



Australian
National
University

程序代写代做 CS编程辅导



Relational Data Model – Part 2

WeChat: cstutorcs

Integrity Constraints

Assignment Project Exam Help

Email: tutorcs@163.com

QQ: 749389476

<https://tutorcs.com>



程序代写代做 CS编程辅导 Integrity Constraints over Relations



- Constraints are **constraints** must hold on *all* relations in a database state.

WeChat: cstutorcs

- The *main types* of constraints in the relational data model include:

Assignment Project Exam Help

1 **Domain constraints**;

Email: tutorcs@163.com

2 **Key constraints**;

QQ: 749389476

3 **Entity integrity constraints**;

<https://tutorcs.com>

4 **Referential integrity constraints**.



程序代写代做 CS编程辅导 (1) Domain Constraints



- Every value in a tuple must be from the **domain of its attribute**.

- INT
- VARCHAR
- DATE
- SMALLINT
- NOT NULL

WeChat: estutorcs

Assignment Project Exam Help

Email: tutorcs@163.com

QQ: 749389476

<https://tutorcs.com>



(2) Key Constraints - Observation



- We observe that: **data occur independently from one another within individual records**
- No two students have the same student ID:

WeChat: cstutorcs

STUDENT			
StudentID	Name	DoB	Email
456	Tom	25/01/1988	tom@gmail.com
458	Peter	20/02/1986	peter@gmail.com
459	Fran	11/09/1987	frankk@gmail.com
...

Assignment Project Exam Help

Email: tutorc@163.com

- No two enrolments have the same student ID, the same course number in the same semester: **QQ: 749389476**

https://tutorcs.com

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
...



程序代写代做 CS编程辅导 (2) Key Constraints - Definitions



- Let $R(A_1, \dots, A_n)$ be a schema.
- A **superkey** SK of R is a subset of attributes of R , i.e., $SK \subseteq \{A_1, \dots, A_n\}$, such that
 - no two distinct tuples in $r(R)$ can have the same value for SK .
- A superkey SK of R is **minimal** if there is no other superkey $SK' \subset SK$ held on R . A minimal superkey is also known as a **candidate key**.
- A **primary key** PK of R is a minimal superkey of R , (i.e., a primary key is one of the candidate keys). If a relation has only one candidate key then that would be the primary key.

WeChat: cstutorcs

Assignment Project Exam Help

Email: tutores@163.com

QQ: 749389476

https://tutores.com



(2) 程序代写代做 CS编程辅导 Key Constraints - Example



STUDENT			
StudentID		DoB	Email
456	Idin	25/01/1988	tom@gmail.com
458	Peter	23/05/1993	peter@gmail.com
459	Fran	11/09/1987	frankk@gmail.com
460	Tyrion	11/09/1987	tyrion@hotmail.com

Assignment Project Exam Help

- Is {DoB} a superkey of STUDENT? **No!**
- Is {StudentID, DoB} a superkey of STUDENT? **Yes!**
- Is {StudentID, DoB} a candidate key of STUDENT? **No!**
- Is {StudentID} a candidate key of STUDENT? **Yes!**
- Can {StudentID} be chosen as a primary key of STUDENT? **Yes!**
- Can {DoB} be chosen as a primary key of STUDENT? **No!**

Email: tutor@163.com

QQ: 749389476

https://tutorcs.com



程序代写代做 CS编程辅导
(2) Key Constraints - Example



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
458	COMP1130	2015 S1	inactive	20/02/2015

Email: tutorcs@163.com

QQ: 749389476

- Is {CourseNo, Semester} a superkey of ENROL? **No!**
- Is {StudentID, CourseNo, Semester} a candidate key of ENROL? **Yes!**
- Can {StudentID, CourseNo} be chosen as a primary key of ENROL? **No!**

<https://tutorcs.com>



程序代写代做 CS编程辅导 (3) Entity Integrity Constraints



- Specifying a primary key **invokes** the entity integrity constraint.
- **null** is a special value, which represents the value of an attribute that may be unknown or inapplicable.
WeChat: cstutorcs
- The **entity integrity constraint** states that **no primary key value can be NULL**.
Assignment Project Exam Help
Email: tutorcs@163.com
QQ: 749389476
- **Note:** Other attributes of R may be constrained to disallow null values, even though they are not attributes in the primary key.
<https://tutorcs.com>



(3) Entity Integrity Constraints – Example



- If STUDENTID is specified as the primary key of STUDENT, then the following relation violates the entity integrity constraint.

WeChat: cstutorcs

Assignment Project Exam Help

Email: tutorms@163.com

STUDENT			
StudentID	Name	DoB	Email
456	Tom	25/01/1988	tom@gmail.com
NULL	Peter	23/05/1993	peter@gmail.com
459	Fran	10/09/1987	frank@gmail.com

- How about the case when EMAIL is the primary key of STUDENT?

https://tutorcs.com

Answer: The relation does not violate the entity integrity constraint.



程序代写代做 CS编程辅导

(4) Referential Integrity Constraints - Observation

- We observe that: **data do not occur independently from one another across relations.**
- Every course number appearing in ENROL must exist in COURSE:



WeChat: cstutors

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

Assignment Project Exam Help

Email: tutors@163.com

COURSE		
No	Cname	Unit
COMP1130	Introduction to Advanced Computing I	6
COMP2400	Relational Databases	6

QQ: 749389476

https://tutors.com

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



程序代写代做 CS编程辅导

(4) Referential Integrity Constraints - Definition



- We use $t[A]$ to denote the value of attribute A in tuple t .

Example: For the tuple $t = \text{Fran}, 11/09/1987, \text{frankk@gmail.com}$,
 $t[\text{Name}] = \text{Fran}$ and $t[\text{Date}] = 11/09/1987$.

- A **referential integrity constraint** specifies a reference between **two** relations, while the previous constraints involve **only one** relation.
- Let R_1 and R_2 be relation schemas in a database schema S , and R_2 has the primary key $\{B_1, \dots, B_n\}$.
- A **foreign key** on R_1 is a statement $[A_1, \dots, A_n] \subseteq R_2[B_1, \dots, B_n]$ restricting states of S to satisfy the following property:
 - for each tuple $t \in r(R_1)$ there exists a tuple $t' \in r(R_2)$ with $t[A_i] = t'[B_i]$ for $i = 1, \dots, n$.
- R_1 is called the **referencing relation** and R_2 is called the **referenced relation**.



程序代写代做 CS编程辅导

(4) Referential Integrity Constraints – Example

- What foreign keys can be established in the database STUENROL?



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

Assignment Project Exam Help

COURSE		
No	Cname	Unit
COMP1130	Introduction to Advanced Computing I	6
COMP2400	Relational Databases	6

QQ: 749389476

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

<https://tutors.com>



程序代写代做 CS编程辅导

(4) Referential Integrity Constraints – Example



- In this case, we can find the following foreign keys on ENROL:

① $[CourseNo] \subseteq COURSE[No]$;

② $[StudentID] \subseteq STUDENT[StudentID]$.

WeChat: cstutorcs

Assignment Project Exam Help

- This database state satisfies the above two foreign keys because

Email: tutorcs@163.com

- for each tuple t_1 in ENROL, there is a tuple t_2 in COURSE such that the CourseNo value in t_1 is the same with the No value in t_2 ;

QQ: 749389476

- for each tuple t_1 in ENROL, there is a tuple t_2' in STUDENT such that the StudentID value in t_1 is the same with the StudentID value in t_2' .

<https://tutorcs.com>



程序代写代做 CS编程辅导

(4) Referential Integrity Constraints – Question

- If the database STUDENT is slightly changed as follows, does this database still satisfy the foreign key constraints in the previous example?



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

Assignment Project Exam Help

COURSE		
No	Course	Unit
COMP1130	Introduction to Advanced Computing I	6
COMP2400	Relational Databases	6

QQ: 749389476

ENROL				
StudentID	CourseNo	Semester	Status	EnrolDate
456	COMP2400	2016 S2	active	25/05/2016
458	COMP1130	2016 S1	active	20/02/2016
459	COMP2600	2016 S2	active	11/06/2016

https://tutors.com

Email: tutors@163.com



(4) Referential Integrity Constraints – Question

Answer: The following table does not satisfy the foreign key of
ENROL: [CourseNo] **[No].**



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

COURSE		
No	Course	Unit
COMP1130	Introduction to Advanced Computing I	6
COMP2400	Relational Databases	6

ENROL				
StudentID	CourseNo	Semester	Status	EnrolDate
456	COMP2400	2016 S2	active	25/05/2016
458	COMP1130	2016 S1	active	20/02/2016
459	COMP2600	2016 S2	active	11/06/2016



程序代写代做 CS编程辅导

Constraint Violations



- There are three basic operations that can change a database state:
 - Insert**: insert one or more new tuples in a relation;
 - Delete**: delete tuples in a relation;
 - Update** (or **Modify**): change the values of attributes in existing tuples.
- Whenever these operations are applied, the integrity constraints specified in a database schema **should not be violated**.
- However,
 - Insert may violate ...
 - Delete may violate ...
 - Update may violate ...

WeChat: cstutorcs

Assignment Project Exam Help

Email: tutorms@163.com

QQ: 749389476

<https://tutorms.com>