Project 3 DW : Dashboarding

by Julian Fransen and Andreja Andrejic

Bitmaps are faster than B-trees for multi-valued queries with complex predicates, which is the case for some of the queries, and if SF < 0.01, which is the case in all queries. Furthermore, the bit-vectors can be operated on without decompressing them, making them ideal candidates to use for the columns a join operation is performed on.

Finally, using the metrics of the execution plan, we empirically determined that TemporalDimension should not be indexed, given the queries and constraints. Our current data + indexes take up 1896 blocks; more could not be added without going over the limit. Query 3 and 4 are written using subqueries, as this significantly improves performance. Below you will find the SQL code for creating the bitmap indexes and queries.

```
CREATE BITMAP INDEX au_aid_bi ON AIRCRAFTUTILIZATION(AIRCRAFTID) PCTFREE 0;
CREATE BITMAP INDEX lr_pid_bi ON LOGBOOKREPORTING(PERSONID) PCTFREE 0;
CREATE BITMAP INDEX lr_aid_bi ON LOGBOOKREPORTING(AIRCRAFTID) PCTFREE 0;
--q1 30% with MODEL = '777'
SELECT SUM(au.flightHours) AS FH, SUM(au.flightCycles) AS FC, t.MONTHID
FROM AircraftUtilization au, TemporalDimension t, AIRCRAFTDIMENSION a
WHERE au.timeID = t.ID AND au.AIRCRAFTID = a.ID AND a.MODEL = '777'
GROUP BY t.monthID;
--q2 30% with AIRCRAFTID = 'XY-WTR'
SELECT SUM(au.scheduledOutOfService) AS ADOSS,
SUM(au.unscheduledOutOfService) AS ADOSU, m.Y AS "Year"
FROM AircraftUtilization au, TemporalDimension t, MONTHS m
WHERE au.timeID = t.ID AND t.MONTHID = m.ID AND au.AIRCRAFTID = 'XY-WTR'
GROUP BY m.Y;
--q3 20% with MODEL = '777'
SELECT subquery_a.MONTHID,1000 * (MAREP+PIREP)/FH AS RRh, 100 *
(MAREP+PIREP)/FC AS RRc,1000 *PIREP/FH AS PRRh, 100 * PIREP/FC AS PRRc,
1000 * MAREP/FH AS MRRh,100 * MAREP/FC AS MRRc
FROM(SELECT t.MONTHID,SUM(au.FLIGHTHOURS) AS FH,SUM(au.FLIGHTCYCLES) AS FC
      FROM AIRCRAFTUTILIZATION au, TEMPORALDIMENSION t,AIRCRAFTDIMENSION a
      WHERE au.AIRCRAFTID = a.ID AND au.TIMEID = t.ID AND a.MODEL = '777'
      GROUP BY t.MONTHID) subquery_a,
      (SELECT l.MONTHID, SUM(CASE WHEN p.ROLE ='M' THEN l.COUNTER ELSE 0
      END) AS MAREP, SUM(CASE WHEN p.ROLE ='P' THEN l.COUNTER ELSE 0 END) AS
      PIREP
      FROM LOGBOOKREPORTING l, AIRCRAFTDIMENSION a, PEOPLEDIMENSION p
      WHERE l.AIRCRAFTID = a.ID AND p.ID = l.PERSONID AND a.MODEL = '777'
      GROUP BY l.MONTHID) subquery_b
WHERE subquery_a.MONTHID = subquery_b.MONTHID;
--q4 20% with AIRPORT = 'KRS'
SELECT subquery_b.MODEL,1000 * MAREP/FH AS MRRh, 100 * MAREP/FC AS MRRc
FROM (SELECT a.MODEL,SUM(au.FLIGHTHOURS) AS FH, SUM(au.FLIGHTCYCLES) AS FC
      FROM AIRCRAFTUTILIZATION au, AIRCRAFTDIMENSION a
      WHERE au.AIRCRAFTID = a.ID
      GROUP BY a.MODEL) subquery_a,
      (SELECT a.MODEL, SUM(CASE WHEN p.ROLE ='M' THEN l.COUNTER ELSE 0 END)
      AS MAREP
      FROM LOGBOOKREPORTING l, AIRCRAFTDIMENSION a, PEOPLEDIMENSION p
      WHERE L.AIRCRAFTID = a.ID AND p.AIRPORT = 'KRS' AND p.ID = l.PERSONID
      GROUP BY a.MODEL) subquery_b
WHERE subquery_a.MODEL = subquery_b.MODEL
```