

Preparation for the workshop - ready, set

Please

- connect to Flux - flux.qa and be ready to answer questions
- test SQL Developer and your Oracle connection to ensure you can login to the database (local install or via MoVE)
- on campus students nominate someone as your table leader for this week

Assignment Project Exam Help

<https://powcoder.com>

Add WeChat powcoder





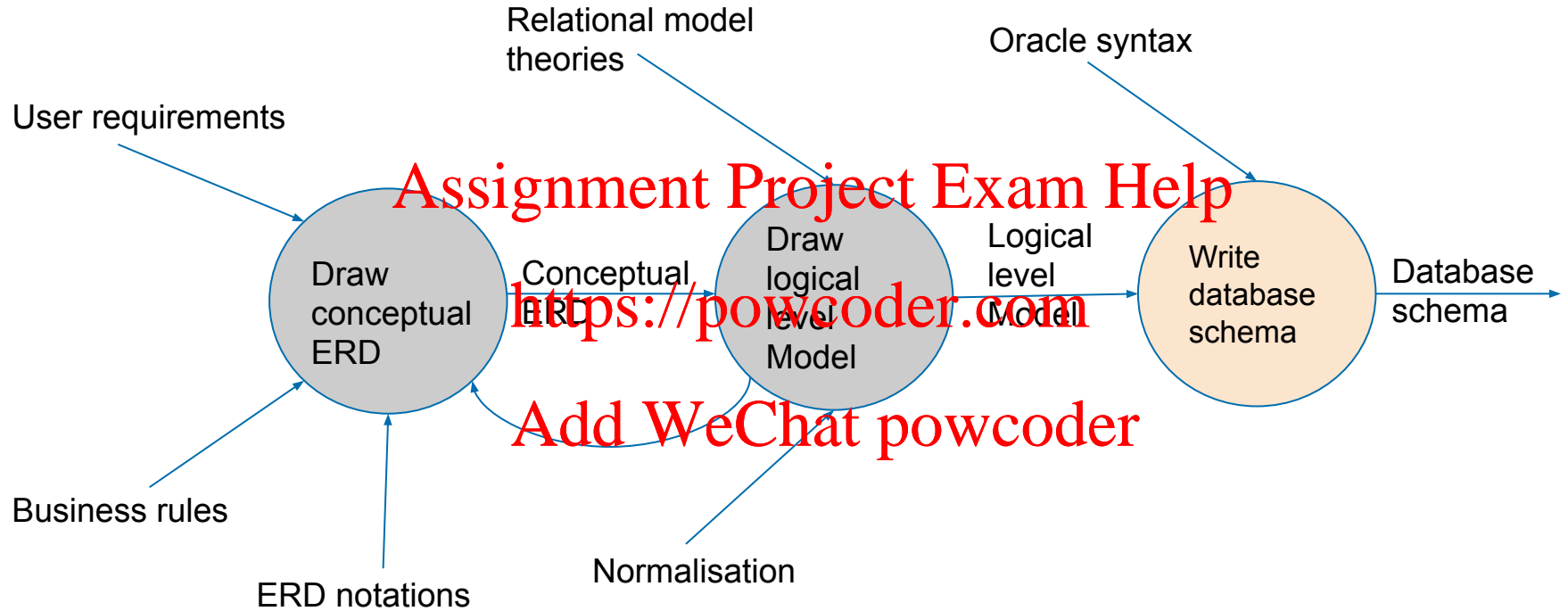
MONASH
University

MONASH
INFORMATION
TECHNOLOGY

Week 6 **Assignment Project Exam Help** Creating & Populating the Database **<https://powcoder.com>** Workshop 2022 S1 **Add WeChat powcoder**

Note for this Workshop we are using examples and syntax particular to Oracle





SQL general syntax

- A single statement is ended 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 unit;
```

Assignment Project Exam Help

<https://powcoder.com>

Add WeChat powcoder



Q1. The SQL Language is made up of the following components (multiple answers can be selected):

- A. Data Control Language (DCL)
- B. Data Query Language (DQL)
- C. Data Definition Language (DDL)
- D. Data Manipulation Language (DML)
- E. Data Structured Query Language (DSQL)
- F. Data Update Language (DUL)

SQL Statements

- Data Definition Language (DDL)
 - Creating database structure
 - 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)
 - Set permissions on objects
 - GRANT

Assignment Project Exam Help

<https://powcoder.com>

Add WeChat powcoder

Assignment Project Exam Help

CREATE A TABLE (DDL)

<https://powcoder.com>

Add WeChat powcoder



Q2. An attribute is to be used to store Australian postcodes eg. 3001, 2000 - the data type should be:

Assignment Project Exam Help

- A. VARCHAR2(4)
- B. CHAR(4)
- C. NUMBER(4)
- D. STRING(4)

<https://powcoder.com>

Add WeChat powcoder

Q3. An attributes is to be used to store a customers outstanding balance - the permitted range is \$0 to \$2000.00 - the data type should be:

Assignment Project Exam Help

- A. VARCHAR2(8)
- B. NUMBER(4,2)
- C. NUMBER(6,2)
- D. NUMBER

<https://powcoder.com>

Add WeChat powcoder

Q4. An attribute is to be used to store the year an event occurred - the data types which could be used are (multiple answers can be selected):

Assignment Project Exam Help

- A. DATE
 - B. DATE(4)
 - C. NUMBER(4)
 - D. CHAR(4)
- <https://powcoder.com>
Add WeChat powcoder

Q5. An attribute is to be used to store the finish time of athletes entered in a 800m running event in minutes and seconds eg. 3 min 25 sec - the data type which should be used is:

Assignment Project Exam Help

- A. DATETIME
- B. TIME
- C. DATE
- D. NUMBER(3,2)

<https://powcoder.com>

Add WeChat powcoder



Common ORACLE data types

- **Text:** CHAR(size), VARCHAR2(size)

- e.g., CHAR(10), VARCHAR2(10)

- CHAR(10) → 'apple' = 'apple '

- VARCHAR2(10) → 'apple' = 'apple'

Assignment Project Exam Help

- **Numbers:** NUMBER(precision, scale)

- Weight NUMBER(7) or NUMBER(7,0) → Weight = 7456123

- Weight NUMBER(9,2) → Weight = 7456123.89

- Weight NUMBER(8,1) → Weight = 7456123.9

<https://powcoder.com>

Add WeChat powcoder

- **Date/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



Column VS Table Level Constraints

TRAINING		
P	* train_code	CHAR (5)
	* train_desc	VARCHAR2 (100)
	* train_hrs	NUMBER (2)
	* train_active_months	NUMBER (2)

Assignment Project Exam Help

```
CREATE TABLE training (  
  train_code          CHAR(5) NOT NULL,  
  train_desc          VARCHAR2(100) NOT NULL,  
  train_hrs           NUMBER(2) NOT NULL,  
  train_active_months NUMBER(2) NOT NULL,  
  CONSTRAINT training_pk PRIMARY KEY (train_code)  
);
```

<https://powcoder.com>

Add WeChat powcoder

column constraints

table constraint



TRAINING	
P * train_code	CHAR (5)
* train_desc	VARCHAR2 (100)
* train_hrs	NUMBER (2)
* train_active_months	NUMBER (2)

TRAINING_COURSE	
PF * train_code	CHAR (5)
P * traincourse_date	DATE
F * trainer_id	NUMBER (3)

TRAINER	
P * trainer_id	NUMBER (3)
* trainer_rego	CHAR (12)
* trainer_fname	VARCHAR2 (25)
* trainer_lname	VARCHAR2 (25)
* trainer_category	CHAR (1)

```
CREATE TABLE training (
  train_code      CHAR(5) NOT NULL,
  train_desc      VARCHAR2(100) NOT NULL,
  train_hrs       NUMBER(2) NOT NULL,
  train_active_months NUMBER(2) NOT NULL,
  CONSTRAINT training_pk PRIMARY KEY ( train_code )
);
```

```
CREATE TABLE trainer (
  trainer_id      NUMBER(3) NOT NULL,
  trainer_rego    CHAR(12) NOT NULL,
  trainer_fname   VARCHAR2(25) NOT NULL,
  trainer_lname   VARCHAR2(25) NOT NULL,
  trainer_category CHAR(1) NOT NULL,
  CONSTRAINT trainer_pk PRIMARY KEY ( trainer_id )
);
```

Assignment Project Exam Help

<https://powcoder.com>

Add WeChat powcoder



TRAINING	
P * train_code	CHAR (5)
* train_desc	VARCHAR2 (100)
* train_hrs	NUMBER (2)
* train_active_months	NUMBER (2)

TRAINING_COURSE	
PF * train_code	CHAR (5)
P * traincourse_date	DATE
F * trainer_id	NUMBER (3)

TRAINER	
P * trainer_id	NUMBER (3)
* trainer_rego	CHAR (12)
* trainer_fname	VARCHAR2 (25)
* trainer_lname	VARCHAR2 (25)
* trainer_category	CHAR (1)

Assignment Project Exam Help
<https://powcoder.com>
 Add WeChat powcoder

```

CREATE TABLE training_course (
  train_code          CHAR(5) NOT NULL,
  traincourse_date    DATE NOT NULL,
  trainer_id          NUMBER(3) NOT NULL,
  CONSTRAINT training_course_pk PRIMARY KEY ( train_code, traincourse_date ),
  CONSTRAINT training_course FOREIGN KEY (trainer_id )
    REFERENCES trainer ( trainer_id ),
  CONSTRAINT training_trainingcourse FOREIGN KEY ( train_code )
    REFERENCES training ( train_code )
);

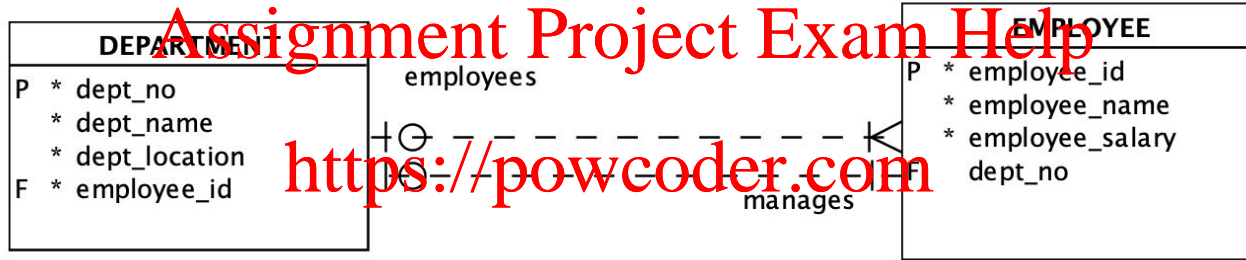
```

Q6. The foreign keys in this model can be declared by (multiple answers can be selected if required). Discuss as a group and arrive at an answer - be prepared to justify your answer:



- A. Column Constraints
- B. Table Constraints
- C. Use of the ALTER command
- D. None of these

Problems here?



Add WeChat powcoder

Alternative (BETTER) method of defining FKs

```
CREATE TABLE training_course (  
  train_code      CHAR(5) NOT NULL,  
  traincourse_date DATE NOT NULL,  
  trainer_id      NUMBER(3) NOT NULL,  
  CONSTRAINT training_course_pk PRIMARY KEY ( train_code, traincourse_date )  
);
```

Assignment Project Exam Help

<https://powcoder.com>

```
ALTER TABLE training_course  
  ADD  
    ( CONSTRAINT trainer_trainingcourse FOREIGN KEY ( trainer_id )  
      REFERENCES trainer ( trainer_id ),  
      CONSTRAINT training_trainingcourse FOREIGN KEY ( train_code )  
      REFERENCES training ( train_code ));
```

Add WeChat powcoder

Referential Integrity

- To ensure referential integrity, SQL defines three possible actions for FKs in relations when a deletion of a primary key occurs:
 - RESTRICT (Oracle No Action basically equivalent)
 - Deletion of tuples is NOT 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.



Referential Constraints SQL Data Modeller

The screenshot displays the SQL Data Modeller interface. On the left, a database schema is shown with three tables: **TRAINING**, **TRAINING_COURSE**, and **CUST_TRAIN**. **TRAINING** has attributes *train_code*, *train_desc*, *train_hrs*, and *train_active_months*. **TRAINING_COURSE** has attributes *train_code*, *traincourse_date*, and *trainer_id*. **CUST_TRAIN** has attributes *ct_id*, *cust_id*, *train_code*, *traincourse_date*, *ct_exam_date*, and *ct_date_expire*. Relationships include **TRAINING** to **TRAINING_COURSE** (labeled 'applies_to'), **TRAINING_COURSE** to **CUST_TRAIN** (labeled 'completed'), and **CUST_TRAIN** to **CUSTOMER** (labeled 'complete').

On the right, the 'Relation Properties - training_dronet' dialog is open, showing the 'General' tab. The 'Name' is 'training_dronetype'. The 'Source Cardinality' section shows 'Source' as 'TRAINING' and 'Source key' as 'TRAINING.TRAINING PK'. The 'Name on Source' is 'applies_to'. The 'Source Entity Synonym' is 'TRAINING'. The 'Source to Target Cardinality' is '1 to *'. The 'Source Optional' checkbox is unchecked. The 'Transferable' checkbox is checked. The 'Dominant Role' is 'None'. The 'Identifying' checkbox is unchecked. The 'Delete Rule' dropdown menu is open, showing options: 'NO ACTION', 'CASCADE', 'SET NULL', and 'RESTRICT'. A mouse cursor is pointing at 'CASCADE'.

Assignment Project Exam Help
<https://powcoder.com>
Add WeChat powcoder



What Referential Integrity Constraint to implement?

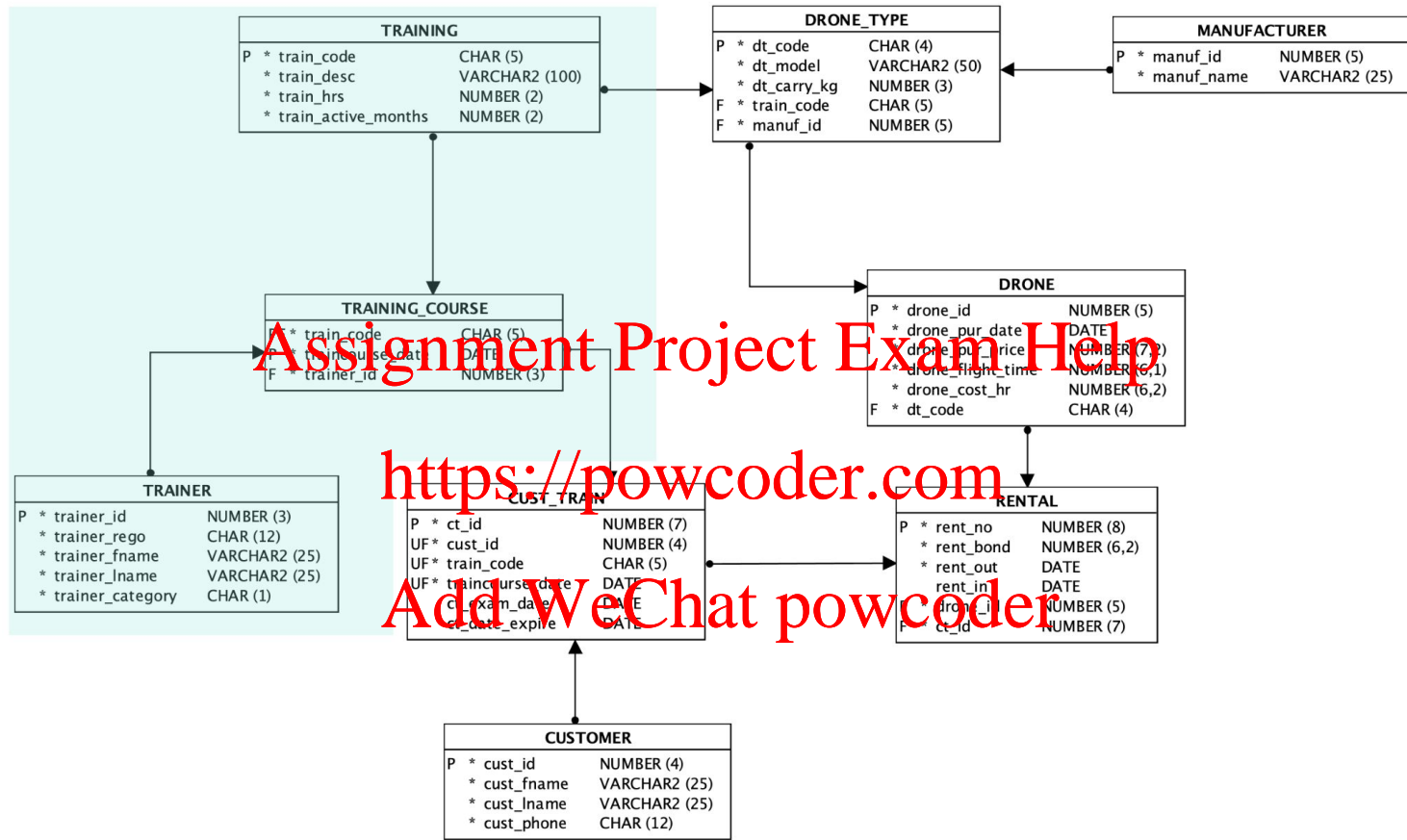
- Use the model to decide on what referential integrity constraint to implement.
 - Mandatory vs Optional participation.

Assignment Project Exam Help

- **The constraints must be decided at the design phase.**

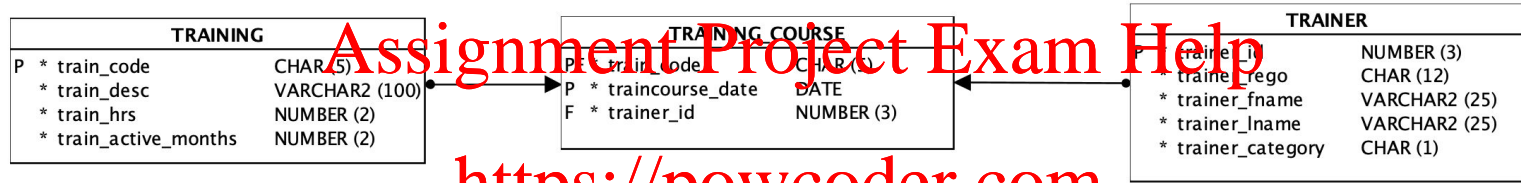
<https://powcoder.com>

Add WeChat powcoder



Assignment Project Exam Help
<https://powcoder.com>
 Add WeChat powcoder

Q7. TRAINERs have a high turnover (they are employed and leave the company frequently), what could we select for the referential constraint involving TRAINING_COURSE.trainer_id FK (multiple answers can be selected):



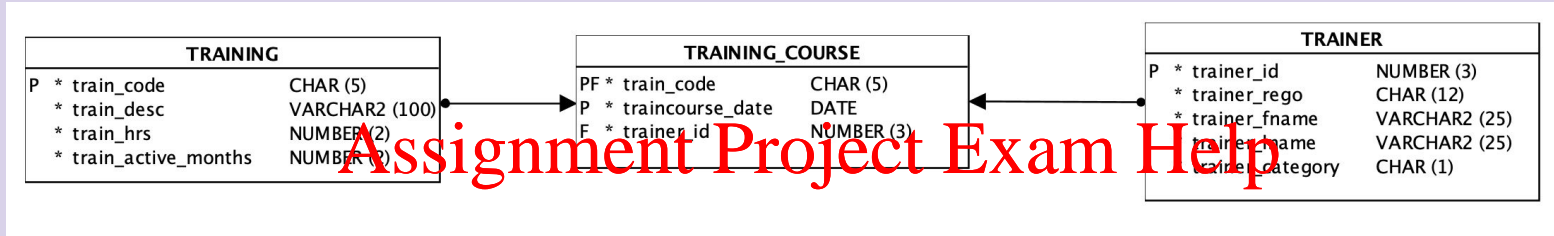
<https://powcoder.com>

- A. RESTRICT
- B. SET NULL
- C. CASCADE
- D. None of these

Add WeChat powcoder



Q8. What could we select for the referential constraint involving TRAINING.train_code FK (multiple answers can be selected):



<https://powcoder.com>

- A. RESTRICT
- B. SET NULL
- C. CASCADE
- D. None of these

Add WeChat powcoder

ALTER TABLE

- Used to change a tables structure.
- For example:
 - Adding column(s).
 - Removing column(s).
 - Adding constraint(s) - used previously for FK's, but can be any constraint
 - Removing constraint(s)

```
ALTER TABLE TRAINER
ADD (CONSTRAINT chk_trainercategory CHECK
      (trainer_category IN ( 'C', 'F' )),
      trainer_nocourses number(3) DEFAULT 0 NOT NULL);
```

Manipulate Constraints

- Turn constraint ON or OFF to temporarily disable
 - ALTER TABLE training_course
DISABLE CONSTRAINT training_trainingcourse;
 - ALTER TABLE training_course
ENABLE CONSTRAINT training_trainingcourse;
- Remove/re add constraint to modify constraint
 - ALTER TABLE training_course
DROP CONSTRAINT training_trainingcourse;
 - ALTER TABLE training_course
ADD
(CONSTRAINT training_trainingcourse FOREIGN KEY (train_code)
REFERENCES training (train_code) **ON DELETE CASCADE**);

DELETING A TABLE

- Use the DROP statement.
- Examples:

- `DROP TABLE training_course PURGE;`
- `DROP TABLE trainer CASCADE CONSTRAINTS PURGE;`

Add WeChat powcoder

Assignment Project Exam Help
ADDING TUPLES/ROWS TO A TABLE (DML)
<https://powcoder.com>

Add WeChat powcoder



INSERT

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

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

Assignment Project Exam Help

<https://powcoder.com>

```
INSERT INTO training VALUES ('C0001', 'Starter Drone Training 1', 8, 24);;
```

Add WeChat powcoder

```
INSERT INTO trainer (trainer_id, trainer_rego, trainer_fname, trainer_lname,
trainer_category) VALUES (312, 'DR523412-314', 'Thomas', 'Price', 'F');
```

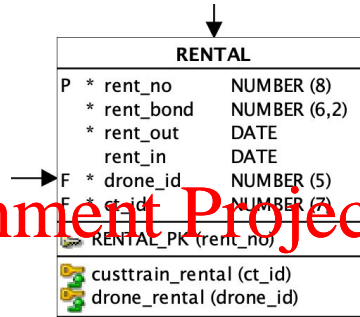
```
INSERT INTO training_course VALUES ('C0001', '20-Oct-2020', 312);
```

Role of: to_date and to_char

Inserting DATES into a table

- 06 Apr 2022
 - this is a character string, not a date - we understand by agreement that it represents a date but it is NOT a date datatype
 - what date is this: 06/04/2022 - 6th April 2022 or the 4th June 2022
 - it depends on your country
- SQL Developer does its own conversion of strings to dates using a preset National Language Support (NLS) rules, however *we must not depend on this*
- TO_DATE is a special Oracle function which converts a string to a date based on a *user supplied pattern*
 - convert a date
 - `to_date('06 Apr 2022','dd Mon yyyy')`
 - convert a date and time
 - `to_date('06/04/2022 17:00','dd/mm/yyyy hh:mi')`
 - convert a time
 - `to_date('17:00','hh:mi')`

Inserting DATES into a table continued



Assignment Project Exam Help

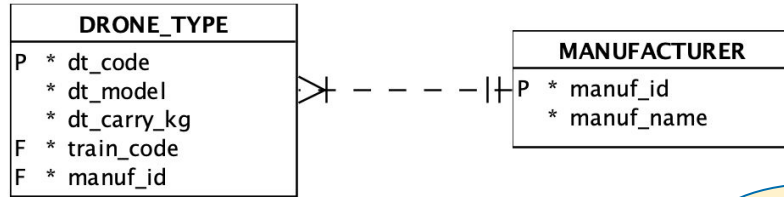
<https://powcoder.com>

Add WeChat powcoder

- Insert a rental into the RENTAL table:

```
insert into RENTAL (rent_no, rent_bond, rent_out, rent_in,  
drone_id, ct_id) values (123, 250,  
to_date('06 Apr 2022 10:00','dd Mon yyyy hh:mi'), null,  
234, 2345);
```

COMMIT and ROLLBACK



Assignment Project Exam Help

How to determine

```
INSERT INTO manufacturer VALUES (12, 'DJI');
```

<https://powcoder.com>

```
INSERT INTO drone_type VALUES('DJIT', 'DJI Trello', 5, 'C0001', 12);
```

Add WeChat powcoder

COMMIT makes the changes to the database permanent.

ROLLBACK will undo the changes.

COMMIT/ROLLBACK only applicable to INSERT/UPDATE and DELETE



Using a SEQUENCE

- Oracle supports auto-increment of a numeric PRIMARY KEY.
 - SEQUENCE.
- Steps to use:

- Create sequence

```
CREATE SEQUENCE manuf_seq  
INCREMENT BY 1;
```

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

```
– INSERT INTO manufacturer  
VALUES (manuf_seq.nextval, 'DJI');
```

```
– INSERT INTO drone_type VALUES('DJIT', 'DJI Trello', 5,  
'C0001', manuf_seq.currval);
```

- Note sequence value CANNOT be relied on after a COMMIT/ROLLBACK

Assignment Project Exam Help

PUTTING THIS TO WORK

<https://powcoder.com>

Add WeChat powcoder

TRAINING_COURSE	
PF * train_code	CHAR (5)
P * traincourse_date	DATE
F * trainer_id	NUMBER (3)

DRONE	
P * drone_id	NUMBER (5)
* drone_pur_date	DATE
* drone_pur_price	NUMBER (7,2)
* drone_flight_time	NUMBER (6,1)
* drone_cost_hr	NUMBER (6,2)
F * dt_code	CHAR (4)

CUST_TRAIN	
P * ct_id	NUMBER (7)
UF * cust_id	NUMBER (4)
UF * train_code	CHAR (5)
UF * traincourse_date	DATE
ct_exam_date	DATE
ct_date_expire	DATE

RENTAL	
P * rent_no	NUMBER (8)
* rent_bond	NUMBER (6,2)
* rent_out	DATE
rent_in	DATE
* drone_id	NUMBER (5)
F * ct_id	NUMBER (7)

CUSTOMER	
P * cust_id	NUMBER (4)
* cust_fname	VARCHAR2 (25)
* cust_lname	VARCHAR2 (25)
* cust_phone	CHAR (12)

Assignment Project Exam Help

<https://powcoder.com>

Add WeChat powcoder

Assume purple relations
(tables) have been created

**Q9. Code the three white
relations using SQL
Developer (omit column
comments).**

**As a group discuss the
approach and constraints
needed before beginning**

```
CREATE TABLE customer (  
    cust_id      NUMBER(4) NOT NULL,  
    cust_fname   VARCHAR2(25) NOT NULL,  
    cust_lname   VARCHAR2(25) NOT NULL,  
    cust_phone   CHAR(12) NOT NULL  
);
```

```
CREATE TABLE rental (  
    rent_no      NUMBER(8) NOT NULL,  
    rent_bond    NUMBER(5, 2) NOT NULL,  
    rent_out     DATE NOT NULL,  
    rent_in      DATE,  
    drone_id     NUMBER(5) NOT NULL,  
    ct_id        NUMBER(7) NOT NULL  
);
```

```
CREATE TABLE cust_train (  
    ct_id        NUMBER(7) NOT NULL,  
    cust_id      NUMBER(4) NOT NULL,  
    train_code    CHAR(5) NOT NULL,  
    traincourse_date DATE NOT NULL,  
    ct_exam_date DATE,  
    ct_date_expire DATE  
);
```

Assignment Project Exam Help

<https://powcoder.com>

Add WeChat powcoder



```

-- PKs
ALTER TABLE rental ADD CONSTRAINT rental_pk PRIMARY KEY ( rent_no );

ALTER TABLE customer ADD CONSTRAINT customer_pk PRIMARY KEY ( cust_id );

ALTER TABLE cust_train ADD CONSTRAINT cust_train_pk PRIMARY KEY ( ct_id );

-- FKs
ALTER TABLE cust_train
  ADD CONSTRAINT customer_custtrain FOREIGN KEY ( cust_id )
    REFERENCES customer ( cust_id );

ALTER TABLE cust_train
  ADD CONSTRAINT traincourse_custtrain FOREIGN KEY ( train_code,
    traincourse_date )
    REFERENCES training_course ( train_code,
    traincourse_date );

ALTER TABLE rental
  ADD CONSTRAINT drone_rental FOREIGN KEY ( drone_id )
    REFERENCES drone ( drone_id );

ALTER TABLE rental
  ADD CONSTRAINT custtrain_rental FOREIGN KEY ( ct_id )
    REFERENCES cust_train ( ct_id );

```

Assignment Project Exam Help

<https://powcoder.com>

Add WeChat powcoder



-- Other Constraints

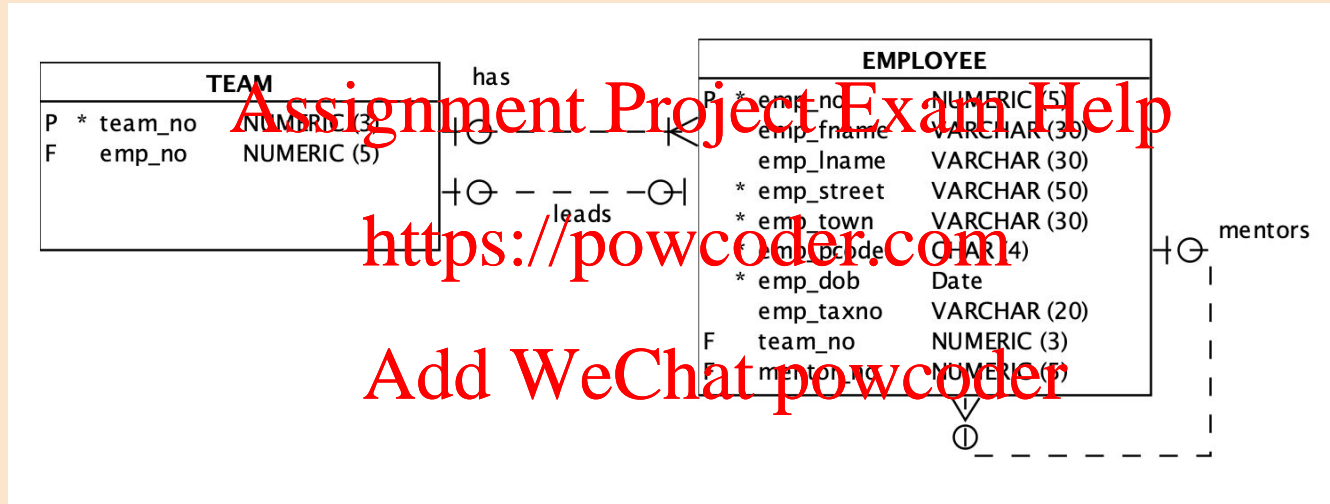
```
ALTER TABLE cust_train  
    ADD CONSTRAINT cust_train_uq UNIQUE ( cust_id,  
                                          train_code,  
                                          traincourse_date );
```

During this workshop column comments were omitted to speed up the coding **Assignment Project Exam Help**

*****HOWEVER**** column comments **MUST** always be provided in the final schema* <https://powcoder.com>

Add WeChat powcoder

Q10. Code the SQL create table statements for the following segment of the Monash Software model (column comments are required):



Answer available 5 PM Sunday