Data Warehousing
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3rd Lab Assignment
Team 12-D3-G

a) **Indexes:**

CREATE BITMAP INDEX idx_aid_au --8 Blocks
ON AIRCRAFTUTILIZATION(AIRCRAFTID);

CREATE BITMAP INDEX idx_aid_lr --16 blocks
ON LOGBOOKREPORTING(AIRCRAFTID);

CREATE BITMAP INDEX idx_pid_lr --16 blocks
ON LOGBOOKREPORTING(PERSONID);

We created 3 BITMAP Indexes on our fact tables which they are LogbookReporting and AircraftUtilization in order to decrease the cost of the KPI Queries. The reason for this is that the fact tables take up more space then dimensions in theory. Using the Execution Plan, we observed that the cost of the queries was to prove it. As a result, we indexed on columns which they call as AIRCRAFTID and PERSONID and reduced query costs. Moreover, The reason for choosing BITMAP was that there were not many repetitive values. Finally, while there were 1832 blocks at the beginning, we obtained 1872 blocks with these indexes and did not exceed the 1900 limit.

b) **Queries:**

We have 4 separate queries and they contain a total of 10 KPIs.

1) **This query retrieves FH and FC KPIs per month, is filtered by the aircraft model 777.**

SELECT T.MONTHID, SUM(AU.FLIGHTHOURS) AS FH, SUM(AU.FLIGHTCYCLES) AS FC
FROM TEMPORALDIMENSION T, AIRCRAFTDIMENSION AD, AIRCRAFTUTILIZATION AU
WHERE AU.AIRCRAFTID = AD.ID AND AU.TIMEID = T.ID AND AD.MODEL = '777'
GROUP BY T.MONTHID;

2) **This query retieves ADOSS, ADOSU KPIs per year, filtered by the aircraft from the fleet.**

SELECT SUM(AU.SCHEDULEDOUTOFSERVICE) AS ADOSS,
SUM(AU.UNSCHEDULEDOUTOFSERVICE) AS ADOSU
FROM AIRCRAFTUTILIZATION AU, MONTHS M, TEMPORALDIMENSION T
WHERE AU.AIRCRAFTID = 'XY-WTR' AND M.ID = T.MONTHID AND AU.TIMEID = T.ID
GROUP BY M.Y;

3) This query retieves RRh, RRc, PRRh, PRRc, MRRh and MRRc KPIs per month, filtered by the aircraft model 777.

```sql
SELECT LR.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 TEMPORALDIMENSION T, AIRCRAFTDIMENSION AD, AIRCRAFTUTILIZATION AU
    WHERE AU.AIRCRAFTID = AD.ID AND AU.TIMEID = T.ID AND AD.MODEL = '777'
    GROUP BY T.MONTHID) AU,
    (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 AD, PEOPLEDIMENSION P
     WHERE L.AIRCRAFTID = AD.ID AND P.ID = L.PERSONID AND AD.MODEL = '777'
     GROUP BY L.MONTHID
    ) LR
 WHERE AU.MONTHID = LR.MONTHID;
```

4) This query retrieves MRRh and MRRc KPIs per aircraft model, filtered by the airport of the reporting person.

```sql
SELECT LR.MODEL,1000*MAREP/FH AS MRRh, 100*MAREP/FC AS MRRc
FROM (SELECT AD.MODEL,SUM(AU.FLIGHTHOURS) AS FH, SUM(AU.FLIGHTCYCLES) AS FC
    FROM AIRCRAFTDIMENSION AD, AIRCRAFTUTILIZATION AU
    WHERE AU.AIRCRAFTID = AD.ID
    GROUP BY AD.MODEL) AU,
    (SELECT AD.MODEL,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 AD, PEOPLEDIMENSION P
     WHERE L.AIRCRAFTID = AD.ID AND P.AIRPORT = 'KRS' AND P.ID = L.PERSONID
     GROUP BY AD.MODEL
    ) LR
 WHERE AU.MODEL = LR.MODEL;
```

c) Assumptions:

- We wrote the queries without using view because of the fact that view is doing double counting and changes the result of some of KPIs. Furthermore, using view increases the cost of our queries.