DB2 EXPRESS C

Installed DB2 EXPRESS C on Windows

Created the database named 'SAMPLE 'while installation of DB2

Connected to 'SAMPLE' DATABASE
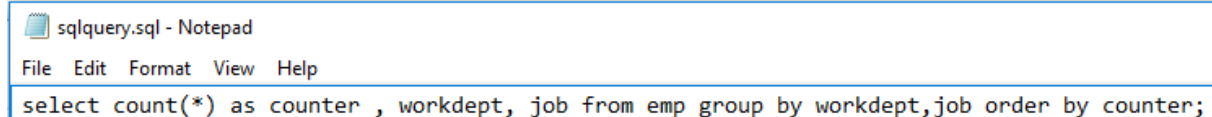
```
db2 => connect to sample

   Database Connection Information

Database server        = DB2/NT64 11.1.1.1
SQL authorization ID   = MANASI M...
Local database alias   = SAMPLE
```

Set the explain mode ON

```
db2 => set current explain mode explain
DB20000I  The SQL command completed successfully.
```

Created an file 'sqlquery.sql' at location 'C:\Program Files\IBM\SQLLIB\BIN'

sqlquery.sql - Notepad

File   Edit   Format   View   Help

```
select count(*) as counter , workdept, job from emp group by workdept,job order by counter;
```

Executed the query to create explain plan in explain mode

```
C:\Program Files\IBM\SQLLIB\BIN>db2 -tvf sqlquery.sql
select count(*) as counter , workdept, job from emp group by workdept,job order by counter

COUNTER     WORKDEPT JOB
----------- -------- --------
          1 A00      PRES
          1 B01      MANAGER
          1 C01      MANAGER
          1 D11      MANAGER
          1 D21      MANAGER
          1 E01      MANAGER
          1 E11      MANAGER
          1 E21      MANAGER
          2 A00      CLERK
          2 A00      SALESREP
          3 C01      ANALYST
          5 E21      FIELDREP
          6 D21      CLERK
          6 E11      OPERATOR
         10 D11      DESIGNER

  15 record(s) selected.
```

Using db2exfmt tool created the query plan

1. The output generated at the terminal is as follows:

```
Select Administrator: DB2 CLP - DB2COPY1

Enter Database Name ==> sample
Connecting to the Database.
Connect to Database Successful.
Enter up to 26 character Explain timestamp (Default -1) ==>
Enter up to 128 character source name (SOURCE_NAME, Default %%) ==>
Enter source schema (SOURCE_SCHEMA, Default %%) ==>
Enter section number (0 for all, Default 0) ==>
Enter outfile name. Default is to terminal ==>
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IBM DATABASE 2 Explain Table Format Tool



******************** EXPLAIN INSTANCE ********************

DB2_VERSION:        11.01.1
FORMATTED ON DB:    SAMPLE
SOURCE_NAME:        SQLC2026
SOURCE_SCHEMA:      NULLID
SOURCE_VERSION:
EXPLAIN_TIME:       2017-02-26-17.57.59.086000
EXPLAIN_REQUESTER: MANASI MILIND JOSHI

Database Context:
----------------
        Parallelism:        None
        CPU Speed:          8.659645e-008
        Comm Speed:         0
        Buffer Pool size:   250
        Sort Heap size:     256
        Database Heap size: 600
        Lock List size:     4096
        Maximum Lock List:  22
        Average Applications: 1
        Locks Available:    28835

Package Context:
---------------
        SQL Type:           Dynamic
        Optimization Level: 5
        Blocking:           Block All Cursors
        Isolation Level:    Cursor Stability
```

```
Original Statement:
----------------
select
  count(*) as counter,
  workdept,
  job
from
  emp
group by
  workdept,
  job
order by
  counter


Optimized Statement:
------------------
SELECT
  Q3.$C0 AS "COUNTER",
  Q3.WORKDEPT AS "WORKDEPT",
  Q3.JOB AS "JOB"
FROM
  (SELECT
     COUNT(*),
     Q2.WORKDEPT,
     Q2.JOB
   FROM
     (SELECT
        Q1.WORKDEPT,
        Q1.JOB
      FROM
        "MANASI MILIND JOSHI".EMPLOYEE AS Q1
     ) AS Q2
   GROUP BY
     Q2.JOB,
     Q2.WORKDEPT
  ) AS Q3
ORDER BY
  Q3.$C0
```

```
Access Plan:
-----------
        Total Cost:              6.83046
        Query Degree:            1


         Rows
         RETURN
         (    1)
          Cost
           I/O
            |
           42
         TBSCAN
         (    2)
         6.83046
            1
            |
           42
         SORT
         (    3)
         6.82941
            1
            |
           42
         GRPBY
         (    4)
         6.82328
            1
            |
           42
         TBSCAN
         (    5)
         6.82233
            1
            |
           42
         SORT
         (    6)
         6.82129
            1
            |
           42
         TBSCAN
```

```
        (    7)
       6.81579
           1
           |
          42
TABLE: MANASI MILIND JOSHI
       EMPLOYEE
          Q1
```

2.The output file is located at the location 'C:\Program files\IBM\SQLLIB\BIN' with name 'out.sql'

```
C:\Program Files\IBM\SQLLIB\BIN>db2exfmt
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IBM DATABASE 2 Explain Table Format Tool

Enter Database Name ==> sample
Connecting to the Database.
Connect to Database Successful.
Enter up to 26 character Explain timestamp (Default -1) ==>
Enter up to 128 character source name (SOURCE_NAME, Default %%) ==>
Enter source schema (SOURCE_SCHEMA, Default %%) ==>
Enter section number (0 for all, Default 0) ==>
Enter outfile name. Default is to terminal ==> out
Output is in out.
Executing Connect Reset -- Connect Reset was Successful.
```

********************Contents of out.sql file**********************

DB2 Universal Database Version 11.1, 5622-044 (c) Copyright IBM Corp. 1991, 2015
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IBM DATABASE 2 Explain Table Format Tool

******************** EXPLAIN INSTANCE ********************

DB2_VERSION: 11.01.1
FORMATTED ON DB: SAMPLE
SOURCE_NAME: SQLC2O26

SOURCE_SCHEMA: NULLID
SOURCE_VERSION:
EXPLAIN_TIME: 2017-02-26-17.57.59.086000
EXPLAIN_REQUESTER: MANASI MILIND JOSHI

Database Context:

       Parallelism: None
       CPU Speed: 8.659645e-008
       Comm Speed: 0
       Buffer Pool size: 250
       Sort Heap size: 256
       Database Heap size: 600
       Lock List size: 4096
       Maximum Lock List: 22
       Average Applications: 1
       Locks Available: 28835

Package Context:

       SQL Type: Dynamic
       Optimization Level: 5
       Blocking: Block All Cursors
       Isolation Level: Cursor Stability

----------------- STATEMENT 1 SECTION 201 ----------------
       QUERYNO: 7
       QUERYTAG: CLP
       Statement Type: Select
       Updatable: No
       Deletable: No
       Query Degree: 1

Original Statement:

```
select
  count(*) as counter,
  workdept,
  job
from
  emp
group by
  workdept,
  job
order by
  counter


Optimized Statement:
-------------------
SELECT
  Q3.$C0 AS "COUNTER",
  Q3.WORKDEPT AS "WORKDEPT",
  Q3.JOB AS "JOB"
FROM
  (SELECT
    COUNT(*),
    Q2.WORKDEPT,
    Q2.JOB
   FROM
    (SELECT
      Q1.WORKDEPT,
      Q1.JOB
     FROM
      "MANASI MILIND JOSHI".EMPLOYEE AS Q1
    ) AS Q2
   GROUP BY
    Q2.JOB,
    Q2.WORKDEPT
  ) AS Q3
ORDER BY
  Q3.$C0
```

Access Plan:

        Total Cost: 6.83046
        Query Degree: 1

         Rows
        RETURN
        (1)
         Cost
          I/O
           |
          42
        TBSCAN
        (2)
        6.83046
           1
           |
          42
        SORT
        (3)
        6.82941
           1
           |
          42
        GRPBY
        (4)
        6.82328
           1
           |
          42
        TBSCAN
        (5)
        6.82233
           1
           |

```
              42
             SORT
             (  6)
            6.82129
               1
               |
              42
            TBSCAN
            (  7)
           6.81579
              1
              |
             42
      TABLE: MANASI MILIND JOSHI
          EMPLOYEE
             Q1
```

Extended Diagnostic Information:

Diagnostic Identifier: 1
Diagnostic Details: EXP0062W The following MQT or statistical view was
                             not eligible because one or more columns or
                             expressions referenced in the query were not found
                             in the MQT: "MANASI MILIND JOSHI"."ADEFUSR".
Diagnostic Identifier: 2
Diagnostic Details: EXP0148W The following MQT or statistical view was
                             considered in query matching: "MANASI MILIND JOSHI".
                             "ADEFUSR".

Plan Details:
----

       1) RETURN: (Return Result)

Cumulative Total Cost: 6.83046
Cumulative CPU Cost: 293970
Cumulative I/O Cost: 1
Cumulative Re-Total Cost: 0.0110993
Cumulative Re-CPU Cost: 128173
Cumulative Re-I/O Cost: 0
Cumulative First Row Cost: 6.82955
Estimated Bufferpool Buffers: 0

Arguments:

BLDLEVEL: (Build level)
        DB2 v11.1.1010.160 : s1612051900
HEAPUSE : (Maximum Statement Heap Usage)
        112 Pages
PLANID : (Access plan identifier)
        df518d14f92a237b
PREPTIME: (Statement prepare time)
          93 milliseconds
SEMEVID : (Semantic environment identifier)
        12150bbb40022393
STMTHEAP: (Statement heap size)
        8192
STMTID : (Normalized statement identifier)
        7a69760d0a6cf6d4

Input Streams:
----
        7) From Operator #2

                Estimated number of rows: 42
                Number of columns: 3
                Subquery predicate ID: Not Applicable

                Column Names:

                +Q4.COUNTER(A)+Q4.JOB+Q4.WORKDEPT

2) TBSCAN: (Table Scan)
        Cumulative Total Cost: 6.83046
        Cumulative CPU Cost: 293970
        Cumulative I/O Cost: 1
        Cumulative Re-Total Cost: 0.0110993
        Cumulative Re-CPU Cost: 128173
        Cumulative Re-I/O Cost: 0
        Cumulative First Row Cost: 6.82955
        Estimated Bufferpool Buffers: 0

        Arguments:

        MAXPAGES: (Maximum pages for prefetch)
              ALL
        PREFETCH: (Type of Prefetch)
              NONE
        SCANDIR : (Scan Direction)
              FORWARD
        SPEED   : (Assumed speed of scan, in sharing structures)
              SLOW
        THROTTLE: (Scan may be throttled, for scan sharing)
              FALSE
        VISIBLE : (May be included in scan sharing structures)
              FALSE
        WRAPPING: (Scan may start anywhere and wrap)
              FALSE

        Input Streams:
        ----
              6) From Operator #3

                    Estimated number of rows: 42
                    Number of columns: 3
                    Subquery predicate ID: Not Applicable

Column Names:

+Q3.$C0(A)+Q3.JOB+Q3.WORKDEPT

Output Streams:
----
    7) To Operator #1

        Estimated number of rows: 42
        Number of columns: 3
        Subquery predicate ID: Not Applicable

        Column Names:

        +Q4.COUNTER(A)+Q4.JOB+Q4.WORKDEPT

3) SORT : (Sort)
        Cumulative Total Cost: 6.82941
        Cumulative CPU Cost: 281933
        Cumulative I/O Cost: 1
        Cumulative Re-Total Cost: 0.010057
        Cumulative Re-CPU Cost: 116136
        Cumulative Re-I/O Cost: 0
        Cumulative First Row Cost: 6.82941
        Estimated Bufferpool Buffers: 0

        Arguments:

        DUPLWARN: (Duplicates Warning flag)
              FALSE
        KEYS   : (Key cardinality)
              10
        NUMROWS : (Estimated number of rows)
              42
        ROWWIDTH: (Estimated width of rows)

```
        20.000000
SORTKEY : (Sort Key column)
        1: Q3.$C0(A)
TEMPSIZE: (Temporary Table Page Size)
        8192
UNIQUE  : (Uniqueness required flag)
        FALSE


Input Streams:
-------------
        5) From Operator #4

                Estimated number of rows:      42
                Number of columns:             3
                Subquery predicate ID:         Not Applicable

                Column Names:
                ------------
                +Q3.JOB+Q3.WORKDEPT+Q3.$C0


Output Streams:
--------------
        6) To Operator #2

                Estimated number of rows:      42
                Number of columns:             3
                Subquery predicate ID:         Not Applicable

                Column Names:
                ------------
                +Q3.$C0(A)+Q3.JOB+Q3.WORKDEPT


4) GRPBY : (Group By)
        Cumulative Total Cost:         6.82328
        Cumulative CPU Cost:           211087
```

Cumulative I/O Cost: 1
Cumulative Re-Total Cost: 0.00839994
Cumulative Re-CPU Cost: 97001
Cumulative Re-I/O Cost: 0
Cumulative First Row Cost: 6.82145
Estimated Bufferpool Buffers: 0

Arguments:

AGGMODE : (Aggregation Mode)
        COMPLETE
GROUPBYC: (Group By columns)
        TRUE
GROUPBYN: (Number of Group By columns)
        2
GROUPBYR: (Group By requirement)
        1: Q2.WORKDEPT
        2: Q2.JOB
ONEFETCH: (One Fetch flag)
        FALSE

Input Streams:
----
        4) From Operator #5

                Estimated number of rows: 42
                Number of columns: 2
                Subquery predicate ID: Not Applicable

                Column Names:

                +Q2.WORKDEPT(A)+Q2.JOB(A)

Output Streams:
----
        5) To Operator #3

Estimated number of rows: 42
Number of columns: 3
Subquery predicate ID: Not Applicable

Column Names:

+Q3.JOB+Q3.WORKDEPT+Q3.$C0

5) TBSCAN: (Table Scan)
        Cumulative Total Cost: 6.82233
        Cumulative CPU Cost: 200169
        Cumulative I/O Cost: 1
        Cumulative Re-Total Cost: 0.00745448
        Cumulative Re-CPU Cost: 86083
        Cumulative Re-I/O Cost: 0
        Cumulative First Row Cost: 6.82142
        Estimated Bufferpool Buffers: 0

        Arguments:

        MAXPAGES: (Maximum pages for prefetch)
                ALL
        PREFETCH: (Type of Prefetch)
                NONE
        SCANDIR : (Scan Direction)
                FORWARD
        SPEED   : (Assumed speed of scan, in sharing structures)
                SLOW
        THROTTLE: (Scan may be throttled, for scan sharing)
                FALSE
        VISIBLE : (May be included in scan sharing structures)
                FALSE
        WRAPPING: (Scan may start anywhere and wrap)
                FALSE

Input Streams:
----
        3) From Operator #6

                Estimated number of rows: 42
                Number of columns: 2
                Subquery predicate ID: Not Applicable

                Column Names:

                +Q2.WORKDEPT(A)+Q2.JOB(A)

        Output Streams:
        ----
                4) To Operator #4

                Estimated number of rows: 42
                Number of columns: 2
                Subquery predicate ID: Not Applicable

                Column Names:

                +Q2.WORKDEPT(A)+Q2.JOB(A)

6) SORT : (Sort)
        Cumulative Total Cost: 6.82129
        Cumulative CPU Cost: 188132
        Cumulative I/O Cost: 1
        Cumulative Re-Total Cost: 0.00641212
        Cumulative Re-CPU Cost: 74046
        Cumulative Re-I/O Cost: 0
        Cumulative First Row Cost: 6.82129
        Estimated Bufferpool Buffers: 1

        Arguments:

DUPLWARN: (Duplicates Warning flag)
        FALSE
KEYS   : (Key cardinality)
        42
NUMROWS : (Estimated number of rows)
        42
ROWWIDTH: (Estimated width of rows)
        20.000000
SORTKEY : (Sort Key column)
        1: Q2.WORKDEPT(A)
        2: Q2.JOB(A)
TEMPSIZE: (Temporary Table Page Size)
        8192
UNIQUE : (Uniqueness required flag)
        FALSE

Input Streams:
----
        2) From Operator #7

                Estimated number of rows: 42
                Number of columns: 2
                Subquery predicate ID: Not Applicable

                Column Names:

                +Q2.JOB+Q2.WORKDEPT

Output Streams:
----
        3) To Operator #5

                Estimated number of rows: 42
                Number of columns: 2
                Subquery predicate ID: Not Applicable

Column Names:

+Q2.WORKDEPT(A)+Q2.JOB(A)

7) TBSCAN: (Table Scan)
        Cumulative Total Cost: 6.81579
        Cumulative CPU Cost: 124639
        Cumulative I/O Cost: 1
        Cumulative Re-Total Cost: 0.00641212
        Cumulative Re-CPU Cost: 74046
        Cumulative Re-I/O Cost: 0
        Cumulative First Row Cost: 6.80953
        Estimated Bufferpool Buffers: 1

        Arguments:

        CUR_COMM: (Currently Committed)
                TRUE
        LCKAVOID: (Lock Avoidance)
                TRUE
        MAXPAGES: (Maximum pages for prefetch)
                ALL
        PREFETCH: (Type of Prefetch)
                NONE
        ROWLOCK : (Row Lock intent)
                SHARE (CS/RS)
        SCANDIR : (Scan Direction)
                FORWARD
        SKIP_INS: (Skip Inserted Rows)
                TRUE
        SPEED   : (Assumed speed of scan, in sharing structures)
                FAST
        TABLOCK : (Table Lock intent)
                INTENT SHARE
        TBISOLVL: (Table access Isolation Level)

CURSOR STABILITY
THROTTLE: (Scan may be throttled, for scan sharing)
            TRUE
VISIBLE : (May be included in scan sharing structures)
            TRUE
WRAPPING: (Scan may start anywhere and wrap)
            TRUE

Input Streams:
----
        1) From Object MANASI MILIND JOSHI.EMPLOYEE

                Estimated number of rows: 42
                Number of columns: 3
                Subquery predicate ID: Not Applicable

                Column Names:

                +Q1.RID+Q1.JOB+Q1.WORKDEPT

Output Streams:
----
        2) To Operator #6

                Estimated number of rows: 42
                Number of columns: 2
                Subquery predicate ID: Not Applicable

                Column Names:

                +Q2.JOB+Q2.WORKDEPT

Objects Used in Access Plan:

Schema: MANASI MILIND JOSHI
Name: EMP
Type: Alias (reference only)

Schema: MANASI MILIND JOSHI
Name: ADEFUSR
Type: Materialized View (reference only)

Schema: MANASI MILIND JOSHI
Name: EMPLOYEE
Type: Table

Time of creation:	2017-02-19-13.53.30.016002
Last statistics update:	2017-02-19-15.59.20.136000
Number of columns:	14
Number of rows:	42
Width of rows:	99
Number of buffer pool pages:	1
Number of data partitions:	1
Distinct row values:	No
Tablespace name:	USERSPACE1
Tablespace overhead:	6.725000
Tablespace transfer rate:	0.080000
Source for statistics:	Single Node
Prefetch page count:	32
Container extent page count:	32
Table overflow record count:	0
Table Active Blocks:	-1
Average Row Compression Ratio:	0
Percentage Rows Compressed:	0
Average Compressed Row Size:	0