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Domain: SQL

WEEK 7 TASK

Table Design

1. CUSTOMER_DIM

```
CREATE TABLE CUSTOMER_DIM (
  CUST_ID NUMBER PRIMARY KEY,
  CUST_NAME VARCHAR2(100),
  ADDRESS VARCHAR2(100),
  PREV_ADDRESS VARCHAR2(100),
  EFFECTIVE_DATE DATE,
  EXPIRY_DATE DATE,
  IS_ACTIVE CHAR(1),
  CHANGE_REASON VARCHAR2(255)
);
```

2. CUSTOMER_STG

```
CREATE TABLE CUSTOMER_STG (
  CUST_ID NUMBER,
  CUST_NAME VARCHAR2(100),
  ADDRESS VARCHAR2(100)
);
```

3. CUSTOMER_HISTORY (for Type 4)

```
CREATE TABLE CUSTOMER_HISTORY AS
SELECT * FROM CUSTOMER_DIM WHERE 1=0;
```

Sample Staging Data

```
INSERT INTO CUSTOMER_STG (CUST_ID, CUST_NAME, ADDRESS) VALUES (1, 'Alice',
'Pune');
INSERT INTO CUSTOMER_STG (CUST_ID, CUST_NAME, ADDRESS) VALUES (2, 'Bob',
'Mumbai');
INSERT INTO CUSTOMER_STG (CUST_ID, CUST_NAME, ADDRESS) VALUES (3, 'Charlie',
'Delhi');
COMMIT;
```

Stored Procedure Definitions

SCD Type 0

```
CREATE OR REPLACE PROCEDURE SCD_TYPE_0_PROC IS
BEGIN
  MERGE INTO CUSTOMER_DIM d
  USING CUSTOMER_STG s
  ON (d.CUST_ID = s.CUST_ID)
  WHEN NOT MATCHED THEN
    INSERT (CUST_ID, CUST_NAME, ADDRESS)
    VALUES (s.CUST_ID, s.CUST_NAME, s.ADDRESS);
END;
/
```

SCD Type 1

```
CREATE OR REPLACE PROCEDURE SCD_TYPE_1_PROC IS
BEGIN
  MERGE INTO CUSTOMER_DIM d
  USING CUSTOMER_STG s
  ON (d.CUST_ID = s.CUST_ID)
  WHEN MATCHED THEN
    UPDATE SET d.CUST_NAME = s.CUST_NAME,
               d.ADDRESS = s.ADDRESS
  WHEN NOT MATCHED THEN
    INSERT (CUST_ID, CUST_NAME, ADDRESS)
    VALUES (s.CUST_ID, s.CUST_NAME, s.ADDRESS);
END;
/
```

SCD Type 2

```
CREATE OR REPLACE PROCEDURE SCD_TYPE_2_PROC IS
BEGIN
  FOR rec IN (SELECT * FROM CUSTOMER_STG) LOOP
    FOR dim IN (
      SELECT * FROM CUSTOMER_DIM
      WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y'
    ) LOOP
      IF dim.CUST_NAME != rec.CUST_NAME OR dim.ADDRESS != rec.ADDRESS THEN
        UPDATE CUSTOMER_DIM
        SET EXPIRY_DATE = SYSDATE,
            IS_ACTIVE = 'N'
        WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y';

        INSERT INTO CUSTOMER_DIM (
          CUST_ID, CUST_NAME, ADDRESS,
          EFFECTIVE_DATE, EXPIRY_DATE, IS_ACTIVE
        )
        VALUES (
          rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS,
          SYSDATE, NULL, 'Y'
        );
      END IF;
    END LOOP;

    INSERT INTO CUSTOMER_DIM (
      CUST_ID, CUST_NAME, ADDRESS,
      EFFECTIVE_DATE, IS_ACTIVE
    )
    SELECT rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS, SYSDATE, 'Y'
    FROM DUAL
    WHERE NOT EXISTS (
      SELECT 1 FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
    );
  END LOOP;
END;
/
```

SCD Type 3

```
CREATE OR REPLACE PROCEDURE SCD_TYPE_3_PROC IS
BEGIN
  FOR rec IN (SELECT * FROM CUSTOMER_STG) LOOP
    UPDATE CUSTOMER_DIM
    SET PREV_ADDRESS = ADDRESS,
        ADDRESS = rec.ADDRESS
    WHERE CUST_ID = rec.CUST_ID
      AND ADDRESS != rec.ADDRESS;

    INSERT INTO CUSTOMER_DIM (CUST_ID, CUST_NAME, ADDRESS)
    SELECT rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS
    FROM DUAL
    WHERE NOT EXISTS (
      SELECT 1 FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
    );
  END LOOP;
END;
/
```

SCD Type 4

```
CREATE OR REPLACE PROCEDURE SCD_TYPE_4_PROC IS
BEGIN
  FOR rec IN (SELECT * FROM CUSTOMER_STG) LOOP
    FOR dim IN (
      SELECT * FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
    ) LOOP
      IF dim.ADDRESS != rec.ADDRESS THEN
        INSERT INTO CUSTOMER_HISTORY
        SELECT * FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID;

        UPDATE CUSTOMER_DIM
        SET ADDRESS = rec.ADDRESS
        WHERE CUST_ID = rec.CUST_ID;
      END IF;
    END LOOP;

    INSERT INTO CUSTOMER_DIM (CUST_ID, CUST_NAME, ADDRESS)
    SELECT rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS
    FROM DUAL
    WHERE NOT EXISTS (
      SELECT 1 FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
    );
  END LOOP;
END;
/
```

SCD Type 6

```
CREATE OR REPLACE PROCEDURE SCD_TYPE_6_PROC IS
BEGIN
  FOR rec IN (SELECT * FROM CUSTOMER_STG) LOOP
    FOR dim IN (
      SELECT * FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE =
'Y'
    ) LOOP
      IF dim.ADDRESS != rec.ADDRESS THEN
        UPDATE CUSTOMER_DIM
        SET EXPIRY_DATE = SYSDATE,
            IS_ACTIVE = 'N'
        WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y';

        INSERT INTO CUSTOMER_DIM (
          CUST_ID, CUST_NAME, ADDRESS, PREV_ADDRESS,
          EFFECTIVE_DATE, EXPIRY_DATE, IS_ACTIVE
        ) VALUES (
          rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS, dim.ADDRESS,
          SYSDATE, NULL, 'Y'
        );
      ELSIF dim.CUST_NAME != rec.CUST_NAME THEN
        UPDATE CUSTOMER_DIM
        SET CUST_NAME = rec.CUST_NAME
        WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y';
      END IF;
    END LOOP;

    INSERT INTO CUSTOMER_DIM (
      CUST_ID, CUST_NAME, ADDRESS, EFFECTIVE_DATE, IS_ACTIVE
    )
    SELECT rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS, SYSDATE, 'Y'
    FROM DUAL
    WHERE NOT EXISTS (
      SELECT 1 FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
    );
  END LOOP;
END;
/
```

Execution & Testing

```
-- Execute any one of the procedures:
EXEC SCD_TYPE_1_PROC;

-- View results:
SELECT * FROM CUSTOMER_DIM;
SELECT * FROM CUSTOMER_HISTORY; -- For SCD Type 4
```

Execution and Results:

```
SQL> CREATE TABLE CUSTOMER_DIM (

  2    CUST_ID NUMBER PRIMARY KEY,

  3    CUST_NAME VARCHAR2(100),

  4    ADDRESS VARCHAR2(100),

  5    PREV_ADDRESS VARCHAR2(100),

  6    EFFECTIVE_DATE DATE,

  7    EXPIRY_DATE DATE,

  8    IS_ACTIVE CHAR(1),

  9    CHANGE_REASON VARCHAR2(255)

 10  );


Table created.


SQL> CREATE TABLE CUSTOMER_STG (

  2    CUST_ID NUMBER,

  3    CUST_NAME VARCHAR2(100),

  4    ADDRESS VARCHAR2(100)

  5  );
```

```
Table created.

SQL> DELETE FROM CUSTOMER_STG;

0 rows deleted.

SQL> INSERT INTO CUSTOMER_STG (CUST_ID, CUST_NAME, ADDRESS) VALUES (1, 'Gaurav', 'Pune');

1 row created.

SQL> INSERT INTO CUSTOMER_STG (CUST_ID, CUST_NAME, ADDRESS) VALUES (2, 'Sanju', 'Mumbai');

1 row created.

SQL> INSERT INTO CUSTOMER_STG (CUST_ID, CUST_NAME, ADDRESS) VALUES (3, 'Ritik', 'Delhi');

1 row created.

SQL> COMMIT;

Commit complete.

SQL> CREATE OR REPLACE PROCEDURE SCD_TYPE_0_PROC IS
  2  BEGIN
  3    MERGE INTO CUSTOMER_DIM d
  4    USING CUSTOMER_STG s
  5    ON (d.CUST_ID = s.CUST_ID)
  6    WHEN NOT MATCHED THEN
  7      INSERT (CUST_ID, CUST_NAME, ADDRESS)
  8      VALUES (s.CUST_ID, s.CUST_NAME, s.ADDRESS);
  9  END;
 10  /

Procedure created.

SQL> CREATE OR REPLACE PROCEDURE SCD_TYPE_1_PROC IS
  2  BEGIN
  3    MERGE INTO CUSTOMER_DIM d
  4    USING CUSTOMER_STG s
  5    ON (d.CUST_ID = s.CUST_ID)
  6    WHEN MATCHED THEN
  7      UPDATE SET d.CUST_NAME = s.CUST_NAME,
  8                 d.ADDRESS = s.ADDRESS
  9    WHEN NOT MATCHED THEN
 10      INSERT (CUST_ID, CUST_NAME, ADDRESS)
 11      VALUES (s.CUST_ID, s.CUST_NAME, s.ADDRESS);
 12  END;
 13  /

Procedure created.

SQL> CREATE OR REPLACE PROCEDURE SCD_TYPE_2_PROC IS
  2  BEGIN
  3    FOR rec IN (SELECT * FROM CUSTOMER_STG) LOOP
  4      -- Check if changed
  5      FOR dim IN (
 SELECT * FROM CUSTOMER_DIM
 WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y'
) LOOP
 IF dim.CUST_NAME != rec.CUST_NAME OR dim.ADDRESS != rec.ADDRESS THEN
    -- Expire old record
    UPDATE CUSTOMER_DIM
    SET EXPIRY_DATE = SYSDATE,
        IS_ACTIVE = 'N'
    WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y';

    -- Insert new
    INSERT INTO CUSTOMER_DIM (
      CUST_ID, CUST_NAME, ADDRESS,
      EFFECTIVE_DATE, EXPIRY_DATE, IS_ACTIVE
    )
    VALUES (
      rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS,
      SYSDATE, NULL, 'Y'
    );
  END IF;
END LOOP;

-- Insert if new
INSERT INTO CUSTOMER_DIM (
  CUST_ID, CUST_NAME, ADDRESS,
  EFFECTIVE_DATE, IS_ACTIVE
)
SELECT rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS, SYSDATE, 'Y'
```

```
 34     FROM DUAL
 35     WHERE NOT EXISTS (
 36       SELECT 1 FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
 37     );
 38   END LOOP;
 39  END;
 40  /

Procedure created.

SQL> CREATE OR REPLACE PROCEDURE SCD_TYPE_3_PROC IS
  2  BEGIN
  3    FOR rec IN (SELECT * FROM CUSTOMER_STG) LOOP
  4      -- Update with prev address
  5      UPDATE CUSTOMER_DIM
  6      SET PREV_ADDRESS = ADDRESS,
  7          ADDRESS = rec.ADDRESS
  8      WHERE CUST_ID = rec.CUST_ID
  9        AND ADDRESS != rec.ADDRESS;
 10
 11     -- Insert if new
 12     INSERT INTO CUSTOMER_DIM (CUST_ID, CUST_NAME, ADDRESS)
 13     SELECT rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS
 14     FROM DUAL
 15     WHERE NOT EXISTS (
 16       SELECT 1 FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
 17     );
 18   END LOOP;
 19  END;
 20  /

Procedure created.

SQL> BEGIN
  2    EXECUTE IMMEDIATE 'DROP TABLE CUSTOMER_HISTORY';
  3  EXCEPTION WHEN OTHERS THEN NULL;
  4  END;
  5  /

PL/SQL procedure successfully completed.

SQL>
SQL> CREATE TABLE CUSTOMER_HISTORY AS
  2  SELECT * FROM CUSTOMER_DIM WHERE 1=0;

Table created.

SQL>
SQL> CREATE OR REPLACE PROCEDURE SCD_TYPE_4_PROC IS
  2  BEGIN
  3    FOR rec IN (SELECT * FROM CUSTOMER_STG) LOOP
  4      FOR dim IN (
  5        SELECT * FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
  6      ) LOOP
  7        IF dim.ADDRESS != rec.ADDRESS THEN
  8          -- Move old to history
  9          INSERT INTO CUSTOMER_HISTORY
 10          SELECT * FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID;
 11
 12          -- Update new
 13          UPDATE CUSTOMER_DIM
 14          SET ADDRESS = rec.ADDRESS
 15          WHERE CUST_ID = rec.CUST_ID;
 16        END IF;
 17      END LOOP;
 18
 19      -- Insert new
 20      INSERT INTO CUSTOMER_DIM (CUST_ID, CUST_NAME, ADDRESS)
 21      SELECT rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS
 22      FROM DUAL
 23      WHERE NOT EXISTS (
 24        SELECT 1 FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
 25      );
 26    END LOOP;
 27  END;
 28  /

Procedure created.

SQL> CREATE OR REPLACE PROCEDURE SCD_TYPE_6_PROC IS
  2  BEGIN
  3    FOR rec IN (SELECT * FROM CUSTOMER_STG) LOOP
  4      FOR dim IN (
  5        SELECT * FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y'
) LOOP
  IF dim.ADDRESS != rec.ADDRESS THEN
    -- Type 2 - expire old
    UPDATE CUSTOMER_DIM
    SET EXPIRY_DATE = SYSDATE,
        IS_ACTIVE = 'N'
    WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y';

    -- Insert new with prev_address (type 3)
    INSERT INTO CUSTOMER_DIM (
      CUST_ID, CUST_NAME, ADDRESS, PREV_ADDRESS,
      EFFECTIVE_DATE, EXPIRY_DATE, IS_ACTIVE
    ) VALUES (
      rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS, dim.ADDRESS,
      SYSDATE, NULL, 'Y'
    );
  ELSIF dim.CUST_NAME != rec.CUST_NAME THEN
    -- Type 1: overwrite
    UPDATE CUSTOMER_DIM
    SET CUST_NAME = rec.CUST_NAME
    WHERE CUST_ID = rec.CUST_ID AND IS_ACTIVE = 'Y';
  END IF;
END LOOP;

-- Insert if new
INSERT INTO CUSTOMER_DIM (
  CUST_ID, CUST_NAME, ADDRESS, EFFECTIVE_DATE, IS_ACTIVE
)
```

```
    SELECT rec.CUST_ID, rec.CUST_NAME, rec.ADDRESS, SYSDATE, 'Y'
    FROM DUAL
    WHERE NOT EXISTS (
      SELECT 1 FROM CUSTOMER_DIM WHERE CUST_ID = rec.CUST_ID
    );
  END LOOP;
END;
/

Procedure created.


SQL> EXEC SCD_TYPE_1_PROC;


PL/SQL procedure successfully completed.


SQL> EXEC SCD_TYPE_2_PROC;


PL/SQL procedure successfully completed.


SQL> SELECT * FROM CUSTOMER_DIM ORDER BY CUST_ID;


   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
```

```
--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------

      1


  CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS

--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------

Gaurav


  CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS
```

```
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------
Pune

   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------


   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
```

```
--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------



  CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS

--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------



  CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS
```

```
--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------



  CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS

--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------

      2


  CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS
```

```
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------
Sanju

   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------
Mumbai

   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
```

```
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------


  CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------


  CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
```

```
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------


   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------


   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
```

```
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------
         3

   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
--------------------------------------------------------------------------------
EFFECTIVE EXPIRY_DA I
--------- --------- -
CHANGE_REASON
--------------------------------------------------------------------------------
Ritik

   CUST_ID
----------
CUST_NAME
--------------------------------------------------------------------------------
ADDRESS
--------------------------------------------------------------------------------
PREV_ADDRESS
```

```
--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------

Delhi


  CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS

--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------



  CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS
```

```
--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------



   CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS

--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------



   CUST_ID

----------

CUST_NAME

--------------------------------------------------------------------------------

ADDRESS

--------------------------------------------------------------------------------

PREV_ADDRESS
```

```
--------------------------------------------------------------------------------

EFFECTIVE EXPIRY_DA I

--------- --------- -

CHANGE_REASON

--------------------------------------------------------------------------------
```