DATABASE ADMIN AND SECURITY

ASSIGNMENT ONE (40 MARKS)

GROUP MEMBERS(CT CLASS)		
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Questions

1. Compare and Contrast (tabulated) the following databases (MySQL, ORACLE & MS SQL Server) in terms of

i. Brief History of each highlighting versions
ii. Unique Features
iii. User Interfaces involved
iv. Programming Languages Supported
v. Operating Systems Supported
vi. Product Licensing **(20 Marks)**

2. Briefly explain the top TEN (10) most common database security vulnerabilities. **(10 Marks)**

3. Enumerate any THREE (3) current Backup tools or software for each MySQL, ORACLE & MS SQL Server. **(10 Marks)**

Answers

1. Compare and Contrast (tabulated) the following databases (MySQL, ORACLE & MS SQL Server) in terms of ;

In terms of	MySQL	Oracle	MS SQL Server
Brief History of each highlighting versions	There are two unique aspects of MySQL in comparison to Oracle and SQL Server: it was not originally developed for commercial use and it is an open source database. The database platform was a happenstance as the individuals who developed it started out trying to use mSQL to interface with their database tables, and decided they needed a much more powerful interface. The initial phase of MySQL used an API leveraged from mSQL, enhancements that increased speed considerably, and other features that included the InnoDB storage engine, full text search, portability, and internationalization. Another difference of the MySQL platform in comparison to the other two is that it is open source. The Digital Age spawned a movement in software development collaboration that has blossomed into a competitive market for databases and other software. According to market reports, there is an excess of 10 million installations of MySQL, which indicates it is quickly moving into the enterprise space. The ownership of MySQL has transitioned from the product's humble beginnings. The two most notable acquisitions are (1) in 2008 when Sun Microsystems acquired MySQL AB, the company that created MySQL, and (2) in 2010 when Oracle acquired Sun Microsystems.	IBM was the first company to develop a RDBMS, however, Oracle Corporation made history in 1980 by releasing its RDBMS, Oracle, for commercial use. Just a few years later the company would release a version of its system for IBM computers. Since its exhibition to the RDBMS market, Oracle has consistently led the way. According to Gartner, Oracle owned nearly 50% of the RDBMS market in 2011. In addition to opening up the commercial market for RDBMS, the Oracle Corporation also was the first company to develop a commercial-level version of SQL that was designed to manipulate data in a RDBMS using (at that time) queries and joins. Oracle Database 12c is the most recent release of the RDBMS.	Microsoft SQL Server entered the RDBMS market as a serious competitor in the mid-1990s when Microsoft purchased it from Sybase, and then released version 7.0. The companies originally worked together to develop the platform to run on the IBM OS/2 platform. However, Microsoft eventually developed its own operating system (Windows NT), and wanted to work solo to create a database management for it. It would take several years for the Microsoft and Sybase to completely sever their ties. Sybase eventually changed its product name so that it would be completely different from the product sold to Microsoft. Microsoft SQL Server version 4.2 was the initial release. SQL Server 2017 is the latest release of SQL Server.

Unique Features	• Relational Database Management System (RDBMS) • Easy to use • It is secure • Client/Server Architecture • Free to download • It is scalable • Compatible on many operating systems • Allows roll-back • High Performance • High Flexibility • High Productivity	• New data redaction to enhance security of sensitive data • Introduction of Oracle Advanced Analytics platform • New database handling for archiving Flash Data Archive (FDA) • Support for integrating with operating system processor groups • Support for data pump for database consolidation • Several enhancements to Oracle Application Express, a rapid-development tool that allows users to develop Web apps using SQL and/or PL/SQL. • Advanced network compression to enhance performance.	• Introduction of In-Memory Online Traction Processing (OLTP), an embedded feature that allows sophisticated database management to enhance performance • New solutions to handle disaster recovery • Updated version of SQL Server Data Tools for Business Intelligence (SSDT BI)
User Interfaces involved	SQL	GUI, SQL	GUI, SQL, Various
Programming Languages Supported	C, C#, C++, D, Java, Ruby, and Objective C	C, C#, C++, Java, Ruby, and Objective C	Java, Ruby, Python, VB, .Net, and PHP
Operating Systems Supported	Windows, Linux, OS X, FreeBSD, Solaris	Windows, Linux, Solaris, HP-UX, OS X, z/OS, AIX	Windows
Product Licensing	Open source	Proprietary	Proprietary

2. **Briefly explain the top TEN (10) most common database security vulnerabilities.**

The following are the most common database security vulnerabilities;

a) **Excessive Privilege Abuse**

Users are granted database access privileges that exceed the requirements of their job function; e.g., a university administrator whose job requires only the ability to change student contact information may take advantage of excessive database update privileges to change grades.

b) **Legitimate Privilege Abuse**

Users may abuse legitimate database privileges for unauthorized purposes; e.g. a rogue health worker who is willing to trade patient records for money.

c) **Privilege Elevation**

Attackers may take advantage of database platform software vulnerabilities to convert access privileges from those of an ordinary user to those of an administrator. Vulnerabilities may be found in stored procedures, built-in functions, protocol implementations, and even SQL statements.

d) **Database Platform Vulnerabilities**

Vulnerabilities in underlying operating systems (Windows 2000, UNIX, etc.) and additional services installed on a database server may lead to unauthorized access, data corruption, or denial of service.

e) **SQL Injection**

A perpetrator typically inserts (or "injects") unauthorized database statements into a vulnerable SQL data channel. Using SQL injection, attackers may gain unrestricted access to an entire database.

f) **Weak Audit Trail**

Weak database audit policy represents a serious organizational risk on many levels, that is, regulatory risk, deterrence, and detection and recovery.

g) **Denial of Service (DoS)**

Access to network applications or data is denied to intended users.

h) **Database Communication Protocol Vulnerabilities**

For example, four out of seven security fixes in the two most recent IBM DB2 FixPacks address protocol vulnerabilities; similarly, 11 out of 23 database vulnerabilities fixed in the most recent Oracle quarterly patch relate to protocols

i) **Weak Authentication**

Allowing attackers to assume the identity of legitimate database users by stealing or otherwise obtaining login credentials.

j) Backup Data Exposure

Backup database storage media is often completely unprotected from attack. As a result, several high profile security breaches have involved theft of database backup tapes and hard disks.

3. **Enumerate any THREE (3) current Backup tools or software for each MySQL, ORACLE & MS SQL Server**

- **MySQL**

MySql Backup FTP - Open the utility and connect to MySQL Server. Please note that you can connect either to MySQL server itself or via phpMyAdmin, which is often more convenient if you backup your database from the remote machine.

- **ORACLE**

Iperius Backup - This is the best software to make backups of Oracle databases, thanks to its unique features: extreme ease of use, high reliability, low resource consumption, the lowest price on the market. It allows in a few simple steps to backup Oracle 9i, 10g and 11g, from any Windows operating system. Iperius can also make backups of the free database Oracle Express Edition (Oracle XE) and the Oracle backup to Cloud and Tape, with integrated compression and encryption.

- **MS SQL Server**

Handy Backup – It contains a set of important features making MS SQL auto backup as quick and reliable as possible. It works with MSSQL Server directly, and lets you to back up MS SQL database with all views, indexes, stored procedures, etc., and always restore them intact.

References

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