It's Time to Upgrade to
IBM COBOL for VSE/ESA!

Alice Crema
IBM Silicon Valley Laboratory
San Jose, California
1.408.463.4462
crema@us.ibm.com

Agenda

- **e-business**

- **Where you are today!**

- **IBM COBOL**

- **It's Time to Upgrade!**

- **Reference Material**

The Story
e-business

The e-business cycle: Getting There by a Reliable Route

Leverage
knowledge and information

Transform
core business processes

Run
a scalable, available, safe environment

Build
new applications
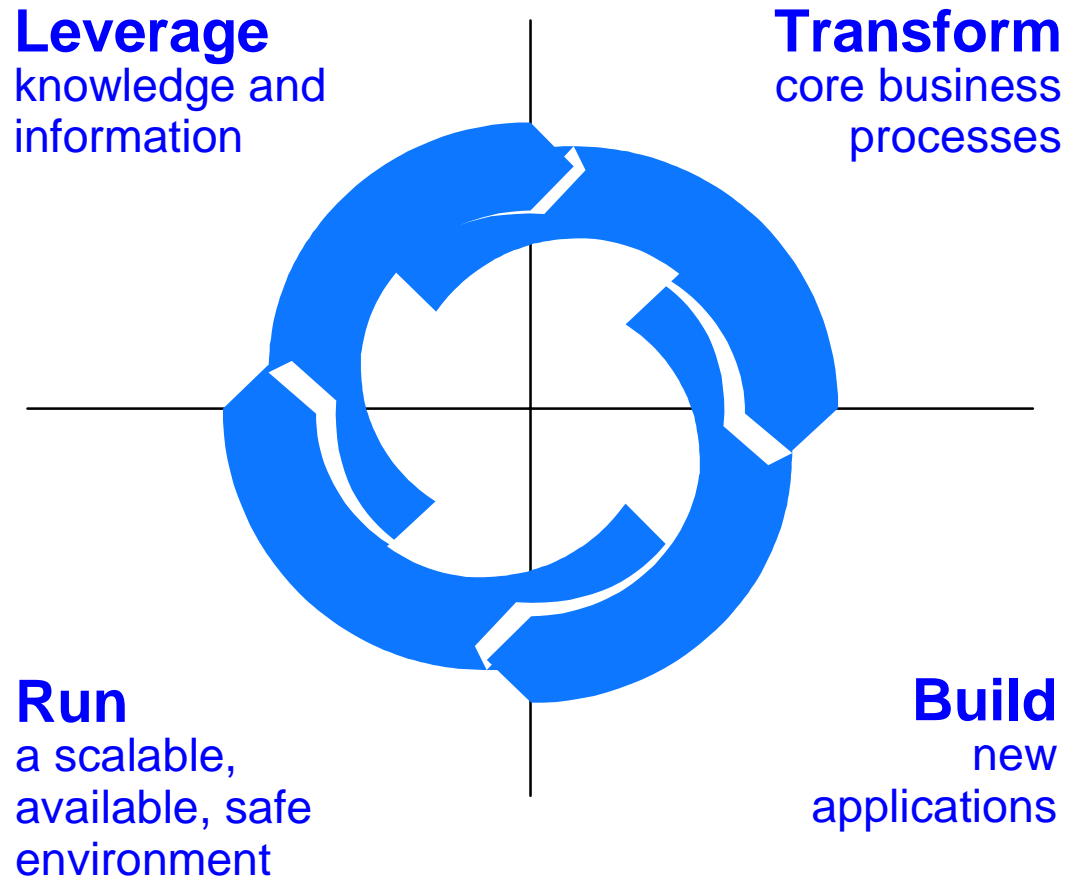
Becoming an e-business, growing as an e-business

e-business Capabilities and Enablement

Transformation and Integration

Web-enable business processes

Leveraging Information

Use data to increase competitiveness

Organizational Effectiveness

Enable People to be more productive

Managing Technology

Create a secure, manageable infrastructure

Application Framework

- Internet
- Messaging
- Transactions
- Integration

‣ Leverage existing applications
‣ Evolve new business models
‣ Support new business processes
‣ Be open for business

COBVSEMG / 04APR00 **5**

Application Designs for e-business

Business Analysis

- Business process roadmaps
- Transformation case studies
- Scenario based patterns

Application Design

- Application topologies
- Design guidelines
- Integration approaches

Application Development

- Programming and component model
- Development guidelines
- Tools product maps
- Integrated development environment

Solution Deployment

- Runtime topologies
- Runtime product maps
- Platform and performance guidelines

The Story

Where You are Today!

Your people are vital today and tomorrow

- **Your COBOL, PL/I, CICS, IMS, DB2 Developers understand ...**
  - ‣ your business, your assets, your policies, your customers
  - ‣ system security, scalability, workload management
  - ‣ your data and existing applications
  - ‣ unit of work, quality of service
  - ‣ production level systems
    - ◆ workload management
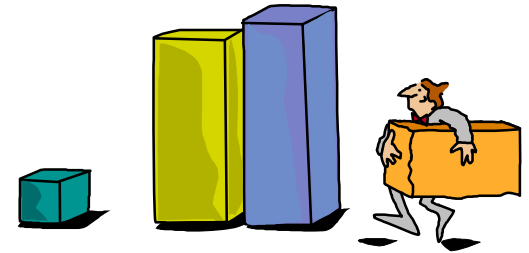   - ◆ resource deployment

  ... and the S/390!

Business Systems Issues

- **Very few business systems are static**
  - Many occasional bug fixes
  - New business requirements
    - New products, Removal of old products
  - External factors
    - Euro, e-Commerce

- **Program logic has become convoluted with business function intertwined**

- **Data structures no longer map to the underlying business**

- **Documentation is either incomplete or nonexistent**

- **Competition**
  - Today's development is tomorrow's maintenance!

Business Systems Positives

- **Legacy code is solid and proven!**
  - ► mission critical applications work

- **Processing is efficient and good**
  - ► applications running for years are well tuned
  - ► applications are often highly integrated with other business processes

- **Few surprises with ...**
  - ✓ legacy code
  - ✓ business system applications

  ... and it is possible to leverage it effectively!

- ★ **Your people are vital today and tomorrow!**

COBOL Legacy Applications: and what do you know now?!?

- **Think about what was completed during your Year 2000 project. You most likely:**

  - have a good inventory of your programs and applications.

  - know where the date-related logic exists in your programs.

  - know how the programs and applications are built.

  - know how your databases are structured.

  - have better program and application documentation.

  - have a better testing methodology.

  - have upgraded your system environment software with state-of-the-art products.

  - know where future enhancements are needed.

  - *have learned how your programmers and the legacy applications are important and valuable assets to the success of your company*!

The Story
IBM COBOL

Languages Today
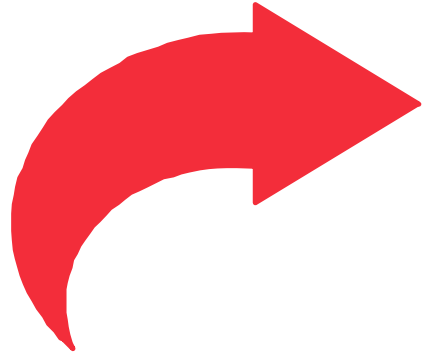
Development Environment

C O M P I L E R S

Language Environment

COBOL

C / C++

PL / I

Language Environment for VSE/ESA Functional Overview

Development Environment

| COBOL | PL/I | C | ASM |

Language Environment

- CEE Architecture
- LE-Callable Services
- Common Library
- Compiler Runtime Support
- InterLanguage Communication
- SQL/DS and CICS Support
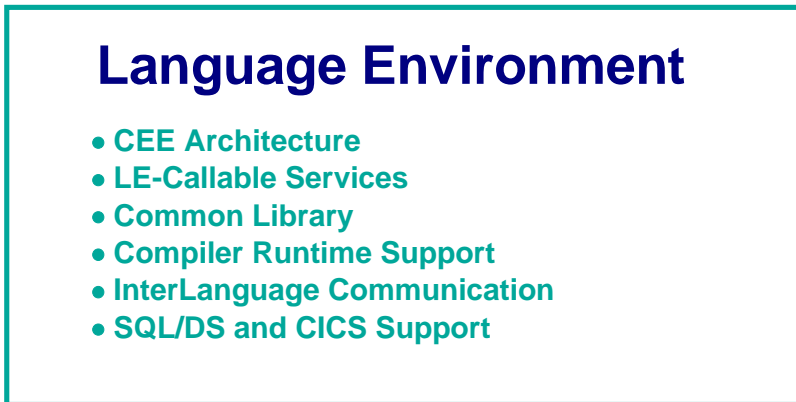
★ **Common Environment**
- Condition Management
- Memory management
- Task management
- Subsystem interface

★ **Common Protocols**
- Tasking
- Linkage

★ **Common Services**
- Message
- Dump

★ **Common Routines**
- Math
- Callable services
- Language runtimes

★ **InterLanguage Communication**

★ **Support for the Debug Tool**

Complete Picture of Language Environment

All the programs supported by LE/VSE Ver 1 Rel 4

LE-conforming Assembler Programs	COBOL for VSE/ESA (5686-068) Programs	PL/I for VSE/ESA (5686-069) Programs	C for VSE/ESA (5686-A01) Programs

VS COBOL II (5668-958) Rel 3.2 and Rel 4 Programs

Assembler Programs

DOS/VS COBOL (5746-CB1) Rel 3.1 Programs

Assembler   **COBOL**   **PL/I**   **C**

Obsolete VSE COBOL Products

Obsolete Products

DOS/VS COBOL Compiler
DOS/VS COBOL Library

(5746-CB1)

VS COBOL II Compiler
VS COBOL II Library
COBTEST debug tool

(5668-958)

- **DOS/VS COBOL compiler and run-time library**
  - ‣ **Market withdraw was March 24, 1997**
  - ‣ **End of service was December 31, 1999**

- **VS COBOL II compiler and run-time library**
  - ‣ **Market withdraw was June 30, 1997**
  - ‣ **End of service was April 24, 1998**

VSE COBOL Run-Time Libraries

Obsolete run-time libraries

VS COBOL II Programs

DOS/VS COBOL Programs	DOS/VS COBOL Programs

Assembler Programs	Assembler Programs

DOS/VS COBOL run-time library

VS COBOL II run-time library

Host COBOL Compilers (VSE and VSE/ESA) Functional Overview

The Best
is Here!

COBOL for VSE/ESA

(Executes on VSE/ESA 1.4 or VSE/ESA V2+)
VS COBOL II plus ...
- Intrinsic Functions (addendum to '85 Std)
- Language Extensions
- Support for Language Environment
- Support for Debug Tool

But First Came ...

DOS/VS COBOL
- COBOL 74 Standard
- 74 STD FIPS Flagging
- Dynamic Debugging
- Batch Debugging
- Interactive Debugging (line mode)

★ **Upgrade DOS/VS COBOL and VS COBOL II directly to COBOL for VSE/ESA**

Then Came ...

VS COBOL II

DOS/VS COBOL plus ...
- COBOL 85 Standard (no intrinsic functions)
- Structured Programming
- DBCS
- National Language
- Improved CICS Interface
- 31-Bit Addressing
- Reentrancy, Fast Sort
- Optimizer, SAA Flagging
- Interactive Debugging (full screen mode)

Strategic VSE COBOL Products

**Strategic Products
Year 2000 Ready**

Full Function Feature Compiler

COBOL for VSE/ESA
Ver 1 Rel 1

IBM Debug Tool

(5686-068)

Language Environment for
VSE/ESA Ver 1 Rel 4

(5686-094)

Debug Tool Functional Overview

- **Common User Interface across systems and subsystems**

- **Seamless across languages**
  - COBOL, C, C++, HP Java, PL/I

- **Seamless across platforms**
  - OS/390, VSE, AS/400, Windows NT, AIX

- **Environments Supported**
  - CICS, TSO, JES/Batch, IMS including IMS/TM, DB2 including Stored Procedures, USS, WebShpere Domino Web Server, VSE, VM

- ★ **Order Debug Tool as Full-Function Feature of COBOL, PL/I, and C Compilers**

- **Debug Tool Features:**
  - Source-level debug tool
  - Language Sensitive
  - Multiple Breakpoints - conditional / patching
  - Programmable Command Entry
  - Utilizes LE Services - at occurrence
  - Step Mode Debugging
  - Logging of Debug Session
  - Dynamic Patching
  - Frequency Sampler

- ► **Demo available at http://www.ibm.com/s390/dt/**
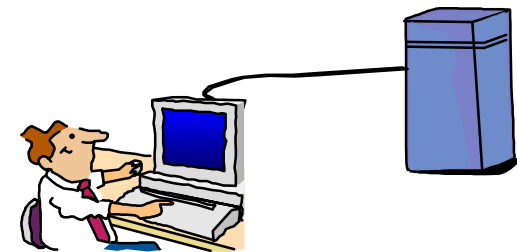
The Story

It's Time to Upgrade!

What is a language run-time library?

- **High-level languages require library routines in order to execute**
  - ► <u>Example</u>: The code for file OPEN is not generated by the compiler, instead a call to a library routine is generated
  - ► <u>Other Examples</u>: INIT/TERM, COBOL variable length move, INSPECT, SORT, dynamic CALL, and more!

- **For COBOL programs, the library routines have been largely invisible to application programmers and system programmers**
  - ● The routines were either statically linked into object modules (compiler option NORES)
  - ● Or the routines were accessed dynamically (compiler option RES) through LIBDEF, which meant that users did not have to write any JCL to access them

Run-Time Migration

Service for old COBOL programs is in the current supported run-time library!

How?

- **Every COBOL program requires library routines in order to execute**
  - ▸ Example: ILBOVOC for VSAM OPEN/CLOSE

- **COBOL programs that are using supported versions of the library routines are supported by IBM service!**
  - All DOS/VS COBOL and VS COBOL II library routines are in Language Environment

Migration Overview

- ## **Plan, plan, plan**

- **Communicate with management and users**
  - Make friends with your system programmer!

- **Migrate the run-time first, then upgrade the source**

- **Use old compiler and link edit library until new run-time is in production**

- **Migrate in test environment first**

- **Regression test . . . why?**
  - Your code, IBM code, Third party code

- **Migrate tested applications to production**

Migration Overview ...
Everything you need to know!

Migration publications

- ★ IBM COBOL for VSE/ESA Compiler and Run-Time Migration Guide (GC26-8070)
- IBM Language Environment for VSE/ESA Run-Time Migration (SC33-6687)
- IBM COBOL for OS/390, MVS & VM Compiler and Run-Time Migration Guide (GC26-4764)
- IBM C/C++ for MVS/ESA Compiler and Run-Time Migration (SC09-2002)
- IBM Language Environment for OS/390 & VM Run-Time Migration (SC28-1944)
- ► Call 1-800-879-2755 to order IBM publications
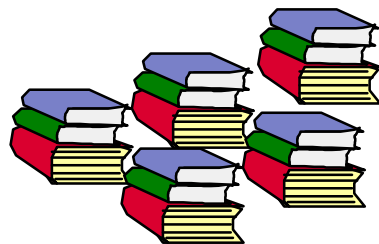
Publications on the Web!

- http://www.s390.ibm.com/os390/bkserv

Other resources

- COBOL CFORUM and LE CFORUM (Available through IIN, select IBMLINK, select TALKLINK, select S/390 store, type COBOL)
- www.ibm.com/software/ad/cobol
- www.ibm.com/s390/products/le_vse/
- www.ibm.com/software/ad/cobol/serv-ov.htm

VisualAge Services contact:
Susan Lee
1.408.463.3287
susanlee@us.ibm.com

Planning for Migration

- **Are your vendor products ready?**

  - **Language Environment Enabled Vendor Tools and Application Packages Working Document**
    - ▸ **http://www.ibm.com/s390/le/** **click on Library**

  - If your vendor needs assistance with Language Environment,
    - ▸ Ask them (or you) to **fax** their request for information to **1-914-435-1752 Attention: LE Migration Team**
    - ▸ Fax vendor company name, product name, and phone number

- ✓ **Remember** ...
  - **Run-time migration first, and then selective source conversion**

Planning for Migration ...

- **Develop a cost/benefit analysis**
  - Include S/390 Modernization in your benefits
  - Review "Technical Advantages of Language Environment"

- **Take inventory of your COBOL development tools**

- **Assess requirements of new software**
  - Prerequisite product levels
  - Compatibility with vendor products
  - Compatibility with IBM products

- **Take inventory of existing applications**

- **Assess migration effort for each application**
  - Assign complexity ratings
  - Prioritize applications

- **Schedule training for programmers**

Planning for Migration ...

What could go wrong without planning?

- **Improper setup**
  - One customer noticed a big performance hit when using TRUNC(BIN); problem was solved by using TRUNC(OPT).
    - ➤ TRUNC(BIN) should never be the default option

- **Incomplete investigation into vendor products**
  - One customer thought they were all ready to start using Language Environment, but when they started testing they found problems with their vendor product failing.
    - ➤ They didn't have the latest level of the product that works with Language Environment

- **Wasted time on migrating applications**
  - One customer migrated <u>all</u> the applications in their libraries to Language Environment which took a long time.
    - ➤ After a closer look at their applications, <u>not</u> all their applications were being used. They migrated unused applications!

Preparation for Migration

- **COBOL ...**
  - runtime currently in use
  - runtime options used
  - compiler options used
    - RES? TRUNC?
      - NUMPROC? CMPR2?
  - source level
    - ANSI 68? ANSI 74? ANSI 85?

- **What will need to be re-linked?**
  - For COBOL-PL/I ILC, start re-linking early
    - See PL/I migration aid (in PL/I Migration Guide)
  - For COBOL-C ILC, start re-linking early
    - See C migration aid (in C Migration Guide)
  - Assembler programs that set up reusable environment
    - Static calls to ILBDSET0 or IGZERRE

➡ **Include <u>all</u> the tools and packages that run with the applications**

Preparation for Migration ...

- ## IBM OPTI-AUDIT (5697-C85)
  - ‣ Inventory and Assessment
  - ‣ Software Asset Management
  - ‣ COBOL Phase Analyzer
  - ‣ COBOL Program Analysis
  - ‣ Monitors program and dataset activity
  - ‣ Web Browser Interface

  - ◆ **General Inventory / Audit Tool**
    - ◆ COBOL conversion progress, standard use of phases or obsolete phases, verify PTF applied, documenting / tracking program changes, showing program interdependencies, etc.

  - ◆ **Problem Determination**
    - ◆ helps quickly to pinpoint cause, ex. AMODE/RMODE incompatibilities, wrong versions of subprograms linked into the main, wrong runtime support, etc.

Preparation for Migration ...

- **Use only one COBOL library for each application**
  - NORES modules contain their own run-time routines
  - They must be link edit with Language Environment

- **Do not have more than one COBOL library in concatenation**
  - Example: DOS/VS COBOL 1st, VS COBOL II 2nd in LIBDEF Chain
  - DOS/VS COBOL main program has SORT
    - Brings up DOS/VS COBOL environment
  - SORT exits written in VS COBOL II
    - Brings up VS COBOL II environment
  - Abend when return to DOS/VS COBOL

- **If more than one COBOL library in LIBDEF**
  - If Language Environment is first in LIBDEF,
    then other COBOL is dead code

Preparation for Migration ...

The most difficult migrations

- **DOS/VS COBOL NORES programs that use assembler with SVC LINK for "CALLing" subprograms**
  - SVC LINK creates new enclave, DOS/VS COBOL under Language Environment must be a single enclave in non-CICS

- **Any applications that do their own program management with assembler**

- **Shops that use exits on the DCB EXLST for label processing**
  - VS COBOL II and COBOL for OS/390, MVS, VM, and VSE/ESA use them all

- **Any shop using modified ILBO* modules**

- **Applications that set SPIEs or STAEs and trap abends**
  - Must migrate to LE condition handling
  - We have some relief for VS COBOL II programs that use SPIE under LE, as long as SPIE is RESET after application code

- **DOS/VS COBOL ILC with PL/I**
  - Must upgrade COBOL before migrating to Language Environment

RES/NORES vs DYNAM/NODYNAM

The difference between statically linked COBOL programs and statically linked run-time library routines

Load Module or Phase

Dynamic Call

Static Call

COBOL PROGRAM A

COBOL PROGRAM B

COBOL PROGRAM C

NORES library access

RES library access

RES library access

Run-time Library Routine IGZ...

Run-time Library Routine IGZ...

Run-time Library Routine IGZ...

Run-time Library Routine CEE...

Resident Run-time Library
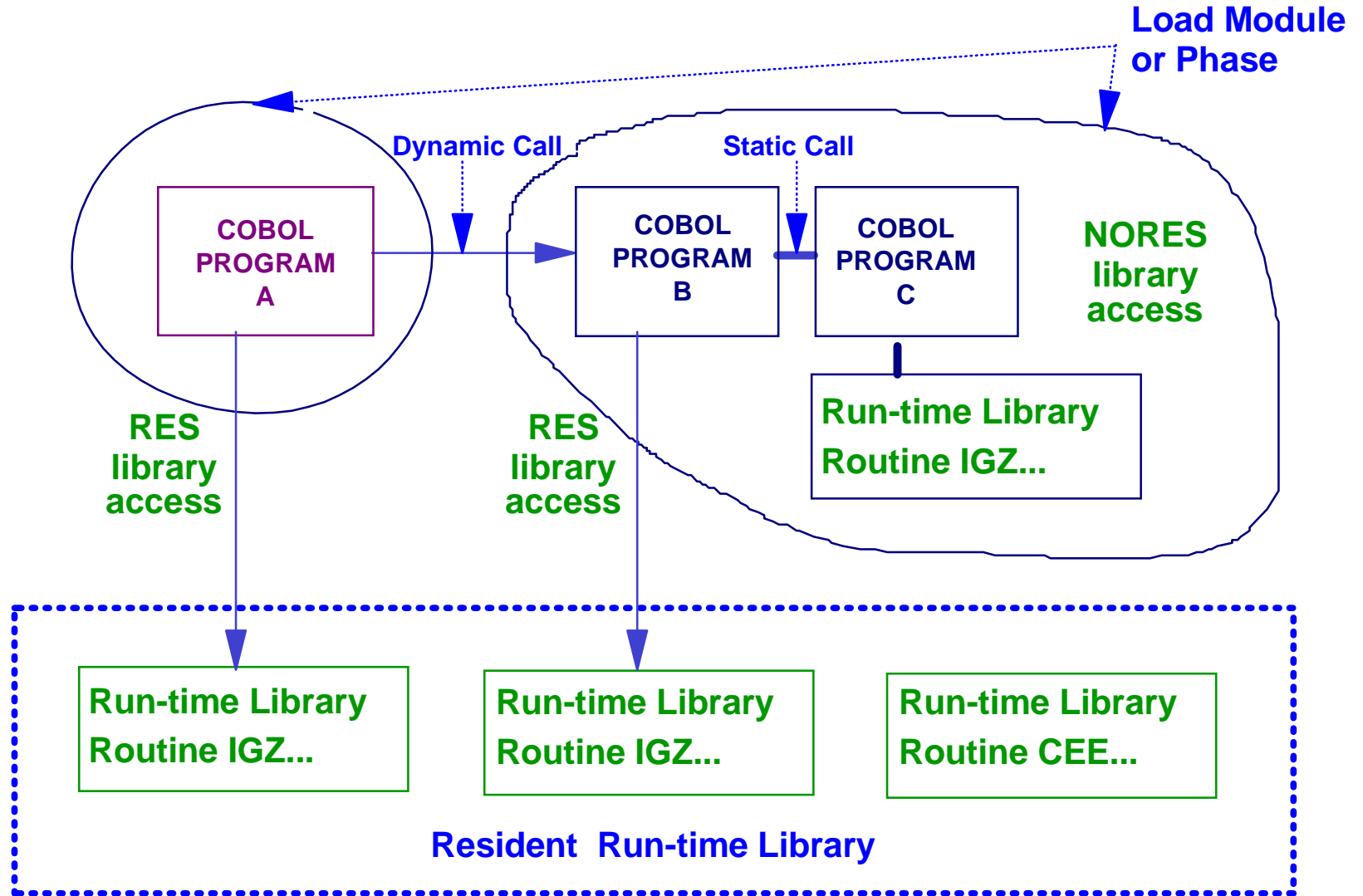
RES and NORES

- **There is no MIXRES run-time option in Language Environment**
  - Mixed RES and NORES common due to:
    - Default compiler option was NORES
    - CALL identifier-1 forced RES

- **Mixed RES and NORES programs are supported in Language Environment**

- **If mixed RES and NORES, then choose your approach in advance (one of the following):**
  - Set up a separate environment for migrated applications and link edit with Language Environment as you move each one
  - Recompile all programs with RES before starting the migration to Language Environment

- **Note: Never use more than one COBOL library in the same application**
  - NORES modules contain their own run-time library routines
  - It must be link edit with Language Environment

Technical Advantages of Language Environment

- **Performance**
  - InterLanguage CALLs
  - COBOL-Assembler-COBOL
  - Faster DYNAMIC CALL support

- **System Exploitation**
  - QSAM buffers
  - COBOL EXTERNAL data
  - CBLPSHPOP run-time option
  - New Compiler options
  - Above 16 meg line support

- **Useability**
  - Language error messages available
  - CBLQDA run-time option
  - Storage tuning via run-time options
  - Restrictions removed for APPLY WRITE-ONLY

- **New Function**
  - ANSI 1985 Intrinsic Functions
  - High-precision math routines
  - OpenEdition, SOM support
  - Condition Handling
  - Millennium Language Extensions
  - Object-Oriented COBOL
  - Client-server
  - DB2 Stored Procedures

- **Platform of the Future**
  - Any future performance improvements or language enhancements available under Language Environment
  - Language Environment element of OS/390, VM, VSE/ESA
  - More support for UNIX-like environment (POSIX, XPG4)

★ **Migrate run-time first, then do selective source conversion!**

Set up Language Environment for COBOL Users

- **Make sure Language Environment is at the latest service level**
  - Example: performance improvement of static calls between COBOL programs

- **For COBOL ILC, start re-linking now**

- **For DOS/VS COBOL with ESTAE exits, start source conversion**

- **For mixed-language shop, no COBOL ILC:**
  - For a COBOL-only migration
    - ► Install PL/I and C ahead of Language Environment in concatenation

Setting up Language Environment for COBOL Users

Recommended options for COBOL programs: (recommended for mixed languages too!)

- **ABTERMENC(ABEND)**
  - Default is RETCODE

- **ALL31(OFF)**
  - (ON) if all migrated or on CICS

- **CBLOPTS(ON)**

- **CBLQDA(OFF)** (OS/390 only)
  - Default is ON

- **CHECK(ON)**
  - maps to VS COBOL II SSRANGE run-time option

- **NODEBUG**
  - USE FOR DEBUGGING

- **ERRCOUNT(0)**
  - Default is ERRCOUNT(20)

- **NOTEST**

- **RTEREUS(OFF)**
  - RTEREUS can have nasty side effects

- **STACK**
  - STACK(BELOW) with ALL31(OFF)
  - STACK(ANY)   with ALL31(ON)

- **STORAGE(NONE,,K)**
  - if no uninitialized variables

- **STORAGE(00,,,)**
  - maps to VS COBOL II WSCLEAR

- **TERMTHDACT(DUMP) for non-CICS**
  - Default is TRACE

- **TERMTHDACT(UADUMP) for diagnosis** (for VSE/ESA)

- **TRAP(ON) TRAP(ON) TRAP(ON)**
  - TRAP(OFF) only if directed by IBM support

Moving Language Environment (LE) into Production

- **Install target depends on migration strategy used**

- **There are 2 main strategies being used, both ok:**
  - Change each application one at a time to use new compiler and run-time library (LIBDEF)
  - Run current phases under LE, then use new compiler later at maintenance or enhancement time

- **LIBDEF for old applications that will not run under Language Environment**
  - Complete the migration later

- **LIBDEF maximum control with performance cost**

- **One CICS partition at a time**

- ✓ **Note:**
  - **Never use more than one COBOL library in the same application**

Selective Conversion

COBOL Compiler	ANSI Standard
OS/VS COBOL DOS/VS COBOL	ANSI 68 and ANSI 74
VS COBOL II Release 1 and 2	mixed ANSI 68/74
VS COBOL II Release 3 and 4	ANSI 74 (CMPR2 compiler option) ANSI 85 (NOCMPR2 compiler option)

Year 2000 Ready Compilers:
  COBOL for OS/390 & VM
  COBOL for MVS & VM
  COBOL for VSE/ESA
	ANSI 85 plus ANSI 85 Addendums (Intrinsic Functions) and some new draft standards

► **Convert ANSI 68/74 source to ANSI 85 source**
- COBOL and CICS Conversion Aid (CCCA/VSE) Ver 2 **(5686-A07)**

► **Convert CICS macro-level source to command-level source**
- CICS Application Migration Aid (CAMA) **(in CICS/VSE 2.3)**

► **Report Writer macro support; continue to use Report Writer**
- COBOL Report Writer Precompiler **(5798-DYR)**
- VisualAge for COBOL Report Writer **(4226060)**

COBOL Compiler Options for S/390

- ## NUMPROC(MIG)
  - Should be default for most shops
  - Closest to OS/VS COBOL or DOS/VS COBOL sign processing

- ## TRUNC(OPT)
  - Should be default for most shops
  - We have changed our recommendation for CICS and DB2
  - OS/VS COBOL or DOS/VS COBOL NOTRUNC actually did truncate in some cases
  - TRUNC(BIN) only for specific programs

- ## OPT(FULL)
  - Don't use for programs with flags in WORKING-STORAGE unless you add references to them.
  - The OPTIMIZER will delete a dead reference anyway, but OPT(FULL) will not delete the data item if it is referenced.

```
77 BEG-MARKER  PIC X(20) VALUE "BEGINNING OF W-S".
 ...
 ...
IF BEG-MARKER NOT EQUAL BEG-MARKER THEN
  DISPLAY BEG-MARKER.
```

COBOL Compiler Options for S/390 ...

- **If currently OS/VS COBOL or DOS/VS COBOL using TRUNC as default or VS COBOL II using TRUNC(STD) as default:**
  - Use TRUNC(STD) as the default under COBOL for OS/390, MVS, VM, and VSE/ESA.
  - They are identical!

- **If currently OS/VS COBOL or DO/VS COBOL using NOTRUNC as default:**
  - Use TRUNC(OPT) as the default under COBOL for OS/390 & VM, COBOL for MVS & VM, and COBOL for VSE/ESA.
  - They are very similar.

- **If currently VS COBOL II Release 2 using NOTRUNC as default:**
  - Use TRUNC(OPT) as the default under COBOL for OS/390 & VM, COBOL for MVS & VM, and COBOL for VSE/ESA.
  - They are identical!

- **TRUNC(BIN) should NOT be used as a default option**
  - It is TOO SLOW!

- **TRUNC(BIN) should be used only for select programs that require guaranteed non-truncation of binary data**
  - This is particularly true if there is a possibility that data being moved into BINARY data items can have a value larger than that defined by the PICTURE clause for the BINARY item.

Adding New COBOL to Old COBOL Apps ...

Example:

Mixing new COBOL (COBOL for OS/390, MVS, VM, or VSE/ESA) **and old COBOL** (OS/VS COBOL, DOS/VS COBOL or VS COBOL II) ... **All calls DYNAMIC**

NORENT RMODE (ANY)	RENT DATA(31)	RENT DATA(24)
New COBOL P1	**New COBOL P3**	**New COBOL P5**
P1 DATA		

P3 DATA

Won't Work for P1 DATA or P3 DATA

16 Meg Line

Old COBOL P2	**VSE is Static** → New COBOL P4		Old COBOL P6
P2DATA	**P4 DATA**	**P5 DATA**	**P6 DATA**

NORENT RMODE (AUTO|24)
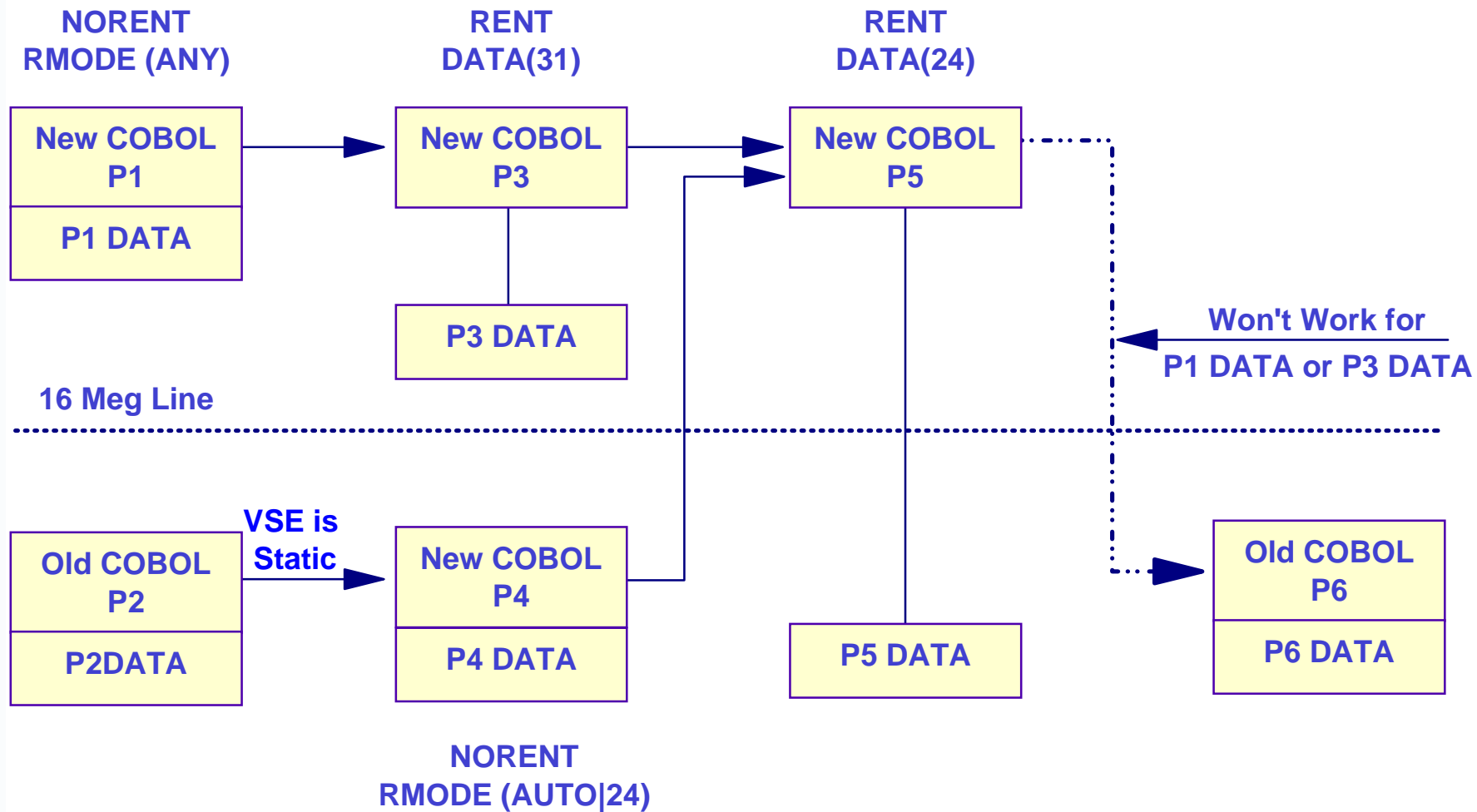
Adding New COBOL to Old COBOL Apps ...

- **Example:**
  Changing only the date routine to COBOL for OS/390, MVS, VM or VSE in an OS/VS COBOL or DOS/VS COBOL application

- A little about AMODE/RMODE
  - OS/VS COBOL or DOS/VS COBOL programs are all RMODE=24 AMODE=24
  - COBOL for OS/390,MVS,VM, VSE/ESA programs can be RMODE=24 or RMODE=ANY
  - COBOL for OS/390,MVS,VM, VSE/ESA programs are all AMODE=31

- Are you ready for the 16meg line?

- Keep all data below the line until all the source is migrated
  - If RENT, then DATA(24)
  - If NORENT, RMODE(24) or RMODE(AUTO)

- Recommend migrating bottom subroutines first

- Old COBOL calling new COBOL is safer than new calling old

- Dynamic call is safer than static, mode switching
  - Can't enter an OS/VS COBOL or DOS/VS COBOL program with AMODE=31!
  - Get IKF995I ILBONTR AMODE ERROR

Adding New COBOL to Old COBOL Apps ...

When should you use the run-time option ALL31(OFF) for <u>CICS</u>?

- **Old load modules (only OS/VS COBOL or DOS/VS COBOL programs and assembler), are AMODE(24) but do not use all of the LE services**
  - The ALL31 setting does not matter for these transactions in CICS

- **If you add an LE-enabled COBOL compiled program, then all of the programs in the module must be AMODE(31) to run with ALL31(ON) under CICS**

- **If load modules have any LE-enabled COBOL compiled programs and also 24-bit assembler programs, then they will require ALL31(OFF)**

- **Bottom line: anytime you add a program compiled with a newer compiler to a load module consisting of OS/VS COBOL or DOS/VS COBOL programs then:**

  - Recompile all of the old programs and 31-bit enable the assembler programs in the load module to move the whole load module above the line in order to continue using ALL31(ON) under CICS

  - Or use ALL31(OFF)

Schedule Programmer Training

- **Migration methodology**
  - Share plans betwen the system folks, the subsystems folks, and the programmers
  - It's a team effort!

- **Conversion aids and tools**

- **New COBOL and subsystems' function**

- **New compiler and run-time options**

- **Language Environment features and options**

- ✓ **For class information and schedules:**
  - ► Call IBM VisuaAge Services / Mentor Training
        1-408-463-3287
  - ► Call IBM Education and Training
        1-800-IBM-TEACh (1-800-426-8322)
  - ► Call IBM Business Partners

VisualAge Mentor Training

VisualAge Mentor Training: Customized offerings specific for your application development environment	▸ S/390 Languages Migration Assessment ▸ S/390 Languages Migration/Conversion ▸ COBOL and Language Environment Advanced Programming ▸ Debug Tool ▸ Language Environment Dump Analysis ▸ High Level Assembler ▸ Workstation Development Environment with VisualAge COBOL

We're here to help you!

Contact VisualAge Manager:
Susan Lee   1.408.463.3287
susanlee@us.ibm.com

http://www.ibm.com/software/ad/cobol/serv-ov.htm

How to Get More IBM Information

IBM TOPICS	http:// Web Addresses
COBOL	www.ibm.com/software/ad/cobol
COBOL Newsletters	www.ibm.com/software/ad/cobol/newslet.htm
Debug Tool	www.ibm.com/s390/dt
DFSORT/VSE	www.ibm.com/storage/dfsortvse/
HLASM	www.ibm.com/software/hlasm
LE/VSE	www.ibm.com/s390/products/le_vse/
OPTI-AUDIT for VSE	www.ibm.com/software/ad/va2000/toolopti.html
PL/I	www.ibm.com/software/ad/pli
Redbooks	www.redbooks.ibm.com
VisualAge Services	www.ibm.com/software/ad/cobol/serv-ov.htm
VM Home Page	www.ibm.com/vm/
VSE Home Page	www.ibm.com/vse/

COBOL Migration Summary

➡ **Develop a migration strategy**
and don't forget to use

★ **GC26-8070 IBM COBOL for VSE/ESA Compiler**
and Run-Time Migration Guide

IBM

■ **COBOL Conversion Paths:**

Move From ...	Directly To ...
DOS/VS COBOL	COBOL for VSE/ESA or COBOL for OS/390 & VM
VS COBOL II	COBOL for VSE/ESA or COBOL for OS/390 & VM

✓ **Migrate the run-time first,**
then selective source conversion

Reference Materials

- ► IBM COBOL Compiler and Run-Time Support
- ► IBM COBOL Market and Service Withdraw Information
- ► Upgrade COBOL Technology with IBM Tools

OS/390, MVS, VM COBOL Compiler and Run-Time Support

Compiler Used	Run-Time Used	Is Compiler Supported?	Is Run-Time Supported?
OS/VS COBOL	OS/VS COBOL	No	No
OS/VS COBOL	VS COBOL II Rel 3	No	No
OS/VS COBOL	VS COBOL II Rel 4	No	Yes until 3/2001
OS/VS COBOL	Language Environment	No	Yes
VS COBOL II Rel 3	VS COBOL II Rel 3	No	No
VS COBOL II Rel 3	VS COBOL II Rel 4	No	Yes until 3/2001
VS COBOL II Rel 3	Language Environment	No	Yes
VS COBOL II Rel 4	VS COBOL II Rel 4	Yes until 3/2001	Yes until 3/2001
VS COBOL II Rel 4	Language Environment	Yes until 3/2001	Yes
COBOL/370	Language Environment	No	Yes
COBOL for MVS & VM	Language Environment	Yes until 12/2001	Yes
COBOL for OS/390 & VM	Language Environment	Yes	Yes
Language Environment for MVS & VM Ver 1 Rel 5			Yes
Language Environment for VM Ver 1 Rel 6+			Yes
Language Environment Element of OS/390			Yes

OS/390, MVS, VM COBOL
Market and Service Withdraw Information

Product Name	Product Number (s)	Market Withdraw	Service Withdraw
OS/VS COBOL V1.2.4	5740-CB1 5740-LM1	Yes 06/30/1992 Yes 06/30/1992	Yes 06/30/1994 Yes 06/30/1994
VS COBOL II V1.3.x	5668-958 5688-022 5688-023	Yes 03/31/1993 Yes 03/31/1993 Yes 03/31/1993	Yes 06/30/1996 Yes 06/30/1996 Yes 06/30/1996
VS COBOL II V1.4.0	5668-958 5688-022 5688-023	Yes 06/30/1997 Yes 06/30/1997 Yes 06/30/1997	Yes 03/31/2001 Yes 03/31/2001 Yes 03/31/2001
AD/Cycle COBOL/370 1.1 COBOL for MVS & VM 1.2 COBOL for OS/390 & VM V2	5688-197 5688-197 5648-A25	Yes 10/31/1996 Yes 09/06/2000 No	Yes 10/31/1997 Yes 12/31/2001 No

Language Environment ...
  for MVS & VM Rel 5
  Element of OS/390 Ver 1
  Element of OS/390 Ver 2
	5688-198
	5645-001
	5647-A01
		Yes
		Yes
		No
			Yes 03/31/2001
			Yes 03/31/2001
			No

VSE COBOL
Compiler and Run-Time Support

Compiler Used	Run-Time Used	Is Compiler Supported?	Is Run-Time Supported?
DOS/VS COBOL	DOS/VS COBOL	No	No
DOS/VS COBOL	VS COBOL II Rel 3.2	No	No
DOS/VS COBOL	VS COBOL II Rel 4	No	No
DOS/VS COBOL	Language Environment	No	Yes
VS COBOL II Rel 3.2	VS COBOL II Rel 3.2	No	No
VS COBOL II Rel 3.2	VS COBOL II Rel 4	No	No
VS COBOL II Rel 3.2	Language Environment	No	Yes
VS COBOL II Rel 4	VS COBOL II Rel 4	No	No
VS COBOL II Rel 4	Language Environment	No	Yes
COBOL for VSE/ESA	Language Environment	Yes	Yes
Language Environment for VSE/ESA Ver 1 Rel 4			Yes

VSE COBOL
Market and Service Withdraw Information

Product Name	Product Number (s)	Market Withdraw	Service Withdraw
DOS/VS COBOL V1.3.x	5746-CB1 5746-LM1	Yes 03/24/1997 Yes 03/24/1997	Yes 12/31/1999 Yes 12/31/1999
VS COBOL II V1.3.x	5668-958 5688-022 5688-023	Yes 03/31/1993 Yes 03/31/1993 Yes 03/31/1993	Yes 06/30/1996 Yes 06/30/1996 Yes 06/30/1996
VS COBOL II V1.4.0	5668-958 5688-022 5688-023	Yes 06/30/1997 Yes 06/30/1997 Yes 06/30/1997	Yes 04/24/1998 Yes 04/24/1998 Yes 04/24/1998
COBOL for VSE/ESA	5686-068	No	No

Language Environment ...
  for VSE/ESA Ver 1 Rel 1
  for VSE/ESA Ver 1 Rel 4
	5686-067
	5686-094
		Yes 12/31/1996
		No
			Yes 12/31/1997
			No

Upgrade COBOL Technology with IBM Tools

- **Inventory and Assessment**
  - **IBM OPTI-AUDIT (5697-C85)**

- **Convert ANSI 68/74 Source to ANSI 85**
  - **COBOL and CICS Conversion Aid (CCCA/VSE) 5686-A07**

- **Convert CICS Macro-level Source**
  - **CICS Application Migration Aid: in CICS/VSE 2.3**

- **Report Writer**
  - **COBOL Report Writer Precompiler (5798-DYR)**
  - **VisualAge for COBOL Report Writer (4226060)**

- **COBOL Testing**
  - **WITT Year2000 (33H0036)**

IBM OPTI-AUDIT for VSE (5697-C85)

- **Year 2000 Inventory and Assessment**
  - Monitors VSE Phase and File Usage
  - COBOL Source Code Analysis
  - Year 2000 Conversion Tracking
  - Support for VSE/SP and VSE/ESA users

- **Software Asset Management**
  - Vendor product analysis
  - What products are installed and being used?

- **Analyzes VSE libraries**
  - Scans DASD to locate ALL libraries
  - Verifies each library and sublibrary
  - Creates an internal phase database
  - Extracts PHASE information

- **Batch Execution Analyzer**

- **VSE Resource Auditing**

- **Web Browser Interface**

- **Change Management Version Control**

- **Monitors program and dataset activity**
  - What programs are used?
  - What programs are NOT being used?
  - When was a program last used?

- **Source to Phase Bind Facility**

- **Phase is Analyzed During BIND**

- **Phase Compare Utility**

- **COBOL Phase Analyzer and COBOL Program Analysis**

- **Reports**
  - Year 2000
  - Software Asset Management
  - Resource Audit
  - Bind Reports
  - New Online Database

**APAR PQ19956 PTF UQ23076
Provides enhancements and new functions.
This is a complete reship of the product.
New manual in PTF: SC26-9135-02
IBM OPTI-AUDIT User's Guide**