**NetID: jc12300**

**Name: Jie Cheng**

**Course: CSGY-6083-Principles of Database Systems**

**Section: B**

**Date of submission: Oct 22, 2023**

**CLEAR**

图示

描述已自动生成

图示

描述已自动生成

DDL Code

-- Generated by Oracle SQL Developer Data Modeler 23.1.0.087.0806

--   at:        2023-10-22 13:23:17 EDT

--   site:      Oracle Database 11g

--   type:      Oracle Database 11g

-- predefined type, no DDL - MDSYS.SDO\_GEOMETRY

-- predefined type, no DDL - XMLTYPE

CREATE TABLE jc\_alumnus (

    person\_id   NUMBER(6) NOT NULL,

    alumnus\_id  NUMBER(6) NOT NULL,

    degree      VARCHAR2(20) NOT NULL,

    year        NUMBER(4) NOT NULL,

    "DATE"      DATE NOT NULL,

    designation VARCHAR2(20) NOT NULL,

    per\_type    VARCHAR2(1) NOT NULL

);

ALTER TABLE jc\_alumnus ADD CONSTRAINT jc\_alumnus\_pk PRIMARY KEY ( person\_id,

                                                                  per\_type );

CREATE TABLE jc\_employee (

    person\_id NUMBER(6) NOT NULL,

    emp\_id    NUMBER(6) NOT NULL,

    hire\_date DATE NOT NULL,

    salary    NUMBER(7) NOT NULL,

    dpt\_name  VARCHAR2(20) NOT NULL,

    emp\_type  VARCHAR2(1) NOT NULL,

    per\_type  VARCHAR2(1) NOT NULL

);

ALTER TABLE jc\_employee

    ADD CONSTRAINT ch\_inh\_jc\_employee CHECK ( emp\_type IN ( 'F', 'S' ) );

ALTER TABLE jc\_employee ADD CONSTRAINT jc\_employee\_pk PRIMARY KEY ( person\_id,

                                                                    per\_type );

CREATE TABLE jc\_faculty (

    person\_id    NUMBER(6) NOT NULL,

    faculty\_rank VARCHAR2(30) NOT NULL,

    per\_type     VARCHAR2(1) NOT NULL

);

ALTER TABLE jc\_faculty ADD CONSTRAINT jc\_faculty\_pk PRIMARY KEY ( person\_id,

                                                                  per\_type );

CREATE TABLE jc\_grad (

    person\_id  NUMBER(6) NOT NULL,

    grad\_major VARCHAR2(20) NOT NULL,

    per\_type   VARCHAR2(1) NOT NULL

);

ALTER TABLE jc\_grad ADD CONSTRAINT jc\_grad\_pk PRIMARY KEY ( person\_id,

                                                            per\_type );

CREATE TABLE jc\_person (

    person\_id      NUMBER(6) NOT NULL,

    per\_fname      VARCHAR2(30) NOT NULL,

    per\_lfane      VARCHAR2(30) NOT NULL,

    per\_str        VARCHAR2(30) NOT NULL,

    per\_city       VARCHAR2(20) NOT NULL,

    per\_state      VARCHAR2(30) NOT NULL,

    per\_country    VARCHAR2(20) NOT NULL,

    per\_zipcode    VARCHAR2(10) NOT NULL,

    per\_gender     VARCHAR2(20) NOT NULL,

    per\_dob        DATE NOT NULL,

    per\_email      VARCHAR2(30) NOT NULL,

    per\_contact\_no NUMBER(10) NOT NULL,

    per\_ssn        VARCHAR2(11),

    per\_type       VARCHAR2(1) NOT NULL

);

ALTER TABLE jc\_person

    ADD CONSTRAINT ch\_inh\_jc\_person CHECK ( per\_type IN ( 'A', 'F', 'G', 'S', 'U' ) );

--  ERROR: Discriminator Value 'E' in FK JC\_EMPLOYEE\_JC\_PERSON\_FKnot found in LOV for Column PER\_TYPE - check constraint for Arc FKArc\_6 cannot be generated

ALTER TABLE jc\_person ADD CONSTRAINT jc\_person\_pk PRIMARY KEY ( person\_id,

                                                                per\_type );

CREATE TABLE jc\_staff (

    person\_id NUMBER(6) NOT NULL,

    job\_title VARCHAR2(20) NOT NULL,

    per\_type  VARCHAR2(1) NOT NULL

);

ALTER TABLE jc\_staff ADD CONSTRAINT jc\_staff\_pk PRIMARY KEY ( person\_id,

                                                              per\_type );

CREATE TABLE jc\_student (

    person\_id       NUMBER(6) NOT NULL,

    std\_id          NUMBER(6) NOT NULL,

    undergrad\_major VARCHAR2(20) NOT NULL,

    std\_type        VARCHAR2(1) NOT NULL,

    per\_type        VARCHAR2(1) NOT NULL

);

ALTER TABLE jc\_student

    ADD CONSTRAINT ch\_inh\_jc\_student CHECK ( std\_type IN ( 'G', 'U' ) );

ALTER TABLE jc\_student ADD CONSTRAINT jc\_student\_pk PRIMARY KEY ( person\_id,

                                                                  per\_type );

CREATE TABLE jc\_undergrad (

    person\_id                NUMBER(6) NOT NULL,

    high\_school\_diploma\_year NUMBER(4) NOT NULL,

    per\_type                 VARCHAR2(1) NOT NULL

);

ALTER TABLE jc\_undergrad ADD CONSTRAINT jc\_undergrad\_pk PRIMARY KEY ( person\_id,

                                                                      per\_type );

ALTER TABLE jc\_alumnus

    ADD CONSTRAINT jc\_alumnus\_jc\_person\_fk FOREIGN KEY ( person\_id,

                                                         per\_type )

        REFERENCES jc\_person ( person\_id,

                               per\_type );

ALTER TABLE jc\_employee

    ADD CONSTRAINT jc\_employee\_jc\_person\_fk FOREIGN KEY ( person\_id,

                                                          per\_type )

        REFERENCES jc\_person ( person\_id,

                               per\_type );

ALTER TABLE jc\_faculty

    ADD CONSTRAINT jc\_faculty\_jc\_employee\_fk FOREIGN KEY ( person\_id,

                                                           per\_type )

        REFERENCES jc\_employee ( person\_id,

                                 per\_type );

ALTER TABLE jc\_grad

    ADD CONSTRAINT jc\_grad\_jc\_student\_fk FOREIGN KEY ( person\_id,

                                                       per\_type )

        REFERENCES jc\_student ( person\_id,

                                per\_type );

ALTER TABLE jc\_staff

    ADD CONSTRAINT jc\_staff\_jc\_employee\_fk FOREIGN KEY ( person\_id,

                                                         per\_type )

        REFERENCES jc\_employee ( person\_id,

                                 per\_type );

ALTER TABLE jc\_student

    ADD CONSTRAINT jc\_student\_jc\_person\_fk FOREIGN KEY ( person\_id,

                                                         per\_type )

        REFERENCES jc\_person ( person\_id,

                               per\_type );

ALTER TABLE jc\_undergrad

    ADD CONSTRAINT jc\_undergrad\_jc\_student\_fk FOREIGN KEY ( person\_id,

                                                            per\_type )

        REFERENCES jc\_student ( person\_id,

                                per\_type );

CREATE OR REPLACE TRIGGER arc\_fkarc\_4\_jc\_grad BEFORE

    INSERT OR UPDATE OF person\_id, per\_type ON jc\_grad

    FOR EACH ROW

DECLARE

    d VARCHAR2(1);

BEGIN

    SELECT

        a.std\_type

    INTO d

    FROM

        jc\_student a

    WHERE

            a.person\_id = :new.person\_id

        AND a.per\_type = :new.per\_type;

    IF ( d IS NULL OR d <> 'G' ) THEN

        raise\_application\_error(-20223, 'FK JC\_GRAD\_JC\_STUDENT\_FK in Table JC\_GRAD violates Arc constraint on Table JC\_STUDENT - discriminator column STD\_TYPE doesn''t have value ''G'''

        );

    END IF;

EXCEPTION

    WHEN no\_data\_found THEN

        NULL;

    WHEN OTHERS THEN

        RAISE;

END;

/

CREATE OR REPLACE TRIGGER arc\_fkarc\_4\_jc\_undergrad BEFORE

    INSERT OR UPDATE OF person\_id, per\_type ON jc\_undergrad

    FOR EACH ROW

DECLARE

    d VARCHAR2(1);

BEGIN

    SELECT

        a.std\_type

    INTO d

    FROM

        jc\_student a

    WHERE

            a.person\_id = :new.person\_id

        AND a.per\_type = :new.per\_type;

    IF ( d IS NULL OR d <> 'U' ) THEN

        raise\_application\_error(-20223, 'FK JC\_UNDERGRAD\_JC\_STUDENT\_FK in Table JC\_UNDERGRAD violates Arc constraint on Table JC\_STUDENT - discriminator column STD\_TYPE doesn''t have value ''U'''

        );

    END IF;

EXCEPTION

    WHEN no\_data\_found THEN

        NULL;

    WHEN OTHERS THEN

        RAISE;

END;

/

CREATE OR REPLACE TRIGGER arc\_fkarc\_5\_jc\_faculty BEFORE

    INSERT OR UPDATE OF person\_id, per\_type ON jc\_faculty

    FOR EACH ROW

DECLARE

    d VARCHAR2(1);

BEGIN

    SELECT

        a.emp\_type

    INTO d

    FROM

        jc\_employee a

    WHERE

            a.person\_id = :new.person\_id

        AND a.per\_type = :new.per\_type;

    IF ( d IS NULL OR d <> 'F' ) THEN

        raise\_application\_error(-20223, 'FK JC\_FACULTY\_JC\_EMPLOYEE\_FK in Table JC\_FACULTY violates Arc constraint on Table JC\_EMPLOYEE - discriminator column EMP\_TYPE doesn''t have value ''F'''

        );

    END IF;

EXCEPTION

    WHEN no\_data\_found THEN

        NULL;

    WHEN OTHERS THEN

        RAISE;

END;

/

CREATE OR REPLACE TRIGGER arc\_fkarc\_5\_jc\_staff BEFORE

    INSERT OR UPDATE OF person\_id, per\_type ON jc\_staff

    FOR EACH ROW

DECLARE

    d VARCHAR2(1);

BEGIN

    SELECT

        a.emp\_type

    INTO d

    FROM

        jc\_employee a

    WHERE

            a.person\_id = :new.person\_id

        AND a.per\_type = :new.per\_type;

    IF ( d IS NULL OR d <> 'S' ) THEN

        raise\_application\_error(-20223, 'FK JC\_STAFF\_JC\_EMPLOYEE\_FK in Table JC\_STAFF violates Arc constraint on Table JC\_EMPLOYEE - discriminator column EMP\_TYPE doesn''t have value ''S'''

        );

    END IF;

EXCEPTION

    WHEN no\_data\_found THEN

        NULL;

    WHEN OTHERS THEN

        RAISE;

END;

/

CREATE OR REPLACE TRIGGER arc\_fkarc\_6\_jc\_student BEFORE

    INSERT OR UPDATE OF person\_id, per\_type ON jc\_student

    FOR EACH ROW

DECLARE

    d VARCHAR2(1);

BEGIN

    SELECT

        a.per\_type

    INTO d

    FROM

        jc\_person a

    WHERE

            a.person\_id = :new.person\_id

        AND a.per\_type = :new.per\_type;

    IF ( d IS NULL OR d <> 'S' ) THEN

        raise\_application\_error(-20223, 'FK JC\_STUDENT\_JC\_PERSON\_FK in Table JC\_STUDENT violates Arc constraint on Table JC\_PERSON - discriminator column PER\_TYPE doesn''t have value ''S'''

        );

    END IF;

EXCEPTION

    WHEN no\_data\_found THEN

        NULL;

    WHEN OTHERS THEN

        RAISE;

END;

/

CREATE OR REPLACE TRIGGER arc\_fkarc\_6\_jc\_alumnus BEFORE

    INSERT OR UPDATE OF person\_id, per\_type ON jc\_alumnus

    FOR EACH ROW

DECLARE

    d VARCHAR2(1);

BEGIN

    SELECT

        a.per\_type

    INTO d

    FROM

        jc\_person a

    WHERE

            a.person\_id = :new.person\_id

        AND a.per\_type = :new.per\_type;

    IF ( d IS NULL OR d <> 'A' ) THEN

        raise\_application\_error(-20223, 'FK JC\_ALUMNUS\_JC\_PERSON\_FK in Table JC\_ALUMNUS violates Arc constraint on Table JC\_PERSON - discriminator column PER\_TYPE doesn''t have value ''A'''

        );

    END IF;

EXCEPTION

    WHEN no\_data\_found THEN

        NULL;

    WHEN OTHERS THEN

        RAISE;

END;

/

CREATE OR REPLACE TRIGGER arc\_fkarc\_6\_jc\_employee BEFORE

    INSERT OR UPDATE OF person\_id, per\_type ON jc\_employee

    FOR EACH ROW

DECLARE

    d VARCHAR2(1);

BEGIN

    SELECT

        a.per\_type

    INTO d

    FROM

        jc\_person a

    WHERE

            a.person\_id = :new.person\_id

        AND a.per\_type = :new.per\_type;

    IF ( d IS NULL OR d <> 'E' ) THEN

        raise\_application\_error(-20223, 'FK JC\_EMPLOYEE\_JC\_PERSON\_FK in Table JC\_EMPLOYEE violates Arc constraint on Table JC\_PERSON - discriminator column PER\_TYPE doesn''t have value ''E'''

        );

    END IF;

EXCEPTION

    WHEN no\_data\_found THEN

        NULL;

    WHEN OTHERS THEN

        RAISE;

END;

/

-- Oracle SQL Developer Data Modeler Summary Report:

--

-- CREATE TABLE                             8

-- CREATE INDEX                             0

-- ALTER TABLE                             18

-- CREATE VIEW                              0

-- ALTER VIEW                               0

-- CREATE PACKAGE                           0

-- CREATE PACKAGE BODY                      0

-- CREATE PROCEDURE                         0

-- CREATE FUNCTION                          0

-- CREATE TRIGGER                           7

-- ALTER TRIGGER                            0

-- CREATE COLLECTION TYPE                   0

-- CREATE STRUCTURED TYPE                   0

-- CREATE STRUCTURED TYPE BODY              0

-- CREATE CLUSTER                           0

-- CREATE CONTEXT                           0

-- CREATE DATABASE                          0

-- CREATE DIMENSION                         0

-- CREATE DIRECTORY                         0

-- CREATE DISK GROUP                        0

-- CREATE ROLE                              0

-- CREATE ROLLBACK SEGMENT                  0

-- CREATE SEQUENCE                          0

-- CREATE MATERIALIZED VIEW                 0

-- CREATE MATERIALIZED VIEW LOG             0

-- CREATE SYNONYM                           0

-- CREATE TABLESPACE                        0

-- CREATE USER                              0

--

-- DROP TABLESPACE                          0

-- DROP DATABASE                            0

--

-- REDACTION POLICY                         0

--

-- ORDS DROP SCHEMA                         0

-- ORDS ENABLE SCHEMA                       0

-- ORDS ENABLE OBJECT                       0

--

-- ERRORS                                   0

-- WARNINGS                                 0

**FEEL**

1. **How many different types of entities (Person/ Place/ Object/ Event/ Concept) are there in customer invoice data? And what are they? Identify entities and give them suitable names.**

4 entities. Customer, Order, Product, Invoice

1. **What is the insertion anomaly in this data set?**

Adding new rows forces users to create 3 and 2 orders with the same Order ID.

1. **What is the update anomaly in this data set?**

Changing data in a row forces changes to other rows with the same Order ID because of duplication.

1. **What is the deletion anomaly in this data set?**

Deleting rows with the same Order ID may cause a loss of data that would be needed for other future rows.

1. **Is this dataset normalized? Why or why not?**

No. Multiple entities are in only one table.

图示

描述已自动生成

图示

描述已自动生成

DDL Code

-- Generated by Oracle SQL Developer Data Modeler 23.1.0.087.0806

--   at:        2023-10-22 15:17:47 EDT

--   site:      Oracle Database 11g

--   type:      Oracle Database 11g

-- predefined type, no DDL - MDSYS.SDO\_GEOMETRY

-- predefined type, no DDL - XMLTYPE

CREATE TABLE jc\_cust\_order (

    order\_quality NUMBER(5) NOT NULL,

    prod\_id       NUMBER(5) NOT NULL,

    order\_id      NUMBER(4) NOT NULL

);

CREATE TABLE jc\_customer (

    cust\_id      NUMBER(6) NOT NULL,

    cust\_fname   VARCHAR2(30) NOT NULL,

    cust\_lname   VARCHAR2(30) NOT NULL,

    cust\_str     VARCHAR2(30) NOT NULL,

    cust\_city    VARCHAR2(20) NOT NULL,

    cust\_state   VARCHAR2(30) NOT NULL,

    cust\_zipcode VARCHAR2(10) NOT NULL

);

ALTER TABLE jc\_customer ADD CONSTRAINT jc\_customer\_pk PRIMARY KEY ( cust\_id );

CREATE TABLE jc\_invoice (

    invoice\_id NUMBER(5) NOT NULL,

    order\_id   NUMBER(4) NOT NULL

);

CREATE UNIQUE INDEX jc\_invoice\_\_idx ON

    jc\_invoice (

        order\_id

    ASC );

ALTER TABLE jc\_invoice ADD CONSTRAINT jc\_invoice\_pk PRIMARY KEY ( invoice\_id );

CREATE TABLE jc\_order (

    order\_id   NUMBER(4) NOT NULL,

    order\_date DATE NOT NULL,

    cust\_id    NUMBER(6) NOT NULL,

    invoice\_id NUMBER(5) NOT NULL

);

CREATE UNIQUE INDEX jc\_order\_\_idx ON

    jc\_order (

        invoice\_id

    ASC );

ALTER TABLE jc\_order ADD CONSTRAINT jc\_order\_pk PRIMARY KEY ( order\_id );

CREATE TABLE jc\_product (

    prod\_id          NUMBER(5) NOT NULL,

    prod\_description VARCHAR2(30) NOT NULL,

    prod\_finish      VARCHAR2(30) NOT NULL,

    prod\_std\_price   FLOAT(8) NOT NULL

);

ALTER TABLE jc\_product ADD CONSTRAINT jc\_product\_pk PRIMARY KEY ( prod\_id );

ALTER TABLE jc\_cust\_order

    ADD CONSTRAINT jc\_cust\_order\_jc\_order\_fk FOREIGN KEY ( order\_id )

        REFERENCES jc\_order ( order\_id );

ALTER TABLE jc\_cust\_order

    ADD CONSTRAINT jc\_cust\_order\_jc\_product\_fk FOREIGN KEY ( prod\_id )

        REFERENCES jc\_product ( prod\_id );

ALTER TABLE jc\_invoice

    ADD CONSTRAINT jc\_invoice\_jc\_order\_fk FOREIGN KEY ( order\_id )

        REFERENCES jc\_order ( order\_id );

ALTER TABLE jc\_order

    ADD CONSTRAINT jc\_order\_jc\_customer\_fk FOREIGN KEY ( cust\_id )

        REFERENCES jc\_customer ( cust\_id );

ALTER TABLE jc\_order

    ADD CONSTRAINT jc\_order\_jc\_invoice\_fk FOREIGN KEY ( invoice\_id )

        REFERENCES jc\_invoice ( invoice\_id );

-- Oracle SQL Developer Data Modeler Summary Report:

--

-- CREATE TABLE                             5

-- CREATE INDEX                             2

-- ALTER TABLE                              9

-- CREATE VIEW                              0

-- ALTER VIEW                               0

-- CREATE PACKAGE                           0

-- CREATE PACKAGE BODY                      0

-- CREATE PROCEDURE                         0

-- CREATE FUNCTION                          0

-- CREATE TRIGGER                           0

-- ALTER TRIGGER                            0

-- CREATE COLLECTION TYPE                   0

-- CREATE STRUCTURED TYPE                   0

-- CREATE STRUCTURED TYPE BODY              0

-- CREATE CLUSTER                           0

-- CREATE CONTEXT                           0

-- CREATE DATABASE                          0

-- CREATE DIMENSION                         0

-- CREATE DIRECTORY                         0

-- CREATE DISK GROUP                        0

-- CREATE ROLE                              0

-- CREATE ROLLBACK SEGMENT                  0

-- CREATE SEQUENCE                          0

-- CREATE MATERIALIZED VIEW                 0

-- CREATE MATERIALIZED VIEW LOG             0

-- CREATE SYNONYM                           0

-- CREATE TABLESPACE                        0

-- CREATE USER                              0

--

-- DROP TABLESPACE                          0

-- DROP DATABASE                            0

--

-- REDACTION POLICY                         0

--

-- ORDS DROP SCHEMA                         0

-- ORDS ENABLE SCHEMA                       0

-- ORDS ENABLE OBJECT                       0

--

-- ERRORS                                   0

-- WARNINGS                                 0