

NetID: jc12300

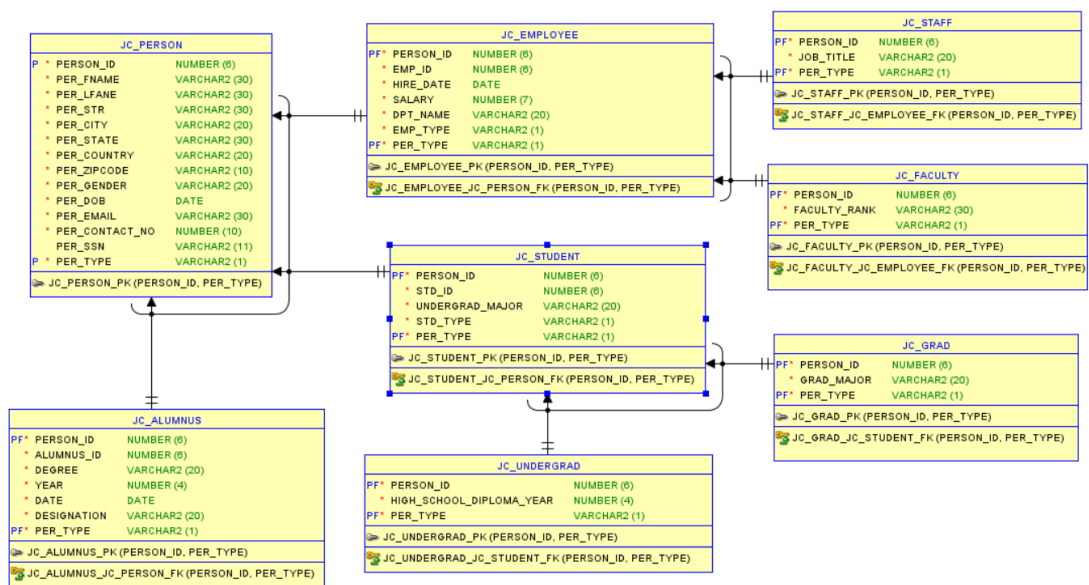
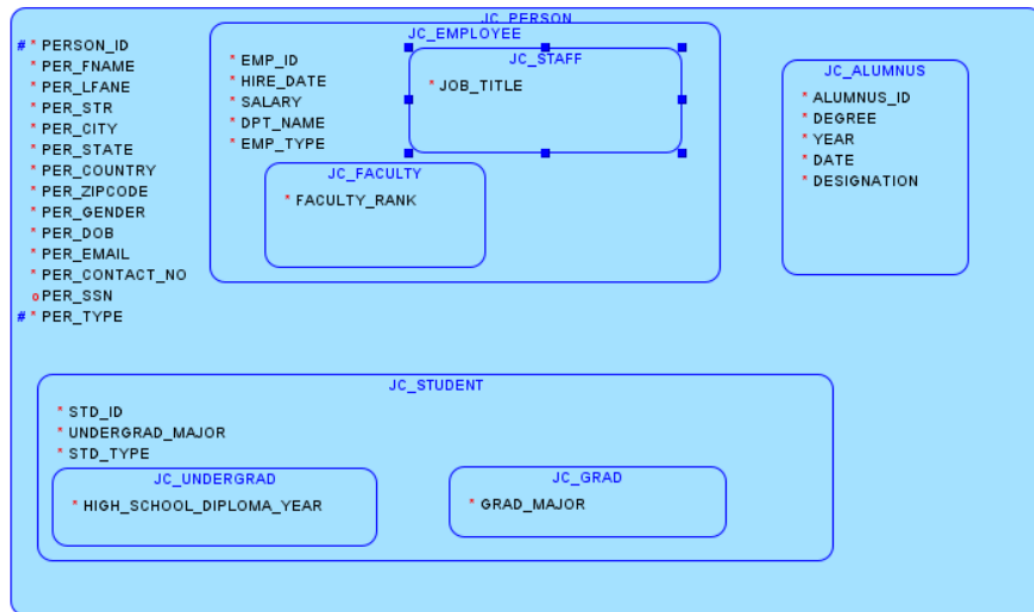
Name: Jie Cheng

Course: CSGY-6083-Principles of Database Systems

Section: B

Date of submission: Oct 22, 2023

CLEAR



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
e );

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,

```

```

);

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_lfname 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,

```

[illegible]

```

        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

i) 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

ii) 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.

iii) What is the update anomaly in this data set?

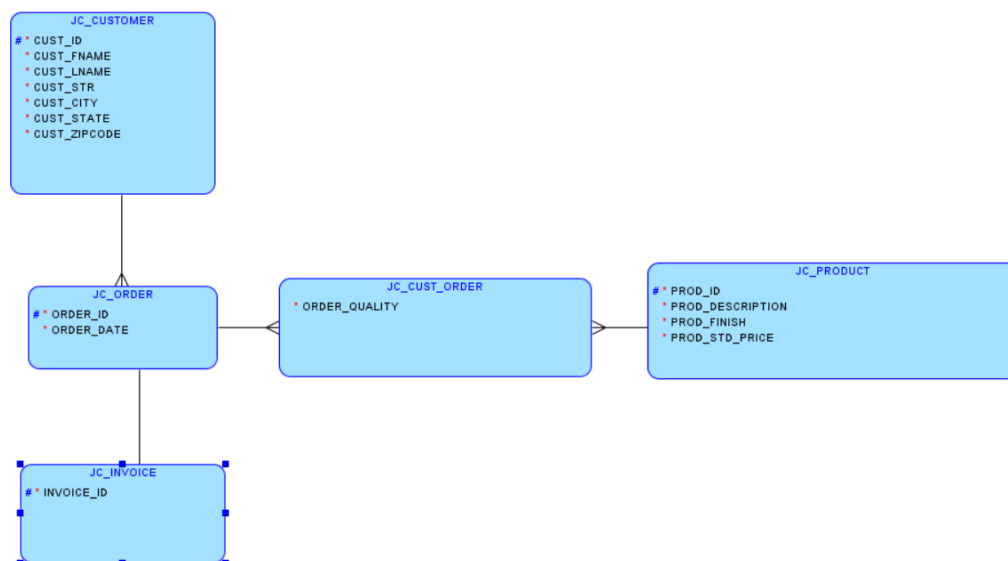
Changing data in a row forces changes to other rows with the same Order ID because of duplication.

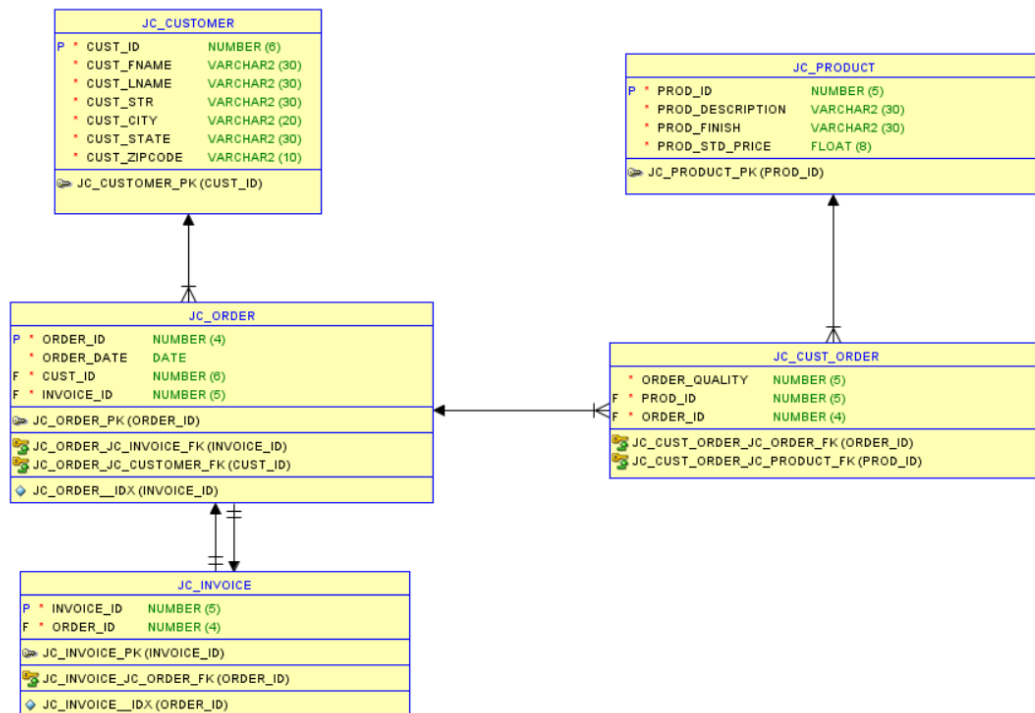
iv) What is the deletion anomaly in this data set?

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

v) Is this dataset normalized? Why or why not?

No. Multiple entities are in only one table.





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
```