**Experiment No: 1**

**Aim:-** Perform the comparative analysis of different DBMS.

|  | **Postgres** | **MySQL** | **MongoDB** | **MS SQL SERVER** |
| --- | --- | --- | --- | --- |
| **Database Type** | Object-Relational Database Model | RDBS, widely used in LAMP suit. | JSON Type Database schema instead of traditional SQL based queries. | Microsoft’s proprietary DBMS |
| **Developed By** | Postgre SQL Global Development Group | Oracle | MongoDB Inc | Microsoft |
| **License Type** | Open-source | Open-source | Open-source | Commercial |
| **First Release** | 1989 | 1995 | 2009 | 1989 |
| **Programmed in** | C | C and C++ | C++ | C++ |
| **Database Model** | Relational | Relational | Document Store | Relational |
| **Query Mechanism** | [SQL Based](https://bytescout.com/blog/sql?utm_referer=www.bing.com) | JSON [Type](https://en.wikipedia.org/wiki/JSON) Query Mechanism (NoSQL) | SQL Based | SQL Based |
| **Concurrent Processing** | Allows Concurrent Processing | Allows Concurrent Processing | Allows Concurrent Processing | Allows Concurrent Processing |
| **Server Side Scripting** | User-Defined Functionalities | Allows Server-side scripting | [JavaScript Scripting language](https://bytescout.com/blog/javascript-commands.html?utm_referer=www.bing.com) | .NET Languages and Transact SQL |
| **Replication Topologies** | Master-Slave Topology | Master-Master,  Master-Slave,  MySQL Cluster Topology | Master-Slave Topology | Dependent on database edition |
| **Language Support** | Perl, [Python](https://bytescout.com/blog/python-tutorial-web-app-security.html?utm_referer=www.bing.com), Tcl, .Net, C, C++  [Java](https://bytescout.com/blog/learn-java-commands.html?utm_referer=www.bing.com) | Ada, C, C#, C++, D, Java Objective-C, OCaml, Perl, Eiffel, Erlang, Haskell | PowerShell, Prolog, Python, PHP, Perl, Ruby, Smattalk, Scala, Matlab, Lua, Lisp, JavaScript, Java, Go, Groovy, Heskell, C++, C#, ColdFusion, Clojure, Erlang, Dart, Delphi,  C, [ActionScript](https://bytescout.com/blog/2016/07/javascript-vs-coffeescript-vs-typescript.html?utm_referer=www.bing.com) | .NET, Java, Python, PHP, Visual Basic, Ruby |
| **Portioning Mechanism** | Not Supported but Table Inheritance can be used to achieve the purpose. | MySQL Cluster based horizontal partitioning | Sharding Partitioning | Horizontal Partitioning with a table spanning several files but no sharding |

## Comparison Matrix for [popular](https://en.wikipedia.org/wiki/Database) DBMS

**Further information on the best database management systems. Some of the most popular DBMS systems are as follows:**

1. Oracle
2. IBM Db2
3. Altibase
4. Microsoft SQL Server

*We will now be giving a DBMS comparison between the four while paralleling the characteristics of them all.*

**Since most of these DBMS servers are relational database management systems, let us start with understanding what a Relational Database is.**

A category of databases that is responsible for storing and allowing access to multiple, interlinked data points is a relational database. Based on the Relational Model, first introduced by Edgar F. Codd in 1969, they function on a straightforward and intuitive technique of tabular data represen tation.

*Each row and column has a unique ID identification in a relational database. This unique ID is called a ‘key.’ These columns are carriers of data and its various attributes. This system of recording makes it very easy to create links and relations amongst the various data points.*

## Oracle Database Management System

The Oracle DBMS is a revolutionary database that is self-equipped to eliminate errors done through manual management of data. It was developed by the Oracle Corporation multi-tier database system mostly used for facilitating online transactions and ‘data warehousing.’

### Pros

* With an automated memory management capability and a cost optimizer, Oracle holds itself in high esteem amongst its users, especially where reliability is a concern.
* It is very simple to manage when compared to other Database Managemoptimizerent Systems.
* Oracle has a feature which weighs DBMS queries against one another. This way, you know which database is the heaviest, and you can optimize usage and performance.

### Cons

* The setting up process initially is very complex.
* The administrative rearrangement that is held internally is not very strong.
* The software is expensive compared to its other higher-end competitors.
* It can gain a lot of malware, and the bug fixer for those is very infrequent and callous.

## IBM Db2

Released by IBM, originally in 1983, IBM Db2 is the company’s pioneer DBMS system used for mostly hybrid management products that aid the user in managing unstructured and structured data alike, on private and communal cloud milieus.

**Earlier, during the making of the IBM Db2, the DBMS software bolstered the relational model of functionality, but in due course of time, they extended their range to and non-relational systems like XML and JSON.**

At this date and time, IBM Db2 systems support Windows, Unix and Linux Operating System and houses premium features like the in-memory technology frequent optimization of storage, compressed action and constant round the clock data availability.

| **Oracle DBMS** | **IBM Db2** | **Microsoft SQL Server** |
| --- | --- | --- |
|  |  |  |
| 1 variant for all software and systems | Different variants for Windows, Unix, and Linux | 1 variant for Linux and Windows |
| Relational Database | Relational Database | MS Relational DBMS |
| Access rights to SQL standards | Access rights to SQL standards | Access rights to SQL standards |
| In-memory function | No in-memory attribute | In-memory function |

## Altibase

*An open-source relational DBMS. It has aided its users in facilitating high-performance technologies that are important for heavy and demanding usage. Altibase is known as the pioneer of the hybrid database since the company developed the very first commercialized one, way back in 2005.*

## Microsoft SQL Server

A DBMS server developed by Microsoft in 1989, Microsoft SQL Server is a relational database with the principal function of data storage and retrieval from and by other software. This server can either be run on an entire network of devices or individually on a single system. It houses a data integration system so that everything can be done in one place itself.

## Comparison between Altibase, Oracle and IBM Db2

| **Function** | **Altibase** | **Oracle** | **IBM Db2** |
| --- | --- | --- | --- |
|  |  |  |  |
| Process | Multi-thread | Multi-thread | Multi-process |
| Model Variant | Relational DBMS | Relational DBMS | Relational DBMS |
| Built | Client to Server | Client to Server | Client to Server |
| Type | Hybrid (on-disk and in-memory) | Only on-disk | Only on-disk |

## Conclusion

All four major databases have been compared on the basis of several attributes in the comparison matrix. It is now up to the programmer to choose the database system that suits the application being developed.