

# Oracle CODASYL DBMS

*Oracle CODASYL DBMS provides a powerful and reliable database environment for mission-critical applications running under the Digital VAX and Alpha OpenVMS operating systems, including large-scale applications such as insurance claim processing, power plant operation, and shop floor control systems. With comprehensive system management capabilities and a full range of features, Oracle CODASYL DBMS optimizes system performance, enhances user productivity, and provides a stable foundation for the deployment of new technologies.*



## **Proven Stability, Performance, and CODASYL-Compliance**

For years, Digital Equipment Corporation's DBMS database system provided the ideal foundation for programmers, analysts, or administrators who used conventional, non-relational planning and coding techniques to design, build, and maintain applications for long-term corporate use. Its stable architecture was especially preferred for large-scale, mission-critical applications that did not map well to a relational database model.

Today Oracle continues the tradition of DBMS reliability and performance with Oracle CODASYL DBMS, a multiuser, CODASYL-compliant database management system for the Digital VAX and Alpha OpenVMS operating systems. CODASYL DBMS is designed for databases of all levels of complexity, ranging from simple hierarchies to sophisticated networks with multilevel relationships, and engineered for multiuser environments, supporting full concurrent access without compromising the integrity and security of the user's database. For application environments where stability, high availability, and throughput are essential, CODASYL DBMS provides a reliable operating platform and a solid development base.

## **Multiversioning Support for Continual Uptime**

Oracle CODASYL DBMS brings additional power, performance, and system management features to the Digital environment. New to CODASYL DBMS is multiversioning support, which facilitates upgrades in production environments by allowing you to install and test CODASYL DBMS while you continue to run older versions in production. This eliminates the downtime usually associated with database upgrades, and allows you to perform "rolling upgrades" to your CODASYL DBMS environment. It also allows you to transition to newer versions of CODASYL DBMS as they become available, without compromising user productivity.

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## **Comprehensive Management Capabilities**

New capabilities in CODASYL DBMS give you greater control over your database, and enables you to fine tune for better performance. A new option to the database verification operation (DBO/VERIFY) enables CODASYL DBMS to run five to 10 times faster than previous versions, and provides a more thorough verification and an enhanced list of corruption diagnostics for facilitating repair tasks. An enhanced database statistics package also provides you with detailed information about the real-time usage of your database resources. In addition, CODASYL DBMS's RELOAD AREA utility can prevent sluggish I/O performance by efficiently scanning stored records and moving them closer to their optimal target pages. When using RELOAD AREA, you can specify a reload sequence or use the default provided. You can also perform the RELOAD operation while the database is online. This allows you to avoid unnecessary database downtime.

## **Support for Large and Growing Databases**

CODASYL DBMS is tuned for the information management needs of growing enterprises. For example, CODASYL DBMS gives you the ability to utilize Very Large Memory configurations—configurations with more than four gigabytes of RAM—on your 64-bit Alpha systems. CODASYL DBMS's Very Large Memory support allows you to store a larger portion of your database in memory, so less time is spent moving data to and from disk, and more users can access more data from your database faster. In addition, CODASYL DBMS's after image journaling (AIJ) features prevent AIJ files from consuming vast amounts of disk space. Even if your database is growing rapidly, CODASYL DBMS provides automatic backup of full AIJ files without DBA intervention, and helps maintain optimal performance.

### **Discrete Disaster Recovery**

To protect your enterprise against data and productivity losses resulting from a node or cluster failure, CODASYL DBMS's Hot Standby option allows you to completely duplicate a database and its environment. In the event of a failure, you can use the replicated database as the master database, with minimal interruption of database users and application processing. The Hot Standby option automatically performs coordinated database synchronization and verification with minimal impact on system resources—the only manual step the administrator must perform is to start the replication services. An additional, optional component—called the Replication Governor—coordinates the database replication and ensures complete synchronization between the master and standby databases. You can implement master and standby databases on systems running OpenVMS VAX, OpenVMS Alpha, or both.

### **Reliable Database Controls**

CODASYL DBMS gives you comprehensive database management controls that help you to optimize your Digital VAX and Alpha OpenVMS environment. Its incremental backup capabilities speed routine maintenance, while its three-phase recovery-by-page feature determines exactly which pages are corrupt and allows you to restore only those pages. You also gain additional locking control with CODASYL DBMS's two-phase locking option, which allows you to lock individual pages as well as individual records. Fewer locks are especially useful in high-throughput, low-contention environments, such as OLTP environments. In addition, a new SQL interface to CODASYL DBMS allows you to directly access your CODASYL DBMS production database with many popular front-end SQL tools, including specialized report-writing tools.

# Oracle CODASYL DBMS Key Features

## Hardware and Software Requirements

Oracle CODASYL DBMS runs on any valid Digital Alpha or VAX configuration running the OpenVMS operating system.

## Performance and Availability

- SQL interface to DBMS
- RELOAD area utility
- After-Image Journaling (AIJ) management: circular AIJ, AIJ Backup Server, and AIJ Log Server
- Incremental backups
- Recovery by page
- Two-phase locking
- Full concurrent access capabilities (storage, retrieval, update, and deletion) in a multi-user environment
- Record locking and journaling
- Automatic transaction and verb rollback
- Multiple database support (one or more databases per process)
- Two Phase Commit capability automatically commits or rolls back updates across multiple databases in one transaction
- Full VMScluster support, including automatic recovery upon node failure
- Integration with CDD/Repository for OpenVMS
- Optional SQL interface allows direct data access from the desktop

## Security and Languages

- Schema, Subschema, Storage Schema, and Security Schema Data Definition Languages (DDLs)
- Security audit logging of database and Security Schema access

- FORTRAN Data Manipulation Language (FDML)
- Generic DML preprocessor for C, Pascal, and DEC Ada
- Callable interpretive interface for any OpenVMS Alpha language that adheres to the OpenVMS calling standard
- Automatic subschema definition extraction from the CDD/Repository for DEC C, MACRO, DEC Pascal, and DEC Ada when using the high-level call interface or generic DML preprocessor

## Database Management

- Easy-to-use utility command language (DBO)
- Database Restructuring Utility (DRU) provides the ability to change many database characteristics without unloading and reloading the database
- Initial Load utility; Unload utility for data extraction; functionality for database restructuring with Unload/Load
- Simple restructuring, including adding AREAS and initializing AREAS, without unloading and reloading a database
- Interactive Database Query utility (DBQ) with video display of subschema structure diagrams on VT100, VT200, or VT300 compatible terminals

## Verification and Backup

- Online and incremental database verification including verification by set
- Full and incremental database backup with or without concurrent database users
- Full and incremental database restore of the entire database or individual areas
- Ability to redo a sequence of committed transactions (roll forward)

## Database Tuning and Optimization

- BATCH RETRIEVAL ready mode (database snapshots) for increased concurrency in large retrieval applications
- Space Area Management (SPAM) pages which improve database free-space search performance
- Boolean record selection expression with index optimization on FIND and FETCH DML statements
- Data compression of data items and database key (DBKey) pointers
- Direct record access through database key (DBKey) pointers
- Automatic expansion of large records across multiple database pages
- Sorted sets implemented with B-trees or simple chains; prefix and suffix compression for sort keys with the B-tree implementation
- DECnet database access for full remote read/write access to non-redundant distributed databases

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9680.1295.5K

Part #: A24170