotelName]⊆ROOM[roomNo, hotelName]



### Assignment Project Exam Help

(v.s. Relation Schema + Integrity Constraints)





#### Data Definition Language – Relation Schema

### Assignment Project Exam Help

Create a relation schema ENROL

• Enrol(StudentID: INT, CourseNo: STRING, Semester: STRING, Status: STRING, Employee DATE)

ENROL
StudentID | CourseNo | Semester | Status | EnrolDate

WeChat: cstutorcs



#### Data Definition Language – Relation Schema

### Assignment Project Exam Help

Create a relation schema ENROL

https://www.fempletaspare.com

ſ			ENROL		
Ī	StudentID	CourseNo	Semester	Status	EnrolDate

• The CREATE TABLE statement is used to create a new relation schema by specifying its name, its attributes and, optionally, its constraints.

```
CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE);
```



### Assignment Project Exam Help

Create a relation schema ENROL

```
https://tutores.com/
StudentID CourseNo Semester Status EnrolData)

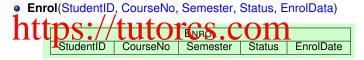
StudentID CourseNo Semester Status EnrolDate
```

WeChat: cstutorcs



### Assignment Project Exam Help

Create a relation schema ENROL



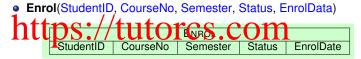
• Can we use the following CREATE TABLE statement to create the above relation schema? CSTUTOTCS

CREATE TABLE Enrol(StudentID, CourseNo, Semester, Status, EnrolDate);



### Assignment Project Exam Help

Create a relation schema ENROL



- Can we use the following CREATE TABLE statement to create the above relation schema? CSTUTOTCS

  CREATE TABLE Enrol(StudentID, CourseNo, Semester, Status, EnrolDate);
- No because the data type is required for each attribute.



### Assignment Project Exam Help

 Enrol(StudentID: INT, CourseNo: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)

https://tutores.com StudentID CourseNo Semester Status EnrolDate

WeChat: cstutorcs



### Assignment Project Exam Help

 Enrol(StudentID: INT, CourseNo: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)



- Which of the following CREATE TABLE statements is/are correct?
  - ORE TE TABLE Enio (Stud Still Lit; Course o VARCHAR(20); Semester VARCHAR(50); Status VARCHAR(50); EnrolDate DATE);
  - CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE,);
  - © CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE),



### Assignment Project Exam Help

 Enrol(StudentID: INT, CourseNo: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)



### WeChat: cstutorcs



### Assignment Project Exam Help

 Enrol(StudentID: INT, CourseNo: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)



None of the following CREATE TABLE statements is correct.

### WeChat: cstutorcs



### Assignment Project Exam Help

 Enrol(StudentID: INT, CourseNo: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)



None of the following CREATE TABLE statements is correct.

```
Semester VARCHAR(50); Status VARCHAR(50), EnrolDate DATE);
```



### Assignment Project Exam Help

 Enrol(StudentID: INT, CourseNo: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)



• None of the following CREATE TABLE statements is correct.

```
Semester VARCHAR(50); Status VARCHAR(50), EnrolDate DATE);
```

CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE,);



### Assignment Project Exam Help

 Enrol(StudentID: INT, CourseNo: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)



None of the following CREATE TABLE statements is correct.

```
Semester VARCHAR(50); Status VARCHAR(50), EnrolDate DATE);
```

- © CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE,);
- © CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE),



# Assignmenta Repoject Exam Help Enrol (StudentID: INT, Course No: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)

Superty / Courte No | Centeste | State | EnrolDate

The correct CREATE TABLE statement

CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semister CMARCHAR(50); EncolDate DATE);



## Assignmenta Repoject Exam Help Enrol (StudentID: INT, Course No: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)

The correct CREATE TABLE statement

```
CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semister (MARCHAR(50)); EncolDate DATE);
```

What about the following two CREATE TABLE statements?

```
create table Enrol(StudentID int, CourseNo varchar(20), Semester varchar(50), Status varchar(50), EnrolDate date); CREATE TABLE enrol(studentiD INT, courseno VARCHAR(20), semester VARCHAR(50), status VARCHAR(50), enroldate DATE);
```



## Assignment permental project Exam Help (StudentID: INT, Course No: STRING, Semester: STRING, Status: STRING, EnrolData: DATE)

### ENROL Superitip/| Opurie (0) Serveste | Shaft | EnrolDate

 PostgreSQL switches CREATE TABLE statements to lower case unless we use double quotes.

```
create table entol(studentid int course o varchar(20), semester varchar(50), states varchar(50), chiolidate date);
```

u1024708=> Column	`Table "public.enrol"	Modifiers
Cotumn	Туре	Modifiers
	+	÷
studentid		I
courseno	character varying(20)	1
semester	character varying(50)	İ
status	character varving(50)	i
enroldate	date	i



### Assignment Project Exam Help

• Can we create two relation schemas with the same name in the same database?

```
CRHATH TABLE Enrol (Student D TYP, Coursen) MRCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE); create table enrol (studentid int, courseno varchar(20), semester varchar(50), status varchar(50), enroldate date); CSTULOTCS
```



### Assignment Project Exam Help

• Can we create two relation schemas with the same name in the same database?

```
CREATE TABLE Enrol (Student I) INT, Coursen WRCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE); create table enrol (studentid int, courseno varchar(20), semester varchar(50), status varchar(50), enroldate date);
```

No With the following error message LUTOTCS

```
u1024708=> create table enrol(studentid int, courseno varchar(20),
u1024708(> semester varchar(50), status varchar(50), enroldate date);
ERROR: relation "enrol" already exists
```



### Assignment Project Exam Help

```
u1024708=> CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE);
CREATE TAILLY / LINE FOR TABLE "Enrol" (StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE);
CREATE TABLE
```

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### Assignment Project Fxam Help

```
u1024708=> CREATE TABLE Enrol(StudentID INT, CourseNo VARCHAR(20),
Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE);
CREATE TABLE "Enrol"(StudentID INT, CourseNo VARCHAR(20),
Semester VARCHAR(50), Status VARCHAR(50), EnrolDate DATE);
CREATE TABLE
CREATE TABLE
```

Yes Involand Enrol are different.

List of relations

Schema | Name | Type | Owner

public | Enrol | table | u1024708
public | enrol | table | u1024708



#### Data Definition Language – Relational Database Schema

## Assignment Project Exam Help

• a set of relation schemas  $S = \{R_1, \dots, R_m\}$ , and

a set of integrity constraints IC.

StudentID Name DoB Email

### WeChat COURSE CO

		ENROL		
StudentID	CourseNo	Semester	Status	EnrolDate



#### **Data Definition Language – Domain Constraints**

### Assignment Project Exam Help



CREATE TAILS STUDENT (StudentID INT, Name VARCHAR(50), DoB Date, Email VACCARCLO)) 131. CSTULOTCS

CREATE TABLE COURSE(No VARCHAR(20), Cname VARCHAR(50), Unit SMALLINT);

CREATE TABLE ENROL(StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50));



#### **Data Definition Language – Key Constraints**

Assignment Project Exam Help



• UNITYE Conclude the constant of the constant

	STUDEN	IT.	
StudentID	Name	DoB	Email



#### **Data Definition Language – Key Constraints**

### Assignment Project Exam Help

```
CREATE TABLE STUDENT

(StudentID INT,

Name VARCHAR (DUITORS.COM)

Email VARCHAR (100),

UNIQUE (StudentID),

VOICE (StudentID, Hear TUTORS

UNIQUE (StudentID, Name),

UNIQUE (StudentID, DoB),

...

UNIQUE (StudentID, Name, DoB, Email));
```



#### **Data Definition Language – Candidate Key**

### Assignment Project Exam Help

- unique: uniquely identify each tuple in a table. Spicify unique for eyery candidate key
- For example, {StudentiD} and {Email} are two candidate keys for STUDENT.

```
CREATE TABLE STUDENT

StudentII 174.1 CSTUTOTCS

Name VARCHAR(50),

DoB Date,

Email VARCHAR(100),

UNIQUE(StudentID),

UNIQUE(Email));
```



### **Data Definition Language – Candidate Key**

#### Assignment Project Exam Help StudentID CourseNo Semester **EnrolDate**

Status

• {Statistic Sursely (Septembre 1) @ San (Octo F) of ENROL.

UNIQUE(StudentID, CourseNo, Semester));

```
CREATE TABLE ENROL
        (StudentID INT ,
         Course of TVARCHAR (20).
Sense ter VARCHAR (50 CStutorcs
         Status VARCHAR(50),
         EnrolDate DATE,
```



### Assignment Project Exam Help

- PRIMARY KEY: Specify PRIMARY KEY the primary key.
- For example Student D and Email Sre wo Cand date keys for STUDENT, and {StudentID} is selected as the primary key.

```
CREATE TABLE STUDENT

VISITAL INT. CSTUTOTCS

DOB Date,
Email VARCHAR(100),
PRIMARY KEY(StudentID),
UNIQUE(Email));
```



### Assignment Project Exam Help

**EnrolDate** 

Status

• {Sinenting Surse Not sent to 1 to Spring Ving Enrol.

StudentID CourseNo Semester

```
CREATE TABLE ENROL
```

(StudentID INT ,

### Vourselle VARCHAR (20). Selecter VARCHAR (50 CStutorcs

Status VARCHAR(50), EnrolDate DATE.

PRIMARY KEY(StudentID, CourseNo, Semester));



## Assignment Project Exam Help

• Calvet to lect multiple primary keys for the same relation schema?

CREATE TABLE STUDENT

(StudentID INT,

Name VARCHAR(50),

We have the total continuous continuo



## Assignment Project Exam Help

CREATE TABLE STUDENT

(StudentID INT,

Name VARCHAR(50),

OB Pate 1.

PRIMARY KEY(StudentID),

PRIMARY KEY(Email));

 No because multiple primary keys for the same relation schema are not allowed



#### **Data Definition Language – Candidate Key**

## Assignment Project Exam Help

• Calvet de multiple UNIQUE constraints for the same relation schema?

CREATE TABLE STUDENT

(StudentID INT,

Name VARCHAR(50),

We construct the same relation schema?

UNIQUE (StudentID),

UNIQUE (StudentID),

UNIQUE (Email));



#### **Data Definition Language – Candidate Key**

## Assignment Project Exam Help

CREATE TABLE STUDENT

(StudentID INT,

Name VARCHAR(50),

We complete the Constraints for the same relation schema?

(StudentID INT,

Name VARCHAR(50),

UNIQUE(StudentID),

UNIQUE(Email));

 Yes because multiple candidate keys (or superkeys) for the same relation schema are allowed.



## Assignment Project Exam Help • Entity integrity constraints: no primary key value can be NULL.

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## Assignment Project Exam Help

Can the StudentID value be NULL?

```
CourseNo VARCHAR(20),
Semester VARCHAR(50),
Status VARCHAR(50),

We enrolled Date C Stutores

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```



## Assignment Project Exam Help • Entity integrity constraints: no primary key value can be NULL.

Can the StudentID value be NULL?

```
CourseNo VARCHAR(20),
Semester VARCHAR(50),
Status VARCHAR(50),
Vencoles Date Stutors
PRIMARY KEY (Student ID. CourseNo. Semester)):
```

• No. None of the columns listed in the primary key can be NULL.



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## Assynatabout UNIQUE dens parts ject Exam Help

```
CREATE TABLE STUDENT

(StudentID INT,

TO She WARTHALEOTCS.COM

DOB Date,

Email VARCHAR(100),

UNIQUE(StudentID),

We Charter Community Control Community Community Control Community Com
```



## Assynatabout UNIQUE dens parts ject Exam Help

CREATE TABLE STUDENT

(StudentID INT,

Dob Date,

Email VARCHAR(100),

UNIQUE(StudentID),

We (NIGHE(Email))

CStutorcs

• In PostgreSQL, two NULL values are not considered equal. That means even in the presence of a unique constraint it is possible to store duplicate rows that contain a null value in at least one of the constrained columns.
But other SQL databases might not follow this rule and be careful when developing applications that are intended to be portable.



### Data Definition Language – Referential Integrity

## Assignment Project Exam Help

columns) in one table must match the values appearing in some row of another table.

```
CREATE ARE TO SUT Stidents OF CREATE THE VARCHAR (50), DOB Date, Email VARCHAR (100));
```

CREATE TABLE COURSE No VARCHAR (20) PRIMARY KEY, Cname VARCHAR (50), Unit SMALLY Chat: CStutores

CREATE TABLE ENROL (StudentID INT, CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50));

- Every StudentID appearing in ENROL must exist in STUDENT.
- Every CourseNo appearing in ENROL must exist in COURSE.



### **Data Definition Language – Foreign Key**

CREATE TABLE STUDENT Project Exam Help DoB Date, Email VARCHAR(100)); ABIE Surse/tutores.com Cname VARCHAR(50), Unit SMALLINT): at: cstutorcs StudentID INT. CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50). FOREIGN KEY(StudentID) REFERENCES STUDENT(StudentID), FOREIGN KEY(CourseNo) REFERENCES COURSE(No));



### Data Definition Language – Foreign Key

CREATE TABLE STUDENT Profect Exam Help DoB Date, Email VARCHAR(100)); ABIE SURSE/TUTORCS Does (StudentID) in VARCHAR (20) PRIMARY KEY, Primary Lova Contraction primary key of STUDENT? Cname VARCHAR(50), Unit SMALLINT): at: cstutorcs StudentID INT. CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50). FOREIGN KEY(StudentID) REFERENCES STUDENT(StudentID), FOREIGN KEY(CourseNo) REFERENCES COURSE(No));



### Data Definition Language – Foreign Key

CREATE TABLE STUDENT Project Exam Help DoB Date. Email VARCHAR(100)); ABIE SURSE/TUTORCS Does (StudentID) in VARCHAR (20) PRIMARY KEY, primary key of STUDENT? Cname VARCHAR(50), Answer: In PostgreSQL, Unit SMALLINT): at: cstuto [StudentID] in Student at: cstuto [Student] in Student at key or form a unique StudentID INT. constraint. CourseNo VARCHAR(20), Semester VARCHAR(50), Status VARCHAR(50). FOREIGN KEY(StudentID) REFERENCES STUDENT(StudentID), FOREIGN KEY(CourseNo) REFERENCES COURSE(No));



### Attribute Constraints – Foreign Key

Assigiant Parchar (20) Piect Exam Help

Semester VARCHAR(50), Status VARCHAR(50),

FOREIGN KEY (StudentID) REFERENCES STUDENT (StudentID),
FOREIGN KEY (StudentID) REFERENCES COLLEGNO):

CREATE TABLE STUDENT

StudentID INT PRIMARY KEY,

 Can we define ENROL before STUDENT and COURSE?

Var (VAR CHARGET): CSTUTORCS

Email VARCHAR(100));

CREATE TABLE Course

(No VARCHAR(20) PRIMARY KEY, Cname VARCHAR(50), Unit SMALLINT);



### **Attribute Constraints – Foreign Key**

Assigi Course No VARCHAR (20) PIET, Project Exam Help

Semester VARCHAR(50), Status VARCHAR(50),

FOREIGN KEY (StudentID) REFERENCES STUDENT (StudentID), FOREIGN KEY (StudentID) REFERENCES (OLISE NO));

CREATE TABLE STUDENT

StudentID INT PRIMARY KEY,

What (VARCHARGE): CStute

Email VARCHAR(100));

CREATE TABLE COURSE

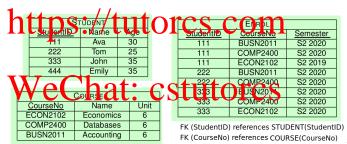
(No VARCHAR(20) PRIMARY KEY, Cname VARCHAR(50), Unit SMALLINT);  Can we define ENROL before STUDENT and COURSE?

the foreign keys that reference STUDENT and COURSE.



# A CREATE INTEX CISTILICE AT INTECR THE EXPERITED OF THE E

In PostgreSQL, the index methods include B-tree, hash and others.

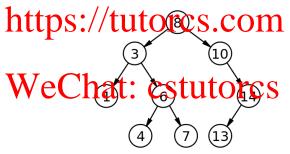


https://www.postgresql.org/docs/12/sql-createindex.html



## ACREATE INPEX constituct Partindipage the Enexified poluments of partindipage the Enex

How to use 'B-tree' (binary search tree) to construct an index?

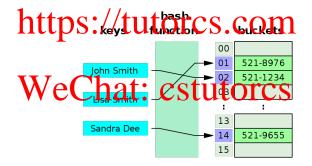


https://en.wikipedia.org/wiki/Binary\_search\_tree



## A CREATE INDEX construction index on the specified columnts) of the specified Habitant Project Exam Help

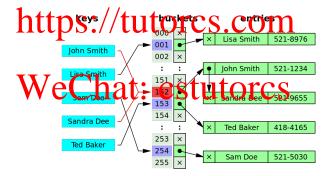
How to use 'Hash Function' to construct an index?





## A CREATE INDEX construction index on the specified columnts) of the specified Habitant Project Exam Help

How to use 'Hash Function' to construct an index?





(credit cookie) René Descartes and the Cartesian Product

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https://en.wikipedia.org/wiki/Ren%C3%A9\_Descartes



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