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ABRDBMS – A new Paradigm in Information Storage and Retrieval from RDBMS

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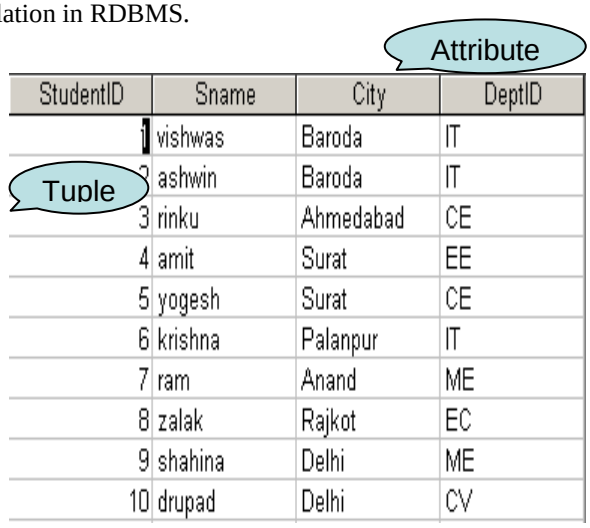
Abstract: Database Systems have been ruling the Computer industry since its inception, especially Relational Database Management Systems. RDBMS' have dominated the database market all over the world. Object Oriented Database Management Systems have also been in existence since a decade or so but they have not been able to win the end-users confidence. Though RDBMS is most widely used database system across the globe but it has several limitations or issue like normalization, redundancy which have not been addressed completely. This research is one step in that direction and addresses the issues of RDBMS in order to reduce the redundancy up to major extent and eliminate the process of normalization in database designing.

Index Terms: DBMS, RDBMS, Relations, Tables, Attributes, Primary Key, Foreign Key, normalization.

I. INTRODUCTION TO RDBMS

Database is an electronic file cabinet where data are stored conceptually not physically. It was developed aiming to eliminate few of the drawbacks of the traditional file systems. Relational Database Management System is the concept developed to implement the database concept [1]. In RDBMS, data are perceived in the form of table (i.e. a relation) at user's disposal. Figure 1 shows a typical relation in RDBMS.



StudentID	Sname	City	DeptID
1	vishwas	Baroda	IT
2	ashwin	Baroda	IT
3	rinku	Ahmedabad	CE
4	amit	Surat	EE
5	yogesh	Surat	CE
6	krishna	Palanpur	IT
7	ram	Anand	ME
8	zalak	Rajkot	EC
9	shahina	Delhi	ME
10	drupad	Delhi	CV

Figure 1 A Relation containing Student details.

Most of the people would be aware of this typical structure of a relation where columns indicate Attribute and rows indicate tuples i.e. records. When similar kinds of relations are put together it makes a database.

However designing the database is not a trivial task at all. One needs to identify and understand the domain, the entities, relevant attributes etc. Wait, wait! The task is not finished yet. The identified entities must be normalized which is a tedious and time consuming task.

Once the database is created after this long process, one can fire SQL queries upon it and can retrieve the desired result. An SQL query is a single statement to instruct the database system to do some task with the database [2].

The following text throws light on some of the points which needs to be addressed as they seem to be time consuming and tedious in context of RDBMS.

1. Finding entities and their relevant attributes.
2. Normalization process is time consuming and complex to understand for a normal user as it requires expertise in it.
3. In order to interact with the database, one needs to know SQL queries of all type like select, update, insert, join etc.

To eliminate the normalization process and make the queries of database operation easier we, propose "Attribute based Relational Database System". This system would use the current database system only for its use but the tables i.e. relations it would use; would all be based on attributes. Following section discusses the concept of Attribute Based RDBMS.

II. ATTRIBUTE BASED RDBMS

Attribute Based RDBMS (AB RDBMS) is a concept to design the database based on the attributes of an entity where the attribute of the entity itself will be treated as a separate table (i.e. relation) and thereby eliminating the need of normalization and making the database interaction easier with simple join queries only. Similar kinds of attempts have been made in [3] and [4].

This paper discusses each and every aspect of AB RDBMS in comparison with traditional RDBMS using the experiments performed by executing the queries in Oracle using TKPROF for statistical comparison of queries. In order to explain the concept of AB RDBMS, we have considered small database containing Student details. First, we will consider it in context of RDBMS and later on we will discuss the same in context of AB RDBMS.

RDBMS

A.Table Structure

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a) Table: Student Details

Attribute Name	Data Type
StudentID	Number(3)
SName	Varchar2(10)
City	Varchar2(10)
DeptID	Varchar2(2)

Table 1 Student Details Relation Schema

b) Table: Dept

Attribute Name	Data Type
DeptID	Varchar2(2)
DName	Varchar2(30)

Table 2 Dept Relation Schema

B. Table Data

a) Table: Student Details

StudentID	Sname	City	DeptID
1	vishwas	Baroda	IT
2	ashwin	Baroda	IT
3	rinku	Ahmedabad	CE
4	amit	Surat	EE
5	yogesh	Surat	CE
6	krishna	Palanpur	IT
7	ram	Anand	ME
8	zalak	Rajkot	EC
9	shahina	Delhi	ME
10	drupad	Delhi	CV

Figure 2 Student relations with values

b) Table: Dept

DeptID	Dname
CE	Computer Engineering
CV	Civil Engineering
EC	Electronics & Communication
EE	Electrical Engineering
IT	Information Technology
ME	Mechanical Engineering

Figure 3 Dept relations with values

AB RDBMS

A. Table Structure

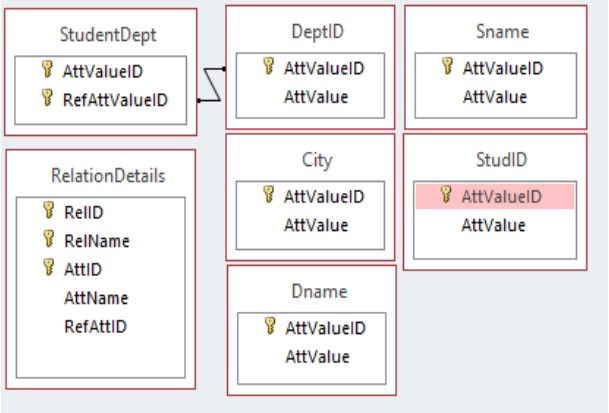

Figure 4 Relationship diagrams of ABSRDMS tables

B. Table Data

AttValueID	AttValue
1	Baroda
2	Baroda
3	Ahmedabad
4	Surat
5	Surat
6	Palanpur
7	Anand
8	Rajkot
9	Delhi
10	Delhi

AttValueID	AttValue
1	vishwas
2	ashwin
3	rinku
4	amit
5	yogesh
6	krishna
7	ram
8	zalak
9	shahina
10	drupad

Figure 5 City and SName data

AttValueID	AttValue
1	IT
2	CE
3	ME
4	EC
5	CV
6	EE

AttValueID	AttValue
1	Information Technology
2	Computer Engineering
3	Mechanical Engineering
4	Electronics & Communications
5	Civil Engineering
6	Electrical Engineering

Figure 6 DeptID and DName data

AttValueID	RefAttValue
1	1
2	1
3	2
4	6
5	2
6	1
7	3
8	4
9	3
10	5

AttValueID	AttValue
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

Figure 7 DeptID and DName data

RelID	RelName	AttID	AttName	RefAttID
1	Student	1.1	StudID	
1	Student	1.2	Sname	
1	Student	1.3	City	
1	Student	1.4	StudentDept	2.1
2	Dept	2.1	DeptID	
2	Dept	2.2	Dname	

Figure 8 Main Relation Details showing the relations among the other tables

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III. EXPERIMENTS AND RESULTS

1. Basic Size Comparison between RDBMS & AB RDBMS

	RDBMS	AB RDBMS
Used Space (GB)	0.244125366	0.243515015
Total Size (GB)	0.830078125	0.830078125
User Segment Size/Table (Bytes)	65536	65536
	65536	65536
		65536
		65536
		65536
		65536
Blocks/Table	1	1
	1	1
		1
		1
		1
		1
Empty Blocks/Table	6	6
	6	6
		6
		6
		6
		6
Average Space (Bytes)	7893	7924
	7832	8012
		7893
		7920
		7932
		7968
Number of Free List Blocks/Table	1	1
	1	1
		1
		1
		1
		1

Table 3 Basic statistics of RDBMS vs. ABRDBMS

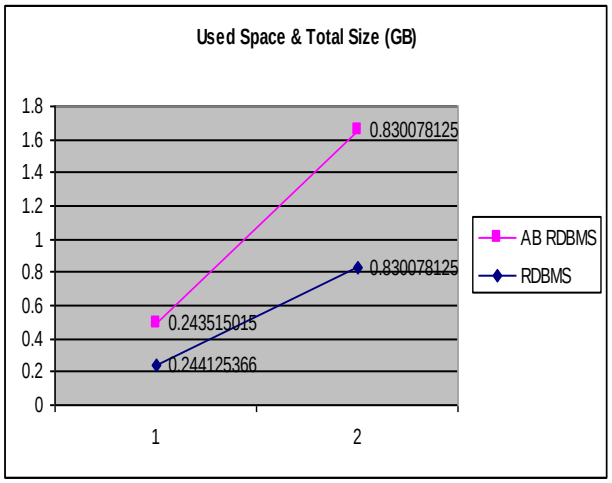

Figure 9 Used space of RDBMS Vs. ABRDMS relations

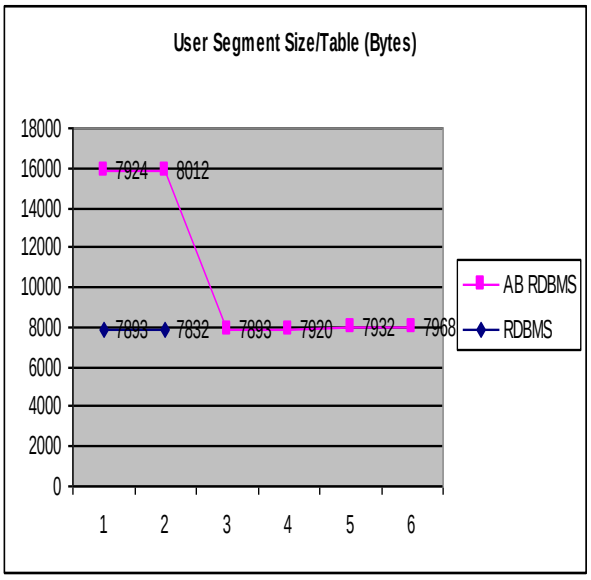

Figure 10 Average space size comparisons

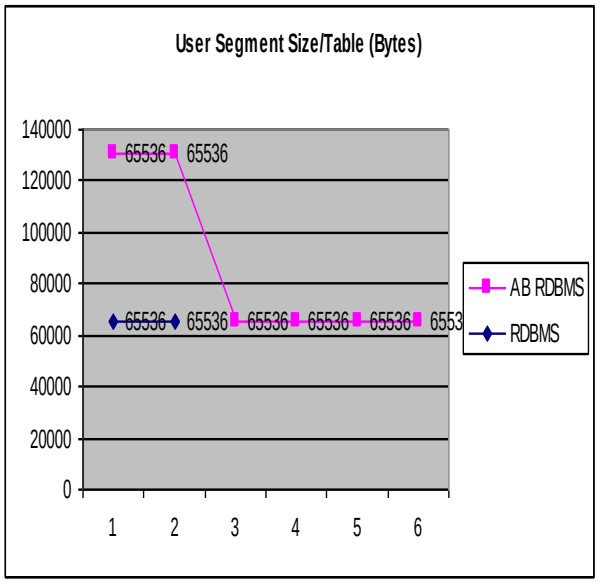

Figure 11 User segment size comparisons

2. Basic Statistics of RDBMS

A.SQL> SELECT * FROM STUDENT;

StudID	Name	City
1	vishwas	Baroda
2	ashwin	Baroda
3	rinku	Ahmedabad
4	amit	Surat
5	yogesh	Surat
6	krishna	Palanpur
7	ram	Anand
8	zalak	Rajkot
9	shahina	Delhi
10	drupad	Delhi

10 rows selected.

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B. SQL> SELECT STUDENT.*, DEPT.* FROM STUDENT, DEPT WHERE STUDENT.DEPTID=DEPT.DID;

StudID	Name	City	DeptID	DeptName
1	vishwas	Baroda	IT	Information Technology
10	drupad	Delhi	CV	Civil Engineering
2	ashwin	Baroda	IT	Information Technology
3	rinku	Ahmedabad	CE	Computer Engineering
4	amit	Surat	EE	Electrical Engineering
5	yogesh	Surat	CE	Computer Engineering
6	krishna	Palanpur	IT	Information Technology
7	ram	Anand	ME	Mechanical Engineering
8	zalak	Rajkot	EC	Electronics & Communications
9	shahina	Delhi	ME	Mechanical Engineering

10 rows selected.

3. Basic Statistics of AB RDBMS

The results are derived using TKPROF: Release 9.2.0.1.0 - Production on Sat Dec 5 16:13:35 2015

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Trace file: rdbmsnew_ora_3956.trc
Sort options: default

TKPROF: Release 9.2.0.1.0 - Production on Sat Dec 5 16:13:13 2015

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Trace file: ab_ora_3988.trc
Sort options: default

A. SQL> SELECT StudID.AttValue AS StudID, Sname.AttValue AS Name, City.AttValue AS City FROM StudID, Sname, City WHERE (StudID.AttValueID=Sname.AttValueID and SName.AttValueID=City.AttValueID);

StudID	Name	City
1	vishwas	Baroda
2	ashwin	Baroda
3	rinku	Ahmedabad
4	amit	Surat
5	yogesh	Surat
6	krishna	Palanpur
7	ram	Anand
8	zalak	Rajkot
9	shahina	Delhi
10	drupad	Delhi

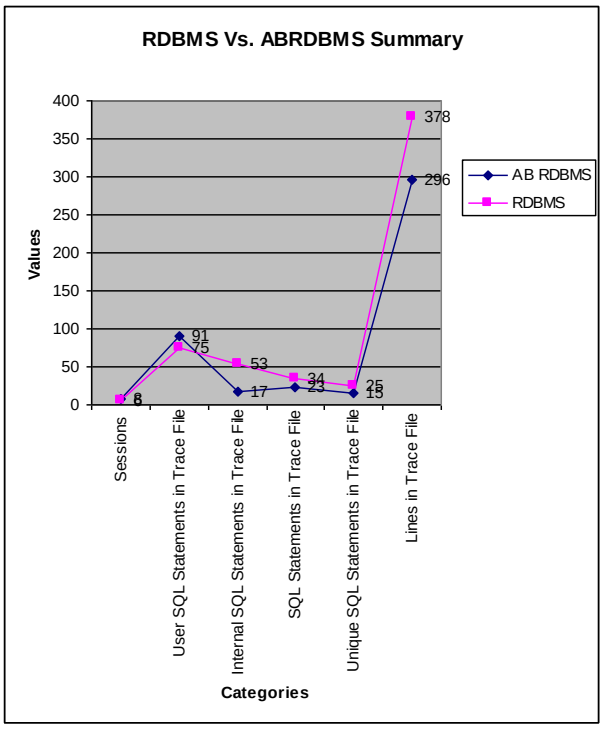

Figure 12 Statistical Comparison of RDBMS Vs. ABRDBMS

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