DBMS

Database: collection of LARGE amounts of data
DBMS: Database Management System, readymade s/w that allows you to manage your data
ANSI definition: collection of programs (readymade s/w) that allows you to Insert, Update, Delete, and Process
Various DBMS available: e.g. MS Excel, dBase, Foxbase, Foxpro, Clipper, Dataease, Dataflex, Advanced Revelation, DB Vista, Quattro Pro, etc.

(input) Raw data (Raw facts Meaningless)	-->>	(output) Information (meaningful data) information (data on whose basis you can take some action; or the management can make a decision) (also known as processed data)

Processing -> work done by computer to convert Data into Information
DBMS: readymade S/w that allows to manage your date
E.g. MS Excel

DBMS vs RDBMS

	DBMS	**RDBMS**
	E.g. MS Excel, Foxpro, tec	E.g. Oracle, MySQL,etcc
1	Naming Convention are Different(Nomenclature is different) 1. Field 2. Record 3. file	Naming Convention are Different(Nomenclature is different) 1. Column, Attribute 2. Tuple, Row, Entity 3. Table, Relation, Entity class
2	Relation between 2 files is maintained programmatically	Relationship between 2 tables can be specified at the time creation(e.g. Foregin key constraint)
3	More programming	Less programming
4	More time is required for s/w	More time is required for s/w development

	development	
5	High network traffic	Low network traffic
6	Processing on Client machine	Processing on server machine(known as Client Server architecture)
7	Slow and expensive	Faster(in terms of network traffic) and cheaper(in terms of hardware cost,network cost, infrastructure cost)
8		
9	File level locking	Row level locking
10	Not Suitable for Multi-user	Suitable for Multi-use
11	Distributed Databases are not supported	Most of the RDBMS support Distributed Databases (Ms Access not support) MySQL database, Oracle Database. Distributed database examples: Banking System,Railway reservation System, Bookmyshow Website, Yatra website example .
12	No security of data ● Allows access of data to the OS Any one delete, copy,rename files	12. Multiple levels of security: - **a. Logging in security** (MySQL database username/password) (e.g. username = pgdac1, password = welcome) **b. Command level security**(to issue MySQL commands) (e.g. create table, create function, create procedure, create user, etc.) **c. Object level security** (to access the tables and other objects of other users) ● Security is in-built feature of RDBMS ● OS cannot access the table data

Various RDBMS are Available:

- **Informix**
    1. Fastest in terms of processing spee
- **Oracle**
    1. most popular RDBMS because the programming is very easy(largest program in oracle is 9 Lines only)

2. Product of Oracle corporation(founded in 1977)
3. No 1 largest Overall s/w company in the world,
4. No 1 largest database s/w company in the world4 ,
5. 10/10 of the top 10 companies in the world use oracle
6. Largest database in the world is amazon.com(used Oracle)
7. Largest Distributed database in the world is yahoo,com(used oracle)
8. 90% of Fortune 500 companies use Oracle
9. Oracle works on 113 Operating System
10. 63% of world commercial database market in client-Server environment
11. 86% of world commercial database market in Internet environment

- **MS SQL Server**
    1. Good RDBMS from Microsoft(competition for Oracle) only works with Windows Operating System.
    2. 16% of world commercial database market
- **Sybase**
    1. Going down
    2. Recently acquired by SAP

Character based(text based) Database

1. Ingres 2. Postgres 3. Unify

- **DB2**
- **CICS**
- **TELON**
- **IDMS**
- **MS Access**
- **Paradox**
- **Vatcom SQL**

MySQL

- Founded in 1995 by a Swedish company
- It's name is a combination of "My", co-founded Michael Widenius' Daughter, and "SQL"
- MySQL is an open-source RDBMS
- Most widely used open-source RDBMS
- Part of the widely used "LAMP" open-source web application software stack(and other "AMP" stacks)

LAMP	**WAMP**
L->Linux A->Apache M->MySQL P->Python or PHP or Perl	W->Windows A->Apache M->MySQL P->Python or PHP or Perl
XAMPP	**MAMP**

X->X Windows A->Apache M->MySQL P->Python or PHP or Perl	M->MAC OS A->Apache M->MySQL P->Python or PHP or Perl

- Free-software open-source projects that requires a RDBMS use MySQL
- E.g. WordPress,Facebook, Google(though not for searches), Joomla, Twitter, Flickr, Instagram, YouTube, etc
- Occuoies 42% of world open-source database market
- Sun Microsystems acquired MySQL in 2008
- Oracle acquired Sun Microsystems in 2010

Software development tools from MySQK;-
SQL

- Structured Query Language
- Commonly pronounced as ”Sequel”

- Create, Drop, Alter
  Insert, Update, Delete
  Grant, Revoke, Select
  (9 Command only)

- Conforms to ANSI standards(e.g. 1 char= 1 Byte)
- Conforms to ISO standards for Quality Assurance
- Not a product of MySQL
- Common for all RDBMS
- Initially founded by IBM(1975-1977)
- SQ Source code is these language
  C, C++--90%
  ALP--10%
- Now controlled by ANSI (therefore SQL is common for all RDBMS)
- In 2005, the source code of SQL rewritten using JAVA(100%)

Q. Why did the oracle purchase the sun microsystem?
Q. Why did the oracle purchase the JAVA?

Products

- **SQL**
- **MySQL Command Line Client**
  * MySQL Client s/w
  * used for running SQL commands, MySQL commands, and MySQL-PL programs

* interface with database
* character based (text based)

- **MySQL Workbench**
  * MySQL Client s/w
  * used for running SQL commands, MySQL commands, and MySQL-PL programs
  * interface with database
  * GUI based

- **MySQL -PL**
  * MySQL Programming Language
  * programming language from MySQL
  * used for database programming
  E.g. HRA calculation, Tax,Attendance calculation etc

- **MySQL Connectors**
- **MySQL for Excel**
- **MySQL Notifier**
- **MySQL Enterprise Backup**
- **MySQL Enterprise High Availability**
- **MySQL Enterprise Encryption**
- **MySQL Enterprise Monitor**
- **MySQL Query Analyzer**
- **etc**

MySQL

MySQL

- Structured Query Language
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- Conforms to ANSI standards(e.g. 1 char= 1 Byte)
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4 sub-division of SQL

DDL(Data definition Language): create Drop Alter
DML(Data ManipulationLanguage): Insert, Update, Delete
DCL(Data Control Language): Grant, revoke
DQL(Data Query Language): Select

- **DTL/TCL**-(Data Transaction Language)/(Transaction Control Language) Commit, Rollback, Savepoint
- Extra in MySQL RDBMS and Oracle RDBMS:-

- Not an ANSI standard:-
- 5th component of SQL
- DDL- Rename, Truncate

Extra in Oracle **RDBMS Only(**after paying 35 Lakh):-
DML(Upsert, Merge)

Rules for table names:

- Max 30 characters(not a file name..different)
- A-Z, a-z, 0-9 allowed
- Special characters $, #, _ allowed
- EMP, emp, Emp case insert
  *EMP2021 allowed
  *201EMP not allowed
- In MySQL, to use # in table name and column name, enclose it in back-quotes
- E.g. EMP`
- Reserved words not allowed in table name
  E.g. cannot create,select, name table. 134 reserved words not allowed

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MySQL Documentation and Oracle Documentation
www.oracle.com
http://docs.oracle.com

Data Types (for MySQL)

- **Char(allows any character)-**1. max 255 characters.
  2. Default width is 1
- **Varchar- allows any character-**
  1. max 65535 characters 64kb-1
  2. No default width, width has to be specified
  3. Conserve on HD space
  4. Searching and retrieval will be slow
  5. E.g. ENAME, ADDRESS, CITY, etc

Text Data Types

Stored outside the table(stored away from the row)

- Tinytext---max 255 characters
- Text-- max 65,535 characters
- Mediumtext--max 16,777,215 characters(16mb-1)
- Longtext-- max 4,294,967,295 characters
  * all of the above are variable length
  * width does not have to specified
  * MySQL maintains a **LOCATOR(**HD pinter) from the table row to the Text data

* used for those columns that are only for storage purposes
* used for those columns that will not be used for searching
E.g. EXPERIENCE, RESUME,

Blob-> Binary Large Object

Tinylob (max upto 255 Bytes of binary data) e.g. BARCODES
Blob (max upto 65,535 Bytes of binary data)
Mediumblob (max upto 16,777,215 Bytes of binary data)
Longblob (max upto 4,294,967,295 Bytes of binary data)

* stored outside the table
* stored away from the table
* MySQL maintains a LOCATOR for the Blob data
e.g. BARCODES, QR-CODES, FINGERPRINTS, SIGNATURES, ICON, THUMBNAILS, SOUND, MUSIC, VIDEOS, PHOTOGRAPHS
* Blon is multimedia datatype

Integer Types(Exact value):-

* Signed or Unsigned(by default it is signed)

Tinyint
Smallint
Mediumint
Int
Bigint

Floating-point types(approximate value)

Float
Double

Fixed-point Types;-

Decimal

- Stores Double as a string E.g. “653.7”
- Used when it is necessary to preserve the exact precision e.g. monetary data
- Max number of digits is 65

Boolean

- True and False evaluate to 1 and 0 respective it
E.g. Marital_status boolean
- Can insert True, False, 1or 0
- Output will display 1 or 0

Date and Time Datatypes:

Date

- 'YYYY-MM-DD' is the default date format in MySQL
  E.g. '2021-11-19'

' 21-11-19':1. Year values from 70-99 are converted to 1970 to 1999
2. Year values from 00-69 are converted to 2000 to 2069

'47-08-15' ------- wrong output it will be
15 august 1947 will be 1947 august 2057

- range 1st Jan 1000 AD to 31st Dec 9999AD
- Date1 - date 2 → returns the number of days between the 2 dates
  '2021-11-19'- '2019-02-24'

1st Jan 1000 AD--> internally store 1
2nd Jan 1000 AD--> internally store 2
3rd Jan 1000 AD--> internally store 3

19th Nov 2021 AD -> 1,475,216(number of days since 1st Jan 1000AD)

- Internally date is stored as a fixed-length number and occupies 7 Bytes of storage

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Time ('hh:mm:ss' or 'HHH:MM:SS')
('-838:59:59' to '838:59:59')

Datetime ('YYYY-MM-DD hh:mm:ss')
('1000-01-01- 00:00:00' to '9999-12-31 23:59:59')

Year (YYYY) (1901 to 2155)

- Max 4,096 columns per table
- Row size 65<=65,535 Bytes
- No upper limit on the number of rows per table provide the table size <=65 Terabytes
- Largest table in world order of Amazon.com
- 100 of Terabytes daily of size

DAY1 Interview Questions

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1. How many SQL statements are used? Define them.
2. Enlist some commands of DDL, DML, and DCL.
3. What is RDBMS? How is it different from DBMS?
4. What is the difference between SQL and MySQL?
5. What is the default port number of MySQL?
6. What are the differences between CHAR and VARCHAR data types?

7. What is the purpose of using the TIMESTAMP data type?
8. Differentiate between FLOAT and DOUBLE?
9. What is the difference between BLOB AND TEXT?

22.11.2021 MySQL

MySQL- SQL

- in DBMS, data is stored in a file
- within a file, the row are stored sequentially
- in RDBMS, table is not a file; every row is a file
- in RDBMS, the rows of a table are not stored sequentially; the rows of a table are scattered (fragmented) all over the DB server HD
- when you INSERT a row into a table, wherever it finds the free space in the DB server HD, it will store the row there the reason why RDBMS does this is to speed up the INSERT statement (considering multi-user environment)
- in a multi-user environment, if multiple users are inserting rows simultaneously into the same table, if the rows were to be stored
- sequentially, it would be very slow when you SELECT from a table, the order of rows in the output depends on the row address; it will always be in ascending order of row address W

Order by clause(Sorting):

- Searching in HDD and sorting is takes place in server ram
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