MONASH University

MONASH INFORMATION TECHNOLOGY

程序代写代做CS编程辅导

Creating & Populating a Database – Data Definition Language

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FIT2094

GROUP OF EIGHT AUSTRALIA

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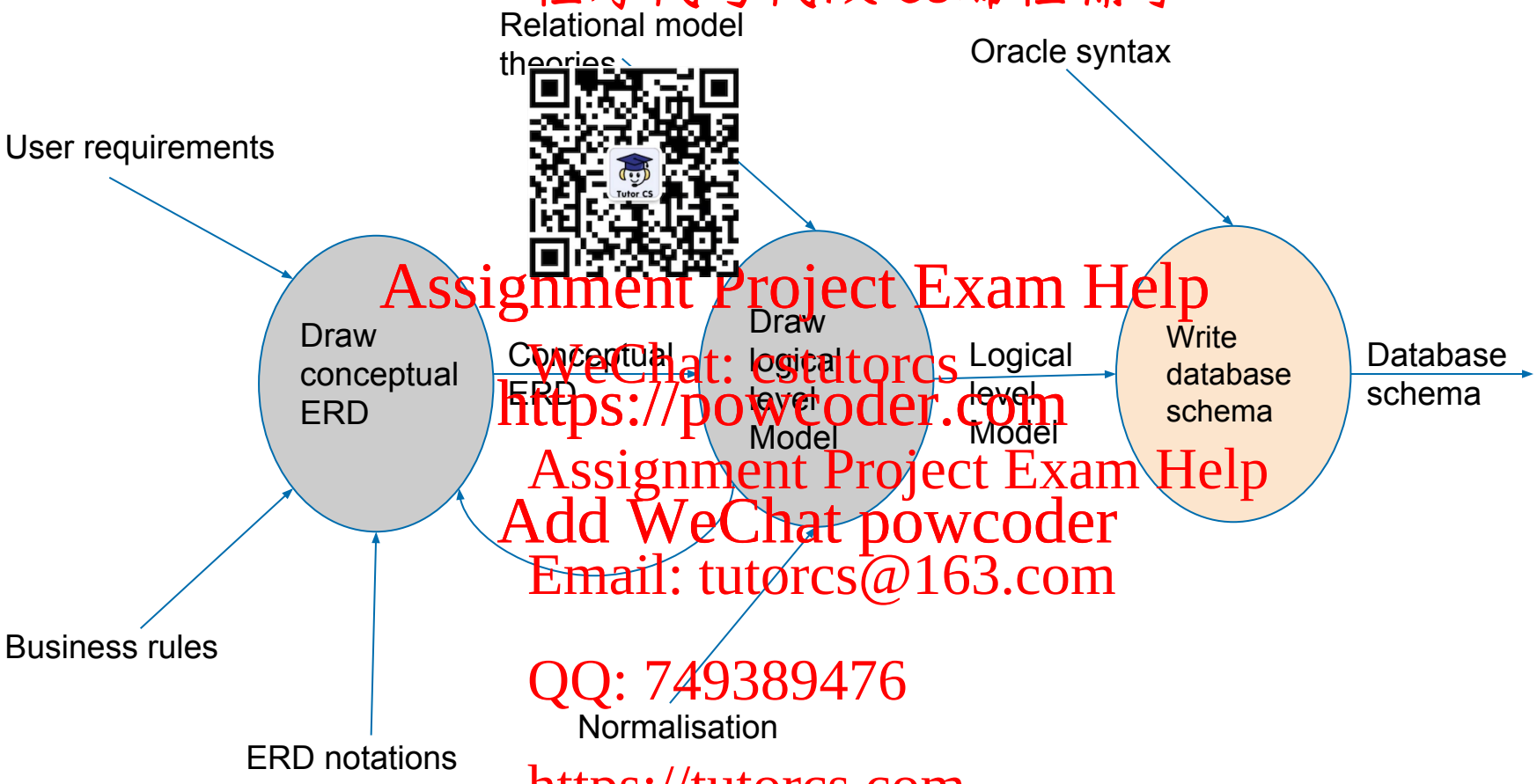

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SQL general syntax

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- A single statement ends with SEMICOLON.
- Predefined KEYWORDS represent clauses (components) of a statement.
- Keywords are NOT case sensitive.
- Examples:

```
CREATE TABLE unit
  (
    unit_code   CHAR(7)  NOT NULL
    unit_name   VARCHAR2(50) CONSTRAINT uq_unit_name UNIQUE NOT NULL,
    CONSTRAINT pk_unit PRIMARY KEY (unit_code)
  );
SELECT * FROM student;
```

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SQL Statements

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- Data Definition Language (DDL)
  - Creating database schema.
    - CREATE TABLE, ALTER TABLE, DROP TABLE
- Data Manipulation Language (DML)
  - Adding and Manipulating database contents (rows).
    - INSERT, UPDATE, DELETE
  - Retrieving data from database
    - SELECT
- Data Control Language (DCL)
  - GRANT

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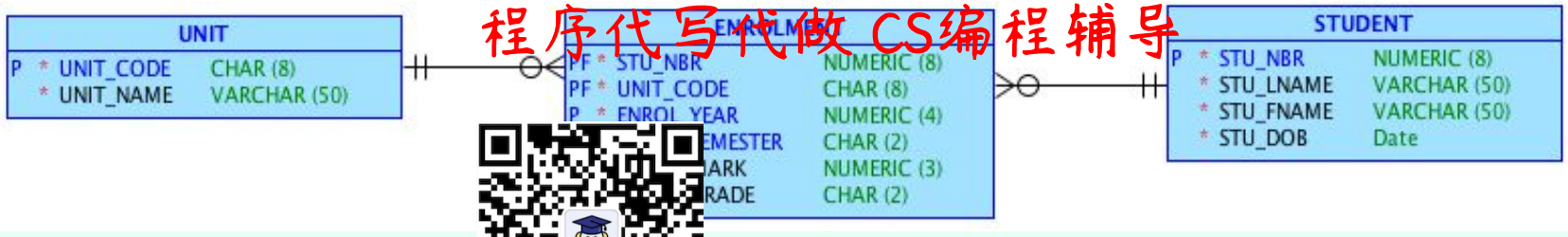

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Q1. There are a numb ness rule represented by the above model. Choose the statement(s) according to the diagram.

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A. A student enrols in a maximum of one unit.

B. An enrolment record is created for a particular student of a unit in a given semester and year.

C. A student can have more than one grade for a given unit.

D. A unit can only have a single student enrolled.

E. More than one option in a to d is correct.

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CREATE A TABLE (DDL)

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```
CREATE TABLE STUDENT (
        stu_nbr      NUMBER(6)  NOT NULL,
        stud_lna     HAR2(50)   NOT NULL,
        stud_fna     HAR2(50)   NOT NULL,
        stu_dob                 NOT NULL,
        CONST        JDENT_PK PRIMARY KEY (stu_nbr)
);
```

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Q2. What relational model component(s) is/are defined in the above create table statement?

A. Relation, Attribute, Domain
B. Primary Key
C. Foreign Key
D. Referential Integrity constraint
E. All of the options in a-d are correct.
F. Some of the options in a-d are correct.

Common ORACLE data types

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- **Text:** CHAR(size), VAR(size)
  - e.g., CHAR(10), V(10)
  - CHAR(10) → 'app'
  - VARCHAR2(10) → 'apple' != 'apple'
- **Numbers:** NUMBER(precision,scale)
  - Weight NUMBER(7) or NUMBER(7,0) → Weight = 7456124
  - Weight NUMBER(9,2) → Weight = 7456123.89
  - Weight NUMBER(8,1) → Weight = 7456123.9
- **Data/Time:** DATE, TIMESTAMP
  - DATE can store a date and time (time to seconds), stored as Julian date
  - TIMESTAMP can store a date and a time (up to fractions of a second)
  - TIMESTAMP WITH TIME ZONE

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Column VS Table Level Constraints

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```
CREATE TABLE STUDENT
        stu_nbr   NUMBER(6)  NOT NULL,
        stud_lname  VARCHAR2(50) NOT NULL,
        stud_fname  VARCHAR2(50)  NOT NULL,
        stu_dob   DATE NOT NULL,
        CONSTRAINT STUDENT_PK PRIMARY KEY(stu_nbr)
);
```

column constraints

table constraint

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Q3. What would be the order of the CREATE TABLE statements in the schema script to successfully create a database based on the above diagram? (assuming that we will define the FK as part of the create table statement)

A. UNIT, ENROLMENT, STUDENT
B. ENROLMENT, STUDENT, UNIT
C. STUDENT, UNIT, ENROLMENT
D. UNIT, STUDENT, ENROLMENT
E. More than one option is correct

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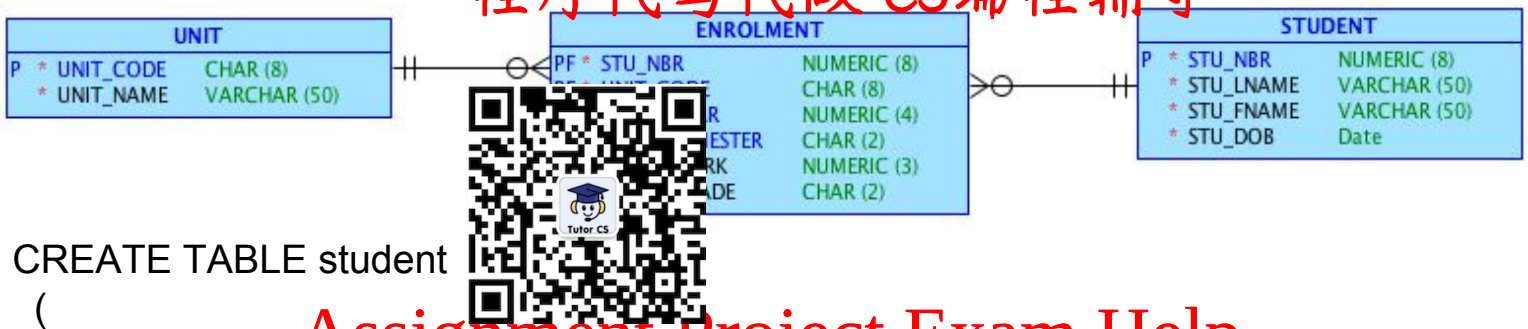


```
CREATE TABLE student
 (
   stu_nbr       NUMBER(8)      NOT NULL,
   stu_lname     VARCHAR(50)    NOT NULL,
   stu_fname     VARCHAR(50)    NOT NULL,
   stu_dob       DATE           NOT NULL,
   CONSTRAINT pk_student PRIMARY KEY (stu_nbr)
 );

CREATE TABLE unit
 (
   unit_code     CHAR(8)        NOT NULL,
   unit_name     VARCHAR(50) CONSTRAINT uq_unit_name UNIQUE NOT NULL ,
   CONSTRAINT pk_unit PRIMARY KEY (unit_code)
 );
```

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Q4. How many foreig K) will be in the database when the three tables are created?

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A. 1.
B. 2.
C. 3.
D. 4.

During discussion, name the attribute(s) that will be assigned as FK and what table(s) would it "link"?

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```
CREATE
  TABLE enrolment
  (
    stu_nbr             NUMBER(8)       NOT NULL,
    unit_code           CHAR(8)         NOT NULL,
    enrol_year          NUMBER(4)       NOT NULL,
    enrol_semester          CHAR(2)         NOT NULL,
    enrol_mark              NUMBER(3),
    enrol_grade             CHAR(2),
    CONSTRAINT pk_enrolment PRIMARY KEY (stu_nbr, unit_code, enrol_year, enrol_semester),
    CONSTRAINT fk_enrolment_student FOREIGN KEY (stu_nbr) REFERENCES student (stu_nbr),
    CONSTRAINT fk_enrolment_unit FOREIGN KEY (unit_code) REFERENCES unit (unit_code)
  );
```

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Alternative method of defining FKs

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```
CREATE
  TABLE enrolment
  (
    stu_nbr             NUMBER(8)       NOT NULL,
    unit_code           CHAR(8)         NOT NULL,
    enrol_year          NUMBER(4)       NOT NULL,
    enrol_semester      CHAR(2)         NOT NULL,
    mark                NUMBER(3),
    grade               CHAR(2),
    CONSTRAINT pk_enrolment PRIMARY KEY
            (stu_nbr, unit_code, enrol_year, enrol_semester)
  );

ALTER TABLE enrolment
    ADD
        ( CONSTRAINT fk_enrolment_student FOREIGN KEY (stu_nbr)
        REFERENCES student ( stu_nbr),
        CONSTRAINT fk_enrolment_unit FOREIGN KEY (unit_code) REFERENCES unit
                        (unit_code));
```

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Referential Integrity

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- To ensure referential [illegible] QL defines three possible actions for FKs in relations when a dele[illegible]mary key occurs:
  - RESTRICT (Orac[illegible]n basically equivalent)
    - Deletion of t[illegible]T ALLOWED for those tuples in the table referred by the FK (the table containing PK) if there is corresponding tuple in the table containing the FK.
  - CASCADE
    - A deletion of a tuple in the table referred by the FK (the table containing PK) will result in the deletion of the corresponding tuples in the table containing the FK.
  - NULLIFY
    - A deletion of a tuple in the table referred by the FK (the table containing PK) will result in the update of the corresponding tuples in the table containing the FK to NULL.

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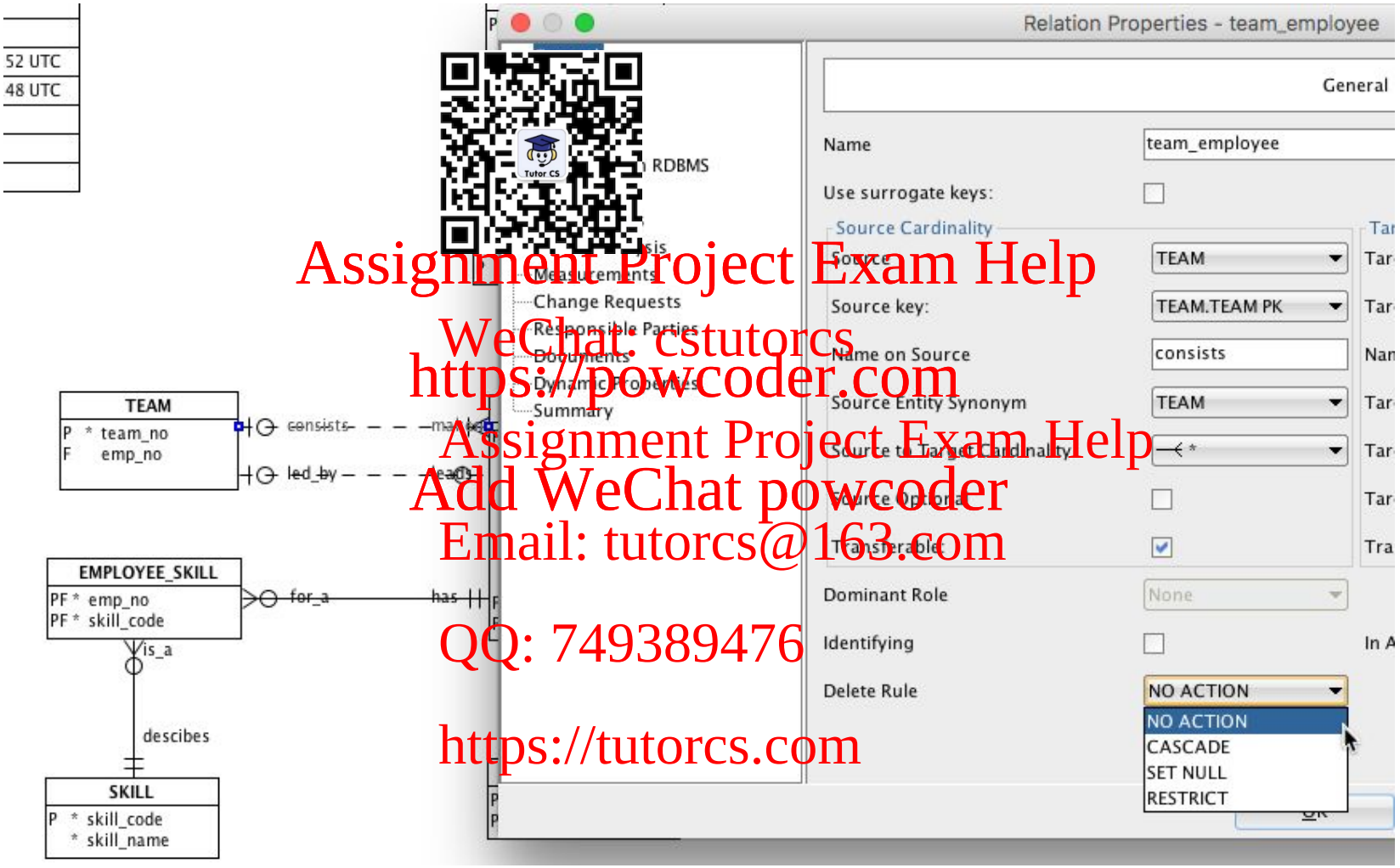

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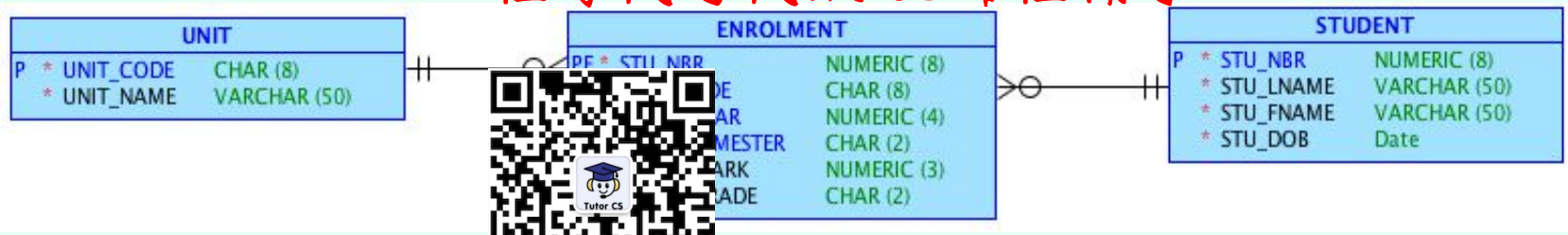

Q5. Assume that the table ENROLMENT contains enrolment details for students in FIT2094 and FIT2001. The referential integrity constraint is CASCADES. What would happen to tuples in ENROLMENT with the unit_code='FIT2094' when we delete the FIT2094 record from UNIT?

A. They will be deleted.

B. The value of unit_code will be updated to NULL.

C. The deletion is not possible, the DBMS will prevent the deletion.

D. None of the above.

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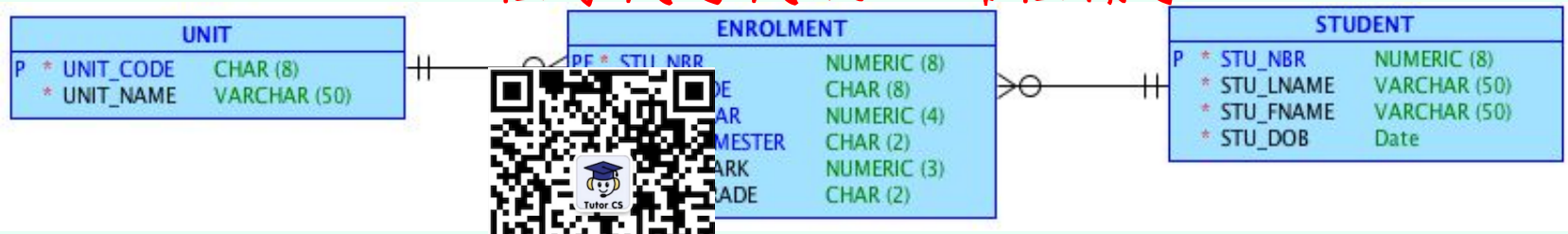

Q6. What would happen to the student record with stu_nbr='1234' in the STUDENT table when we delete all tuples with stu_nbr='1234' in the ENROLMENT table? (Assume referential integrity is CASCADE constraints.)

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A. Student record with stu_nbr='1234' in the STUDENT table will be deleted.

B. Nothing will happen to the STUDENT table.

C. The stu_nbr='1234' in the STUDENT table will be updated to NULL.

D. Deletion will not be permitted by the DBMS.

What Referential Integrity Constraint to implement?

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- Use the model to decide on what referential integrity constraint to implement.
  - Mandatory vs Optional participation.
- The constraints must be decided at the design phase.

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Q7. What referential integrity constraint could be implemented according to the above model for the FKs in the PROJECT table without violating the business rules depicted in the model?

A. NULLIFY
B. CASCADE
C. RESTRICT
D. b and c are correct.
E. a, b and c are correct.

ALTER TABLE

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- Used to change a table structure.
- For example:
  - Adding column(s).
  - Removing column(s).
  - Adding constraint(s).
  - Removing constraint(s).

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```
ALTER TABLE student
   ADD (stu_address varchar(200),
        status      char(1) DEFAULT  'C',
        constraint status_chk CHECK (status in ('G','C'))
          );
```

Referential Integrity Definition - Example

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```
ALTER TABLE enrolment
      DROP CONSTRAINT fk_enrolment_student;

ALTER TABLE enrolment
      DROP CONSTRAINT fk_enrolment_unit;


ALTER TABLE enrolment
   ADD
        ( CONSTRAINT fk_enrolment_student FOREIGN KEY (stu_nbr)
        REFERENCES student ( stu_nbr) ON DELETE CASCADE,

        CONSTRAINT fk_enrolment_unit FOREIGN KEY (unit_code) REFERENCES unit
                    (unit_code) ON DELETE CASCADE
         );
```

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DELETING A TABLE

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- Use the DROP statement.
- Examples:
  - `DROP TABLE enrolment PURGE;`
  - `DROP TABLE student CASCADE CONSTRAINTS PURGE;`

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ADDING TUPLES/ENTER DO A TABLE (DML)

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INSERT

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- Adding data to a table in a database.
- SYNTAX:

INSERT INTO *table [(column [, column...])]*
VALUES *(value [, value...]);*

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```
INSERT INTO unit VALUES ('FIT2094', 'Databases');
INSERT INTO student VALUES (112233, 'Wild',
            'Wilbur', '01-Jan-1995')
```

Role of: to_date and to_char

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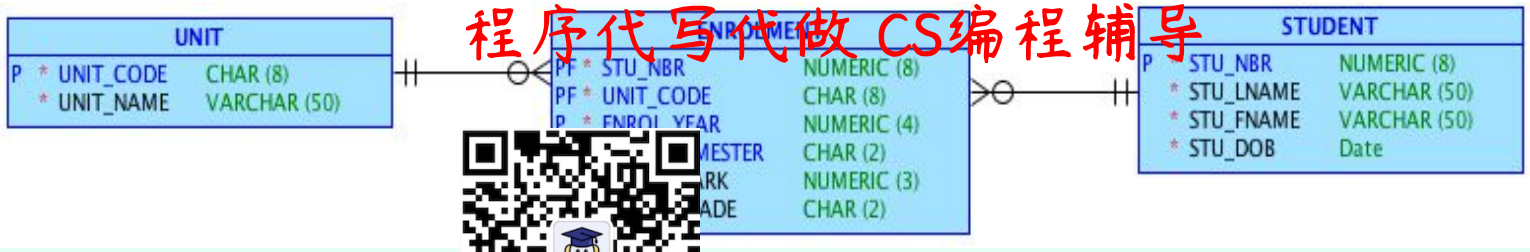

Q8. Assume the tables have been created with primary and foreign key constraints and there is no data currently in the tables. In what order should we populate the table?

A. UNIT- > ENROLMENT -> STUDENT

B. STUDENT -> ENROLMENT -> UNIT

C. STUDENT -> UNIT -> ENROLMENT

D. More than one option is correct.

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COMMIT and ROLLBACK

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```
INSERT INTO enrolme[illegible]S (112233,
                'F[illegible]1,2018,45,'N');
INSERT INTO enrolme[illegible]S (112233,
                'FIT2001',1,2018,80,'HD');
COMMIT;
```

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COMMIT makes the changes to the database permanent.

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ROLLBACK will undo the changes.

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Using a SEQUENCE

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- Oracle supports auto-[illegible] of a numeric PRIMARY KEY.
  - SEQUENCE.
- Steps to use:
  - Create sequence

```
CREATE SEQUENCE sno_seq
INCREMENT BY 1;
```

  - Access the sequence using two built-in variables (pseudocolumns):
    - NEXTVAL and CURRVAL
      -

```
INSERT INTO student
VALUES(sno_seq.nextval, 'Bond','James',
       '01-Jan-1994');
```

      -

```
INSERT INTO enrolment
VALUES(sno_seq.currval,'FIT2094',...');
```

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Q9. Two new students and their enrolment details need to be added, James Bond wants to enrol in FIT2094 and FIT2001, Bruce Lee only wants to enrol in FIT2094. The sequence for sno is called sno_seq. What problems, if any, exist in the script:

```
-- Add two students
INSERT INTO student VALUES (sno_seq.nextval,'Bond','James','01-Jan-1994');
INSERT INTO student VALUES (sno_seq.nextval,'Lee','Bruce','01-Feb-1994');
-- Add the enrolments
INSERT INTO enrolment VALUES (sno_seq.currval,1,2018,'FIT2094',0,'NA');
INSERT INTO enrolment VALUES (sno_seq.currval,1,2018,'FIT2001',0,'NA');
INSERT INTO enrolment VALUES (sno_seq.currval,1,2018,'FIT2094',0,'NA');
COMMIT;
```

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A. There will be an error message. It states that a violation of primary key constraints in the ENROLMENT has occurred.
B. Bruce Lee will be enrolled in FIT2001.
C. There will be NO enrolment record for James Bond.
D. All of the options a-c are problems that will be caused by the script.
E. Some of the options in a-c are problems that will be caused by the script.
F. There will be no problem caused by the script.

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PUTTING THIS TO WORK

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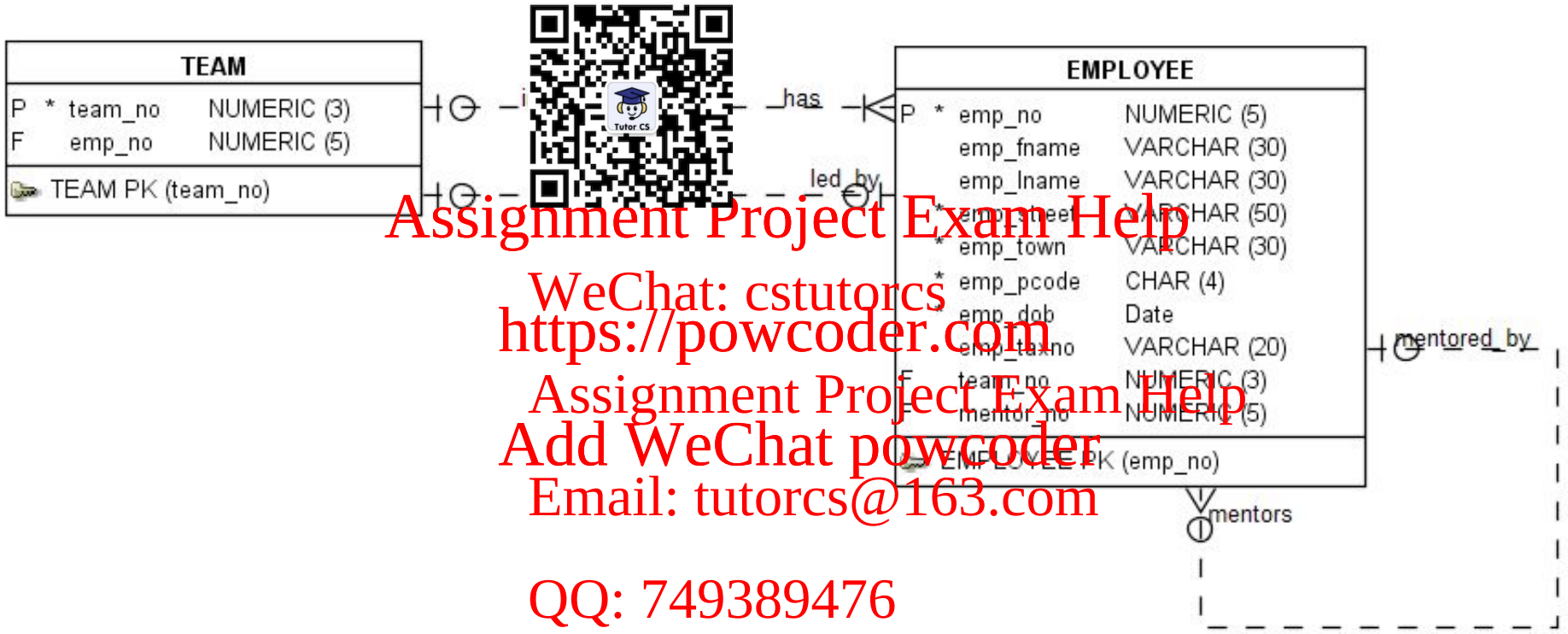

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```
CREATE TABLE employee (
    emp_no       NUMBER(5) NOT NULL,
    emp_fname    VAR
    emp_lname    VAR
    emp_street   VAR                T NULL,
    emp_town     VAR                T NULL,
    emp_pcode    CHA                L,
    emp_dob      DATE NOT NULL,
    emp_taxno    VARCHAR2(20),
    team_no      NUMBER(3),
    mentor_no    NUMBER(5)
);

ALTER TABLE employee ADD CONSTRAINT employee_pk PRIMARY KEY ( emp_no );

CREATE TABLE team (
    team_no   NUMBER(3) NOT NULL,
    emp_no    NUMBER(5)
);

ALTER TABLE team ADD CONSTRAINT team_pk PRIMARY KEY ( team_no );
```

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```
ALTER TABLE employee
    ADD CONSTRAINT emp_mentors_emp FOREIGN KEY ( mentor_no )
        REFERENCES e                    p_no )
            ON DELET

ALTER TABLE employee
    ADD CONSTRAINT t                    oyee FOREIGN KEY ( team_no )
        REFERENCES team ( team_nd )
            ON DELETE SET NULL;

ALTER TABLE team
    ADD CONSTRAINT emp_leads_team FOREIGN KEY ( emp_no )
        REFERENCES employee ( emp_no )
            ON DELETE SET NULL;
```

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