EMPRESS Embedded RDBMS

in

Telecommunications and Networking

Highlights

▶ EMPRESS Embedded RDBMS Functionality

▶ What Distinguishes EMPRESS for Telecommunications and Networking

▶ EMPRESS Applications in Telecommunications and Networking

1. Introduction

The convergence of Internet, telephony and wireless technology changes the way we communicate, work and live. The present challenge of leading telecommunications and networking vendors is to provide systems with richer functionality at faster speeds and lower cost in order to meet constantly evolving market demands.

For telecommunications and networking vendors, accelerating time-to-market produces rapid recovery of development cost and increased revenue generation. One technique for faster time to market is to use component-based design for product development. Reusable modules and commercial off-the-shelf components like EMPRESS RDBMS are ready to be embedded as part of feature rich products. By using commercial components, valuable human resources are not wasted in reinventing and maintaining the same component functionality. Building intelligent devices becomes an easier and more straightforward task.

Reasons why EMPRESS RDBMS is utilized in telecommunications and networking applications:

- Rich toolset, rich data types and rich functionality for rapid development
- Flexible and configurable for application optimization
- Small footprint ideal for size constrained environments
- Predictable performance
- High reliability and consistency of data
- Embeddable as a single unified program that is robust and efficient
- Easy, straightforward and cost effective runtime licensing
- Continuous product development, deployment and life cycle support

2. EMPRESS Embedded RDBMS Functionality

EMPRESS Small Footprint Embedded RDBMS delivers an unmatched combination of rich features, rich tools, rich data types and high performance that are well suited to the Telecommunications & Networking industry:

Rich toolset, rich data types and rich functionality for rapid development

- o **TOOLSET API's:**
  - o DSQL and ESQL
  - o Interactive SQL and Java SQL
  - o C and C++
  - o JDBC
  - o ODBC
  - o Report writer
  - o Third party product interfaces

- o **EMPRESS DATA TYPES:**
  - o Character
  - o Text
  - o National Language Support
  - o Byte Stream
  - o Date and Time
  - o Microsecond Timestamp
  - o Decimal
  - o Dollar
  - o Real
  - o Float and Double Precision
  - o Integer – short, long, 64-bit
  - o Sequence

- o **EMPRESS FUNCTIONALITY:**
  - o SQL support
  - o Kernel level C API
  - o Transactions
  - o Locking
  - o Indexing
  - o Time series Indexing
  - o Hierarchical Join
  - o Cascade Delete
  - o Persistent Stored Modules
  - o Triggers and Stored Procedures
  - o Referential Constraints
  - o Range Checks
  - o MicroSecond Time Stamp
  - o On-Line Backup and Recovery
  - o Replication
  - o Audit trail Logging
  - o Unicode support
  - o User Defined Functions
  - o Integrity Check
  - o Import and Export
  - o Shared Memory
  - o Batch Commands

Flexible and Configurable for application optimization

o Stand-alone, client/server and distributed modes
o On-disk and in-memory capability
o Layered architecture accessible at 4 levels allows optimization and rapid prototyping
o Over 170 system variables for configuration, tuning and optimizing
o Customizable product footprint

Small footprint for constrained environments

o Minimum resource consumption for high functionality
o Small disk size that is customizable
o Small memory usage with usage limits

Predictable performance

o Fast database engine
o Minimum overhead
o Kernel level control and speed
o Direct access to database structures
o Deterministic response

High reliability and consistency of data

o 24x7 unattended operation
o Data integrity maintained
o Minimum storage/disk fragmentation

Embeddable as a single unified program that is robust and efficient

o EMPRESS can be linked with an application in a single address space
o EMPRESS installation is embeddable into application installation procedure

Easy, straightforward and cost effective runtime licensing

o Choose from:
   o royalty based
   o one-time fee
   o yearly subscription

Continuous product development, deployment and life cycle support

o EMPRESS Software technical support team of knowledgeable database experts deliver high quality, timely support

3. What Distinguishes EMPRESS for Telecommunications & Networking

EMPRESS is known for its rich feature set, fast performance and small footprint. For telecommunications and networking applications, there are additional key unique features that distinguish EMPRESS:

1. <u>Hierarchical Join</u>

   Data structures in telecommunications and networking applications are mostly hierarchical in nature. EMPRESS RDBMS "hierarchical-join" feature is used for hierarchical relationships among tables. This feature offers the potential for greater performance optimization as shown in benchmark read operations.

2. <u>Cascade Delete</u>

   EMPRESS RDBMS provides native API cascade deletes. This allows the deletion of all related information from multiple tables with one single delete operation. In router and intelligent switch devices, routing information can be stored in a set of tables defined as routing schema. This routing schema is dynamic since certain devices on the network are re-configured or removed very frequently. Tables in routing schema are inter-related to each other. In other words, tables that contain information about the routing nodes are related to tables that contain route maps associated with the nodes. With the EMPRESS Cascade Delete, deleting a record from the routing nodes can cause all associated records from route maps to be deleted. The benchmark results show that EMPRESS RDBMS is highly efficient with this type of operation.

3. <u>Transaction Span in Dealing with Database and Non-Database Operations</u>

   In telecommunications and network application, when the routing configuration is changed, the application has to

enter/update new information into the routing tables. At the same time the actual reconfiguration activity on the device (non-database task) has to be performed. These two activities, a database task and a non-database task, must be done in atomic fashion, hence in the same transaction. EMPRESS native API provides the flexibility of allowing database transactions to span not only database tasks but also non-database tasks.

4. <u>EMPRESS and Application can Run in the Same Address Space</u>

In Telecommunications and Networking applications, devices that are able to run an application in the same address space as the database have the advantage of:

a. <u>Less memory consumption</u>
EMPRESS can be embedded in the same address space as the application. In this environment, the EMPRESS footprint can be smaller than 1MB with full database functionality. With client/server databases, there is the application, the client and the server. The server also may occupy much more memory.

b. <u>Easy configuration</u>
With EMPRESS embedded in the application, there is only the application to configure. With client/server databases, there are 3 configurations (server configuration, client configuration and application configuration) to manage.

c. <u>Single Point of Failure</u>
With EMPRESS embedded in the application, there is a potential single point of failure, the application. With client/server databases, multiple potential points of failure (client, server, application) must be considered.

d. <u>Decreased Complexity</u>
With EMPRESS embedded in the application, the system is much simpler to maintain.

In addition, EMPRESS has the flexibility to be configured as standalone (embedded in the application) or client/server as needed.

4. EMPRESS Applications in Telecommunications and Networking

EMPRESS RDBMS has been embedded in many telecommunications and networking applications such as:

- IP Telephony (VoIP) Systems
- Voice Mail Tracking System
- Enterprise Communication Server
- Home Appliance Communication Server
- Intelligent Routers
- Intelligent Switches
- Network Management Systems
- Web-based Data and Network Management Systems

From companies such as Fujitsu, Lucent, Cisco, Intelliden, Matsushita, NTT-Com, Network Telco, etc.

In these applications, EMPRESS Embedded Database is used to:

- Collect and analyze data streams in real-time and store and transmit data from network and communications equipment such as phone systems, voice mail, routers and other equipment
- Make the EMPRESS database engine and all its data entirely in memory for fastest data processing
- Use EMPRESS User Defined Functions and User Defined Procedures to program devices automatically to deliver data and alarms to the local or remote data/control center
- Define and store access and command level information in the database to securely communicate the devices via WAN, LAN or Web
- Store statistics, usage data and events in EMPRESS databases and view the data with a Web browser

5. SUMMARY

EMPRESS Embedded RDBMS delivers an unmatched combination of rich features, rich tools, rich data types and high performance that are well suited to the Telecommunications & Networking industry. Unique features including <u>hierarchical joins</u>, <u>cascade deletes</u>, <u>low-level interfaces</u>, and <u>single address space configuration</u> solidify EMPRESS' position as the leading database for telecommunications & networking products.

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