

VSAM to DB2 MIGRATION

Business Reasons

&

Technical Solution Overview

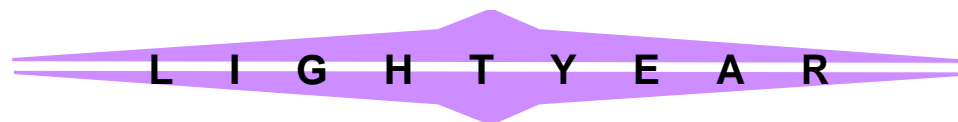
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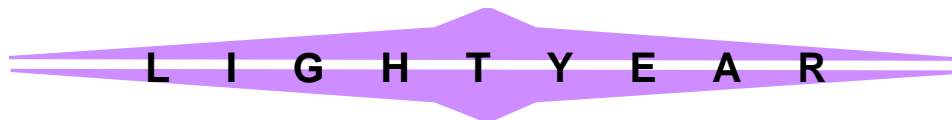


VSAM to DB2 Migration - Agenda

- BUSINESS ISSUES FOR VSAM to DB2 MIGRATION
- Who are Lightyear Consulting and Circle Computer ?
- VS2 OVERVIEW
- MIGRATION PROCESS OVERVIEW
- DB2 TABLE DESIGN + MAPPING / DATA MIGRATION
- SW INSTALLATION and SUPPORT
- POST-MIGRATION APPLICATION MAINTENANCE
- RUN TIME CONSIDERATIONS

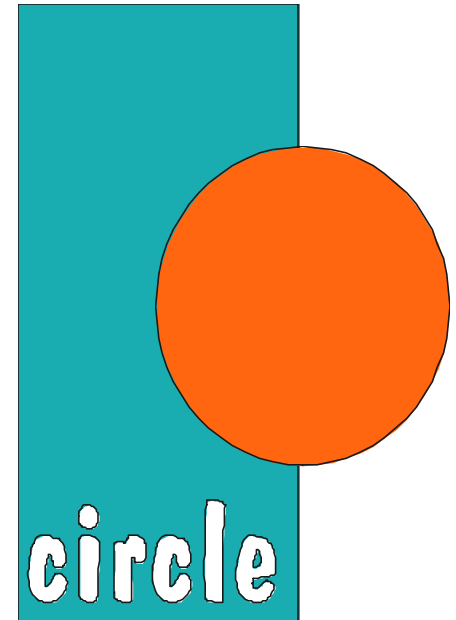
Lightyear Consulting Ltd.

- formed 1991 in W-Canada, expansion into USA in 1996
- IBM BESTeam Partner
- IBM Beacon Award Winner in 1999
- Winner of Best IBM OS/390 SW Distributor in 2000
- Skilled in and certified by IBM in IMS, DB2, CICS and OS/390 (z/OS),
WEBSPPHERE, VISUALAGE FOR JAVA
- Education, Consulting, Software Development
- Offices in Calgary, Palo Alto, Los Angeles, Phoenix, Austin
- signed distributor agreement for DL/2 and VS2 specifically to address
customers that have stated their intent/desire to move off IMS and/or
VSAM without re-write
- in-house consultants and external contractor network for VSAM, IMS,
DB2, JAVA, WebSphere or DL/2 specific skills and/or project management,
incl. IBM CERTIFIED DB2, WEBSPPHERE, CICS, VISUALAGE FOR JAVA



CIRCLE COMPUTER GROUP

- FORMED IN 1978
- SW Manufacturer of DL/2 and VS2
- SKILLS ORIENTED and TECHNICAL FOCUS
- EDUCATION, CONSULTANCY, SOFTWARE
- US OFFICE - mainly for CICS/DB2 Education
- S/W Distributors in USA, Scandinavia, Germany, Italy, France, Japan, South America, Israel, Australia
- IBM BEST Team Partner
- Ownership of all CICS courses run by IBM world wide



Moving from VSAM to DB2 - Options

OPTION 1

Migrate VSAM applications and datasets to DB2 environment	Unrealistic cost, risky effort, unreachable goals considering evolving business priorities
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OPTION 2

Perform extracts and queries directly on VSAM datasets	Expensive, time consuming, frustrating, non-flexible for 24x7 or real time purposes, lack of tools and skills.
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OPTION 3

Duplicate VSAM datasets to DB2	Forever duplicity, ongoing data cleansing, synchronization / restructuring becomes major resource tax, no real time or 24x7 benefits, day old data syndrome
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OPTION 4

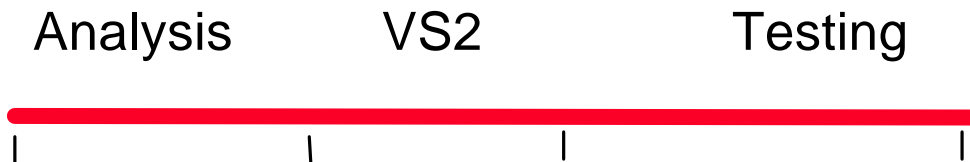
Migrate only the data and its access to DB2 V S 2	Both quickest and most reliable, source code remains unchanged, removal of VSAM dependencies, migration risk minimized, quality of data and SLA's, plenty of tools, acceptable performance tax, real time data available at all times to all customers (single source of data), Your company and IBM's strategic direction across all platforms.
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VS2 - What are the Benefits (1) ?

Conventional Migration Effort From VSAM To DB2



VSAM To DB2 using VS2



- SIGNIFICANT RISK ELIMINATION AND COST REDUCTION
- Application code is unchanged
- Application functionality is not compromised
- Dataset by Dataset migration - phased-in approach
- Use VSAM and DB2 concurrently during migration
- Use of modern relational approaches to write new programs (ODBC, JDBC, SQL, Java, tools, ...) and change data structures
- Relational skills (both DBA and programming) readily available in marketplace

VS2 - What are the Benefits (2) ?

Acknowledged Strengths

- **VS2 comes from the same stable as DL/2** which is a solid product being explored by numerous Legacy organizations worldwide, with a comprehensive support system already in place.
- **VS2 provides Legacy data in DB2 form** for analysis, query, e-purpose.
- **Preserving the investment in application Legacy code**, i.e., applications keep running unchanged, VS2 transparently redirects dataset calls to either VSAM or DB2 which ever is appropriate.
- **No source code changes are required for the conversion.**
- **New application development can be 100% DB2 based.**
- **Various levels of conversion are available** i.e., From basic Key and Data through a fully functioning DB2 database. Business requirement and available resource determine conversion levels. Mixing and matching of available options is also available.
- **During maintenance, applications can be optimized for DB2** as and when resources become available or business imperatives dictate so.
- **Minimum risk migration, at customer's pace on a dataset by dataset basis.** This gradual process allows for data cleansing and ease of audit ability procedures.
- **VSAM data structures are re-engineered to DB2 mode** in either of these ways:

VSAM dataset	DB2 database	
One Record	One Table	Recommended Design
One Record	Several Tables (up to 5)	User Exits Required
Several Records	One Table	User Exits Required

VS2 - What are the Benefits (3) ?

Additional Benefits

- Organizations can refocus on growing its business and technical capabilities under a single data infrastructure paradigm
 - ◆ Potential for faster deployment of new applications or application upgrades
 - ◆ Single source of production data, available at all times to all customers alike
 - ◆ Consistent quality-of-data and quality-of-service across the board to all customers
- Simplifies data maintainability and future database restructuring
- Effective assistance toward the Continuous Availability and Real Time needs for 24x7 purposes
- Significant economy-of-scale savings are possible in certain elements:
 - ◆ CPU and DASD usage, DRP complexity
 - ◆ Application and Data maintainability
 - ◆ Reduced set of production and development OEM tools
- Facilitates the running of Sysplex environments
 - ◆ Provides simplification to the Real Time Operability challenges
 - ◆ Allows for better management of standards and measurements
 - ◆ Simpler set-up and operation of test streams
- Harmonizing potential
 - ◆ Planning, Development and Service Delivery resources/Skills
 - ◆ Change Management and Control processes

Immediate Gains

- Removal of long-existing VSAM dataset limitations
 - ◆ Not necessary to evaluate and acquire more VSAM scaffolding features.
 - DB2 already includes a sound and established Partition Tablespace feature
 - ◆ No logical storage limitations
 - All related business data can be moved quickly into one single type of database
 - ◆ Most organizations have a mixed set of VSAM datasets and DB2 databases
- ➔ VS2 will allow for a clearly-defined, recognized, supported data architecture direction

When should you NOT migrate off VSAM

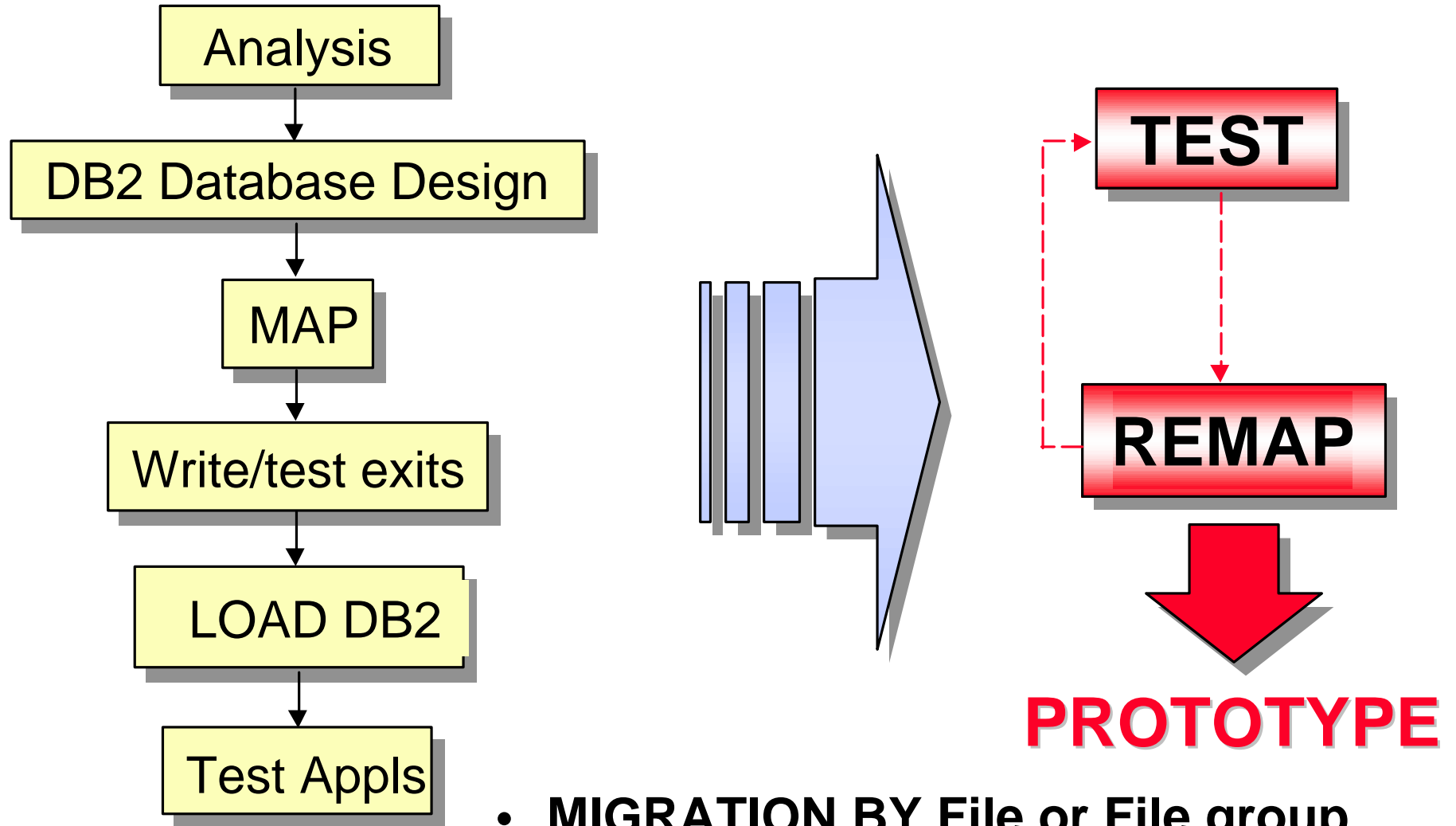
- If you have a heavy dependency on features that are not supported with VS2 (see chart near end of presentation)
- If you have no DB2 in-house and no intention to acquire it
- If you envision increased usage/investment into new VSAM applications
- If you have written extensive non-VSAM applications interfacing into VSAM via the Operating system

VSAM COMPONENTS

- ISPF MAPPING/GENERATION FACILITY
 - > Map VSAM fields to DB2 Columns
 - > Generate VS2 driver programs
- CALL INTERCEPTION FACILITY
 - > Intercepts VSAM calls and directs them to VS2 for processing
- VS2 MAPPER
- SAMPLE COBOL, PL/1 AND ASSEMBLER EXITS SUPPLIED

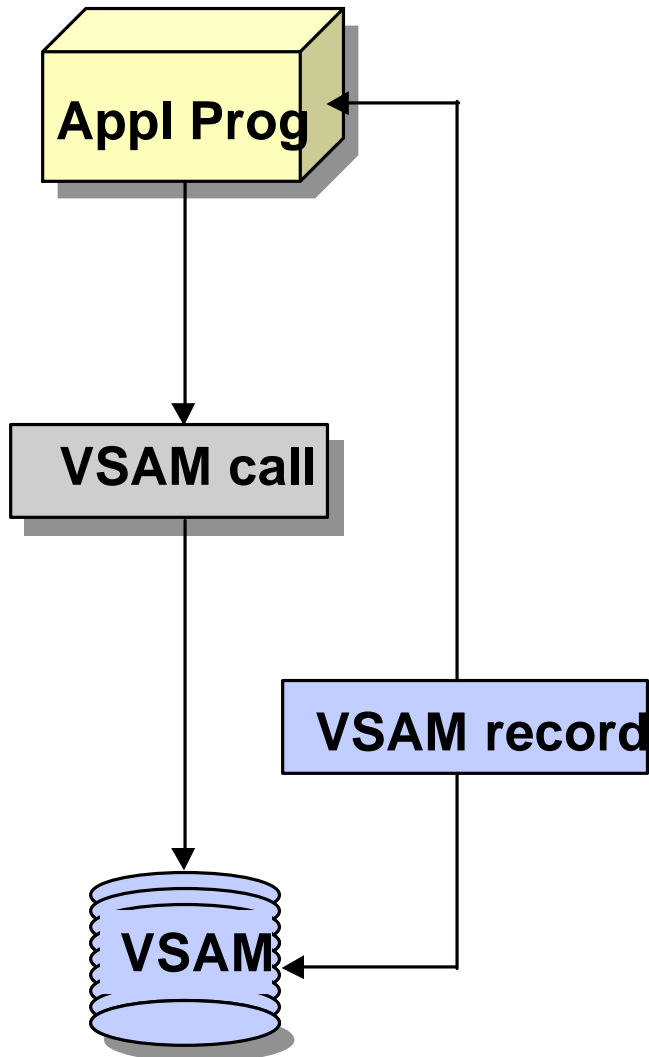
MIGRATION PROCESS OVERVIEW

- REQUIRES APPL KNOWLEDGE AND VS2 SKILL

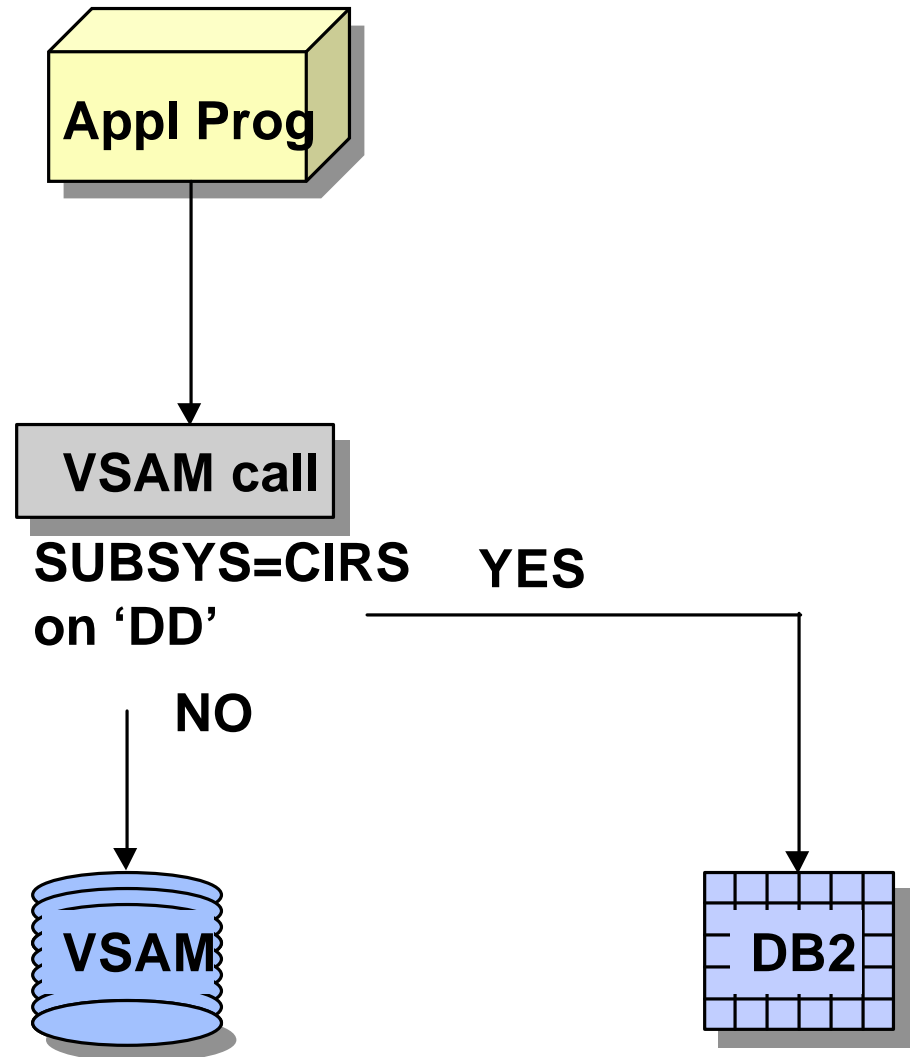


EXECUTION PROCESS FLOW - 1

BEFORE VS2

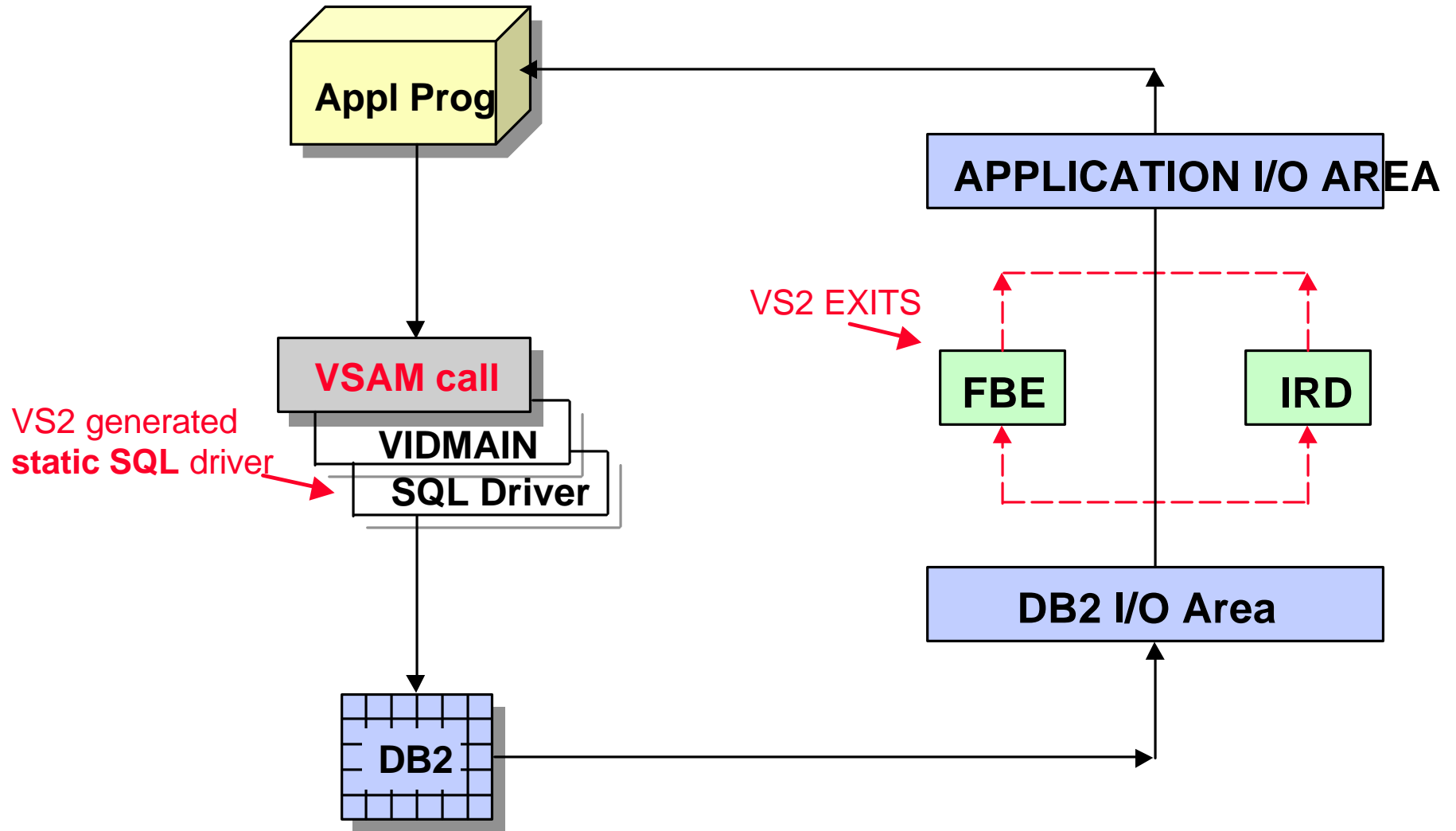


AFTER VS2 - PART 1 OF 2



EXECUTION PROCESS FLOW - 2

FOLLOWING CONVERSION TO VS2 - PART 2 OF 2

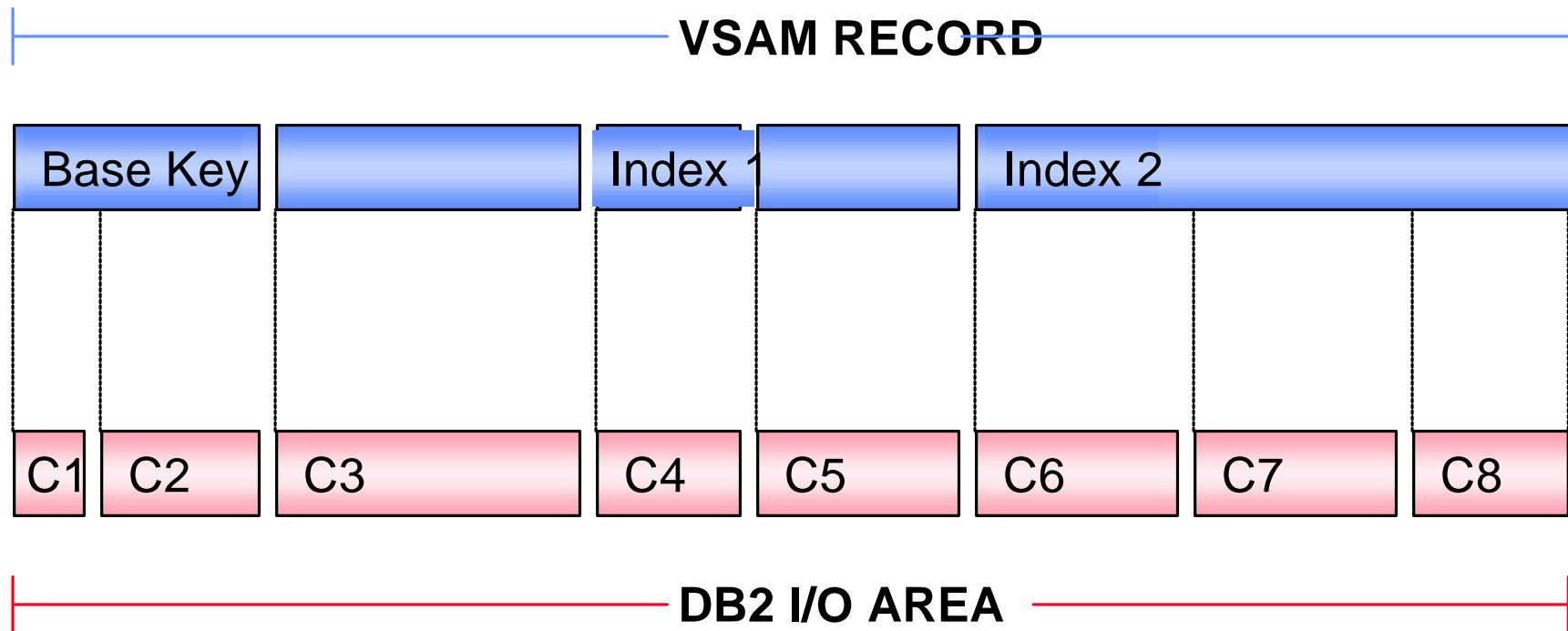


PHYSICAL DB2 DATABASE DESIGN

- ONE DB2 TABLE FOR EVERY VSAM file set (Base, AIX, Path)
- VSAM BASE CLUSTER KEY BECOMES DB2 PRIMARY KEY
- COPYBOOK FIELD BECOMES DB2 COLUMN (typically)
- REDEFINED RECORD LAYOUTS HANDLED THROUGH EXITS
- OBSOLETE (Filler ?) FIELDS DO NOT NEED TO BE MIGRATED TO DB2

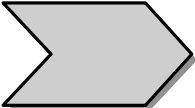
VS2 MAPPING

- ONE TIME ACTIVITY



- FIELD to COLUMN Relationship using VSAM Copybook
- Mapping performed through VS2 ISPF Dialogues or by VS2 MAPPER

MAPPING PROCESS

1. CREATE DB2 DATABASE
 2. MAP RECORDS
 3. GENERATE SQL DRIVERS
 4. UNLOAD DATA FROM VSAM (VS2 utility)
 5. CONVERT UNLOAD FILE AND LOAD DB2 TABLES
 6. IN BATCH - JCL change
IN CICS - Add file to VS2 Table (Macro driven)
 7. TEST
 - > MAPPING
 - > EXITS
- 
- Test Applications

RE-ENGINEERING

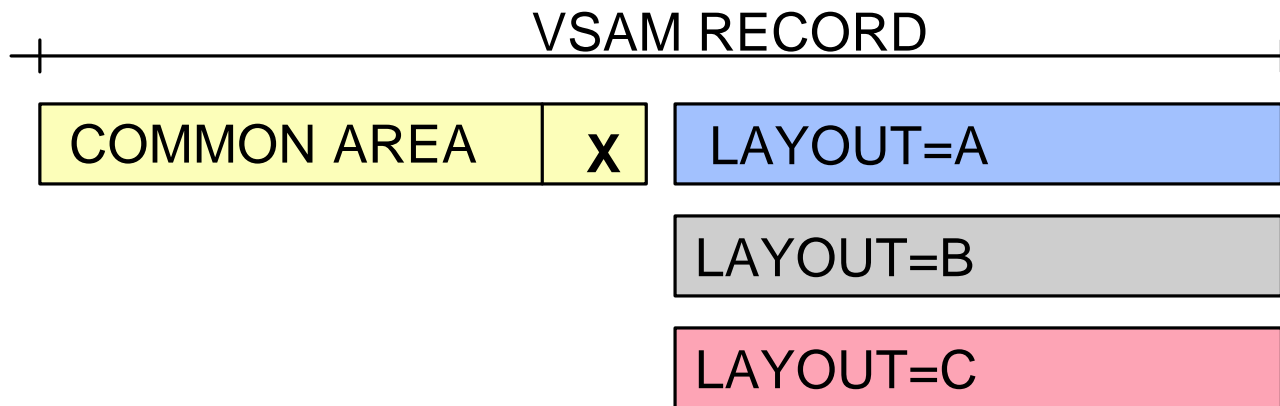
- VSAM PICTURE FIELDS ==> DB2 DATE
 - > Typically 4 byte packed field X'0971229C' becomes 1997-12-29
- OBSOLETE FIELDS
 - > Omit from DB2 Table (Fields defined as 'FILLER')
- MOVING FIELD POSITION
- CHANGING FIELD ATTRIBUTES
 - > Extending field size
 - > Numeric fields to DECIMAL, INTEGERER, SMALLINT
- ADDING ADDITIONAL COLUMNS
 - > For future use by 'new' DB2 applications

RE-ENGINEERING

- COPYBOOK REDEFINES
 - PROBLEM
VSAM allows differing data types in the same record structure
Handled by applications using masks.
 - RESOLUTION
VS2 provides granularity through Exits and additional
DB2 tables

ADDITIONAL RE-ENGINEERING THROUGH FBE & IRD EXITS

REDEFINED RECORD



DB2TAB_COMMON	KCOL_A, KCOL_B + Common area columns
DB2TAB_LAYOUT_A	KCOL_A, KCOL_B + Layout=A columns
DB2TAB_LAYOUT_B	KCOL_A, KCOL_B + Layout=B columns
DB2TAB_LAYOUT_C	KCOL_A, KCOL_B + Layout=C columns

- 1. FIELD BUILD EXIT TO READ APPROPRIATE TABLE BASED ON FIELD X**
- 2. IRD EXIT REQUIRED FOR UPDATE PROCESSING BASED ON FIELD X**

OTHER POTENTIAL SOLUTIONS

USER FIELD BUILD EXIT - POSSIBLE USE

- TO ENRICH DB2 DATA

➔ VSAM record

Name	Street	Town	City	Ctry	National Phone
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Flag resolved by Appl pgm

➔ DB2 Record Layout

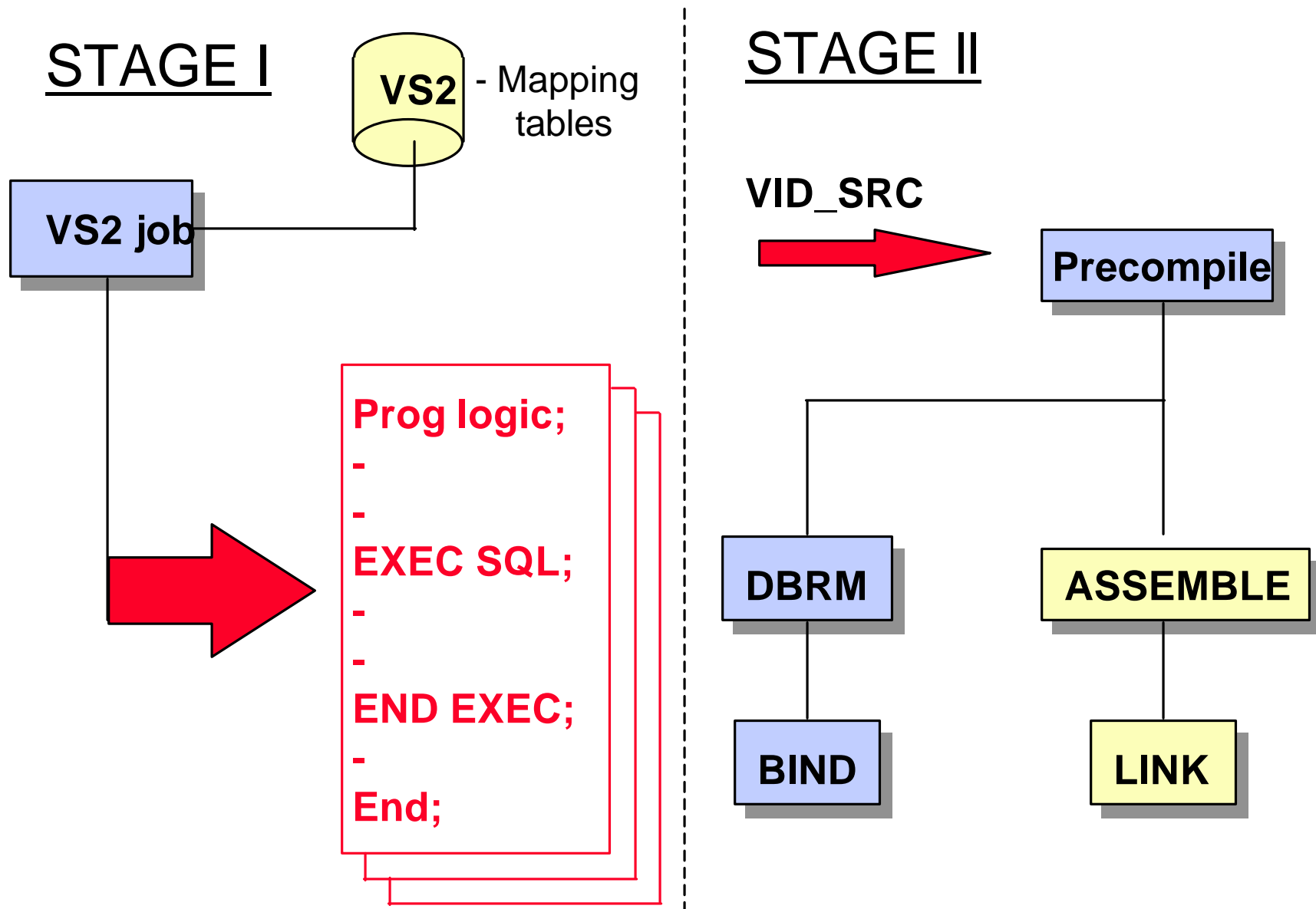
Name	Street	Town	City	Country namenn	International Phone
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Mapped to

Translated by FBE

- MANY OTHER POSSIBILITIES

SQL DRIVER GENERATION



RUN-TIME CONSIDERATIONS

- VSAM APPLICATIONS NOW BECOME DB2 APPLICATIONS
 - > Housekeeping Utilities in DB2
 - > Local and Disaster Recovery Implications
- PACKAGE BIND / EXPLAIN
- DB2 PERFORMANCE / CAPACITY IMPLICATIONS
- CHANGES TO DB2 APPLICATION ENVIRONMENT
 - > VS2 Drivers May need to be Re-Genned

POST-MIGRATION APPL MAINTENANCE

- APPLICATION CHANGES CAN BE SQL-BASED
 - > New SQL calls can be Added to Application Programs
 - > Existing VSAM calls can be changed

INSTALLING VS2

- UNIQUE 'RIGHT TO USE' KEY FOR EACH CPU EXTENDED ANNUALL
- ISPF TAILORING APPLICATION
 - > Customised INSTALL AND SAMPLIB libraries
- VS2 LOAD LIBRARY and DRIVERS LIBRARY;
 - > LPALIB in Batch - Subsystem
 - > DFHRPL in CICS
 - > LPA changes
- BATCH JCL CHANGES FOR ACCESS TO DB2
- OPTIONALLY
 - > Enable supplied Trace and Debugging Facilities
- FIXES DELIVERED BY EMAIL - USUALLY AMASPZAP FORMAT

FEATURES NOT SUPPORTED

- VSAM ESDS Datasets
- VSAM LDS Datasets
- RBA Processing

Next Steps:

- Follow-up on some technical issues
- Pilot porting project to assess validity (billable)
- Mentoring/training onsite or at Lightyear's or Circle's offices
- Development of a migration project

Upcoming Lightyear Events

- October 21 to 25 - DB2 (and CICS + IMS) City-to-City Roadshow - hosted by IBM and Lightyear (with Lightyear and IBM speakers)
 - pick a 1/2 day or a full day agenda
 - Oct. 21- Seattle
 - Oct. 22 - Pasadena / Los Angeles
 - Oct. 23 - Phoenix, AZ
 - Oct. 24 - Dallas, TX
 - Oct. 25 - Kansas City, MO
 - register now !
- November 6: z/OS Update - What new beyond OS/390
- November 19 or 20: IMS to DB2 Conversion without application re-write
- December or early next year: DB2 Stored procedures - What Options do you have ?
- Early Next year: Wireless Access to Legacy Data - Options
- Early Next year or later this year: Application Construction with WebSphere Studio Application Developer (aka VisualAge for Java Vnext) and/or Host-on-Demand - what is a better option ?
- Details at: www.lightyr.com - you will get an e-mail invite once details are finalized !