

Assignment No2 Solution

CS 614

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Solution :

Question No. 1

Consider the following table having the information of students of a university:

Student ID	Student Name	Campus ID	Student Age	Degree Program
1	Ali	VLHR01	27	MS
2	Kamran	VISB01	24	BS
3	Akmal	VRWP01	24	BS
4	Ahmad	VLHR01	26	MS
5	Rehan	VISB01	23	BS
6	Rizwan	VRWP01	29	MS
7	Umer	VISB01	25	BS
8	Javed	VLHR01	26	MS

You are required to completely de-normalize the above table using "horizontal splitting" on the basis of Degree Program.

Solution:

Horizontal splitting of above table on the basis of Degree program column is given below:

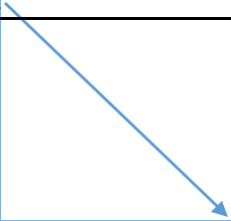
Student ID	Student Name	Campus ID	Student Age	Degree Program
1	Ali	VLHR01	27	MS
4	Ahmad	VLHR01	26	MS
6	Rizwan	VRWP01	29	MS
8	Javed	VLHR01	26	MS

Student ID	Student Name	Campus ID	Student Age	Degree Program
2	Kamran	VISB01	24	BS
3	Akmal	VRWP01	24	BS
5	Rehan	VISB01	23	BS
7	Umer	VISB01	25	BS

Question No. 2

Consider the following normalized tables for a telecommunication company showing the daily call record details of customers:

Customer Info		
Customer_ID	Customer Phone No.	Balance
1	033XXXXX	300
2	033YYYYY	250
3	033ZZZZZZ	300
4	033AAAAA	1000
5	033BBBBB	80
6	033CCCCC	554
...



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Call record detail

Call_ID	Customer_ID	Dialed Phone Number	Duration	Call Charges
1	1	032ABCVD	1 minute	2 RS
2	1	032ABCVG	2 minutes	4 RS
3	1	032ABCVD	1 minute	2 RS
4	2	032ANNNN	3 minutes	6 RS
5	2	032AMMM	4 minutes	8 RS
6	3	033RRRRR	1 minute	2 RS
...

Due to certain performance factors company wants to de-normalize the tables using pre-joining technique.

Table Information is given below:

Assume 1:4 record count ratio between customer Info (master) and Call record detail (detail).

Assume 15 million customers.

Assume 10 byte Customer_ID.

Assume 50 byte header for customer Info (master) and 80 byte header for **Call record detail** (detail) tables.

You are required to perform the following tasks:

Calculate the Total space in GBs used with normalization.

Calculate the Total space in GBs used after de-normalization.

Solution:

Total space used by normalized table structures of Call record details of customer

= (Header of master table * records in master table) + (Header of detail table * records in detail table)

= (50 * 15) + (80 * 60)

= 750 + 4,800

= 5,550 MB

=5.6 GB

Thus, normalized structure of Call Record of customer used 5.6 GB space.

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Solution:

Total space used by de-normalized table structures of Call Record of customer
= (Header of detail table + header of master table- header of Key ID) * records in detail table

$$= (80 + 50 - 10) * 60$$

$$= 120 * 60$$

$$= 7,200 \text{ MB}$$

$$= 7.2 \text{ GB}$$

Thus, de-normalized structure of Call Record of Customer used 7.2GB space.

Net result is 29% additional space required in raw data table size for the database.

The 29% investment in additional storage for pre-joining will dramatically increase performance for queries which would otherwise need to join the very large header and detail tables.