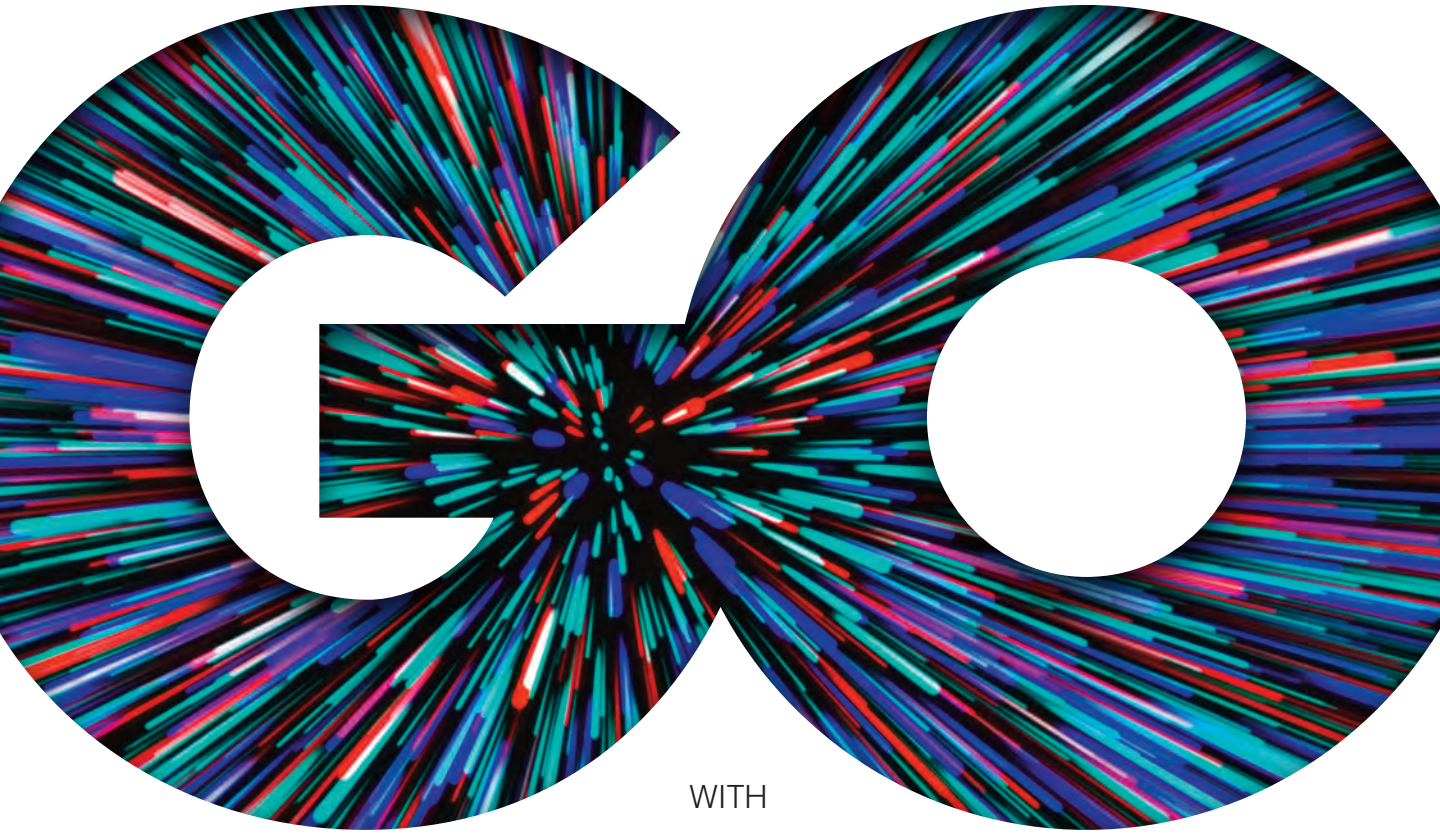
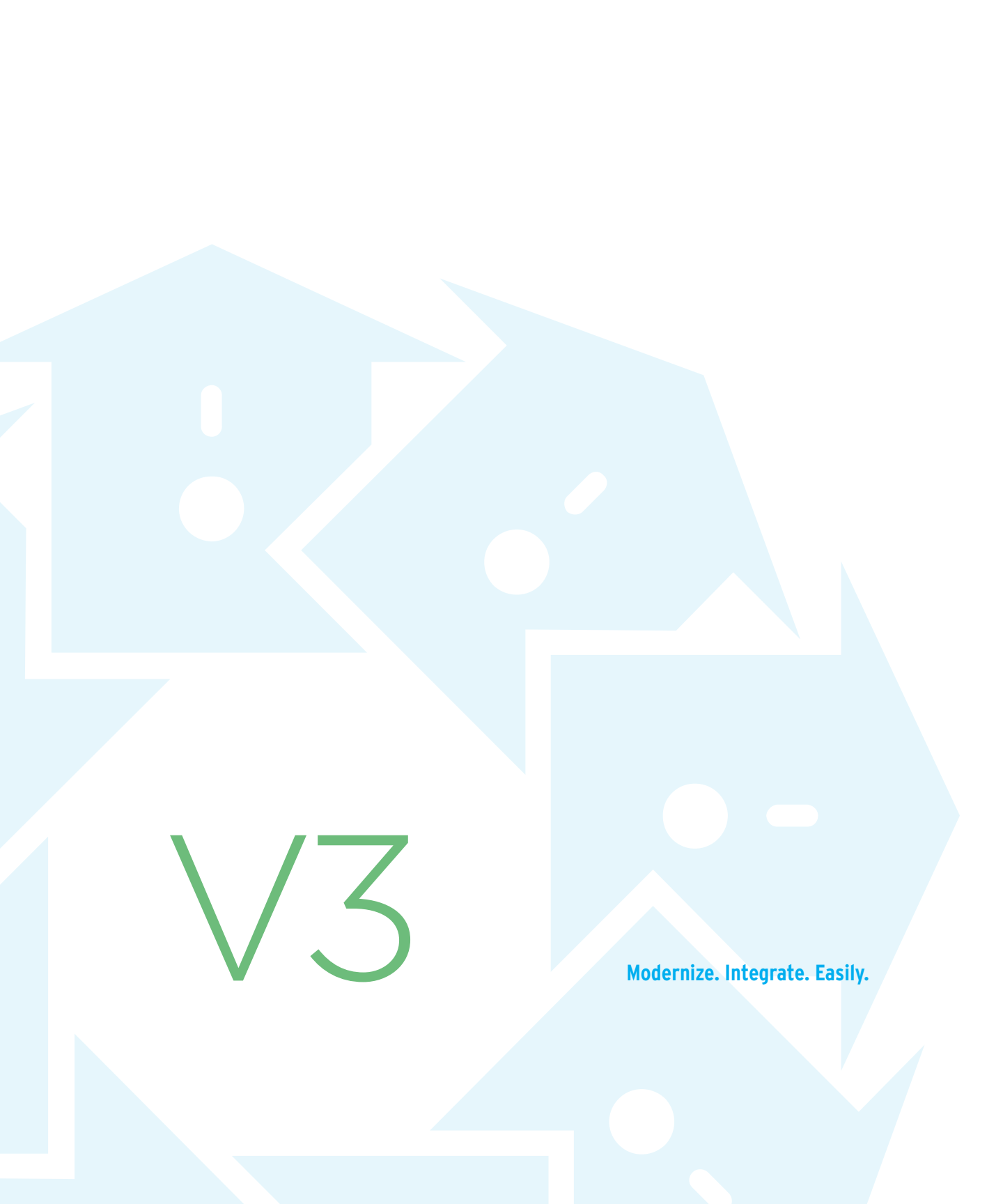
WHAT ARE YOUR **GO**ALS?



WITH

c-treeRTG® V3

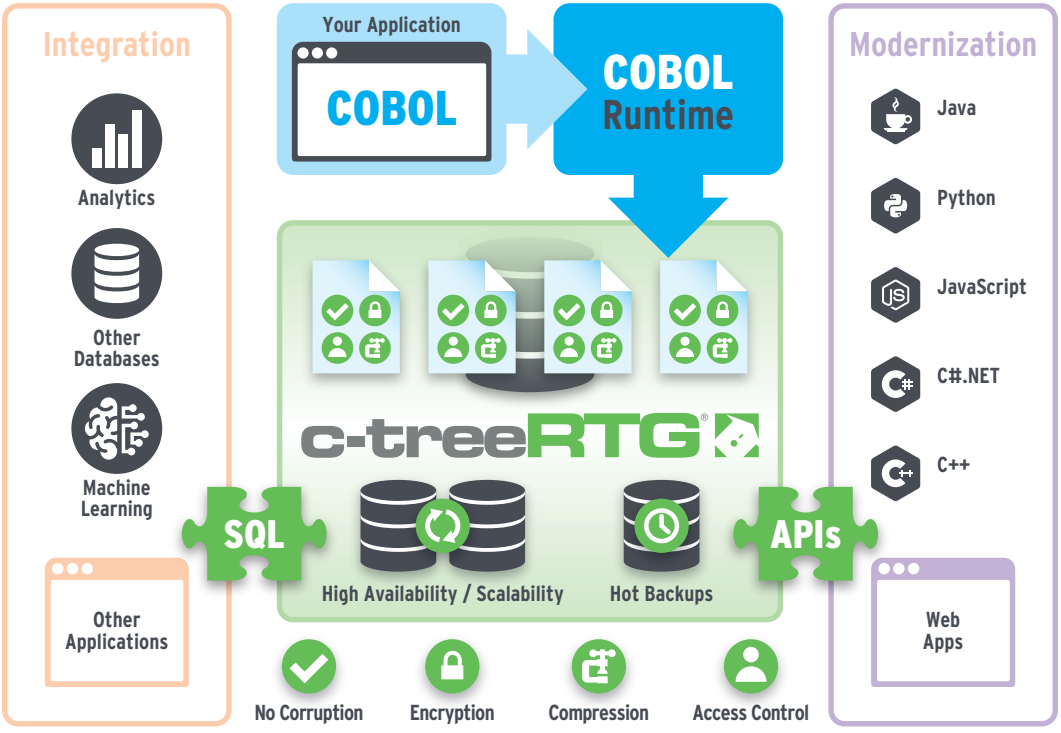
One Core Technology — Endless Possibilities


V3
Modernize. Integrate. Easily.

c-treeRTG® V3

The latest release of c-treeRTG V3 has a variety of new enhancements and features for COBOL and Btrieve® developers. This document is a quick overview of these exciting new additions.

You may also want to read this content online at faircom.com/v3update. It contains links to each feature in the c-treeRTG V3 Update Guide where you can learn more about each feature with a simple click.



As a reminder, we've updated our product names and logos.

c-treeACE is now faircom db, c-treeEDGE is now faircom edge, c-treeRTG is still c-treeRTG

Create Big Solutions

- **Multitenant Cloud Apps**
- **Huge Transactions**
- **Big Data Analytics**

Go Bigger With RTG V3

- Millions of records per transaction
- Millions of open files
- 128 TB temp tables
- 4 TB sort memory
- 2 GB transaction logs
- 64 K strings
- 2,500 columns per table

Speed Up Everything

- **Faster Applications**
- **More Concurrent Users**
- **Predictable Performance**
- **Lower Hardware Costs**
- **Reduced Tuning Costs**
- **Faster Software Development**

Go Faster - RTG Server

The following enhancements are available by simply upgrading the c-treeRTG Server:

- Up to 3x faster overall performance
- Up to 4x faster indexes with improved key compression, locking, node pruning, and sorting
- Up to 3x faster SQL for joins, filters, sorts, ORs, and parameterized queries
- Insert many SQL rows in one statement
- Faster file open, close, encryption, and truncate
- Faster connections and app communications
- Faster transaction log checkpoints
- More concurrency with less lock contention
- Faster replication that runs in parallel
- Faster encryption at rest and in transit
- Configure when data, index, and logs flush to disk

Speed Up Everything

- **Gain performance with ctree.conf configuration changes**
- **Utilize optional stand-alone mode for bulk data loading**

Go Faster - RTG Client

Fine tune your RTG application:

- **<delcurrent>** improves record delete performance
- **<transaction deferautocommit>** speeds apps that don't use explicit transactions
- **<bulkaddition>** available in V2. Rapidly load bulk data by delaying building the index until file is closed
- **<bulkaddition prmiidx>** new in V3. Complements <bulkaddition> by using a faster index creation strategy for loading tables with existing data
- **<scancache>** optimizes performance by adjusting the cache retention strategy to prevent read-biased processes from pushing regularly accessed data out of cache with data that won't likely be re-accessed
- **Stand-alone mode** is now supported allowing data files to be opened and accessed by the client application, without going through the c-treeRTG Server. This provides opportunities for faster bulk data loading, processing local client-side copies of data, etc.

Run More Securely

- **Faster encryption support for data at rest and in transit**
- **New Security Event Monitoring**
- **Audit security in logs**
- **Use LDAP directories**
- **AWS Secrets Manager available upon request**

Go Safer With RTG V3

- **<permission>** sets file read/write access, file redefinition, and file delete permissions for file owner, group, and all other users
- Send encrypted passwords to command-line utilities making it safe to automate CLI scripts with hidden passwords
- Data at rest encryption overhead reduced from 17% to 5%
- TLS encryption now available for data in transit
- Authenticate using LDAP
- Log all login attempts to SYSLOG
- Automatically expire passwords
- Lock out accounts after too many login attempts
- Enforce password strength
- Block and unblock connections
- Manage inherited permissions more easily
- Read-only servers provide increased security for write once read many applications
- MASTER_KEY_LIB allows for custom solutions when storing and retrieving a master key

New RTG V3 File and Data Management Options

RTG File and Data Controls

- Full-Text Search over COBOL data
- Better datetime compatibility and millisecond support for SQL access
- **<filecopy>** contains a new -overwrite attribute
- **<filepool>** enables file pooling, which reduces file open time
- Log options now include lock requests, startonread events, and file handler switches
- **<memoryfile persist>** keeps a memory file available when the application that created it disconnects
- **<truncateifexist>** deletes all existing records providing faster recreation of files for OPEN OUTPUT operation for large files that are frequently recreated
- **<prefetch ttl>** defines how long a set of prefetched records (recall <prefetch> was added in V2) remains valid (ttl is "time-to-live"). This provides a mechanism to prevent records from becoming stale and out of date

RTG V3 SQL Access

- **Real-time SQL access to COBOL has been improved in this release**

RTG SQL Improvements

- Run SQL queries across multiple databases
- Faster SQL performance
- Increased:
  - String field support to 64 K
  - Columns per file to 2,500
  - Sort memory to 4 TB
- Enhanced logging
- Full-Text Search via SQL

RTG Data and Tools

- **Tools have been improved to help you migrate and optionally "SQLize" your data**

Data Migration and Tools

- Support for more field types
- Enhancements to XFD/XDD logic improves data migration
- Drop a table from SQL without removing the data file from disk

ctutil Enhancements

- -f option for -info and -unload commands force file open even if file is corrupted
- -n option for -load command deletes any existing records before loading new records
- -tron command enhanced to display the transaction status of the file
- -sqlrefresh command preserves existing table attributes (synonyms, grant, …)
- -test command verifies configuration files are properly formatted

Low Administration

- **Automatic Self Tuning**
- **Built-in Browser Apps**
- **Simply Works**

Goal: Zero Administration

- Use new built-in browser apps to replicate, explore and monitor data
- Automatically replicate everything and anything
- Automatically deploy and resync replicas
- Automatically tune indexes
- Automatically manage data growth
- Automatically alert on low disk space
- Automatically reclaim deleted record space
- Automatically timestamp records
- New or enhanced CLI utilities to manage:
  - Data replication
  - Data partitions
  - Encryption
  - KEEPOPEN_LIST (data caches)
  - Recording and replaying transactions

Increase Uptime

- **Stay Up Longer**
- **Recover Faster**
- **Upgrade Without Downtime**

Faster Recovery

- Back up to STDOUT
- Restore from STDIN
- Faster restores from large backups
- Wildcards exclude and include files in backups

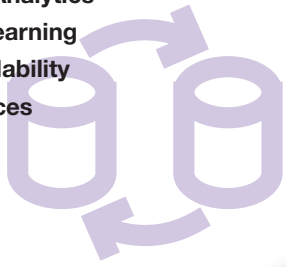
High Availability (Beta)

- Parallel synchronous replication
- Built-in failover clustering
- Linux cluster failover
- Windows cluster failover

For details, see the Replication Overview Guide, which also includes several use cases.

Replicate Data for:

- **Cloud Computing**
- **Distributed Reads**
- **Disaster Recovery**
- **Real-time Analytics**
- **Machine Learning**
- **Global Scalability**
- **Microservices**



Data Replication

Synchronous and asynchronous replication can now run with parallel threads:

- Replicate data at high speed across many servers
- Create multiple read-only servers for bulk reporting, ad hoc reporting, dashboards, intensive queries, real-time analytics, machine learning, etc.
- Create multiple disaster recovery servers in remote locations
- Shard global transaction data across many databases in the cloud
- Create up-to-date caches of data across microservices
- Create ACID-compliant, read-only replicas for an app to write to one server and read from many
- Create eventually consistent replicas for an app to read and write to any server

Diagnose Faster

- **Find Potential Problems**
- **Fix Problems Faster**
- **Report Issues Easier**

Diagnose Easier

New configuration options to:

- Detect memory buffer overruns
- Manage diagnostic crash dumps
- Log flush status
- Log index node queue failures

Monitor each logged-in account for:

- Disk reads and writes
- Data and index cache requests and hits
- Connection information
- Logical and physical file opens and closes
- File creates, renames, and deletes
- Average log save time
- Cached data stats

New APIs and Languages Available in the "Driver" to Easily Integrate with:

- **Web Applications**
- **Enterprise Message Queues**
- **Cloud IoT and iPaaS**
- **Enterprise Service Bus**
- **SOA**
- **B2B**

Access COBOL Data With:

- **c.isam** – ISAM API for control and speed
- **c.lowlevel** – Individual control over data/index files
- **c.nav** – c-treeDB API, easier to use than ISAM with slight speed penalty
- **c.sql.direct** – Direct SQL – Embed SQL in C code
- **cpp.nav** – c-tree Database API for C++
- **cpp.replication** – C++ replication API
- **csharp.nav** – C# c-tree Database API
- **csharp.sql.ado.net** – ADO.NET SQL access
- **csharp.sql.storedprocs** – C# stored procedures
- **vb.nav** – c-treeDB API for Visual Basic
- **ctree.callbacks** – Callback APIs for C and C++
- **Java APIs** – nav/c-treeDB, SQL, JPA, replication, and SQL stored procedure
- **JSON RPC API** –RPC API that uses JSON/HTTP
- **Node.js APIs** – CTDB, REST, and SQL for Node.js
- **node-red.rest.crud & node-red.sql** for Node-RED
- **php.sql & php.sql.pdo** – SQL for PHP and PDO
- **Python APIs** – NAV API, SQL, and SQLAlchemy
- **sql.cli** – SQL for ISQL
- **sql.jdbc** – Provides a JDBC connection
- **sql.odbc** – Provides an ODBC connection

Read more about c-treeRTG online at faircom.com/v3update. This page features similar topics and links to the c-treeRTG V3 Update Guide for additional details.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CELEBRATING
FairCom®
FORTY YEARS

Warp speed – *defined as faster than the speed of light, 299,792,458 meters per second.*

As a species, we have always strived to ever increase our speed. Going even faster improves life for everyone by saving time, getting more done, or providing a thrill.

Today, the consensus of scientific knowledge is that humans traveling faster than the speed of light is impossible. Yet, history is full of scientifically "absurd" theories that became a reality through years of determination and research.

Our V3 cover honors the determination to explore where we all can GO. Motion and progress, not only in physics but in dreams and aspirations, make the impossible infinitely possible.

Crossing the galaxy may not be the goal today; nevertheless, the drive to improve and to progress is inherent in all of us. Join us in taking another step towards our goals and the impossible.

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