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Oracle Rdb: Product Strategy and Status Update

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Agenda

- Strategy
- Current Development Activity
 - Itanium Port
 - Performance Work
- Roadmap
- Quality
- Training

Product Development Strategy

1. High-end OLTP systems focus
 - High performance
 - Unique scalability on OpenVMS
 - Extensive tuning capabilities
 - High availability
 - Robust on-line management
2. Integration with Oracle software environment
 - Oracle Developer Suite
 - Oracle Application Server
 - Extend Java, JDBC support
 - Oracle Enterprise Manager
 - Oracle Database
- HP's OpenVMS will remain the only supported Operating System

Oracle's Strategy for Rdb

- *“....We know how to do this. Ask any customer from our Rdb database acquisition from Digital Equipment Corporation. Nearly nine years later, we are still providing world-class support to thousands of Rdb customers running mission-critical applications.”*

Larry Ellison, Oracle CEO quoted in
advertisements in Business Week, The Economist,
Wall Street Journal + Others

“Nine Years Later” White Paper

Nine Years Later: Thousands of Satisfied Oracle Rdb Customers



No forced migrations—Oracle delivers
post-acquisition support, innovation, stewardship

When Oracle acquired Rdb from Digital Equipment Corporation in 1994, we promised to focus on quality and stability while enhancing features based on customer demand. With the acquisition, we purchased patented technology, skilled engineers, and access to an important customer base. Nine years later, we're keeping our promise to thousands of customers worldwide through technical innovation and unwavering support for their mission critical Rdb systems.

Committed to the Future of Rdb

Rdb is nearly 20 years old, yet in just nine years Oracle has developed more than 50 percent of the code base. Our significant enhancements, dedication, support, and resources continue to make Rdb the best choice for high throughput database applications on OpenVMS systems—everything from cellular phone billing systems and lotteries to major financial exchanges—and satisfied customers like Intracorp prove it.

“I've worked with Rdb for more than 16 years. Oracle has maintained the outstanding level of customer support for Rdb that existed before its acquisition, and has continued to develop new features and performance enhancements,” says Ken McGinnis, database administrator for Intracorp, a Philadelphia-based medical management company with more than 20,000 customers.

When Digital sold the Rdb set of database products, the move concerned many Rdb customers. They wanted assurance that their mission-critical resource would be dependable into the next millennium. Thanks to Oracle, Rdb customers have unequivocally received that assurance. After acquiring Rdb, we formed independent Rdb Customer Advisory

Councils in four regions—North America, Europe, Japan, and Australia/New Zealand—and then listened closely to what the councils had to say, building innovative features to meet customer demand. Nine years later, these same customers praise our successful management of Rdb's acquisition and transition, demonstrating our clear grasp of the different customers and markets for Oracle and Rdb.

While the original contract with Rdb called for three years of development and seven years of support, we've gone well beyond that agreement, with nine years—and counting—of Rdb development and support. With the acquisition, some 90 percent of Digital Rdb employees chose to stay on with Oracle. In fact, Oracle's head of technology development, Executive Vice President Charles A. Rozewat, is a former Digital Rdb executive who joined during the acquisition. Most of the development team, which remains in Nashua, New Hampshire, continues to fulfill commitments made to the Rdb customers, including the development of innovative, high-quality features as prioritized by customers and the councils; broadening the Rdb application set; and integrating Rdb with Oracle's long-term strategies.

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http://www.oracle.com/peoplesoft/Rdb_CaseStudyE.pdf

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Excerpt ...

We know how to do this. When Oracle acquired Rdb from Digital Equipment Corporation in 1994, we promised to focus on quality and stability while enhancing features based on customer demand. Nine years and thousands of satisfied customers later, we're doing exactly that. In fact, we've developed more than 50 percent of the code base and sponsor annual customer forums worldwide.

Customers Respond

“When Oracle acquired the product in 1994 we were very worried about Rdb's future. Our worry was misplaced. Oracle instituted processes to help ensure customers were well informed about the future of Rdb. At the same time, Oracle gave Rdb a new lease on life by significantly increasing the resources devoted to enhancing the database. At no point have we felt pressured to move to Oracle's main database product.”

Chris Barratt
Development Manager
Flinders Medical Centre

Customers Respond

**“We began to use Rdb in 1991 and were concerned about continued support when Oracle acquired Rdb,” said.
“We need not have worried. The support has been very good and very professional and we have always received an immediate response to our inquiries. At no time did Oracle raise the question of migration to their database. The service provided has always been of the highest professional standard.”**

Agustin Ramos
Systems Technology Manager
Bolsa de Madrid

Sybase Forecast - 1995



**ORACLE INTEGRATES Rdb INTO THE
WORLD OF OPEN SYSTEMS.**

If you're expecting Oracle to protect your investment in your Rdb database and applications, prepare a eulogy. And wear black. Oracle has problems with the easy part - moving Rdb data into Oracle 7. And they really stumble when it comes to migrating your valuable legacy applications. With SYBASE® you have choices. You can keep your Rdb applications running Or

UP TO 50% DISCOUNT

We are now offering eligible Rdb customers up to a 50% discount on the purchase of SYBASE SQL Server and OmniSQL Gateway™ licenses. In addition, you can qualify for a complimentary five-day consulting package. Offer expires March 15, 1995.

migrate them. Or start fresh. Even if you have ACMS, we have the experts on board to solve your problems. We think reports of your Rdb's death are greatly exaggerated. For our white paper on Rdb migration options using SYBASE, call us at 1-800-SYBASE-1, ext. 6540.

SYBASE®
THE ENTERPRISE CLIENT/SERVER COMPANY

Oracle Inc. is a registered trademark and SYBASE is a registered trademark of Sybase, Inc. Other company or product names may be trademarks of their respective holders. For details on the Sybase Rdb offer and how it may apply to your site, please contact a Sybase sales representative.

CIRCLE READER SERVICE CARD NO. 104.

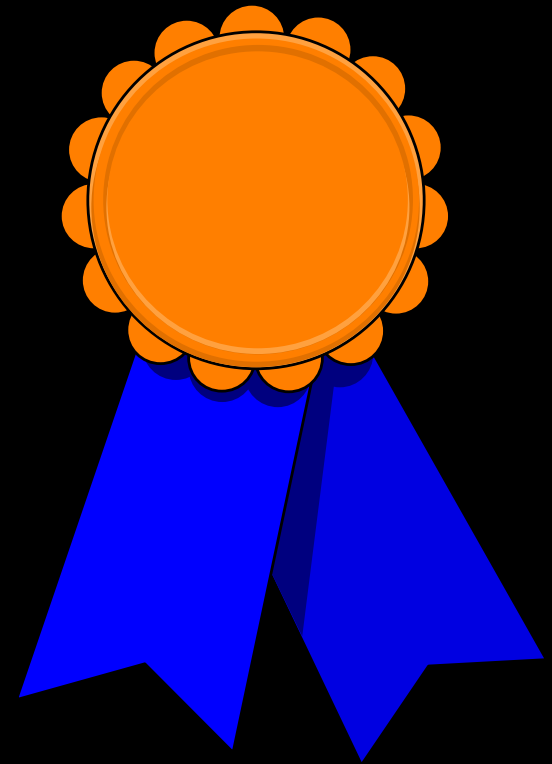
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How Rdb Is Used

- Trading commodities, equities and futures: US, UK, Australia, Austria, Sweden, Spain, France, Greece, Italy, Switzerland, Hong Kong, Singapore, Korea and Germany
- Mobile phone systems: US, Japan, Hong Kong, UK, South Africa, Peru, Germany, Austria, Czech Republic, Denmark, France, Greece, Portugal and Switzerland
- Semiconductor manufacturing: Worldwide
- Lottery Systems: Europe, Canada, Australia, South America and the US
- Automobile manufacturing: Volvo, Nissan, Toyota, Fiat ...
- Short Messaging Service: Worldwide
- Passport control: New Zealand
- Government: Ireland, Department of Social, Community and Family Affairs
- Education: Europe, United States, Australia -largest secondary education system in Southern Hemisphere
- Reservation systems: Thrifty and Dollar car rental
- Satellite Television: United States
- Automatic Toll Systems: United States

Recent Victories

- New Sales driven by applications
 - OM Group
 - Singapore Exchange, others
 - EssNet (Lottery Systems)
 - Tattersall's, many others
 - LogicaCMG (Short Messaging Services)
 - VCS Aktiengesellschaft
 - BBC Radio
- New projects with existing customers
 - Deutsche Börse
 - SIAER
 - Sharp
 - NTT
 - ... more soon



How Do We Do This?

- Knowing our customers and their needs
- Responding to those needs with great new features
 - Continuous LogMiner
 - Hot Standby
 - Row Cache
 - Bit Mapped Indexes
 - SQL*Net for Rdb, JDBC support
- Rdb Technical Forums and other events
- Email mailing list
- Cooperation with HP

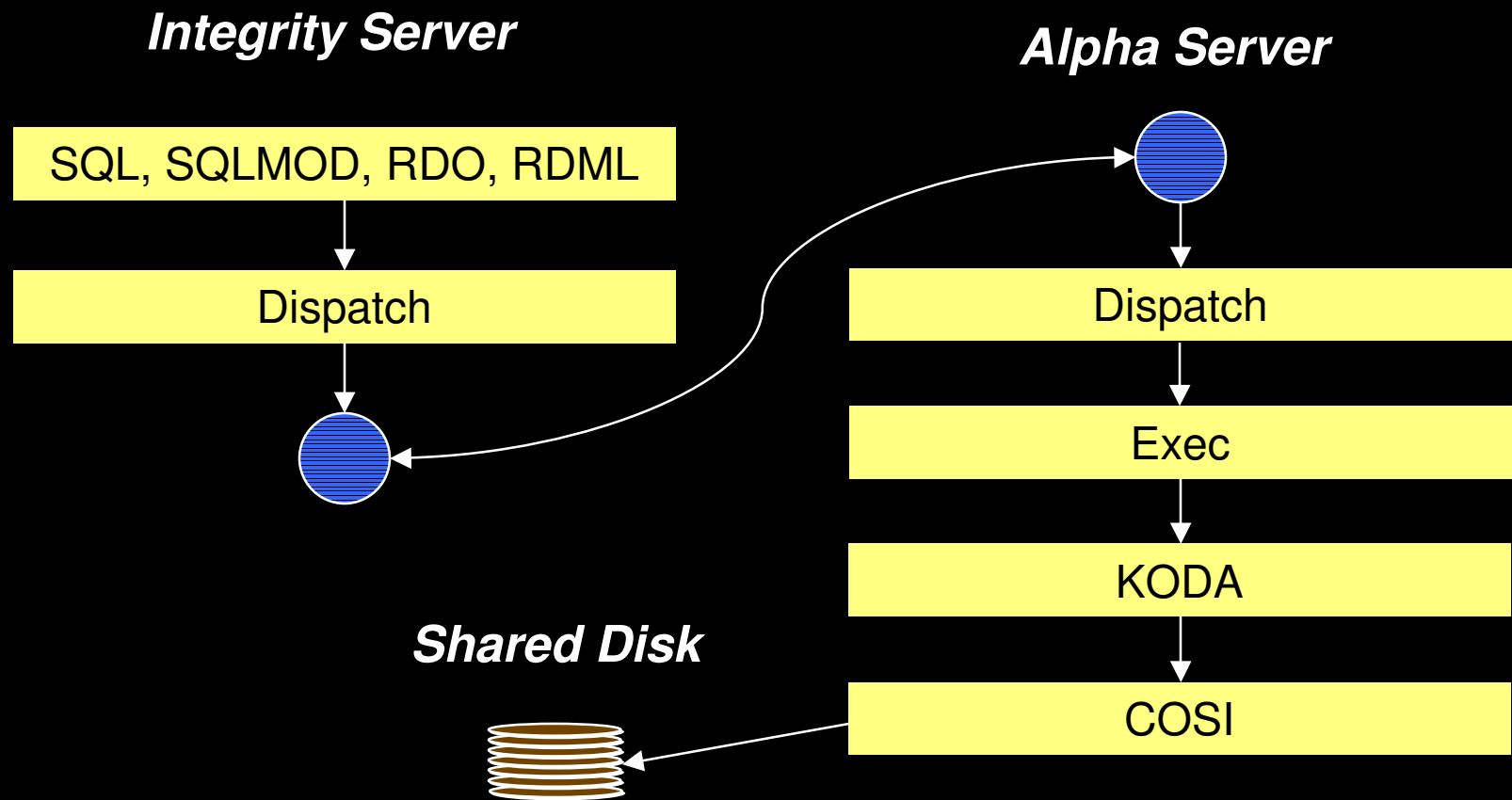
Development Work

- Implement the Strategy:
- OLTP Focus
 - Itanium Migration
 - Row Cache Enhancements
 - Backup Media Management
 - Optimizer Improvements
- Oracle Integration
 - Replication and database integration
 - Development Tools and Techniques
 - Enterprise Manager Support

Oracle Rdb on OpenVMS I64 – Current Status

- Oracle Rdb Running Native on HP Integrity Servers
 - IVP successful
 - Most simple native operations work (e.g. Insert, Update, Select, Create Database, Backup/Restore)
 - Running subset of nightly regression tests today
 - Run-time debugging underway
- Oracle CODASYL DBMS Running Native on HP Integrity Servers
 - Perform local attaches from multiple concurrent processes and execute DML applications written in C, Bliss and Fortran using IPF native compilers and our DML pre-compiler and FDML preprocessor.
 - 90% of regression tests running successfully today
 - Multi-user stress tests running daily without uncovering problems
 - Create Database, Backup/Restore, Verify, Alter working.
- Advanced Developer's Kit
 - Contains native SQL and RDML preprocessors for OpenVMS I64, CDD and Remote-only access to existing Alpha-resident Rdb databases. **Now in beta test!** <http://www.oracle.com/rdb> choose beta link

The Application Development Kit



Hardware and OS Support

- Next Generation Alpha System
 - EV7 Certification completed with current releases of Rdb 7.0 and 7.1
 - Benefit: Significant performance improvement
- VMS 7.3-2 /Opal
 - Rdb Certification Testing completed
 - Benefit: Upgrade with confidence to take advantage of the latest VMS enhancements.

Native 64-bit Row Cache

- Replace existing VLM/SSB techniques
- Improved performance
- Vastly larger caches viable

Rdb 7.1.2 + VMS V7.3-2 + GS1280 = Performance

- Resident Large Caches
 - >1,000 million database rows
 - >12 million index nodes
 - > 32 processor GS 1280 with 256 GB Memory
- **1.8 Million Transactions per Minute**
- Details in “Native 64 Bit Virtual Addressing For Oracle Rdb Caches Capability and Performance” white paper – OpenVMS Technical Journal

Snapshots in Row Cache

- Store snapshot copy of row in cache
 - Limited snapshot “life time”
- Memory access faster than disk access
 - Eliminate page locking & I/O
- Quickly write & read
 - No need to write snapshot page
 - No need to update live page
 - Search chain in memory

Snapshots In Row Cache

- Read & modify records from cache
- Maintain record snapshot in cache
- Avoid IO to database and page locks
- Should improve application performance
 - Let's test to find out

Simple Database

```
SQL> create table t1 (  
        f1 integer,  
        f2 integer,  
        f3 char(50));  
  
SQL> create storage map t1_map  
        for t1 store in foo_u1;  
  
SQL> create unique index  
        it1 on t1 (f1)  
        type is sorted  
        store in foo_u1_idx;
```

Simple Processes

- Writer

- Does 5000 read write transactions
- Each transaction does 20 updates of the form:

```
update t1 set f2 = :lp where f1 = :k;
```

- :k is incremented in circular way from 501 to 600

- Reader

- Does 5000 read only transactions
- Each transaction does 30 selects of the form:

```
select f2 into :r from t1 where f1 = :v;
```

- :v is incremented in circular way from 501 to 600

Lots Of Page Contention

- Reader and Writer processes access :
 - Same 100 records
 - Distributed over same 10 database pages

Simple Database (cont.)

Mandatory for
row cache

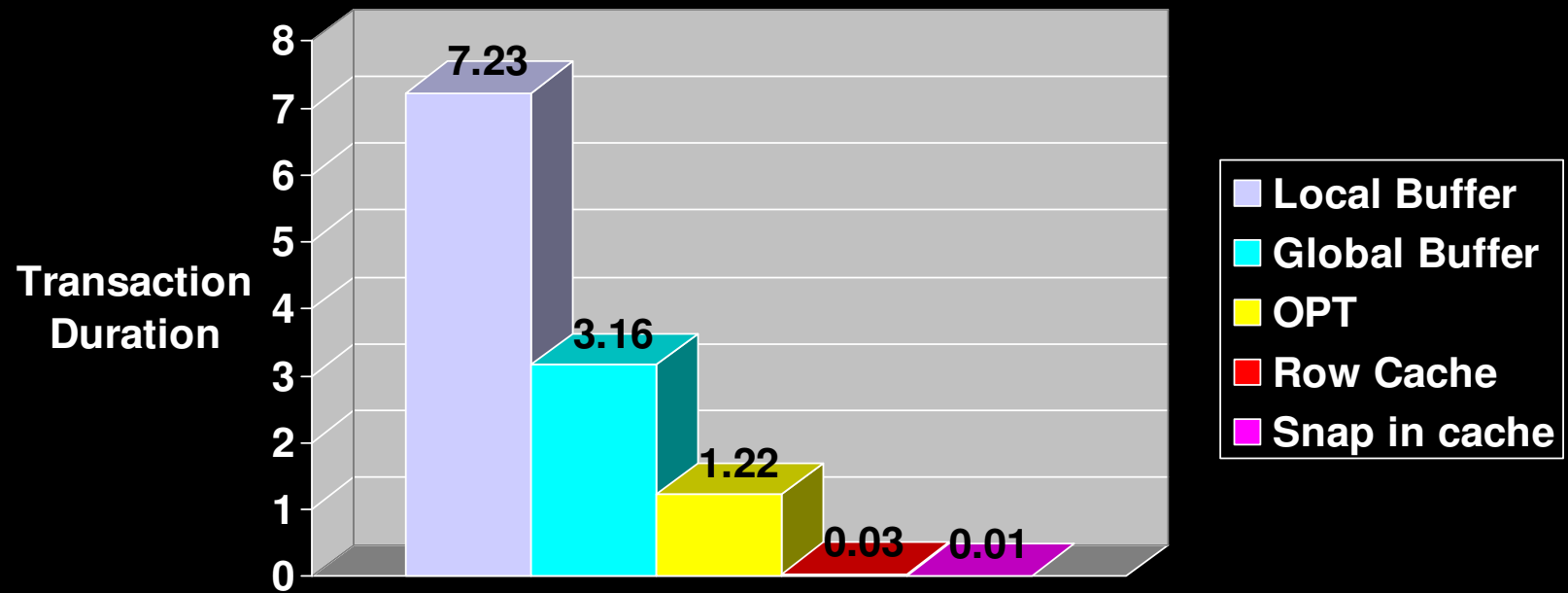
```
SQL> alter data file db
      reserve 10 cache slots
      row cache is enabled
      number of cluster node 1 -- or galaxy cluster

add journal fooaij1 filename fooaij1.aij
add journal fooaij2 filename fooaij2.aij
add journal fooaij3 filename fooaij3.aij
add journal fooaij4 filename fooaij4.aij

journal is enabled
      allocation 50000 blocks,
fast commit enabled (
      checkpoint interval 10000 blocks));
```

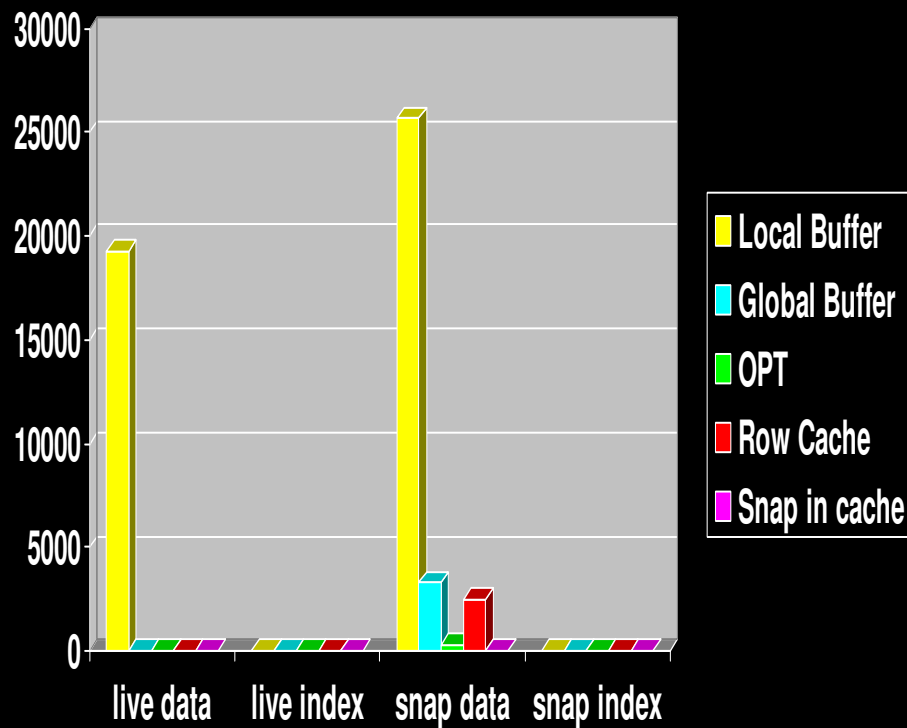
Results:

Transaction Duration



Results: Database IO

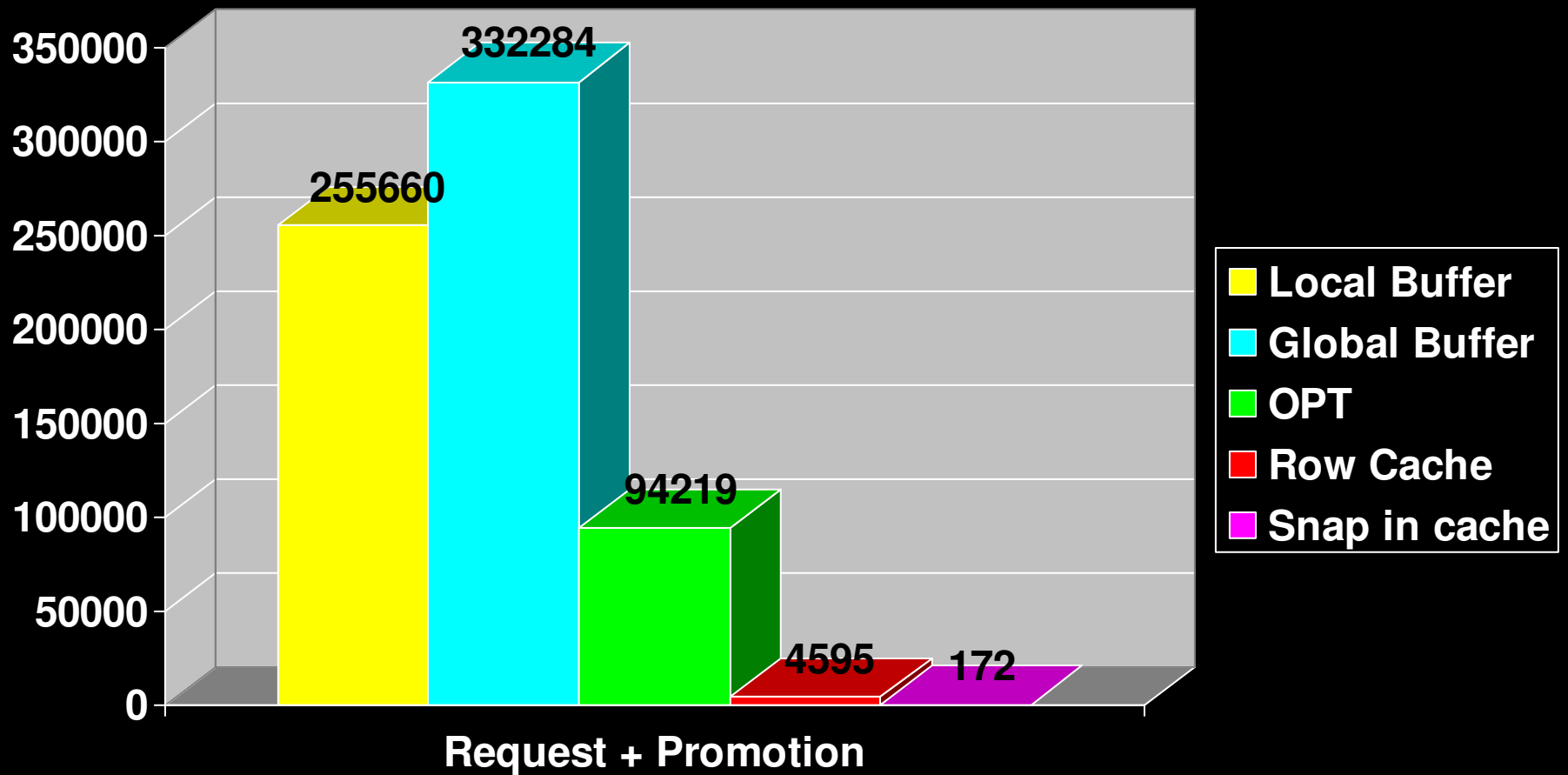
Read



Write



Results: Page Locking



Row Cache Sizing Spreadsheet

- Excel spreadsheet
 - Example provided “AS-IS”; not officially supported by Oracle Corporation
 - Available on MetaLink
- Specify
 - Number of users
 - Slot count and slot size for each cache
- Calculates memory utilization
- Creates SQL statement template commands for cache creation

Sizing Sheet

Microsoft Excel - RWC5H712.XLS

File Edit View Insert Format Tools Data Window Help

Geneva 10 B I U

E8 = 1

	A	B	C	D	E	F	H	I	N
1	Users = 600	R.SLOTS	S.SLOTS	LENGTH	Replace	Tot.Mem	.rdc Alloc	.rdc Extent	
2	ORDERTBL	55,000	None	256	ENABLED	17,014,784	100	20	
3	ORDERIDX1	14,000	343	480	ENABLED	7,667,712	3241	4321	
4	ORDERIDX2	2,200	1245	1,000	ENABLED	3,653,632	5476	12312	
5	HISTORYIDX	22,000	40000	960	ENABLED	62,660,608	2333	1231	
6	HISTORYTBL	88,000	50000	2,200	ENABLED	310,788,096	2333	1231	
7	CUSTIDX1	5,000	1000	960	ENABLED	6,111,232	2333	1231	
8	CUSTIDX2	5,000	1000	960	ENABLED	6,111,232	2333	1231	
9									
10									
11									
12									
13									
14									
15	Totals					414,007,296			
16									
17									
18									
19									

Available in MetaLink

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SQL Syntax Sheet

Microsoft Excel - RWCSH712.XLS							
File Edit View Insert Format Tools Data Window Help							
B16 = Geneva 10 B I U \$ %							
	A	B	C	D	E	F	G
1	CREATING	Select entire ROW#2 and drag down for all caches in 'Template' sheet.					
2	create cache ORDERTBL	cache size is 55000 rows	row length is 256 bytes	row replacement is EN	allocation is 10	extent is 20	blocks
3	create cache ORDERIDX1	cache size is 14000 rows	row length is 480 bytes	row replacement is EN	allocation is 3	extent is 4321	blocks
4	create cache ORDERIDX2	cache size is 2200 rows	row length is 1000 bytes	row replacement is EN	allocation is 5	extent is 12312	blocks
5	create cache HISTORYIDX	cache size is 22000 rows	row length is 960 bytes	row replacement is EN	allocation is 2	extent is 1231	blocks
6	create cache HISTORYTBL	cache size is 88000 rows	row length is 2200 bytes	row replacement is EN	allocation is 2	extent is 1231	blocks
7	create cache CUSTIDX1	cache size is 5000 rows	row length is 960 bytes	row replacement is EN	allocation is 2	extent is 1231	blocks
8	create cache CUSTIDX2	cache size is 5000 rows	row length is 960 bytes	row replacement is EN	allocation is 2	extent is 1231	blocks
9							
10							
11							
12							

Oracle Media Manager 2.0 Support

- Oracle Media Management version 2.0 API support begins in Rdb version 7.1.2.1
 - Legato Networker for Rdb now released for production use
 - StorServer ABC available now
 - HP ABS available now
 - OpenView Data Protector promised in Q1 2005
- Parallel backup plan files supported
- Benefits:
 - Same tape library support for OpenVMS and Rdb backups
 - Tape library support for parallel backups

LEGATO NetWorker for OpenVMS Adds Support for Oracle Rdb/Oracle

- **June 30, 2004 - LEGATO announces availability of Oracle Rdb/Oracle modules for NetWorker for OpenVMS**
 - Industry First!
 - Beta Program oversubscribed
- **LEGATO Software only backup/recovery vendor to offer support for heterogeneous backups**
 - Key ISVs endorsing LEGATO solution – Cerner and IDX
 - Marquis customers implement LEGATO NetWorker solution
- **HP Endorses LEGATO NetWorker for OpenVMS**
 - HP OpenVMS Software Business Unit teams with LEGATO
 - HP Services offers migration service for customers moving from scripts, ABS/SLS and third party solutions to LEGATO NetWorker
- **Contacts/Information: Visit LEGATO Software at Booth #726**
 - LEGATO Software – Shaun Ellis, OpenVMS PM – sellis@legato.com
 - HP Services – Denise Schorsch - denise.schorsch@legato.com
 - Product Information/Success Stories: www.legato.com



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Why Data Replication is Important

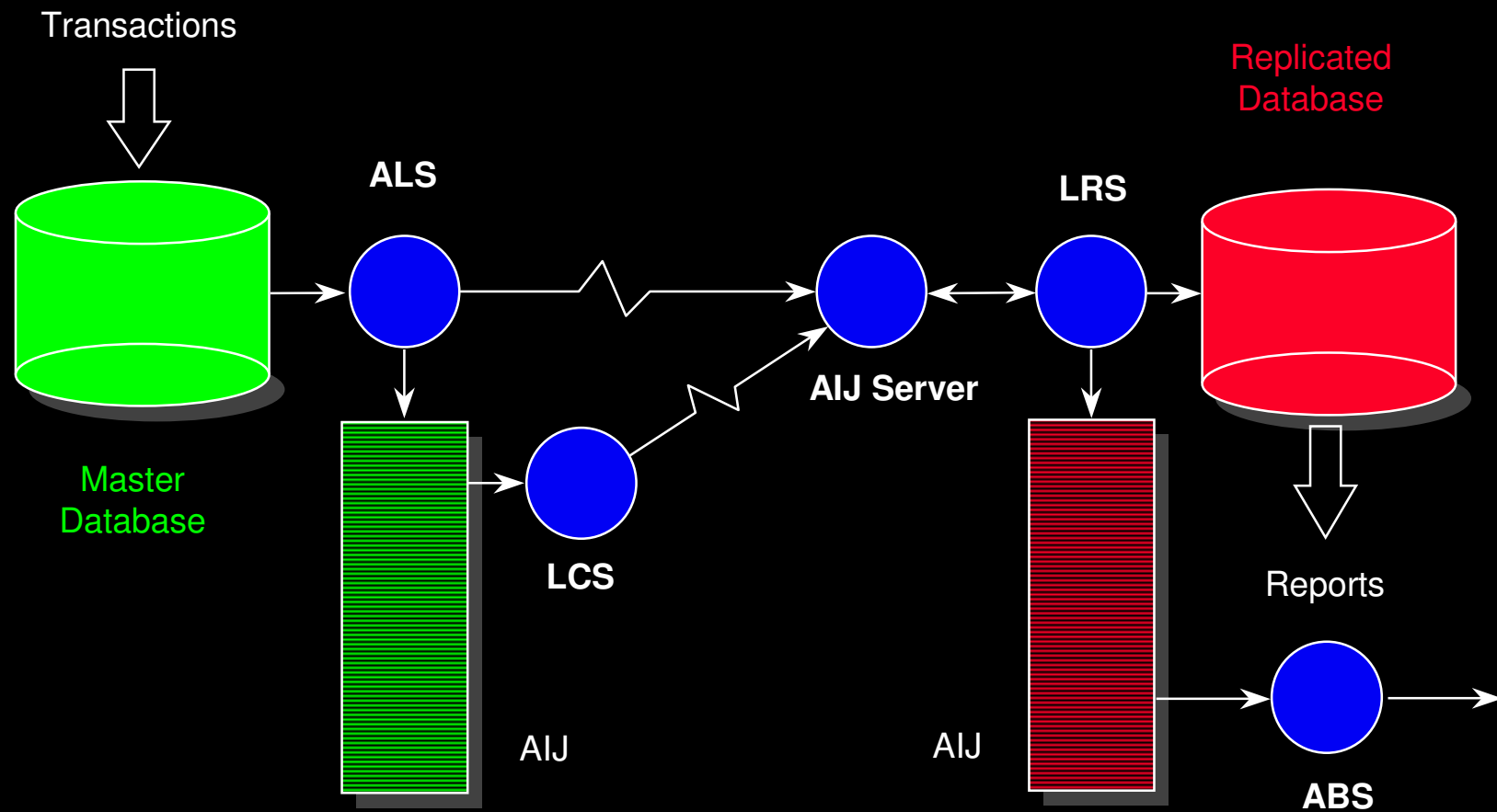
Information access is increasingly important; disks are increasingly cheap

- Ad hoc, reporting access interferes with OLTP
- Access to information needs to be continuous, but
 - Databases must sometimes be restructured
 - Databases must sometimes be isolated
 - Databases and systems sometimes fail
- Information must be protected from disaster
- Oracle Rdb is not always the right database management system

Replication: 6 Methods

Replication Method	Type	Year
Journal Backup/Restore Method	Journal	~1980
Replication Option for Rdb	Table	~1985
Hot Standby	Journal	~1995
LogMiner/Loader	Journal	2000-2
Application Based	Table	
Shadowing/Mirroring	Disk	~1990

Hot Standby Architecture



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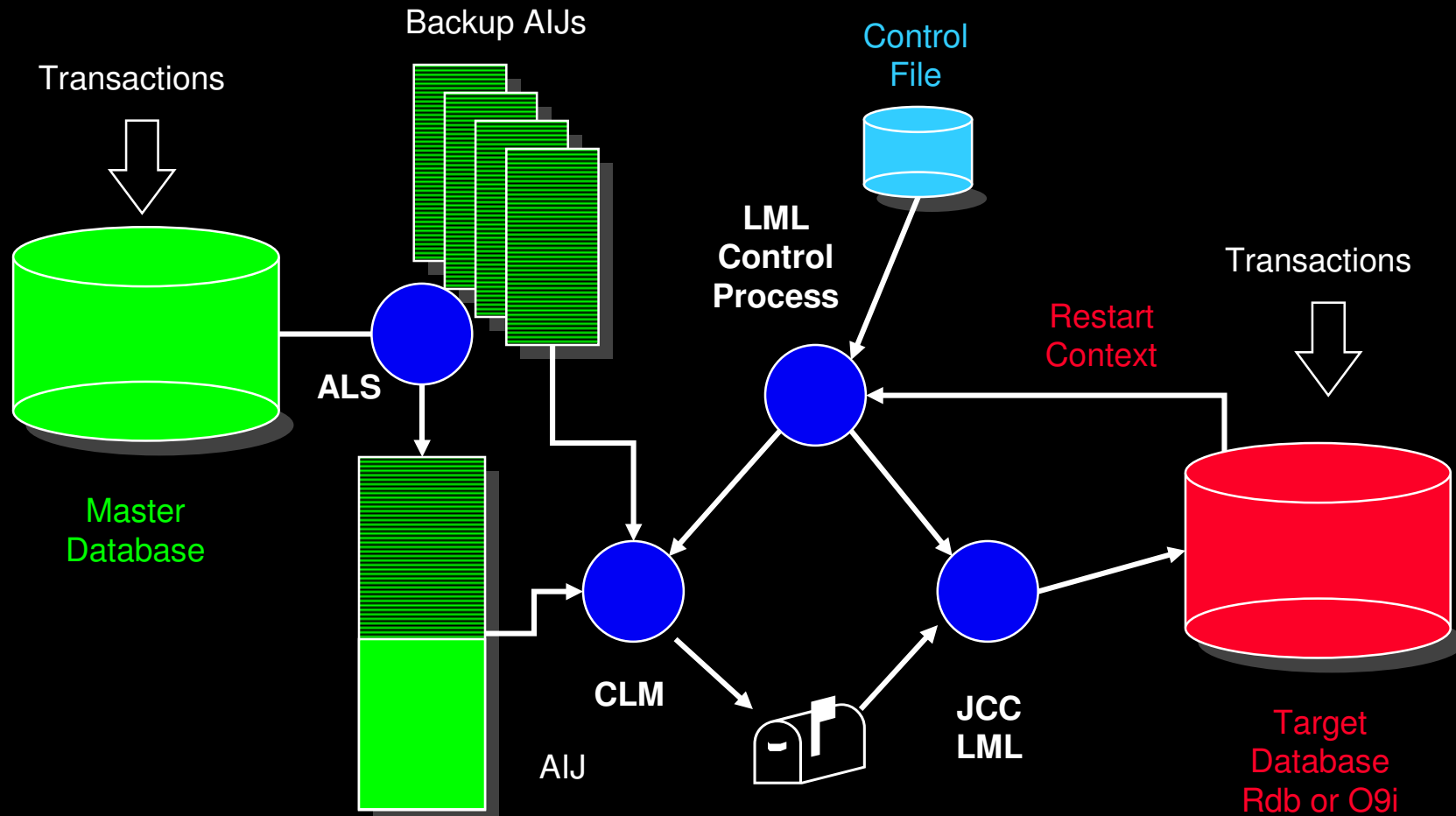
Hot Standby

- Excellent performance
 - Near zero cost on master database
 - Standby cost much lower than SQL
 - Physical address based replication
 - Asynchronous IO operations
- Exceedingly low network overhead
- Event, not schedule driven
- Transactional
- Extensively used

Hot Standby (Cont.)

- No real geographic limit
- Excellent recovery from network failure
- Configurable database consistency
- Also maintains standby copy of AIJ
- But,
 - Entire database is replicated
 - Standby database can be read but not written
 - Isolation level is read committed
 - Design center is failover, not reporting
 - Limited to single target database
 - Can't back up standby database

Continuous LogMiner / JCC LogMiner Loader



CLM/LML

- Transactional
 - One or many source transactions = one target transaction
- Event driven or scheduled (Static LogMiner)
- Excellent performance on source database
 - Uses journals, not tables
 - Takes advantage of hardware disk cache; no database hot spot
- Excellent performance on target database
 - Multiple load threads now supported
- Multiple target databases supported

CLM/LML (Cont.)

- No Geographic Limit
- Low network overhead
- Write your own loader if you like
- Lots of flexibility
 - Logical data model
 - Physical implementation
 - Supports Rdb, Oracle, Tuxedo targets; more possible
 - Read/write access to target possible (be careful)

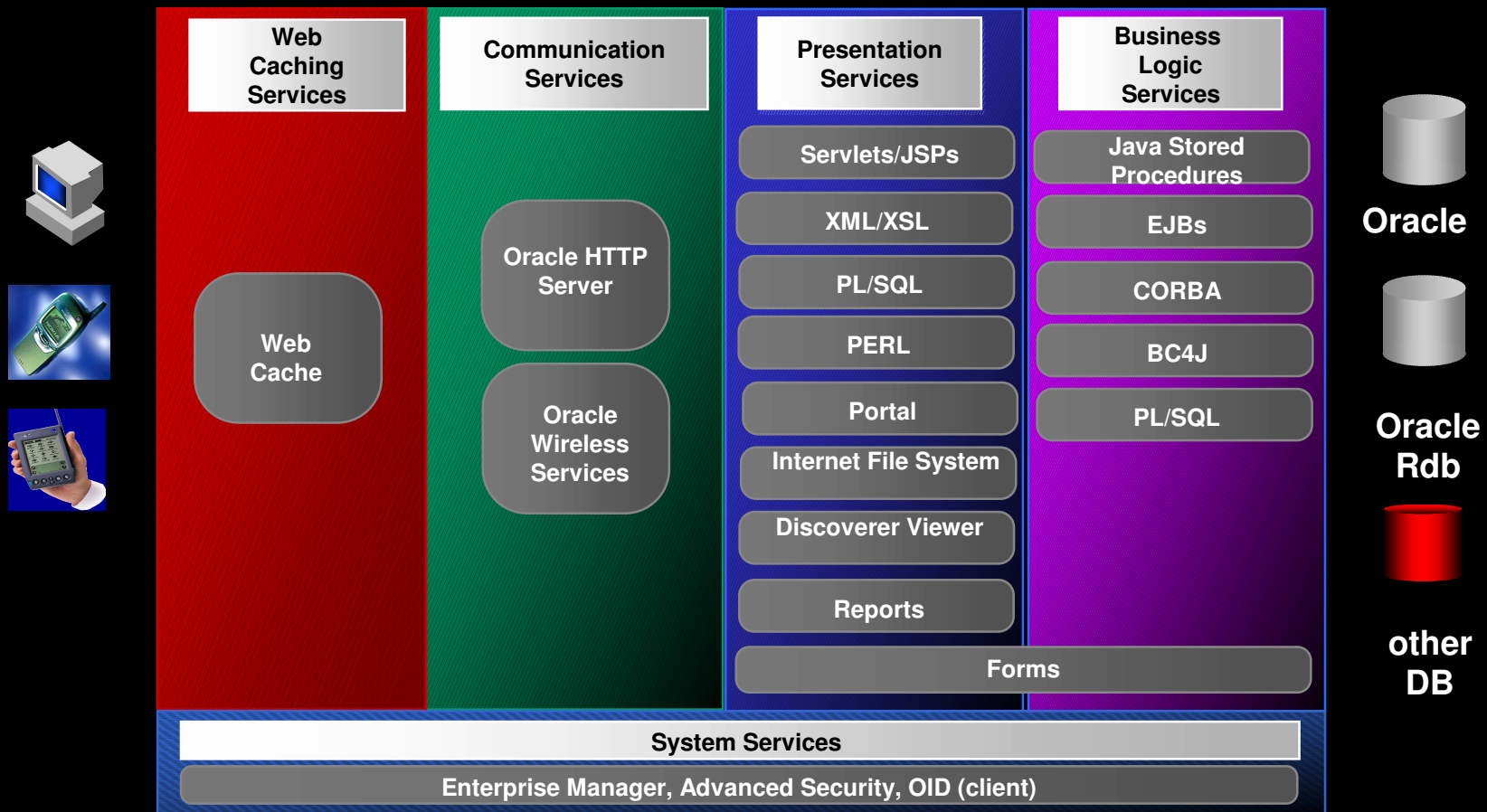
CLM/LML (Cont.)

- But,
 - More overhead than Hot Standby
 - More complex to set up than ROR
 - Not as extensively used, but...

DECdtm XA Interface Project

- HP's DECdtm/XA Gateway means
 - DECdtm-compliant components participate with XA-compliant components
 - DECdtm becomes XA-compliant RM
- Rdb supports DECdtm 2PC so it can now participate in XA transactions
- Benefit: True distributed transactions that update multiple Rdb and Oracle databases.

Oracle9i Application Server Release 2 and 10G Qualification



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Rdb JDBC Support

- Standard Oracle JDBC drivers
 - Require OCI translation via SQL*Net for Rdb
- The Rdb JDBC Native Thin Driver
 - 100% pure JAVA driver that communicates directly to the Rdb JDBC Thin Server via JAVA Sockets over TCP/IP.
- The Rdb JDBC Native SQL Driver
 - Connects directly to Rdb SQL via a native API. This driver requires an Rdb client installation, and therefore is Rdb-specific and not suitable for applets. The Rdb Native driver, written in a combination of Java and C, converts JDBC invocations to calls to SQLMOD modules

Rdb Extension for Oracle Enterprise Manager 9i

- Enterprise Manager is able to
 - Discover Rdb databases
 - Display Rdb Schema Objects
 - Detect events and react to them
 - Schedule jobs
- Production release available now.
- OEM 4.1 support planned for 2004.
- Benefit: Events and jobs from same console for both Oracle Rdb and Oracle Database.

Rdb 7.1.2

- Oracle Database Compatibility
 - Media Management API 2.0
 - Rdb Extension for Oracle Enterprise Manager 9i
 - New SQL Features
- Performance
 - Snapshots in Cache
 - 64 Bit Row Cache
 - Optimized Page Transfer
 - Log Recovery Server (LRS) enhancements for Hot Standby
 - Bit Map 'OR' and 'Like'
 - Index Estimation (provides improved index estimations for both the Dynamic and Static Optimizer)
 - Sampled Selectivity (allows cardinality estimation in the Static Optimizer)
- Availability and Web
 - Rdb Native JDBC Drivers V1
- OpenVMS
 - 7.3-2 / Opal certified

Oracle Rdb Roadmap

<i>Develop. Stream</i>	Q2CY04	Q3CY04	Q4CY04	Q1CY05	Q2CY05	Q3CY05	Q4CY05	Q1CY06
Rdb 7.0 VAX + Alpha	7.0.7.2 Maintenance Release	7.0.7.3 Maintenance Release		7.0.7.4 Maintenance Release		7.0.7.5 Maintenance Release		7.0.7.6 Maintenance Release
Rdb 7.1 Alpha Only	7.1.2.4 Maintenance Release	7.1.3.0 Feature + Maintenance Release	7.1.3.1 Maintenance Release		7.1.3.2 Maintenance Release		7.1.3.3 Maintenance Release	
Rdb 7.2 Itanium + Alpha	7.2.0.0 ADK, Itanium Only		7.2.0.0 Beta 1	7.2.0.0 Beta 2	7.2.0.0 Itanium + Alpha Production Release	7.2.0.1 Maintenance Release	7.2.0.2 Maintenance Release	7.2.0.3 Maintenance Release

Oracle DBMS Roadmap

<i>Develop. Stream</i>	Q2CY04	Q3CY04	Q4CY04	Q1CY05	Q2CY05	Q3CY05	Q4CY05	Q1CY06
DBMS 7.0 VAX + Alpha		7.0.5.1 Maintenance Release		7.0.5.2 Maintenance Release		7.0.5.3 Maintenance Release		7.0.5.4 Maintenance Release
DBMS 7.1 Alpha Only	7.1.1.0 Maintenance + New Features		7.1.1.1 Maintenance Release		7.1.1.2 Maintenance Release		7.1.1.3 Maintenance Release	
DBMS 7.2 Itanium + Alpha			7.2.0.0 Beta		7.2.0.0 Itanium + Alpha Production Release	7.2.0.1 Maintenance Release	7.2.0.2 Maintenance Release	7.2.0.3 Maintenance Release

Rdb 7.1.3

- Oracle Database Compatibility
 - 10G/9iAS Release 2 compatibility
 - 9.2.0.4 OCI upgrade for SQL*Net for Rdb
 - Rdb XA Integration
- Performance
 - Optimizer
 - Bitmap scans for static OR tactic
 - Dynamic optimizer termination after first index scan completes when fast first is running
 - Bitmap scan performance enhancements
 - Predicate Peephole Optimization
 - Query Execution Timeout
- Availability and Web
 - Rdb Native JDBC Drivers 7.1.3

Version Numbers

- Now five digits: 7.1.2.4.1

← Processor Type
← Bug fix / mandatory update
← Minor functional change
← Major functional change

Group Quality Initiative

- Quality Project Leader
- Process improvements
- Robust testing for all 7.1.2 new features
- Enhancing tests for existing features (e.g.):
 - Sequences
 - Galaxy
 - Continuous Log Miner
 - Concurrent Index Builds
 - Sorted Ranked Btrees

Testing Today

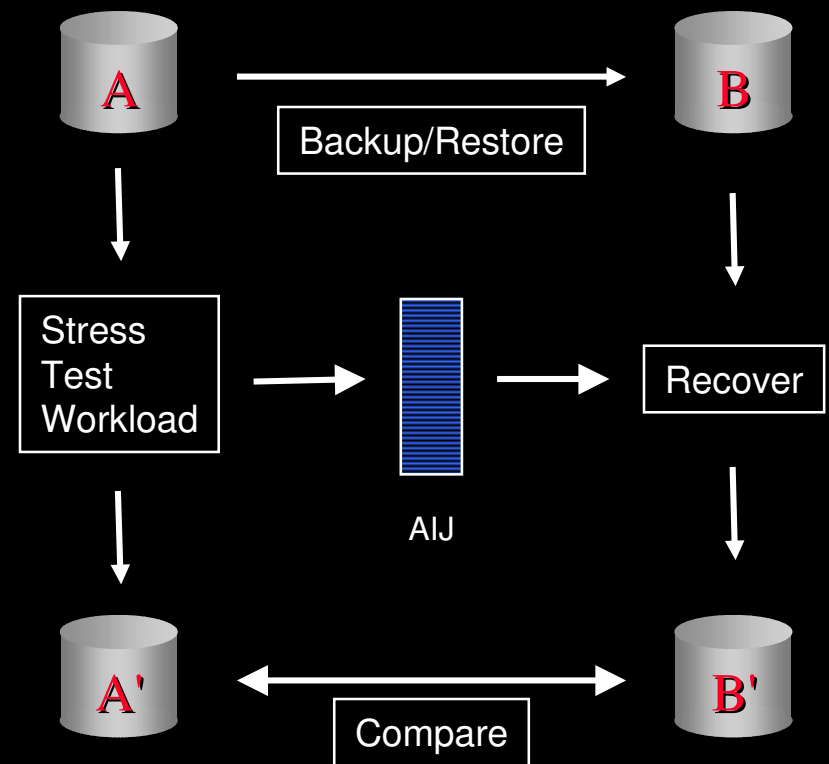
- Regression tests
 - Live code is tested daily
 - Kits are tested even more thoroughly
 - Tests are being reevaluated for relevance
 - Test coverage is being verified
- Random tests
 - Executed continuously on a range of hardware platforms

The Rdb Random Test System is...

- A demanding multi-user stress test
 - Focus is on
 - Asynchronous I/O completion
 - Rollback and recovery from process and monitor failure
 - RMU /RECOVER processing
 - Locking - contention & deadlocks
 - Parameter driven
 - Batch based
- Not...
 - A performance benchmark test
 - A code coverage or general regression test
 - A very good test of SQL, Dispatch or EXEC features
 - Perfect

Random Test Method

1. Create & backup database
2. Run multi-user stress test
3. Verify database
4. Restore from backup & recover from AIJ
5. Verify database
6. Unload all records from both databases
7. Compare



Quality

- Developing a random query generator
 - does the query compile?
 - does the query generate the same results as previous version [7.1.0.4 vs. 7.1.0.3, or 7.1 vs. 7.0]
 - compare results with Oracle Database
- Benefits:
 - Detect poor strategies before we ship
 - Detect incorrect results before we ship

A few words about Rdb Training

- Previous Rdb training model was not meeting customer needs
 - Courses not scheduled
 - Courses cancelled due to low enrollment
 - Course material not updated for new features
 - Courses did not always meet expectations when taught
- New partnership now in place worldwide with the leaders in Rdb Product Family training
 - Courses will be scheduled well in advance
 - Courses will only be cancelled if enrollment is extremely low
 - Quality training facilities convenient to airports and hotels
 - Up-to-date training material will be used
 - On-site training available

Partner List

- Europe, Asia, Middle East and Africa:

VX Company

Laren, The Netherlands

<http://www.vxcompany.com/rdbtrainingcourses>



- Americas:

JCC Consulting, Inc.

Granville, Ohio, United States

<http://www.jcc.com/> (choose Training)



- Oracle CODASYL DBMS Training Worldwide:

Software Concepts International

Nashua, New Hampshire, United States

<http://www.sciinc.com/training/index.htm>



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Summary

- After 9.5 years at Oracle, Rdb development continues because the Rdb business is healthy and valuable.
- Cooperation between the Oracle and HP development teams means better performance and manageability for you.
- Development strategy maximizes the value of your Rdb investment.
 - Oracle development tools and middleware
 - Oracle management tools and API's
 - Oracle Database for reporting and data warehouses

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HP WORLD 2004

Solutions and Technology Conference & Expo

