Keys and IMAGE Database Migrations

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The Keys to Data Bases

- A Vocabulary Primer
- IMAGE Database Features
- Programming with IMAGE
- RDBMS Indexes
- Omnidex Indexes
- Moving Data

Vocabulary IMAGE-RDBMS

- Data Set = Table
- Record = Row
- Field = Column
- Primary-Key = Unique key value
- Foreign Key – Value must exist in other table before valid
- SQL = Structured Query Language

Other Changes

- No Arrays
  - Ex. Sales is an array with 12 buckets
  - Sales (1) = January Sales
  - Sales (5) = May sales
- Major program logic changes

Books for your Library

- SQL Instant Reference by Martin Gruber (2nd Edition for SQL92 & 99) published by Zybex Press
- Teach yourself SQL by Ben Forta published by SAMSpublishing.com
- SQL in a Nutshell, Kline & Kline published by OReilly.com

Books for your Library (2)

- Oracle SQL Tuning by Mark Gurry published by OReilly.com
- SQL Server 2000 with XML (.Net Enterprise Servers) by Graeme Malcolm published by Microsoft Press
- Designing & Implementing Databases with MS SQL Server MCSE Readiness Review by Robert Sheldon published by Microsoft Press

Books for your Library (3)

- SQL Tips & Techniques, by Konrad King published by Premier Press
- The Guru's Guide to SQL Server Stored Procedures, XML and HTML by Ken Henderson published by Addison Wesley Press
- Oracle SQL*Loader Jonathan Gennick & SanJay Mishra published by O'Reilly.com

IMAGE Database Features

- Masters – Manual & Automatic
- Details – Related to 0-16 Masters
- Indexes – various field types
  - Date format application specific
- Sorted Chains
  - Beyond the sort key
- Forward and backward chained read

Programming with IMAGE

- By default records were in chronological order
- If you added a sorted chain IMAGE uses the rest of the columns in the record as a tiebreaker to get unique values
- Order of the records is important

RDBMS Indexes

- Can cluster on index to get records in same page and stored in sorted order
- Cannot use the transparent extra columns like in IMAGE sorted chains

Omnidex Indexes (and TPI)

- Extra Indexes – originally outside the IMAGE DB
- B-Trees before IMAGE had B-Trees
- B-Tree on any field
- Keyword retrieval
- Grouped indexes (keyword across field)
- TPI was subset interface

What is Omnidex anyway?

- Very high speed & flexible indexing
- Returns count of records qualifying at about 500K records/second
- Can do “Venn diagrams” of data
- Allows virtual keys (IMSAM)
  - Pieces of fields
  - Concatenated Pieces of fields

Moving Data-you need a Plan

- What data needs to be moved
- What data is NOT going to move
  - Data Blueprint
- How to handle history
- First load
- Cleaning data
- Summaries
- Final cut-over

What about the data?

- We used special non-intuitive flags
  - Negative inventory amount = allocated
  - 20999999 = End of Time Date
- We read chain heads for counts
- We used DBFind knowing that the records would be in chronological order

Programming Changes

- What language? COBOL differences?
- How are you using IMAGE?
- Will the behavior require automasters?
- Adding foreign key does some things
  - Must be a primary key on other table
  - Can't get order without explicit field
- With IMAGE all logic in program

Programming Changes

- In SQL rules can be in DB
- IMAGE does not enforce unique keys on details
  - you can in SQL
- Special identify fields
  - Id number (ODX)
  - Start at
  - Increment by

Programming Changes

- The values in a field – IMAGE did not enforce
  - Ex. Status value = A,B, or C
  - What if not valid

When moving data

- Is it by flat file or record complex
- What sort order is required?
  - Ex. Customer number sequence or order#
  - Do you rely on chronological order?
  - Will you need a chained unload?
  - How will this impact reports? Need sort?

Nulls

- If something hasn't shipped
  - Used to have end of time date or 0
  - No longer valid as RDBMS expects date
  - Program expects EOT or 0
  - Should this be a date or alpha?
  - Also minus dates not allowed

Data Values

- Definition was J2 or I4 etc
- What is smallest/largest value?
  - Source
  - Target
- Are the defaults OK?
- What if you are shadowing?

Philosophy

- Minimum Change
  - Code – Use same language
  - Database - Eloquence
  - JCL/Scripts – Use emulation layer
- Go Native
  - Programs
  - Database
  - JCL/Scripts

Eloquence at a Glance

- Excellent compatibility and performance for IMAGE based applications
- Cost effective
- Supports multiple platforms
- Proven solution

Excellent compatibility

- All TurboIMAGE intrinsics are supported and behave identical
- HP e3000 applications can typically be ported with no or only minor changes

Cost Effective

- Eloquence saves considerable time and effort in the migration process and allows focusing on other tasks
- Eloquence is easy to manage and retains existing know how
- Eloquence is priced attractively

Complete Package

- The Eloquence product includes all IMAGE components
  - Comprehensive set of database utilities
  - Structural maintenance
  - Integrated indexing (TPI subset)
  - On-line backup
  - MPE migration tools

Beyond Eloquence

- A range of well known HP e3000 tools support Eloquence
  - SUPRTOOL
  - Speedware (to be released)
  - Cognos Powerhouse (to be released)
  - MB Foster UDA Link, …
- UDALink available for access with ODBC and JDBC

Conclusions

- You must know how your programs use data and keys
- Omnidex/IMSAM changes functions
- RDBMS has different kinds of keys and indexes
- What is your strategy?

What if you need to Synchronize data

- Phased Migration
- Large Number of records
- How to optimize for keys during the loading

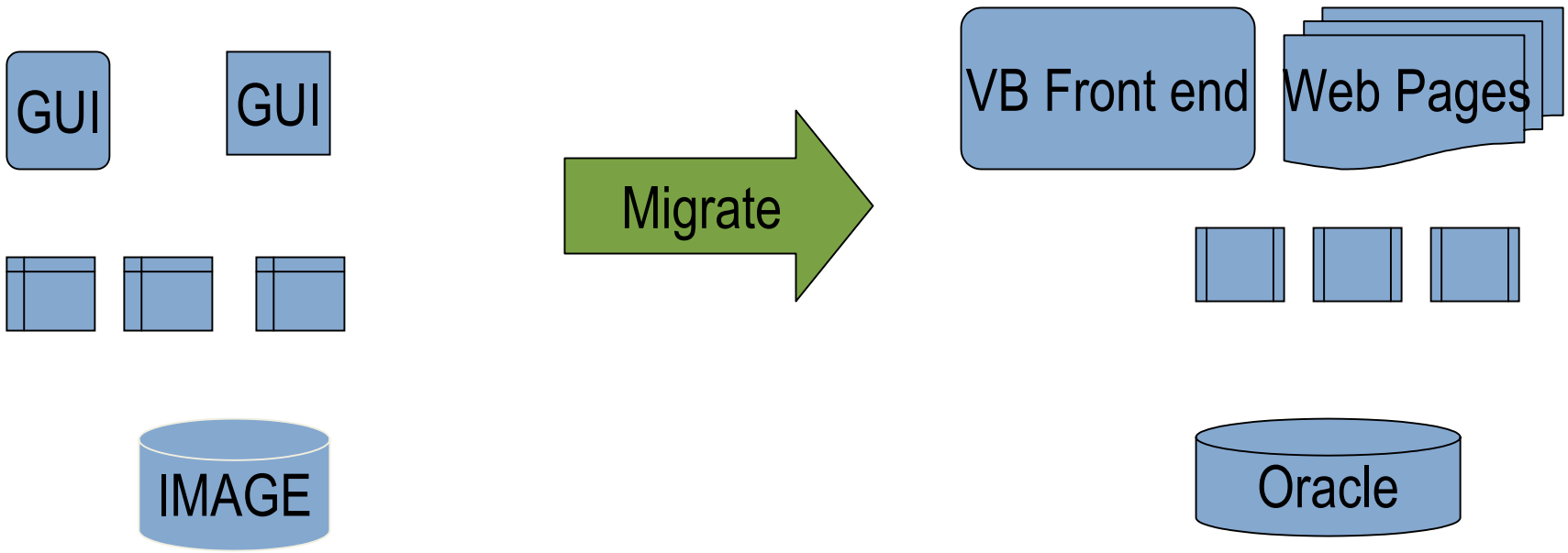
Overview

- Why use Synchronization
- Considerations related to migration
- Modification Options
  - Modify application code
  - Modifications within database
  - Use 3rd party software

Why use Synchronization?

- Data access for mobile/disconnected users
- Isolation of data for security
- Data Warehouse
- Migration

Migration



Considerations

- What options are available for a phased migration
  - Move minor apps first
  - Move major apps first
- Number/complexity of tables that are staying or moving to remote Database (DB)
- What is your Target DB and Source DB and what tools (and at what cost) are available for synchronization

Considerations

- What timeframe do you need the changes to be completed in?
  - Do you have the time to develop your own mechanism?
- How long will the databases need to be kept synchronized?

Considerations

- Complexity of Existing application using MPE DB, and of new application with new DB?
  - Is it easy to modify to add multiple update code
  - Will it be significantly easier in one app than the other
- Do you have/own the source code for your Existing Application?
- Do you have/own the source code for your New Application?

Considerations

- Do you have IT staff that can make the changes?
- What is your budget to hire external resources or purchase software to implement this?
- How important is it to have concurrency between the two databases? What is the maximum latency between updates?

Considerations

- Is one database read only or do you need two way synchronization?
- Is the table structure the same?
- Are the data rules the same?

IMAGE Synchronization Issues

- SQL generation
- Lack of data-type checking
- Data transformation / mapping
- Schema mapping
- Ordered Indexes

Allbase Synchronization Issues

- SQL mapping
- Data transformation/mapping
- Schema mapping
- Allbase procedures and triggers

Choose Primary DB

- Allbase/IMAGE as Primary DB
- New DBE is Primary DB
- Phased migration with either being primary at some point

Basic Implementation Options

- Modifications in old or new Application code
- Modifications in Database (triggers etc.)
- 3rd party software
- In-house synch software
- Combination of the above

Update Timing Options

- Real Time
  - Consecutive Update
  - 2 phase commit
- Near Real Time
  - Queued Update
- Periodic Bulk load
  - XML file
  - CSV
  - SQL Stmt File

Modifications in App code

- Write updates to a file, transfer, then load
  - CSV file with Oracle (sqlldr) or SQLServer (BCP) Bulk Loader – can vary commit rate
  - XML File with SQLServer ‘SQLXMLBulkLoad’
- Make temporary additions in the NEW code to also update desired tables in the old database using ODBC,JDBC or OLEDB

Oracle Bulk Load

- Oracle loader has command
  - sqlldr scott/tiger control=loader.ctl
- Oracle bulk loader needs
  - *control file*, specifies *how* data is loaded);
  - *data file*, (specifies *what* data is loaded).

Oracle Bulk Load

- **Control File format:**

  LOAD DATA INFILE <dataFile>

  APPEND INTO TABLE <tableName>

  FIELDS TERMINATED BY '<separator>‘

  <list of all attribute names to load>)

- http://www.orafaq.com/faqloadr.htm

SQL Server Bulk Load

- SQLXMLBulkLoad object
  - Execute Method using schema and datafile
  - Passed as Parameters
- Bulk load is generally INSERT only

Modifications in App code

- Write to a new ‘update indication’ table and have another service read changes and update secondary database
- Write to another API, which will connect to remote database and perform the update (ex: MBF Universal Connector)

Modifications in DBE

Allbase:

- Add triggers and procedures that write to a new 'update indication' table which describes which records have changed in various tables
- OR Alter existing tables to add a timestamp column. Triggers can update this column
- Have a service read the 'update indication' table or the time-stamped tables for change indicators, then update remote db

Oracle:

- Use 'Oracle Generic Connectivity' to connect through ODBC and perform the updates

Oracle Generic Connectivity

- Feature of Oracle8i as of 8.1.6
- Uses “Heterogeneous Service Agents” to do SQL and Data mapping
- Limitations with blobs
- Stored procedures not supported
- Functions in where clause not supported

Note: Oracle Transparent Gateway is NOT supported for ALLBASE or IMAGE

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