Assignment# 02



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| **Course Title:** | Data Base Management System |
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**Part A:**

a. Examine the documentation sets of Microsoft SQL Server, Oracle, and IBM's DB2 system to identify their support for the following: (a) client-server architecture

(b) Web services

(c) service-oriented architecture

(a) Client-Server Architecture

**1. Microsoft SQL Server:**

- Supports client-server architecture through SQL Server Client Tools and SQL Server Network Library.

- Client applications connect to SQL Server using TCP/IP, Named Pipes, or Shared Memory.

**2. Oracle:**

- Uses Oracle Net Services for client-server communication.

- Supports various protocols (TCP/IP, HTTP, FTP) for client connectivity.

**3. IBM DB2:**

- Supports client-server architecture through DB2 Client and DB2 Server.

- Clients connect to DB2 using TCP/IP, SSL, or Kerberos authentication.

**(b) Web Services**

**1.** **Microsoft** **SQL** **Server**:

- Supports web services through SQL Server Web Services and HTTP endpoints.

- Exposes database operations as web services using SOAP, REST, and JSON.

**2**. **Oracle**:

- Provides Oracle Web Services and Oracle Service Bus.

- Supports web service standards (SOAP, WSDL, UDDI) for integration.

**3**. **IBM DB2:**

- Supports web services through DB2 Web Services and IBM WebSphere.

- Offers RESTful APIs for database access and manipulation.

**(c) Service-Oriented Architecture (SOA)**

**1. Microsoft SQL Server:**

- Integrates with Microsoft BizTalk Server for SOA.

- Supports SOA patterns (service composition, orchestration) using SQL Server Integration Services.

**2. Oracle:**

- Supports SOA through Oracle Service Bus and Oracle SOA Suite.

- Provides tools for service design, deployment, and management.

**3. IBM DB2:**

- Integrates with IBM WebSphere for SOA.

- Supports SOA patterns (service composition, orchestration) using DB2 Web Services and IBM WebSphere.

**Part B:**

Search the Web for a number of Web services other than the ones discussed in Section 3.2. What do these services have in common? Identify whether the services access a database . Explain in detail.

1. Amazon Web Services (AWS) - Cloud Computing

2. Google Maps API - Geolocation and Mapping

3. PayPal API - Payment Processing

4. Twitter API - Social Media Integration

5. Salesforce API - Customer Relationship Management

**Commonalities Among Web Services**

1. Platform Independence (REST, SOAP, JSON, XML)

2. Standardized Interfaces (API Endpoints, HTTP Methods)

3. Authentication and Authorization Mechanisms (API Keys, OAuth)

4. Data Exchange Formats (JSON, XML, CSV)

5. Scalability and High Availability

6. Cloud-Based Infrastructure

7. Support for Multiple Programming Languages

**Database Access**

**1. Amazon Web Services (AWS**): Accesses internal databases for storage and processing.

**2. Google Maps API:** Retrieves map data from external sources (satellites, GPS).

**3. PayPal API:** Stores payment processing data in internal databases.

**4. Twitter API**: Interacts with Twitter's internal database for social media data.

**5. Salesforce API:** Accesses Salesforce's database for customer relationship management.

**Additional Features**

**1. AWS:** Supports cloud computing, storage, and analytics.

**2**. **Google Maps API:** Offers geocoding, directions, and places search.

**3. PayPal API:** Provides payment processing, invoicing, and payment tracking.

**4. Twitter API:** Supports social media integration, trending topics, and user management.

**5. Salesforce API:** Offers customer relationship management, sales automation, and marketing tools.

**Technologies Used**

**1. AWS:** Uses Amazon DynamoDB, Amazon S3, and Amazon EC2.

**2. Google Maps API:** Utilizes Google Cloud Storage and Google Cloud Datastore.

**3. PayPal API:** Employs MySQL, Java, and Apache HTTP Server.

**4. Twitter API:** Built on Java, Scala, and Apache Thrift.

**5. Salesforce API:** Uses Oracle Database, Java, and Apache HTTP Server.

**Benefits**

1. Scalability and flexibility

2. Improved data management and analytics

3. Enhanced customer experience

4. Streamlined payment processing

5. Increased social media engagement

**Challenges**

1. Security and data privacy concerns

2. Integration complexity

3. Dependence on third-party services

4. Scalability and performance issues

5. Cost management

**Part C:**

Based on the Oracle architecture described in section 3.7, examine the structure of two other DBMSS of your choice. Describe features common to all three DMBSS. Explain in detail.

1. Database Instance

2. Oracle Database (System Global Area, Background Processes)

3. Oracle Net Services (Listener, Client)

4. Storage (Data Files, Control Files, Log Files)

**Microsoft SQL Server Architecture**

1. Database Engine (Relational Engine, Storage Engine)

2. SQL Server Instance (System Databases, User Databases)

3. SQL Server Network Library (Client-Server Communication)

4. Storage (Data Files, Log Files, Filegroups)

**PostgreSQL Architecture**

1. Database Cluster (Data Directory, Configuration Files)

2. PostgreSQL Server (Backend, Frontend)

3. PostgreSQL Network Stack (Client-Server Communication)

4. Storage (Tablespaces, Data Files, WAL Files)

**Common Features Among Oracle, Microsoft SQL Server, and PostgreSQL**

1. Multi-Tier Architecture

2. Relational Database Management

3. Support for SQL

4. Transaction Management (ACID Compliance)

5. Security Features (Authentication, Authorization)

6. Support for Client-Server Architecture

7. Scalability and High Availability Options

8. Support for Web Services and SOA

9. Backup and Recovery Mechanisms

10. Query Optimization and Execution Plans

**Similarities in Storage Management**

1. Data Files and Log Files

2. Storage Hierarchy (Tablespaces, Filegroups, Data Directories)

3. Data Caching and Buffering

**Differences and Unique Features**

**1. Oracle:**

- Exadata Storage

- Oracle RAC (Real Application Clusters)

- Automatic Storage Management

**2. Microsoft SQL Server:**

- Integration with Microsoft Ecosystem (Azure, .NET)

- Columnstore Indexes

- PolyBase (Big Data Integration)

**3. PostgreSQL:**

- Open-Source

- Extensibility through Extensions (e.g., PostGIS)

- Support for Multiple Data Types (JSON, XML,)