DB2 VSAM Transparency

User Experiences

Roland P. Chung
Senior Consultant

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VSAM Transparency Defined

- Class of "middleware" software that intercepts VSAM calls and maps them to a DB2 database server.

- Part of an overall strategy for extending VSAM data.
  - Phased approach – one file at a time
  - Rapid implementation – produces results quickly
  - Coexisting applications
    - Old
    - New

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Why VSAM Transparency?

- Opens up closed business information *NOW* to new applications through SQL and industry-standard interfaces.

- Adopt and leverage the benefits of DB2.

- Extends the value of existing data to new areas of the enterprise.

- Avoids changes to existing BATCH and CICS programs.
    - Preserve business logic.
    - Utilize existing staff expertise.
    - Introduce incremental change.

- Accelerates delivery of new functionality through distributed access to data.

- Produces results in DAYS!

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Why DB2?

- You probably already own it.
- Greater accessibility to data.
  - Concurrency (think about VSAM file sharing issues).
  - Distributed access through other platforms/systems.
  - 24x7
- New applications.
- Better business tools (analytics, intelligence enablement).
- Reduced maintenance costs.
- Stronger security.
- Improved data integrity.
  - Strong data types.
  - Locking.
- Better tools.

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DB2 Enhanced Connectivity

- Enable Business Intelligence / Analytics.
  - Reporting tools such as crystal reports.
  - BI/BA frameworks.

- Power distributed systems and applications via:
  - SQL / ODBC / JDBC / OLEDB.
  - The Web.
    - EJB / Servlets.
    - Server scripts / CGI.
    - Web services.
    - .Net

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VSAM Transparency Features

- Supports:
  - Key sequenced data sets (KSDS).
  - VSAM alternate indexes.
  - Entry sequenced data sets (ESDS).
  - Relative record data sets (RRDS) in some cases.
- No changes required to application programs.
- Maps VSAM to normalized data model.
  - Within VSAM file.
  - Across VSAM files.
- May require change to JCL

Operating System Interfaces
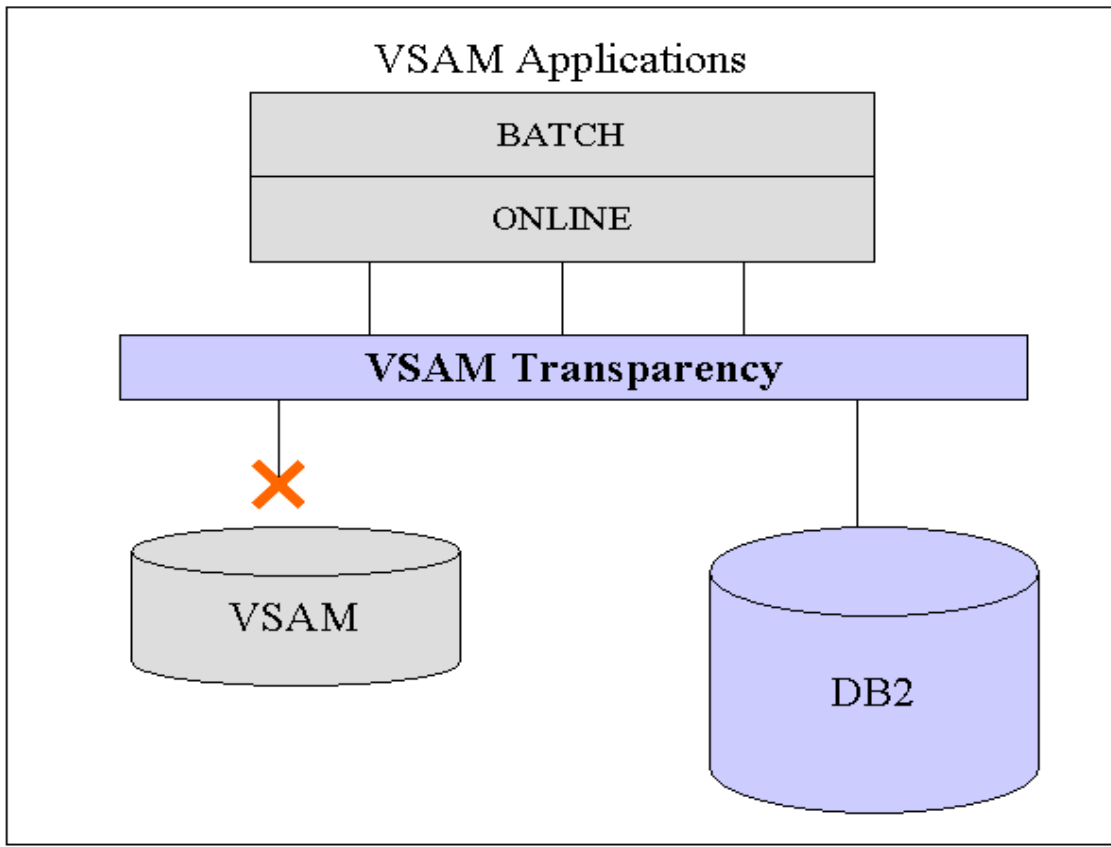
- VSE
  - Typically uses VDA (IKQVEX01)
  - CICS EXEC interception

Overview

Components

- Assembler macros.

- Batch utilities.

- Configuration tools.

- Copybook conversion aids.

- CICS transactions.

Capabilities

–   One VSAM file can be mapped to multiple tables.

–   Redefining (different record types) is supported.

–   Alternate index files are usually replaced by DB2 indexes.

–   VSAM fields can be converted to various data types.

–   Repeating groups can be migrated into different DB2 tables and columns.

–   Additional columns can be created in DB2 that did not exist in the VSAM file.

–   Fields can be mapped into more than one column.

–   Default values for DB2 and VSAM can be given.

–   "File" and "Column" user exits are supported.
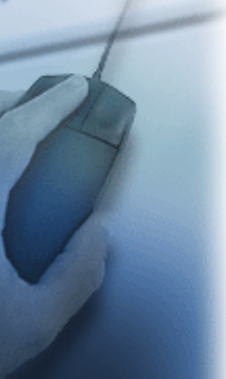
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Planning

- Identify initial group of VSAM files.
  - Most valuable to new applications and objectives.
- Identify associated BATCH and CICS programs for testing purposes.
- Create data mapping to DB2 data model.
  - Database design.
  - Data types.
  - Naming conventions.
  - Normalization.
- Determine VSAM data cleanliness.

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Implementation

- Install DB2 VSAM Transparency product.

- Define data mapping to VSAM Transparency.

- Load VSAM files into DB2 through VSAM Transparency.

- (Delete/redefine VSAM files with NOALLOC.)

- Turn VSAM Transparency ON.

- Run VSAM programs.

Results

- Phased implementation produces most immediate results.

- Immediate results unlock business data quickly.

- Unlocked business data facilitates development of new applications.

- New applications address outstanding user requirements.

- Satisfied requirements translate into new functionality.

- New functionality helps to achieve overall business objectives.

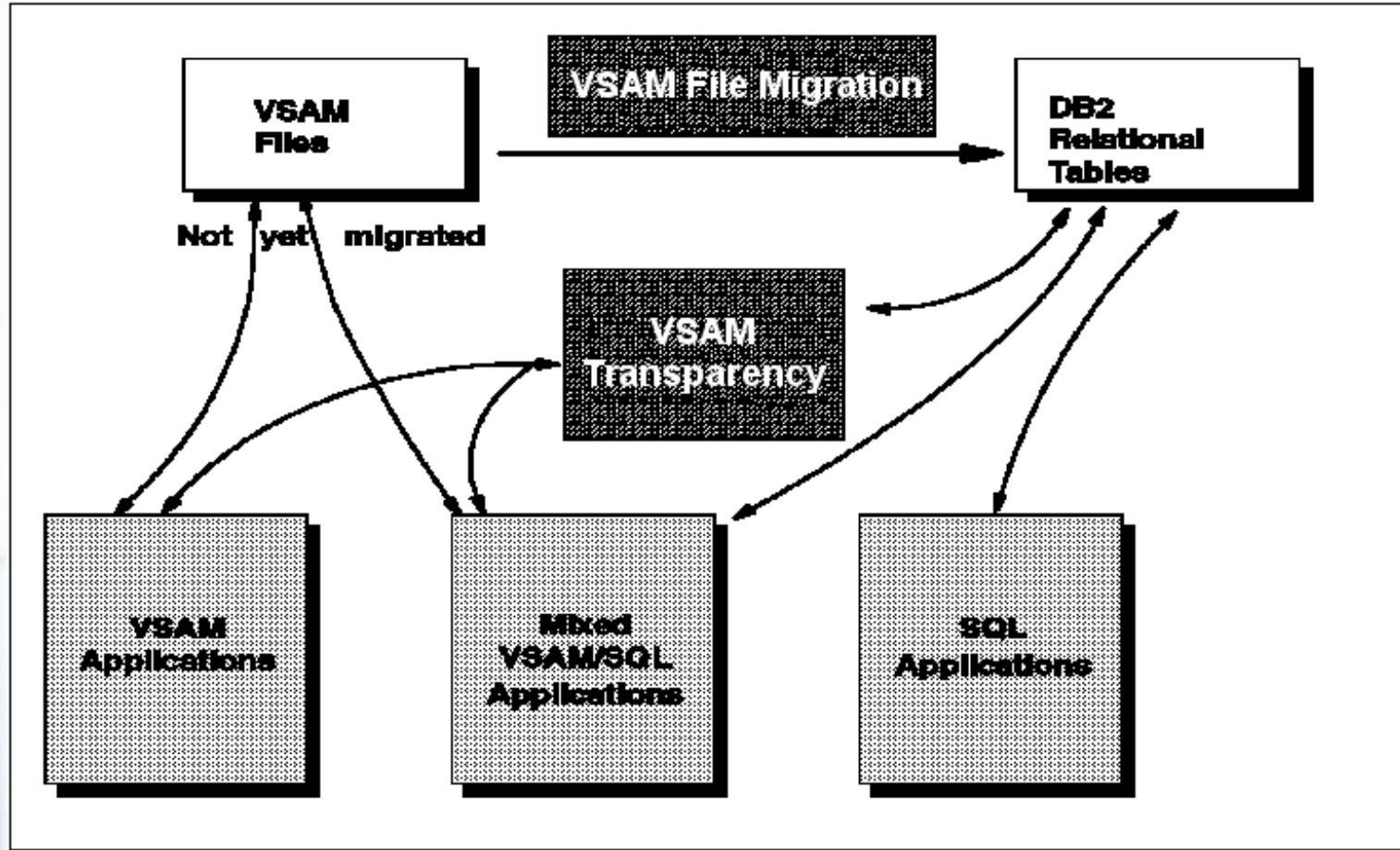- Achieved business objectives deliver greater value from IT investment.

Mix and Match

Handy Tools

- VSAM IDCAMS
  - Note that IBM DB2 VSAM Transparency for VSE does not allow IDCAMS to run against a file that has been placed under its control.
- DITTO
  - Great tool for testing VTr, checking VSAM files, etc…
  - VV, VP (FORMAT=HEX)
  - Batch and CICS
- ISQL
  - Confirm Loaded data
  - Alter tables as needed
- CECI
  - online test that I run

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Data Design Hints

- Addition of new Columns
  - Only in DB2, not detected by VSAM program

  - Can be derived and maintained by VT through FILE user exits.

  - Future expansion and growth.

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Data Design Hints

- Consider using BASE Tables

ACCTMST

ACCTADR

ACCTNAM
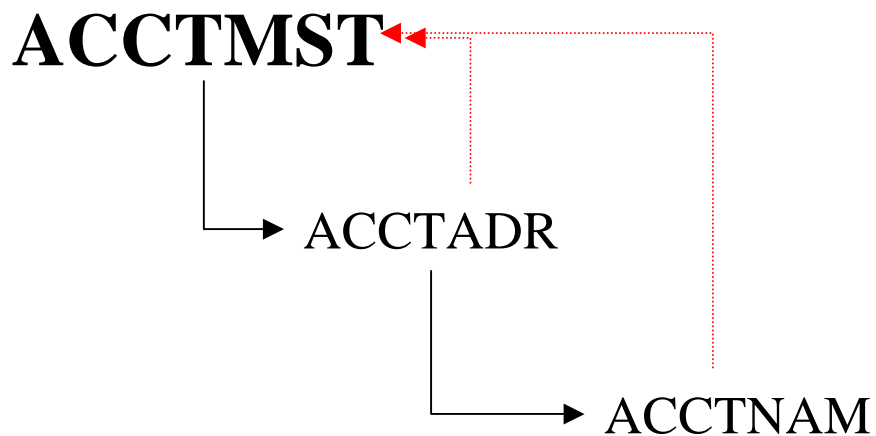
Creating User Exits

- COBOL
  - LE Startup/Teardown
  - Use existing copy books for record layout

- ASSEMBLER
  - Faster execution
  - Smaller executables

User Exit Hints

- DO
  - PREP with BLOCK
  - PREP with ISOL(CS)
  - Use cursor for SELECT and INSERT

- DON'T
  - COMMIT WORK
  - Use WHENEVER

- REMEMBER
  - The exit has been called within an EXISTING LUW!
  - The exit does NOT persist from record to record!

Is Your Data Ready?

- SPACES where packed data is expected

- Years of COBOL data checks built into your applications

- Zoned where packed data is expected

- Consider using Column or File exits to build permanent "data cleansing filters" into your VSAM Transparency layer.
  - Addresses data issues at LOAD
  - Addresses data issues at RUNTIME!

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Subtle Differences

- Sign Digit issues
  - VSAM "F", returned as "C"
  - Example: Was: x'00000F' Now: x'00000C'

```
+--------+------------------------------+
|        |        Recognized as         |
| Code   |---------+--------------------|
|(Binary)| digit   |       sign         |
|--------+---------+--------------------|
|  1010  |    A    |        plus        |
|  1011  |    B    |        minus       |
|  1100  |    C    |  plus (preferred)  |
|  1101  |    D    | minus (preferred)  |
|  1110  |    E    |        plus        |
|  1111  |    F    |     plus (zone)    |
+--------+---------+--------------------+
```

TEST TEST TEST

- Use DITTO VP to read a record with FORMAT=HEX
  - Compare before and after for that record

- Close VSAM file in CICS
  - CEMT SET FILE(ACCTMST) CLOSED

- Use CECI. Excellent tool!

- Execute application transaction to read (SELECT) or write (INSERT NEW)

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CICS Considerations

- Pseudo-conversational
  - "Preferred" by VSAM Transparency due to inherently small LUWs

- Conversational
  - SYNCPOINT should trigger an end to the LUW.
  - If using the START BROWSE function:
    - ENDBR prior to the SYNCPOINT.
    - STARTBR and reposition after the SYNCPOINT.

DB2 VSE Considerations

- Number of packages per LUW (NPACKAGE)
  - SQLCODE –807: The maximum number of packages per agent has been exceeded.
    - Every VSAM file uses at least 2 packages per DB2 table
      - 1 for BATCH and 1 for online.
    - Every user EXIT, if contains DB2 calls, would use a package
    - Bringing more VSAM files over will increase the number of packages used within a single LUW.

- SYSACCESS may need to be expanded by adding another SYS00nn DBSPACE.

- Partition sizes – DB2 application requestor now inside each partition where a VSAM job is using transparency.

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Presenting Numeric Data

- Field is PICTURE 99 (ex: x'F0F1') in VSAM
- Converted to SMALLINT and stored as '1' in DB2
- SELECT colname FROM … returns '1'
- But you are used to viewing the field as '01'
- SELECT SUBSTR(DIGITS(colname),2) …
- Use same approach within a VIEW

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Performance Observations

- Elapsed Time

~1X	Up to 30X
Minimal Data model	Complex Data model

Miscellaneous

- VSAM buffer may not be cleared by the user EXIT from call to call. Always assume residual garbage during INSERT processing.

- VSAM Transparency maintains cursors. You don't! User EXITs will not persist across calls within an LUW.

- With BLOCKING and an INSERT cursor, errors will be deferred!

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Products

- VSE
  - VSAM Transparency feature of DB2 from IBM
  - VSAM Redirector for VSE from IBM

- OS/390
  - 2BDB2/VSAM from ISI
  - CICS VSAM Transparency

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Conclusion

- VSAM Transparency supports a normalized relational data model.

- VSAM Transparency yields tangible results in DAYS.

- VSAM Transparency provides the ultimate defense against lurking data integrity issues while you convert your applications.

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Resources

- ## The Fillmore Group, Inc.
  - www.TheFillmoreGroup.com
  - frank.fillmore@thefillmoregroup.com

- ## IBM
  - DB2 Server for VSE&VM
    - www.ibm.com/software/data/db2/vse-vm

- ## ISI
  - DB2 UDB for z/OS
    - www.isi.com.au/isi/website/2BDB2-web.nsf/2bdb2a?OpenFrameSet
      - Choose "VSAM to DB2"

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