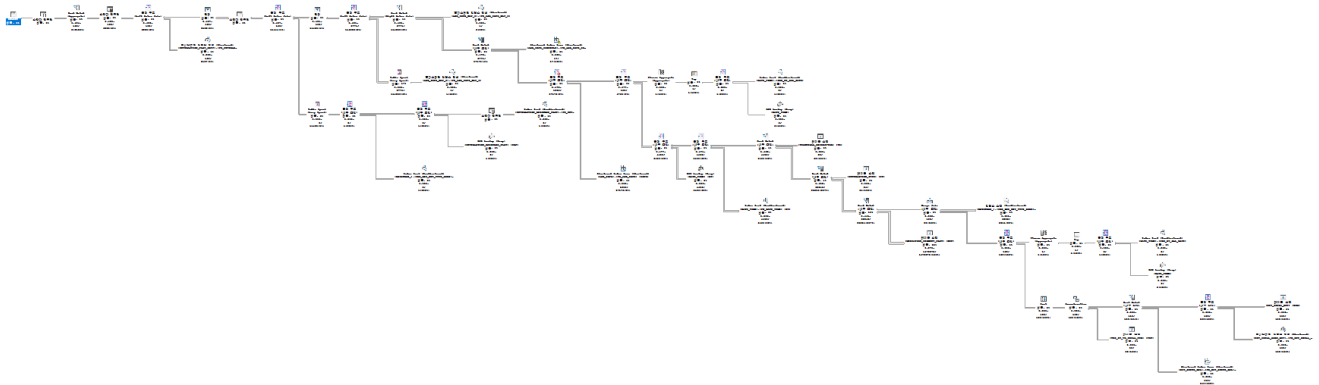


빠른 쿼리의 SQL Trace 분석

Description

MS SQL이 생성한 Graphical SQL Plan의 맨 우측부터 분석을 시작하여 분할 정복 방식으로 Text SQL Plan을 작성하였습니다. Text SQL Plan의 화살표 우측에는 테이블 탐색 결과, 인덱스 탐색 결과, 조인 결과에 따른 Row 수를 기입하였습니다.

Graphical SQL Plan



Text SQL Plan(마지막이 최종)

자식 노드 간에는 위에서 아래로, 부모-자식 노드 간에는 안쪽에서 바깥쪽으로 진행합니다.

```
NESTED LOOP → 109행
  TABLE FULL SCAN(XST_SKILL_MST) → 109행
  INDEX RANGE SCAN(XST_SKILL_CODE_MST) → 109행
```

```
HASH JOIN → 110행
  NESTED LOOP → 109행
    TABLE FULL SCAN(XST_SKILL_MST) → 109행
    INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
  TABLE ACCESS BY INDEX ROWID → 110행
    INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
```

```
UNION-ALL → 168행
  HASH JOIN → 110행
```

NESTED LOOP → 109행
TABLE FULL SCAN(XST_SKILL_MST) → 109행
INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
TABLE ACCESS BY INDEX ROWID → 110행
INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행

SORT ORDER BY → 168행
UNION-ALL → 168행
HASH JOIN → 110행
NESTED LOOP → 109행
TABLE FULL SCAN(XST_SKILL_MST) → 109행
INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
TABLE ACCESS BY INDEX ROWID → 110행
INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행

NESTED LOOP → 168행
SORT AGGREGATE → 1행
COUNT(STOP KEY) → 1행
NESTED LOOP → 2행
INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
SORT ORDER BY → 168행
UNION-ALL → 168행
HASH JOIN → 110행
NESTED LOOP → 109행
TABLE FULL SCAN(XST_SKILL_MST) → 109행
INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
TABLE ACCESS BY INDEX ROWID → 110행
INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행

MERGE JOIN → 168행
INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
NESTED LOOP → 168행
SORT AGGREGATE → 1행
COUNT(STOP KEY) → 1행
NESTED LOOP → 2행
INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
SORT ORDER BY → 168행
UNION-ALL → 168행
HASH JOIN → 110행
NESTED LOOP → 109행
TABLE FULL SCAN(XST_SKILL_MST) → 109행
INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
TABLE ACCESS BY INDEX ROWID → 110행
INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행

```

HASH JOIN → 62846행
MERGE JOIN → 168행
  INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
  NESTED LOOP → 168행
    SORT AGGREGATE → 1행
    COUNT(STOP KEY) → 1행
    NESTED LOOP → 2행
      INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
      TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
    SORT ORDER BY → 168행
    UNION-ALL → 168행
      HASH JOIN → 110행
      NESTED LOOP → 109행
        TABLE FULL SCAN(XST_SKILL_MST) → 109행
        INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
        TABLE ACCESS BY INDEX ROWID → 110행
        INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
        TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
      TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행

```

```

HASH JOIN → 62846행
TABLE FULL SCAN(INTERACTION_TYPE) → 24행
HASH JOIN → 62846행
  MERGE JOIN → 168행
    INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
    NESTED LOOP → 168행
      SORT AGGREGATE → 1행
      COUNT(STOP KEY) → 1행
      NESTED LOOP → 2행
        INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
        TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
      SORT ORDER BY → 168행
      UNION-ALL → 168행
        HASH JOIN → 110행
        NESTED LOOP → 109행
          TABLE FULL SCAN(XST_SKILL_MST) → 109행
          INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
          TABLE ACCESS BY INDEX ROWID → 110행
          INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
          TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
        TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행

```

```

HASH JOIN → 4453행
TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
HASH JOIN → 62846행
  TABLE FULL SCAN(INTERACTION_TYPE) → 24행
  HASH JOIN → 62846행
    MERGE JOIN → 168행
      INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
      NESTED LOOP → 168행

```

SORT AGGREGATE → 1행
 COUNT(STOP KEY) → 1행
 NESTED LOOP → 2행
 INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
 TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
 SORT ORDER BY → 168행
 UNION-ALL → 168행
 HASH JOIN → 110행
 NESTED LOOP → 109행
 TABLE FULL SCAN(XST_SKILL_MST) → 109행
 INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
 TABLE ACCESS BY INDEX ROWID → 110행
 INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
 TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
 TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행

NESTED LOOP → 4453행
 HASH JOIN → 4453행
 TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
 HASH JOIN → 62846행
 TABLE FULL SCAN(INTERACTION_TYPE) → 24행
 HASH JOIN → 62846행
 MERGE JOIN → 168행
 INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
 NESTED LOOP → 168행
 SORT AGGREGATE → 1행
 COUNT(STOP KEY) → 1행
 NESTED LOOP → 2행
 INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
 TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
 SORT ORDER BY → 168행
 UNION-ALL → 168행
 HASH JOIN → 110행
 NESTED LOOP → 109행
 TABLE FULL SCAN(XST_SKILL_MST) → 109행
 INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
 TABLE ACCESS BY INDEX ROWID → 110행
 INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
 TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
 TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행
 INDEX RANGE SCAN(PK_DATE_TIME) → 4453행

NESTED LOOP → 4453행
 NESTED LOOP → 4453행
 HASH JOIN → 4453행
 TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
 HASH JOIN → 62846행
 TABLE FULL SCAN(INTERACTION_TYPE) → 24행
 HASH JOIN → 62846행
 MERGE JOIN → 168행
 INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
 NESTED LOOP → 168행

```

        SORT AGGREGATE → 1행
        COUNT(STOP KEY) → 1행
        NESTED LOOP → 2행
            INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
            TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
    SORT ORDER BY → 168행
    UNION-ALL → 168행
    HASH JOIN → 110행
        NESTED LOOP → 109행
            TABLE FULL SCAN(XST_SKILL_MST) → 109행
            INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
            TABLE ACCESS BY INDEX ROWID → 110행
                INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
                TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
                TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행
                INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
                TABLE ACCESS BY USER ROWID(DATE_TIME) → 4453행

```

```

NESTED LOOP → 163행
    SORT AGGREGATE → 1행
    COUNT(STOP KEY) → 1행
    NESTED LOOP → 2행
        INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
        TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
NESTED LOOP → 4453행
    NESTED LOOP → 4453행
        HASH JOIN → 4453행
            TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
            HASH JOIN → 62846행
                TABLE FULL SCAN(INTERACTION_TYPE) → 24행
                HASH JOIN → 62846행
                    MERGE JOIN → 168행
                    INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
                    NESTED LOOP → 168행
                        SORT AGGREGATE → 1행
                        COUNT(STOP KEY) → 1행
                            NESTED LOOP → 2행
                                INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
                                TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
                    SORT ORDER BY → 168행
                    UNION-ALL → 168행
                    HASH JOIN → 110행
                        NESTED LOOP → 109행
                            TABLE FULL SCAN(XST_SKILL_MST) → 109행
                            INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
                            TABLE ACCESS BY INDEX ROWID → 110행
                                INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
                                TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
                                TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행
                                INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
                                TABLE ACCESS BY USER ROWID(DATE_TIME) → 4453행

```

```

NESTED LOOP → 1956행
  NESTED LOOP → 163행
    SORT AGGREGATE → 1행
    COUNT(STOP KEY) → 1행
    NESTED LOOP → 2행
      INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
      TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
    NESTED LOOP → 4453행
      NESTED LOOP → 4453행
        HASH JOIN → 4453행
          TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
          HASH JOIN → 62846행
            TABLE FULL SCAN(INTERACTION_TYPE) → 24행
            HASH JOIN → 62846행
              MERGE JOIN → 168행
                INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
                NESTED LOOP → 168행
                  SORT AGGREGATE → 1행
                  COUNT(STOP KEY) → 1행
                  NESTED LOOP → 2행
                    INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
                    TABLE ACCESS BY USER ROWID(DATE_TIME) → 2
                  SORT ORDER BY → 168행
                  UNION-ALL → 168행
                    HASH JOIN → 110행
                    NESTED LOOP → 109행
                      TABLE FULL SCAN(XST_SKILL_MST) → 109
                      INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST)
                      TABLE ACCESS BY INDEX ROWID → 110행
                      INDEX RANGE SCAN(PK_XST_QUEUE_REL) →
                      TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
                      TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행
                      INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
                      TABLE ACCESS BY USER ROWID(DATE_TIME) → 4453행
                    INDEX RANGE SCAN(PK_AGR_SCFG) → 1956행

```

```

HASH JOIN → 2771행
  INDEX RANGE SCAN(PK_AGR_SCFG_SCHEDULE) → 17행
  NESTED LOOP → 1956행
    NESTED LOOP → 163행
      SORT AGGREGATE → 1행
      COUNT(STOP KEY) → 1행
      NESTED LOOP → 2행
        INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
        TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
      NESTED LOOP → 4453행
        NESTED LOOP → 4453행
          HASH JOIN → 4453행
            TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
            HASH JOIN → 62846행
              TABLE FULL SCAN(INTERACTION_TYPE) → 24행
              HASH JOIN → 62846행
                MERGE JOIN → 168행
                  INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
                  NESTED LOOP → 168행
                    SORT AGGREGATE → 1행
                    COUNT(STOP KEY) → 1행

```

```

COUNT(STOP KEY) → 1행
NESTED LOOP → 2행
    INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
    TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
SORT ORDER BY → 168행
UNION-ALL → 168행
    HASH JOIN → 110행
        NESTED LOOP → 109행
            TABLE FULL SCAN(XST_SKILL_MST) → 2행
            INDEX RANGE SCAN(PK_XST_SKILL_CODE) → 2행
            TABLE ACCESS BY INDEX ROWID → 110행
            INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 2행
            TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
        TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행
    INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
    TABLE ACCESS BY USER ROWID(DATE_TIME) → 4453행
INDEX RANGE SCAN(PK_AGR_SCFG) → 1956행

```

```

HASH JOIN(OUTER) → 2771행
    INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
    HASH JOIN → 2771행
        INDEX RANGE SCAN(PK_AGR_SCFG_SCHEDULE) → 17행
        NESTED LOOP → 1956행
            NESTED LOOP → 163행
                SORT AGGREGATE → 1행
                COUNT(STOP KEY) → 1행
                NESTED LOOP → 2행
                    INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
                    TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
            NESTED LOOP → 4453행
                NESTED LOOP → 4453행
                    HASH JOIN → 4453행
                        TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
                        HASH JOIN → 62846행
                            TABLE FULL SCAN(INTERACTION_TYPE) → 24행
                            HASH JOIN → 62846행
                                MERGE JOIN → 168행
                                    INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
                                NESTED LOOP → 168행
                                    SORT AGGREGATE → 1행
                                    COUNT(STOP KEY) → 1행
                                    NESTED LOOP → 2행
                                        INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
                                        TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
                                    SORT ORDER BY → 168행
                                    UNION-ALL → 168행
                                        HASH JOIN → 110행
                                            NESTED LOOP → 109행
                                                TABLE FULL SCAN(XST_SKILL_MST) → 2행
                                                INDEX RANGE SCAN(PK_XST_SKILL_CODE) → 2행
                                                TABLE ACCESS BY INDEX ROWID → 110행
                                                INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 2행
                                                TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
                                            TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행
                                        INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
                                        TABLE ACCESS BY USER ROWID(DATE_TIME) → 4453행
                                INDEX RANGE SCAN(PK_AGR_SCFG) → 1956행

```

INDEX RANGE SCAN(PK_AGR_SCFG) → 17908

NESTED LOOP(OUTER) → 2771행
HASH JOIN(OUTER) → 2771행
INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
HASH JOIN → 2771행
INDEX RANGE SCAN(PK_AGR_SCFG_SCHEDULE) → 17행
NESTED LOOP → 1956행
NESTED LOOP → 163행
SORT AGGREGATE → 1행
COUNT(STOP KEY) → 1행
NESTED LOOP → 2행
INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
NESTED LOOP → 4453행
NESTED LOOP → 4453행
HASH JOIN → 4453행
TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
HASH JOIN → 62846행
TABLE FULL SCAN(INTERACTION_TYPE) → 24행
HASH JOIN → 62846행
MERGE JOIN → 168행
INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 229
NESTED LOOP → 168행
SORT AGGREGATE → 1행
COUNT(STOP KEY) → 1행
NESTED LOOP → 2행
INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
SORT ORDER BY → 168행
UNION-ALL → 168행
HASH JOIN → 110행
NESTED LOOP → 109행
TABLE FULL SCAN(XST_SKILL_FACT) → 147937
INDEX RANGE SCAN(PK_XST_SKILL_FACT) → 147937
TABLE ACCESS BY INDEX ROWID → 147937
INDEX RANGE SCAN(PK_XST_QUEUE) → 147937
TABLE FULL SCAN(TXS_ST_VQ_SKILL_FACT) → 147937
TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 147937
INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
TABLE ACCESS BY USER ROWID(DATE_TIME) → 4453행
INDEX RANGE SCAN(PK_AGR_SCFG) → 1956행
MATERIALIZED VIEW → 2771행
INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행

FILTER OPERATION → 163행
NESTED LOOP(OUTER) → 2771행
HASH JOIN(OUTER) → 2771행
INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
HASH JOIN → 2771행
INDEX RANGE SCAN(PK_AGR_SCFG_SCHEDULE) → 17행
NESTED LOOP → 1956행
NESTED LOOP → 163행
SORT AGGREGATE → 1행


```

COUNT(STOP KEY) → 1행
NESTED LOOP → 2행
    INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
    TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
NESTED LOOP → 4453행
    NESTED LOOP → 4453행
        HASH JOIN → 4453행
            TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
            HASH JOIN → 62846행
                TABLE FULL SCAN(INTERACTION_TYPE) → 24행
                HASH JOIN → 62846행

            MERGE JOIN → 168행
                INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 168행
                NESTED LOOP → 168행
                    SORT AGGREGATE → 1행
                        COUNT(STOP KEY) → 1행
                        NESTED LOOP → 2행
                            INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
                            TABLE ACCESS BY USER ROWID(INTERACTION_TYPE) → 2행
                    SORT ORDER BY → 168행
                    UNION-ALL → 168행
                        HASH JOIN → 110행
                            NESTED LOOP → 109행
                                TABLE FULL SCAN(XST_SKILL) → 109행
                                INDEX RANGE SCAN(PK_XST_SKILL) → 109행
                                TABLE ACCESS BY INDEX ROWID(XST_SKILL) → 109행
                                INDEX RANGE SCAN(PK_XST_SKILL) → 109행
                                TABLE FULL SCAN(TXS_ST_VQ_SKILL) → 109행
                            TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 147행
                        INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
                        TABLE ACCESS BY USER ROWID(INTERACTION_TYPE) → 4453행
                    INDEX RANGE SCAN(PK_AGR_SCFG) → 1956행
MATERIALIZED VIEW → 2771행
    INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행

```

```

NESTED LOOP(OUTER) → 163행
    FILTER OPERATION → 163행
        NESTED LOOP(OUTER) → 2771행
            HASH JOIN(OUTER) → 2771행
                INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
                HASH JOIN → 2771행
                    INDEX RANGE SCAN(PK_AGR_SCFG_SCHEDULE) → 17행
                    NESTED LOOP → 1956행
                        NESTED LOOP → 163행
                            SORT AGGREGATE → 1행
                                COUNT(STOP KEY) → 1행
                                NESTED LOOP → 2행
                                    INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
                                    TABLE ACCESS BY USER ROWID(INTERACTION_TYPE) → 2행
                        NESTED LOOP → 4453행
                            NESTED LOOP → 4453행
                                HASH JOIN → 4453행
                                    TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
                                    HASH JOIN → 62846행
                                        TABLE FULL SCAN(INTERACTION_TYPE) → 24행
                                        HASH JOIN → 62846행

```

MERGE JOIN → 140행

```

MERGE JOIN → 100행
  INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE)
  NESTED LOOP → 168행
    SORT AGGREGATE → 1행
    COUNT(STOP KEY) → 1행
    NESTED LOOP → 2행
      INDEX RANGE SCAN(IDX_DT
      TABLE ACCESS BY USER RC
    SORT ORDER BY → 168행
    UNION-ALL → 168행
    HASH JOIN → 110행
      NESTED LOOP → 109행
        TABLE FULL SCAN(XS1
        INDEX RANGE SCAN(PF
        TABLE ACCESS BY INDEX F
        INDEX RANGE SCAN(PF
        TABLE FULL SCAN(TXS_ST_VQ_
      TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) →
        INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
        TABLE ACCESS BY USER ROWID(DATE_TIME) → 4453행
        INDEX RANGE SCAN(PK_AGR_SCFG) → 1956행
    MATERIALIZED VIEW → 2771행
      INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
  MATERIALIZED VIEW → 9행
    NESTED LOOP → 9행
      NESTED LOOP → 9행
        INDEX RANGE SCAN(PK_INTERACTION_RESOURCE_FACT) → 9행
        TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 9행
      INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 9행

```

```

NESTED LOOP(OUTER) → 163행
  NESTED LOOP(OUTER) → 163행
    FILTER OPERATION → 163행
      NESTED LOOP(OUTER) → 2771행
        HASH JOIN(OUTER) → 2771행
          INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
          HASH JOIN → 2771행
            INDEX RANGE SCAN(PK_AGR_SCFG_SCHEDULE) → 17행
            NESTED LOOP → 1956행
              NESTED LOOP → 163행
                SORT AGGREGATE → 1행
                COUNT(STOP KEY) → 1행
                NESTED LOOP → 2행
                  INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
                  TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
                NESTED LOOP → 4453행
                  NESTED LOOP → 4453행
                    HASH JOIN → 4453행
                      TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 63행
                      HASH JOIN → 62846행
                        TABLE FULL SCAN(INTERACTION_TYPE) → 24행
                        HASH JOIN → 62846행
                          MERGE JOIN → 168행
                            INDEX RANGE SCAN(IDX_RES_KEY_TYPE_C
                            NESTED LOOP → 168행
                              SORT AGGREGATE → 1행
                              COUNT(STOP KEY) → 1행

```

```

        NESTED LOOP → 2행
            INDEX RANGE SCAN(INTERACTION_RESOURCE_FACT) → 1행
            TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 1행
        SORT ORDER BY → 168행
        UNION-ALL → 168행
        HASH JOIN → 110행
            NESTED LOOP → 109행
                TABLE FULL SCAN(TXS_SEGMENT_FACT) → 109행
                INDEX RANGE SCAN(PK_DATE_TIME) → 109행
                TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 109행
                INDEX RANGE SCAN(PK_INTERACTION_RESOURCE_FACT) → 109행
            TABLE FULL SCAN(TXS_SEGMENT_FACT) → 109행
            TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 109행
            INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
            TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 4453행
            INDEX RANGE SCAN(PK_AGR_SCFG) → 1956행
        MATERIALIZED VIEW → 2771행
            INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
        MATERIALIZED VIEW → 9행
        NESTED LOOP → 9행
            NESTED LOOP → 9행
                INDEX RANGE SCAN(PK_INTERACTION_RESOURCE_FACT) → 9행
                TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 9행
                INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 9행
            INDEX RANGE SCAN(PK_INTERACTION_FACT_CRYPT) → 163행

```

HASH GROUP BY

```

    NESTED LOOP(OUTER) → 163행
        NESTED LOOP(OUTER) → 163행
            FILTER OPERATION → 163행
                NESTED LOOP(OUTER) → 2771행
                    HASH JOIN(OUTER) → 2771행
                        INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
                        HASH JOIN → 2771행
                            INDEX RANGE SCAN(PK_AGR_SCFG_SCHEDULE) → 17행
                            NESTED LOOP → 1956행
                                NESTED LOOP → 163행
                                    SORT AGGREGATE → 1행
                                        COUNT(STOP KEY) → 1행
                                            NESTED LOOP → 2행
                                                INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
                                                TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 2행
                                            NESTED LOOP → 4453행
                                                NESTED LOOP → 4453행
                                                    HASH JOIN → 4453행
                                                        TABLE FULL SCAN(TECHNICAL_DESCRIPTOR) → 62846행
                                                        HASH JOIN → 62846행
                                                            TABLE FULL SCAN(INTERACTION_TYPE) → 62846행
                                                            HASH JOIN → 62846행
                                                                MERGE JOIN → 168행
                                                                    INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 168행
                                                                    NESTED LOOP → 168행
                                                                        SORT AGGREGATE → 1행
                                                                            COUNT(STOP KEY) → 1행
                                                                                NESTED LOOP → 2행
                                                                                    INDEX RANGE SCAN(PK_INTERACTION_RESOURCE_FACT) → 2행
                                                                                    TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 2행

```

```

        SORT ORDER BY → 168행
        UNION-ALL → 168행
        HASH JOIN → 110행
        NESTED LOOP →
            TABLE FULL
            INDEX RANGE
            TABLE ACCESS BY
            INDEX RANGE
            TABLE FULL SCAN(TXS
            TABLE FULL SCAN(MEDIATION_SEGMENT_F
            INDEX RANGE SCAN(PK_DATE_TIME) → 4453행
            TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 4453행
            INDEX RANGE SCAN(PK_AGR_SCFG) → 1956행
        MATERIALIZED VIEW → 2771행
            INDEX RANGE SCAN(PK_AGR_SCFG_MAP_I) → 1행
    MATERIALIZED VIEW → 9행
        NESTED LOOP → 9행
            NESTED LOOP → 9행
                INDEX RANGE SCAN(PK_INTERACTION_RESOURCE_FACT) → 9행
                TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 9행
                INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 9행
    INDEX RANGE SCAN(PK_INTERACTION_FACT_Cryp) → 163행

```

최종 Text SQL Trace 분석

대체로 옵티마이저가 최적의 조인 경로를 생성해낸 것으로 보입니다. 하지만 상기 트레이스 내용을 확인하면서 들었던 몇 가지 의문을 하기에 정리하였습니다.

(1) TOP-N 쿼리를 통해서 단일 행 반환 이후 해당 행에 대해서 또 다시 집계 함수를 수행하는 내용이 있습니다.

```

    SORT AGGREGATE → 1행
        COUNT(STOP KEY) → 1행
            NESTED LOOP → 2행
                INDEX RANGE SCAN(IDX_DATE_CAL_DATE) → 2행
                TABLE ACCESS BY USER ROWID(INTERACTION_RESOURCE_FACT) → 2행

```

불필요한 연산처럼 보이지만 일전에 삼성증권에 방문하였을 때 Dynamic SQL문으로 쓰이는 것을 보고 상기 와 같은 쓰임새를 납득하였습니다.

(2) 유일하게 부하 지점으로 보이는 부분은 MEDIATION_SEGMENT_FACT 테이블을 FULL SCAN 하는 부분입니다. 일전에 삼성증권에서 해당 쿼리가 1분 40초나 걸리게 했던 부분이 MS SQL 옵티마이저가 생성한 SQL Plan에서도 전체 쿼리 소요 시간 중 많은 부분을 차지하고 있었습니다! 느린 쿼리와 차이점은 하기에 서 볼 수 있듯이 NESTED LOOP 조인이 아닌 HASH JOIN이라는 점입니다.

```

    HASH JOIN → 62846행
        MERGE JOIN → 168행
            INDEX RANGE SCAN(IDX_RES_KEY_TYPE_CODE) → 2292행
            NESTED LOOP → 168행
                SORT AGGREGATE → 1행
                COUNT(STOP KEY) → 1행

```

```

    NESTED LOOP → 2행
      INDEX RANGE SCAN(IDX_DT_CAL_DATE) → 2행
      TABLE ACCESS BY USER ROWID(DATE_TIME) → 2행
  SORT ORDER BY → 168행
  UNION-ALL → 168행
    HASH JOIN → 110행
      NESTED LOOP → 109행
        TABLE FULL SCAN(XST_SKILL_MST) → 109행
        INDEX RANGE SCAN(PK_XST_SKILL_CODE_MST) → 109행
        TABLE ACCESS BY INDEX ROWID → 110행
        INDEX RANGE SCAN(PK_XST_QUEUE_REL) → 228행
      TABLE FULL SCAN(TXS_ST_VQ_SKILL_FIX) → 58행
  TABLE FULL SCAN(MEDIATION_SEGMENT_FACT) → 1479372행

```

전체 쿼리 수행 시간 0.494초 중에서 해당 HASH JOIN이 0.441초를 차지합니다. 전체 쿼리 소요 시간 중 89%입니다. MEDIATION_SEGMENT_FACT 테이블의 RESOURCE_KEY 컬럼에 인덱스가 없어서 168행의 RESOURCE_KEY 컬럼을 기준으로 해시 테이블을 만들고 1479372번 해시 테이블 탐색을 수행하여 62846행을 결과로 내놓았습니다. 1479372번 탐색하여 62846행만 결과로 내놓은 것은 전체 4.25%에 불과하므로 굉장히 비효율적입니다. 따라서 MEDIATION_SEGMENT_FACT 테이블에 RESOURCE_KEY 컬럼에 대한 단일 컬럼 인덱스를 생성하고 NL 조인을 수행한다면 MEDIATION_SEGMENT_FACT 테이블로의 Random Access가 168번에 불과하므로 조인되는 데이터 중 결과 집합에서 누락되는 데이터가 없기에 훨씬 효율적이라고 볼 수 있습니다. 또한 만약에 MEDIATION_SEGMENT_FACT 테이블이 시간이 지남에 따라 데이터가 증가하는 테이블이라면 RESOURCE_KEY 컬럼에 단일 컬럼 인덱스가 있기 때문에 쿼리 소요 시간이 증가하지 않습니다.

MS SQL Hint 사용 예시

FROM 절에 테이블을 나열한 순으로 NL 조인

```

SELECT o.주문번호, o.고객번호, c.고객명, c.전화번호, o.주문금액
FROM 주문 o, 고객 c
WHERE o.주문일자 ≥ TRUNC(SYSDATE)
AND c.고객번호 = o.고객번호
OPTION (FORCE ORDER, LOOP JOIN)

```

FROM 절에 테이블을 나열한 순으로 조인하되 조인 방식이 테이블마다 다를 때

```

SELECT o.주문번호, o.고객번호, c.고객명, c.전화번호, o.주문금액, t.결제방식명
FROM 주문 o
      INNER LOOP JOIN 고객 c ON (c.고객번호 = o.고객번호)
      INNER HASH JOIN 결제방식 t ON (t.결제방식코드 = o.결제방식코드)
WHERE o.주문일자 ≥ TRUNC(SYSDATE)
OPTION (FORCE ORDER)

```