**Database Engineering Lab**

**Experiment-2**

**(Study Commercial & Open-source Database)**

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**BATCH: S7**

1. **Enlist database systems.**

**Answer:**

1. **Relational Database Management Systems (RDBMS):**
   * MySQL
   * PostgreSQL
   * Microsoft SQL Server
   * Oracle Database
   * SQLite
   * MariaDB
2. **NoSQL Databases:**
   * MongoDB (Document-oriented)
   * Cassandra (Wide-column store)
   * Redis (Key-value store)
   * CouchDB (Document-oriented)
   * Neo4j (Graph database)
   * Amazon DynamoDB (Managed NoSQL database)
   * Firebase (Realtime Database)
3. **NewSQL Databases:**
   * Google Spanner
   * CockroachDB
   * NuoDB
4. **In-memory Databases:**
   * Redis (also classified as a key-value store)
   * Memcached
5. **Time Series Databases:**
   * InfluxDB
   * Prometheus
   * OpenTSDB
6. **Graph Databases:**
   * Neo4j
   * Amazon Neptune
   * ArangoDB
7. **Wide-column Store Databases:**
   * Apache Cassandra
   * HBase
8. **Search Engines:**
   * Elasticsearch
   * Apache Solr
9. **Object-oriented Databases:**
   * db4o
   * ObjectDB
10. **Cloud-Based Databases:**
    * Amazon Aurora
    * Google Cloud Spanner
    * Microsoft Azure Cosmos DB
11. **Multimodel Databases:**
    * ArangoDB
    * OrientDB
12. **Embedded Databases:**
    * SQLite
    * H2 Database Engine
13. **Enlist the versions of Oracle.**

**Answer:**

* Oracle v2 (1979): First commercially available SQL-based RDBMS implementing some basic SQL queries and simple joins.
* Oracle v3 (1983): Concurrency control, data distribution, and scalability
* Oracle v4 (1984): Multi-version read consistency. First version available for MS-DOS.
* Oracle v5 (1985): Support for client/server computing and distributed database systems. First version available for OS/2.
* Oracle v6 (1988): Row-level locking, scalability, online backup and recovery, PL/SQL. First version available for Novell Netware 386.
* Oracle 6.2: Oracle parallel server.
* Oracle7 (1992): PL/SQL stored procedures, Triggers, Distributed 2-phase commit, Shared Cursors, Cost-Based Optimizer.
* Oracle 7.1 (1994): Parallel SQL Execution. First version available for Windows NT.
* Oracle 7.2 (1995): Shared Server, XA Transactions, Transparent Application Failover.
* Oracle 7.3 (1996): Object-relational database.
* Oracle8 Database (1997): Recovery Manager, Partitioning. First version available for Linux.
* Oracle8i Database (1998): Native internet protocols and Java, Virtual Private Database.
* Oracle9i Database (2001): Oracle Real Application Clusters (RAC), Oracle XML DB.
* Oracle9i Database Release 2 (2002): Advanced Queuing, Data Mining, Streams, Logical Standby
* Oracle Database 10g Release 1 (2003): Automated Database Management, Automatic Database Diagnostic Monitor, Grid infrastructure, Oracle ASM, Flashback Database.
* Oracle Database 10g Release 2 (2005): Real Application Testing, Database Vault, Online Indexing, Advanced Compression, Data Guard Fast-Start Failover, Transparent Data Encryption.
* Oracle Database 11g Release 1 (2007): Active Data Guard, Secure Files, Exadata.
* Oracle Database 11g Release 2 (2009): Edition-Based Redefinition, Data Redaction, Hybrid Columnar Compression, Cluster File System, Golden Gate Replication, Database Appliance.
* Oracle Database 12c Release 1 (2013): Multitenant architecture, In-Memory Column Store, Native JSON, SQL Pattern Matching, Database Cloud Service.
* Oracle Database 12c Release 2 (2017): Native Sharding, Zero Data Loss Recovery Appliance, Exadata Cloud Service, Cloud at Customer
* Oracle Database 18c (2018): Polymorphic Table Functions, Active Directory Integration, Transparent Application Continuity, Approximate Top-N Query Processing, PDB Snapshot Carousel, Online Merging of Partitions and Subpartitions.
* Oracle Database 19c (2019): Active Data Guard DML Redirection, Automatic Index Creation, Real-Time Statistics Maintenance, SQL Queries on Object Stores, In-Memory for IoT Data Streams, Hybrid Partitioned Tables, Automatic SQL Plan Management, SQL Quarantine, Zero-Downtime Grid Infrastructure Patching, Finer-Granularity Supplemental Logging, Automated PDB Relocation.
* Oracle Database 21c (2021): Blockchain Tables, Multilingual Engine - JavaScript Execution in the Database, Binary JSON Data Type, Per-PDB Data Guard Physical Standby (aka Multitenant Data Guard), Per-PDB GoldenGate Change Capture, Self-Managing In-Memory, In-Memory Hybrid Columnar Scan, In-Memory Vector Joins with SIMD, Sharding Advisor Tool, Property Graph Visualization Studio, Automatic Materialized Views, Automatic Zone Maps, SQL Macros, Gradual Password Rollover .
* Oracle Database 23c (2023): JSON Relational Duality, JSON Schema Validation, Transactional Microservices Support, OKafka, Operational Property Graphs, Support for SQL/PGQ, Schema Privileges, Developer Role, SQL Firewall, TLS 1.3 Support, Integration with Azure Active Directory OAuth2, True Cache, Readable Per-PDB Standby, Sharding with active-active Raft-based replication, Automatic SQL Plan Management, Priority Transactions, SQL Syntax Simplification, Annotations, Data Usage Domains, Column Value Lock-free Reservations.

1. **What is the difference between i, g & c from 9i, 10g and 12c respectively?**

**Answer:**

The letters "i," "g," and "c" in Oracle Database versions indicate specific features or focus areas. Here's a breakdown of what each letter represents in the context of Oracle 9i, 10g, and 12c:

* Oracle 9i ("i" for Internet): Oracle 9i was named with an "i" to emphasize its focus on internet-related features. It introduced native support for Java, enhanced data warehousing capabilities, and tools for internet application development. The "i" in 9i reflected Oracle's recognition of the growing importance of the internet in computing.
* Oracle 10g ("g" for Grid Computing): Oracle 10g emphasized grid computing capabilities. The "g" stands for "Grid Computing," highlighting Oracle's approach to creating a grid of computing resources that work together seamlessly. Features included improvements in manageability, self-tuning, and the introduction of the Automatic Database Diagnostic Monitor (ADDM).
* Oracle 12c ("c" for Cloud): Oracle 12c was named with a "c" to highlight its focus on cloud-related features. The "c" stands for "Cloud," emphasizing Oracle's commitment to providing solutions for cloud computing environments. Oracle 12c introduced a multitenant architecture, allowing the consolidation of multiple databases into a single container database. This architecture was designed to be more suitable for cloud deployments. Other features included improvements in security, as well as enhancements for database as a service (DBaaS) and platform as a service (PaaS) offering.

In summary, the letters in Oracle version names signify the primary focus or key features of that particular release. "i" emphasizes internet-related features, "g" highlights grid computing, and "c" signifies a focus on cloud-related capabilities. Each version builds upon the previous ones, incorporating new technologies and addressing the evolving needs of the IT landscape.

1. **Study of Database.**

* In computing, Oracle Coherence (originally Tangosol Coherence) is a Java-based distributed cache and in-memory data grid. It is claimed to be intended for systems that require high availability, high scalability and low latency, particularly in cases when traditional relational database management systems provide insufficient throughput, or insufficient performance.
* Coherence provides mechanisms to integrate with other services using TopLink, Java Persistence API, Oracle Golden Gate and other platforms using APIs provided by Coherence.
* Coherence can be used to manage HTTP sessions via Coherence\*Web,in which application services such as Oracle WebLogic Server, IBM WebSphere, Apache Tomcat and others are claimed to get the same performance, fault tolerance, and scalability as data.
* In the summer of 2020, Coherence Community Edition was released as open source on GitHub. Some Coherence usage patterns are also open source and are listed and supported through the Oracle Coherence incubator. These patterns implement features such as messaging, work distribution and data replication across wide area networks with Coherence.