



Tools to Make Your HP COBOL Applications Migration Easy

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Overview

Breaking down the 3GL migration challenge

HP COBOL

- About HP COBOL
 - An implementation of ANSI standard COBOL, with a few differences and extensions.
- Why you may need a migration tool
 - HP COBOL compiler does not exist on other platforms
 - Technologies referred to by the code do not exist on other platforms
 - Concepts are different on other platforms
 - Significant amount of code and concepts need to be adapted
 - Major investment of time and resources

Challenges of HP COBOL Migration

HP e3000 3GL applications are
proprietary to MPE/iX

- Issues exist in 4 areas: code, database, OS and user interface
 - Compiler-specific code
 - Syntax and MPE extensions
 - Platform-specific code
 - Database and MPE intrinsics
 - MPE concepts references
 - JCL, Message files, file equations, CIERROR, JCW, etc.
 - User interface / VPLUS replacement
- Database migration

Understanding HP COBOL

- How does HP Cobol differ from ANSI Cobol and other compilers? Examples:
 - Syntax and compiler directives
 - e.g. comma, dot, semicolon, “<>”, etc.
 - e.g. \$PAGE, \$TITLE, \$EDIT, \$DEFINE, \$COMMENT, \$CONTROL QUOTE, \$CONTROL LIST, \$INCLUDE
 - HP-specific extensions
 - ACCEPT MY-DATA **FREE ON INPUT ERROR**
 - CALL...**GIVING**
 - MOVE **%33** TO MY VALUE

Understanding HP COBOL

- How does HP Cobol differ from ANSI Cobol?
 - HP-specific concepts
 - e.g. MOVE **"!JOB J123, MANAGER.SYS"** TO OUT-REC
 - e.g. MOVE **"FILE MYFILE;DEV=LP"** TO COMMAND-BUF
 - e.g. Checking **CIERROR** or **return status**
 - e.g. Passing **PARM** and **INFO** on RUN command
 - e.g. Specifying an entry point
 - Reserved Words (HP or other compilers)
 - e.g. DIVIDE-BY-ZERO, BEGINNING, COMMON, DISABLE, ENABLE, ENDING, FILE-LIMITS, MORE-LABELS, PROCESSING, WINDOW

User interface

- Areas that need attention
 - Direct terminal I/O
 - Differences between HP COBOL and other compilers in the way information is displayed
 - Escape sequences and control characters
 - VPLUS forms
 - Do not exist on other platforms
 - Covered in “User Interface” presentation

Database / File interface

- Areas that need attention
 - Database
 - TurbolImage: Does not exist on other platforms
 - TurbolImage is accessed with HP Image intrinsics (lots of them)
 - Code is very specific to Image methodology
 - Usually, the intrinsics are intertwined in the application
 - Image/SQL: Does not exist on other platforms
 - Allbase/SQL: HPUX support ends in Dec 2006.
 - Omnidex/Superdex
 - File system
 - File naming (FILE.GROUP.ACCT)
 - Cobol statements or intrinsics
 - Cobol statements: OPEN, READ, WRITE
 - Intrinsics: FOPEN, FREAD, FWRITE, etc.
 - MPE file access: Sequential, Message, Circular, Temporary, RIO, Byte-Stream
 - KSAM files
 - Accessed using Cobol statements, Fxxxx or CKxxxx intrinsics

How it works today

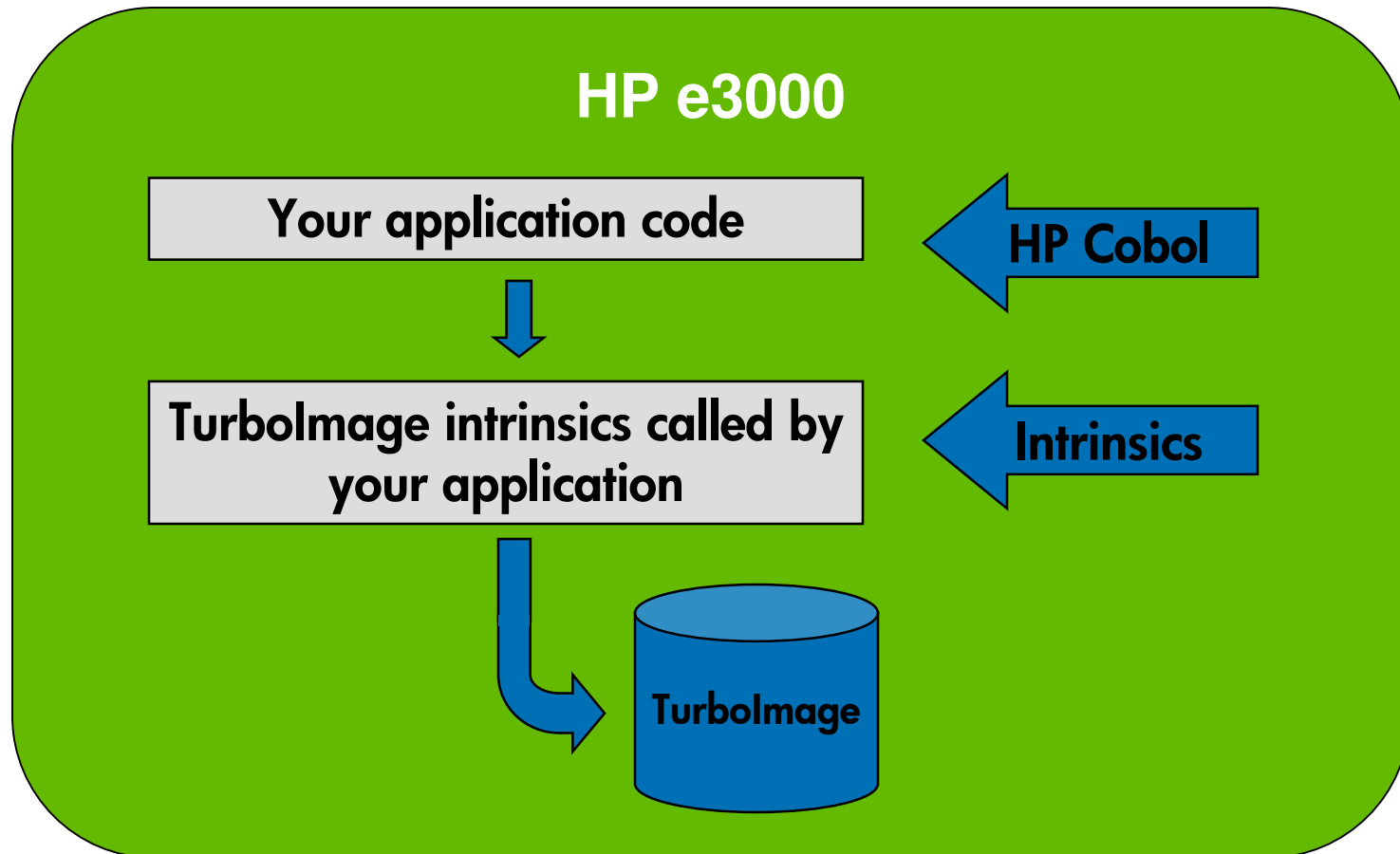


Image Look-alike Option

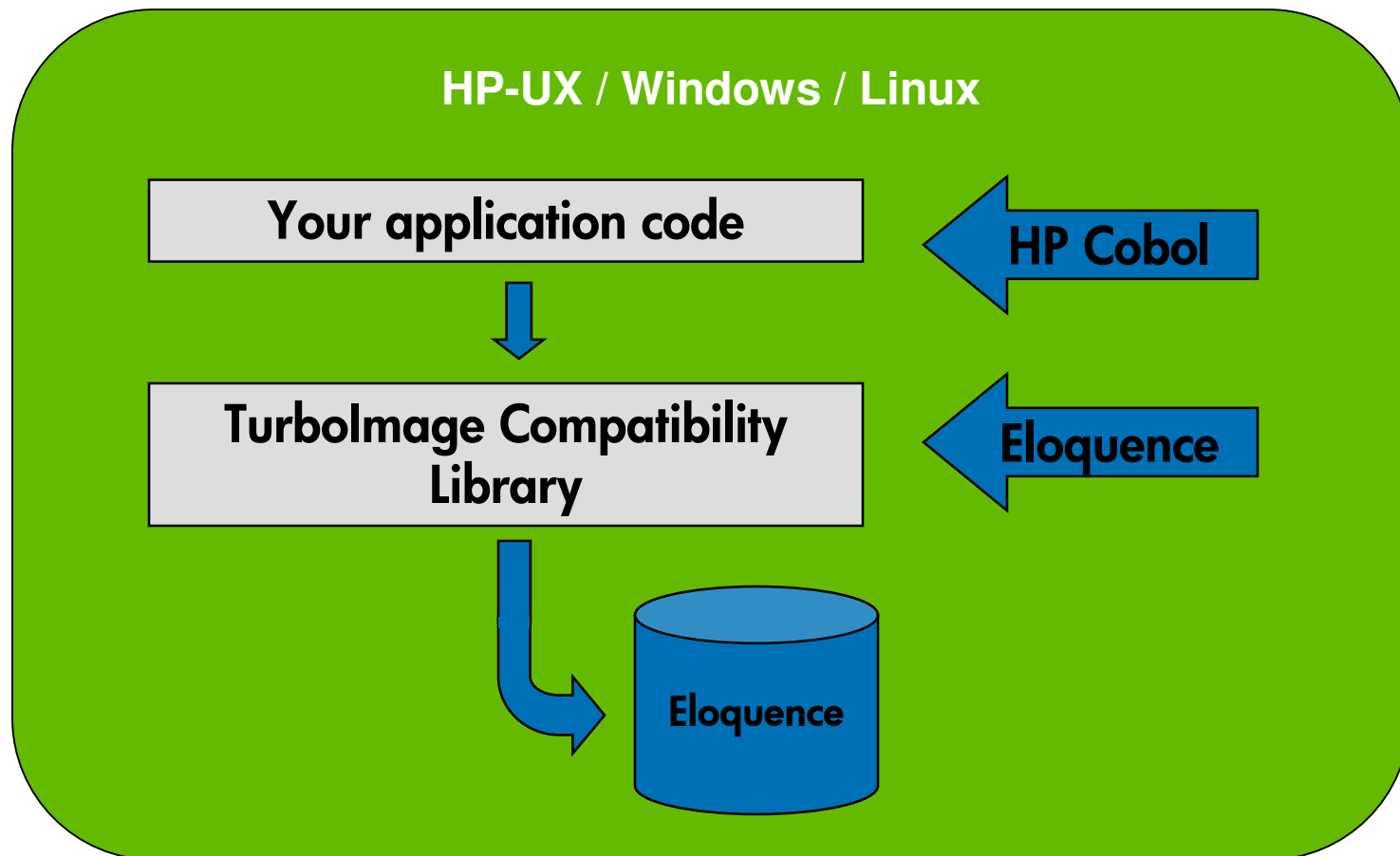
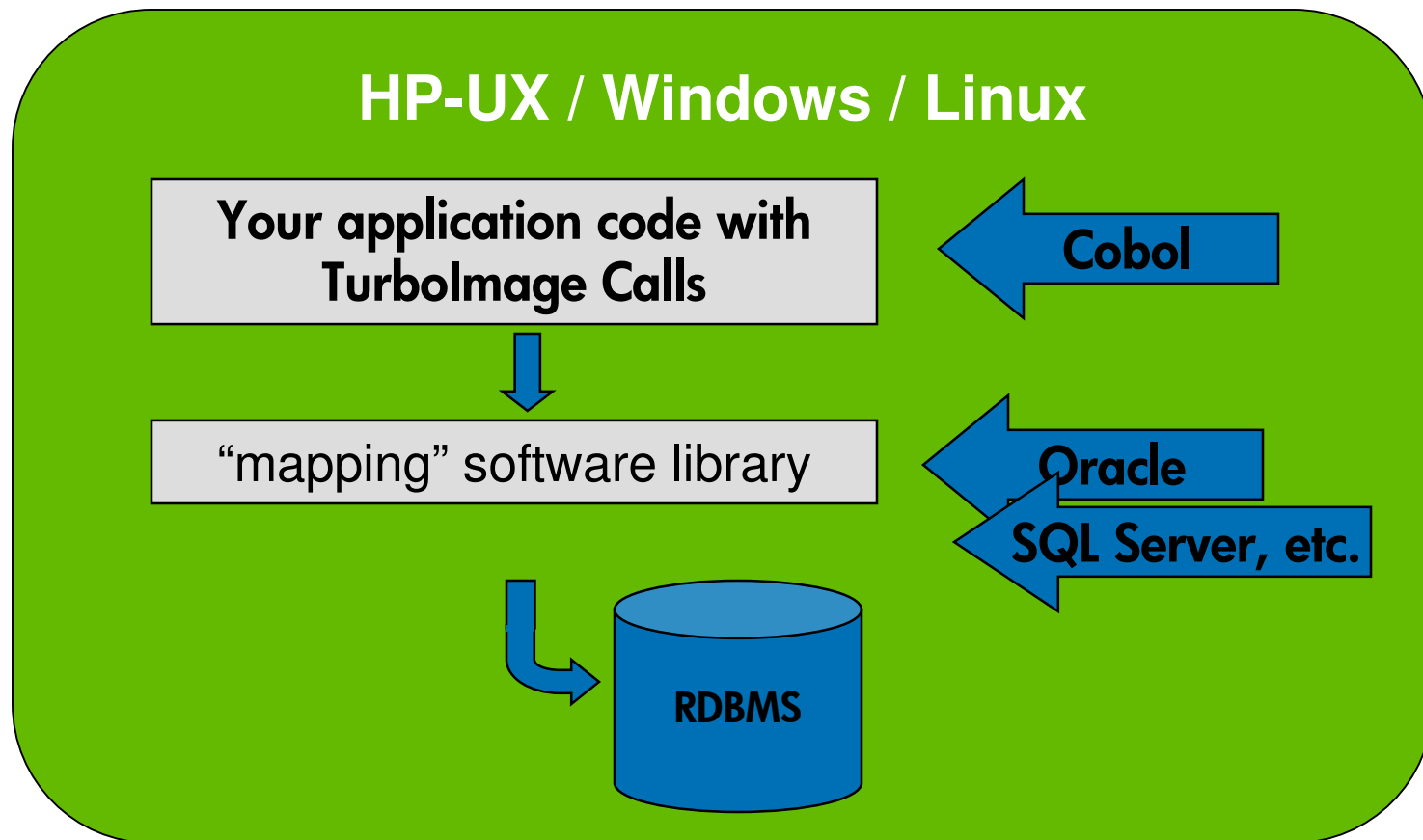
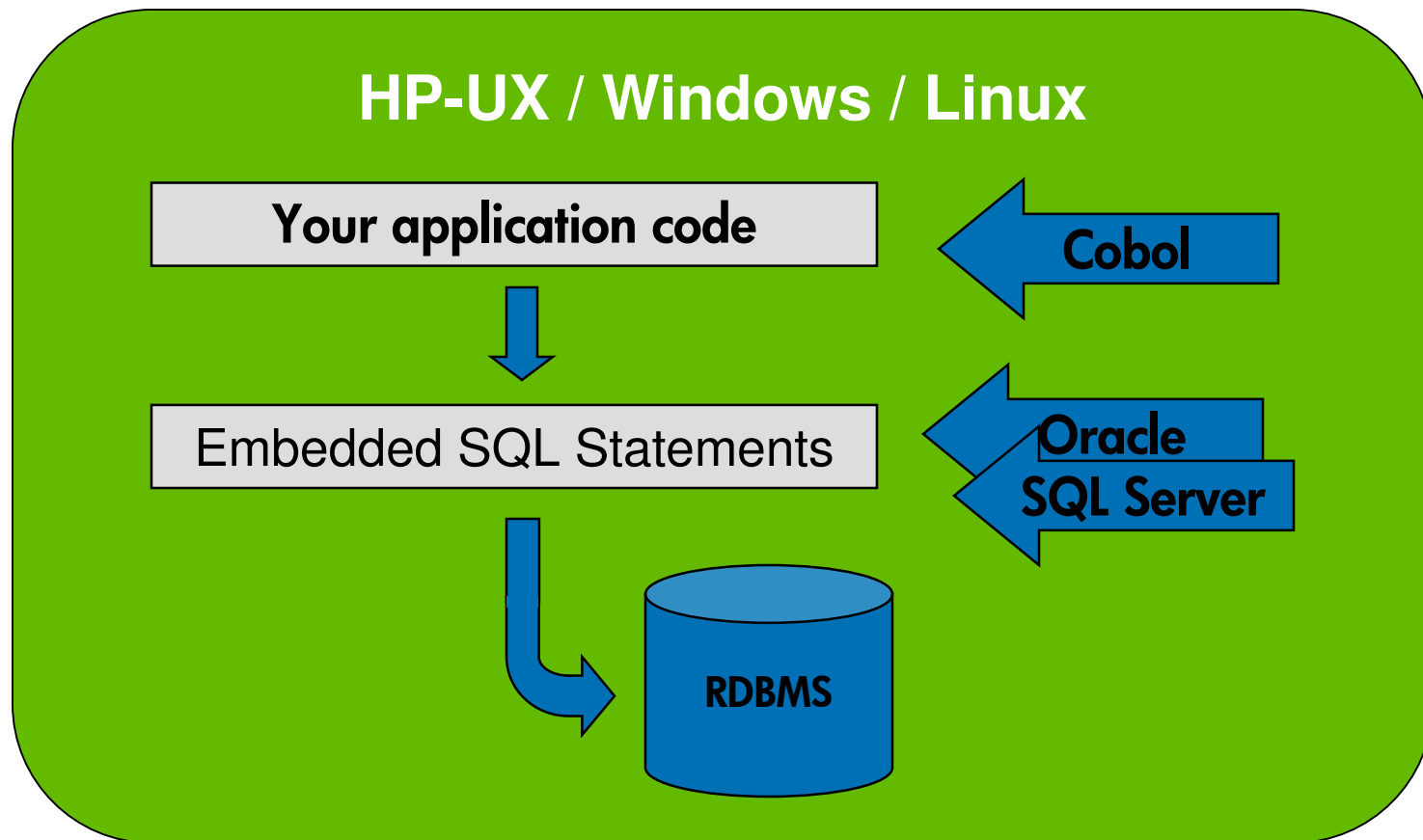


Image intrinsics mapping Option



Redesign Option



OS interface

- Areas that need attention
 - Calls to MPE system intrinsics and surround code (return-status check)
 - Execution of OS Commands
 - File equations
 - MPE-specific networking
 - UDC and command file utilization
 - JCL code
 - System variables and JCWs
 - Interaction with spoolers
 - Interaction with jobs
 - Interaction with forms
 - Interaction with hardware devices

HP COBOL specifics

- Areas that need attention
 - Cobol Concepts
 - Copylibs
 - KSAM files need to be migrated
 - Concept is done differently with other compilers
 - \$INCLUDE is done differently
 - CIERROR and intrinsics return status
 - Macro expansion does not exist with other compilers
 - SORT files
 - Sharing file IDs (FDs as Intrinsic parameters)

SUMMARY: So what is required?

- Solutions for
 - HP COBOL code conversion for new compiler
 - MPE-specific concepts
 - Database and file migration
 - Terminal interface (Direct I/O and VPLUS)
 - Additional challenges
 - External utilities replacement
 - Job files and command files
 - Inter-application or inter-system communication
 - Use of ODBC, ADO or JDBC by PC apps

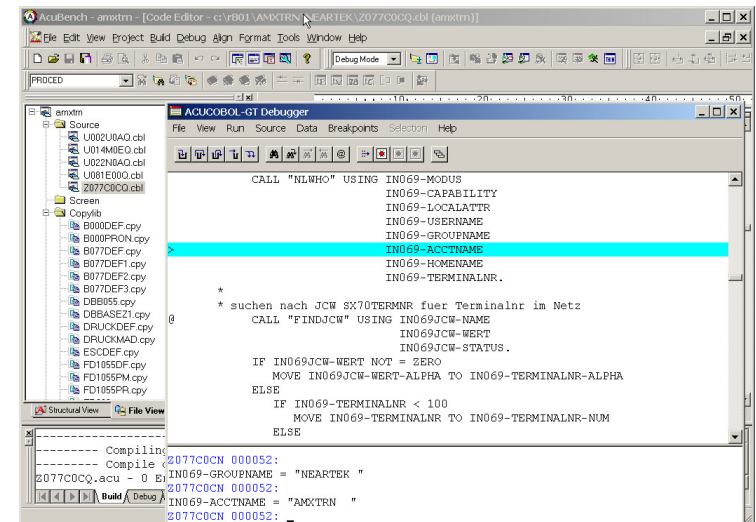


HP COBOL replacement Compilers

COBOL Compiler Options

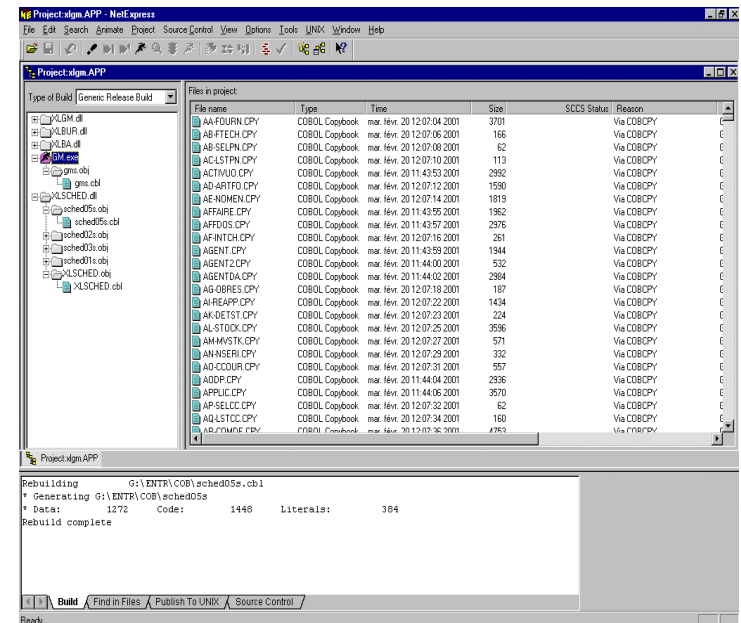
- AcuCOBOL-GT
 - AcuCOBOL-GT runtime (UNIX, Windows)
 - AcuBench

ACUCORP™



COBOL Compiler Options

- MicroFocus
 - NET EXPRESS (Windows)
 - SERVER EXPRESS (UNIX)



Cobol Compilers summary

- Microfocus' Server or Net Express
 - Largest market share
 - Priced on no. dev and users
 - Compiles into native code
 - Offers screen equivalent for GUI forms
 - Requires a lot of code changes
 - Supported by COBOL Migration solutions
- AcuCorp's AcuCobol-GT
 - Very popular in the HP e3000 community
 - Priced on no. dev and users
 - Compiles into OS independent object code and native code
 - Runs on the HP 3000!
 - Offers GUI and SQL interfaces
 - Require very little syntax changes with MPE switch compatibility
 - Supported by COBOL Migration solutions
- Fujitsu's NetCobol
 - Not as well known but proven
 - No run-time fees
 - Most .Net enabled
 - Compiles into native code for .Net
 - No popular migration tool support (sweet3000 not offered anymore)
- Legacy J's PerCobol
 - Not very popular; not marketed in the 3000 community
 - Compiles into Java byte code. Offers GUI interface.
 - No migration tool support except for ViewJ for VPLUS



Migration Solutions

Possible Migration Solutions

- Manual conversion
- Speedware's AMXW
- Ordina-Denkart's ViaNova 3000
- Transoft
- others

Manual approach

- Migrate your databases and files
- Convert HP COBOL code syntax to work with new compiler
- Convert all that is MPE-specific to platform-native equivalents
- Terminal interface (Direct I/O and VPLUS)
- Additional challenges
 - External utilities replacement
 - Job files and command files
 - Inter-application or inter-system communication
 - Use of ODBC, ADO or JDBC by PC apps
 - etc.

The AMXW Solution

- Adapts the code
 - to a new compiler
 - to run in the new environment
- Maps MPE-specifics to platform-native equivalents
 - Supports MPE intrinsics
 - Supports database and file intrinsics
 - Supports MPE commands with an MPE shell
 - Uses mapping technology; not an emulator
- Migrates databases and files
- Handles user interface including VPLUS replacement solutions

Product Overview

- Migrates applications written in many 3GLs to Unix or Windows
 - HP COBOL to MicroFocus or AcuCOBOL-GT
 - Fortran 77 to Fortran 77
 - Pascal to Pascal
 - C to C
 - SPL to C
- Solves most challenges involved in a migration process
- Flexible purchasing model: Use the tool yourself or outsource the project or a combination of both
- Cost-effective solution which yields quick results and fast Return-On-Investment (ROI)
- Proven for 12 years; used by high-profile companies

AMXW - Nearthek Automatic Migration to uniX/Windows

File Edit Project Build Tools Window ?

project

- Prototype
 - Clause Copy Library
 - Cobol Include Files
 - Cobol Source Files
 - TUTOR\COB
 - DEMOMAIN.COB
 - DEMORPT.COB
 - DEMOSUB.COB
 - DEMOWRLD.COB
 - Fortran Source Files
 - SPL Include Files
 - SPL Source Files
 - C Source Files
 - C Include Files
 - Wingspan C Screens
 - Wingspan H Screens
 - Database Schemas
 - Job Control Language Files
 - Edwin VFORMS
 - Message Catalogs

ExamDiff

Files View Navigation Search Info

Diff 1: Change line 1 (left file) to line 1 (right file)

DEMOMAIN.mpe	DEMOMAIN.mig
65 A000-Main.	210 NEWLAB SECTION.
66	211
67 Display "SPDEMO Speedware (c) 2003"	212 ACCEPT NL--CMD FROM COMMAND-LINE.
68 " Version 1.01 " when-compile	213 CALL "NLLOADENV" USING NL--CMD.
69	214
70 perform B100-Initialize.	215 A000-MAIN.
71 move 0 to vp-lastkey	216
72 perform B200-Process	217 DISPLAY "SPDEMO Speedware (c) 2003"
73 until vp-lastkey = 8.	218 " Version 1.01 " WHEN-COMPI
74 perform C300-Close-Vplus.	219
75	220 PERFORM B100-INITIALIZE.
76 goback.	221 MOVE 0 TO VP-LASTKEY
77	222 PERFORM B200-PROCESS
78 B100-Initialize.	223 UNTIL VP-LASTKEY = 8.
79 call "vopenterm"	224 PERFORM C300-CLOSE-VPLUS.
80 using forms-comarea	225
81 termfilename	226 CALL "NLTERMINATE"
82 if vp-cstatus <> 0 then	227 STOP RUN.
83 perform C300-close-vplus	228
84 display "Unable to open terminal file	229 B100-INITIALIZE.
85	230 CALL "vopenterm" USING FORMS-COMAREA
86 stop run.	231 TERMFILENAME
87 call "vopenformf"	232 IF VP-CSTATUS NOT = 0
88 using forms-comarea	233 THEN
89 formfilename	234 PERFORM C300-CLOSE-VPLUS
90	235 DISPLAY "Unable to open terminal file
	236 CALL "NLTERMINATE"
	237 STOP RUN.
	238
	239 CALL "vopenformf" USING FORMS-COMAREA
	240 FORMFILENAME
	241
	242

26 differences found

Added lines Deleted lines Changed lines

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Preprocessor used: no migration required for C:\Nearthek\NEWLAB\MPEXL\TUTOR\COB\SPDEMODB.CLC

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Preprocessor used: no migration required for C:\Nearthek\NEWLAB\MPEXL\TUTOR\COB\UCOMAREA.CLC

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Preprocessor used: no migration required for C:\Nearthek\NEWLAB\MPEXL\TUTOR\COB\UCOMSUB.CLC

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Business Benefits of AMXW

- Gets you up and running – fast!
- Quick and cost-effective
- Reduces the risk of error
- Minimizes tedious manual conversion
- Offers flexible approach
 - Purchase and migrate yourself
 - Outsource project
 - A combination of both: in-house & outsourcing

Technical Benefits of AMXW

- Automates code conversion for the new compiler and environment
- Migrates millions of lines of code in a day
- Supports the most popular MPE intrinsics and commands
- Maintains application performance and business continuity
- Enables gradual conversion of MPE-specifics to explicit native equivalents

Solution to Intrinsics

- Developed most commonly used intrinsics (system calls)*
 - **IMAGE** (*Dbbegin, Dbclose, Dbdelete, Dbend, Dberror, Dbexplain, Dbfind, Dbget, Dbinfo, Dblock, Dbopen, Dbput, Dbunlock, Dbupdate, Dbxbegin,...*)
 - **KSAM** (*Ckclose, Ckdelete, Ckerror, Cklock, Ckopen, Ckopenshr, Ckread, Ckreadbykey, Ckrewrite, Ckstart, Ckunlock, Ckwrite,...*)
 - **FILES** (*Fcheck, Fclose, Fcontrol, Fdelete, Ferrmsg, Ffileinfo, Fgetinfo, Flock, Fopen, Fpoint, Fread, Freadbackward, Freaddir, Freadlabel, Freadseek, Frename, Fsetmode, Fspace, Funlock, Fupdate, Fwrite, Fwritedir, Fwritelabel, Genmessage, lodontwait, lowait, Print, Printfileinfo, Read, Readx,...*)
 - **PROCESS** (*Activate, Create, Createprocess, Father, Getprocid, Getprocinfo, Kill, Quit, Suspend, Terminate,...*)
 - **COMMANDS** (*Command, Hpcicommand, Mycommand,...*)

* Sample listing only – several more intrinsics are available.

Intrinsics case study

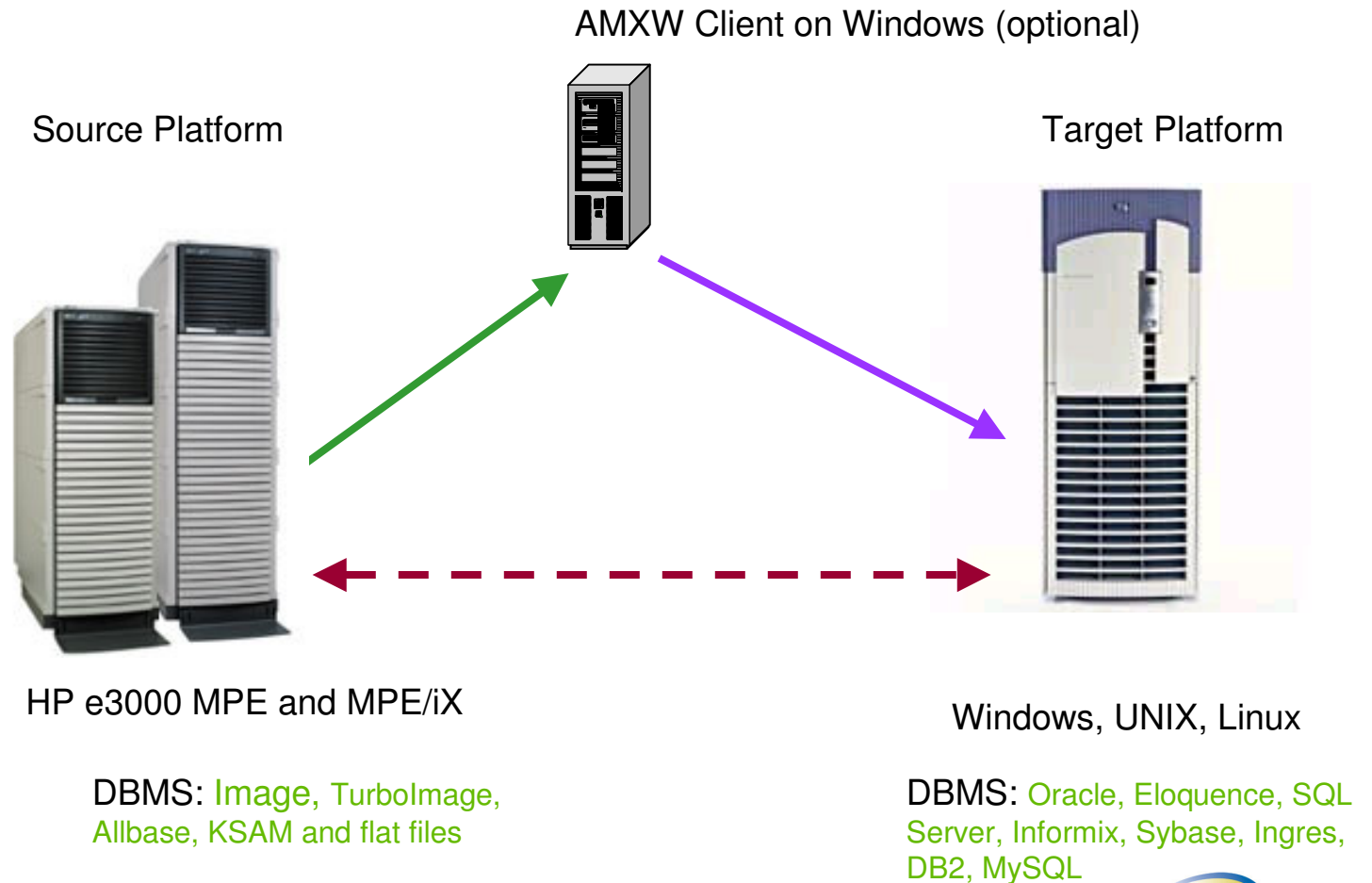
MPE system intrinsics calls					
Name	No.	Name	No.	Name	No.
ACTIVATE	6	FFILEINFO	100	GETINFO	12
ASCII	106	FGETINFO	43	HPCICOMMAND	2
BINARY	2	FINDJCW	6	PCIDELETEVAR	3
CALENDAR	2	FLABELINFO	3	HPCIGETVAR	33
CLOCK	2	FLOCK	39	HPFOPEN	1
COMMAND	170	FOPEN	745	JOBINFO	1
CREATE	1	FPOINT	499	KILL	8
CREATEPROCESS	6	FREAD	644	PRINTFILEINFO	10
CTRANSLATE	1	FREADBYKEY	8	PROCINFO	13
DASCII	48	FREADDIR	85	PUTJCW	21
DATELINE	462	FREMOVE	18	QUIT	10
DEBUG	1	FSETMODE	14	SETJCW	1
DMOVIN	4	FSPACE	0	WHO	126
DMOVOUT	3	FUNLOCK	38		
FCHECK	498	FUPDATE	14		
FCLOSE	900	FWRITE	909		
FCONTROL	319	FWRITEDIR	50		
FERRMSG	2	GETDSEG	3		

Solution to MPE Concepts

- Developed Command Interpreter (CI) commands* using most common parameters
 - **FILES** (*Build, File, Listf, Listftemp, Purge, Rename, Reset, Save,...*)
 - **PROCESS** (*Run,...*)
 - **BATCH/SESSIONS** (*Stream, Job, Showjob,...*)
 - **ENVIRONMENT** (*Input, Setjcw, Setvar, Listf, Listftemp, Purge, Rename, Reset, Save, Showjcw, HP variables and JCWs,...*)
 - **CI / UDCS** (*MPE and target OS CommandFiles, Continue, Else, Endif, Eod, Eoj, Help, If, Recall, Reply, Showcatalog, Tellop,...*)
 - **OTHERS** (*Comment, Listacct, Listgroup,...*)

* Sample listing only – several more MPE concepts are available.

AMXW Architecture



AMXW Migration Process

- Collect code source files, copy libraries, databases and files on the HP e3000
- Migrate databases and files using AMXW or DBmotion
- Import source files and copy libraries in AMXW client (optional)
- Migrate the application
 - Converts your code so that it works with your new compiler in your new environment
- Run the application
 - Uses database and OS intrinsics library
 - Uses MPE shell
 - Supports new user interface including VPLUS replacement technologies

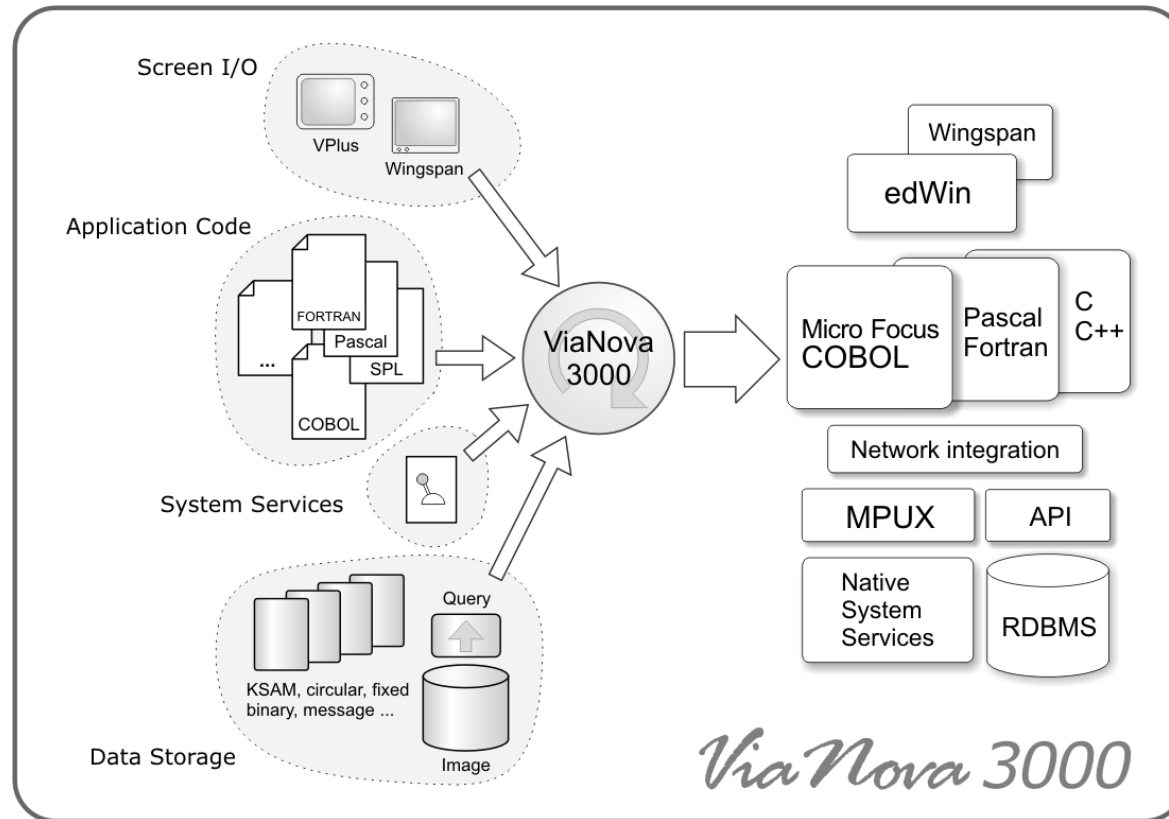
The ViaNova 3000 solution (Ordina-Denkart)

- Code conversion
 - MicroFocus: Adapts code to work with MicroFocus compiler
 - Cross-compiler outsource-based service required
 - AcuCOBOL: Uses the AcuCOBOL-GT MPE switch and MPUX emulator
 - Cross-compiler outsource-based service not required
 - Not all HP COBOL code specifics handled; some manual work required
 - Supports MPE intrinsics
 - Supports file intrinsics
 - Supports Database intrinsics through ORDAT's ti2SQL
 - Supports MPE commands with their MPE emulator (MPUX)
- Migrates databases and files (mix of ViaNova and ORDAT)
- Replaces VPLUS using their edWin/3k product

ViaNova 3000 - Solution overview

- Migrates applications written in many 3GLs to Unix or Windows
 - HP COBOL to MicroFocus (cross-compiler) or AcuCOBOL-GT
 - Fortran 77 to Fortran 77
 - Fortran to C
 - Pascal to C
 - C to C
 - SPL to C
- Solves most challenges involved in a migration process
- Outsource-based model: send the code, receive it migrated (~95%); in certain cases companies have used the tool with training
- Proven solution used by high-profile companies

ViaNova 3000 - solution overview



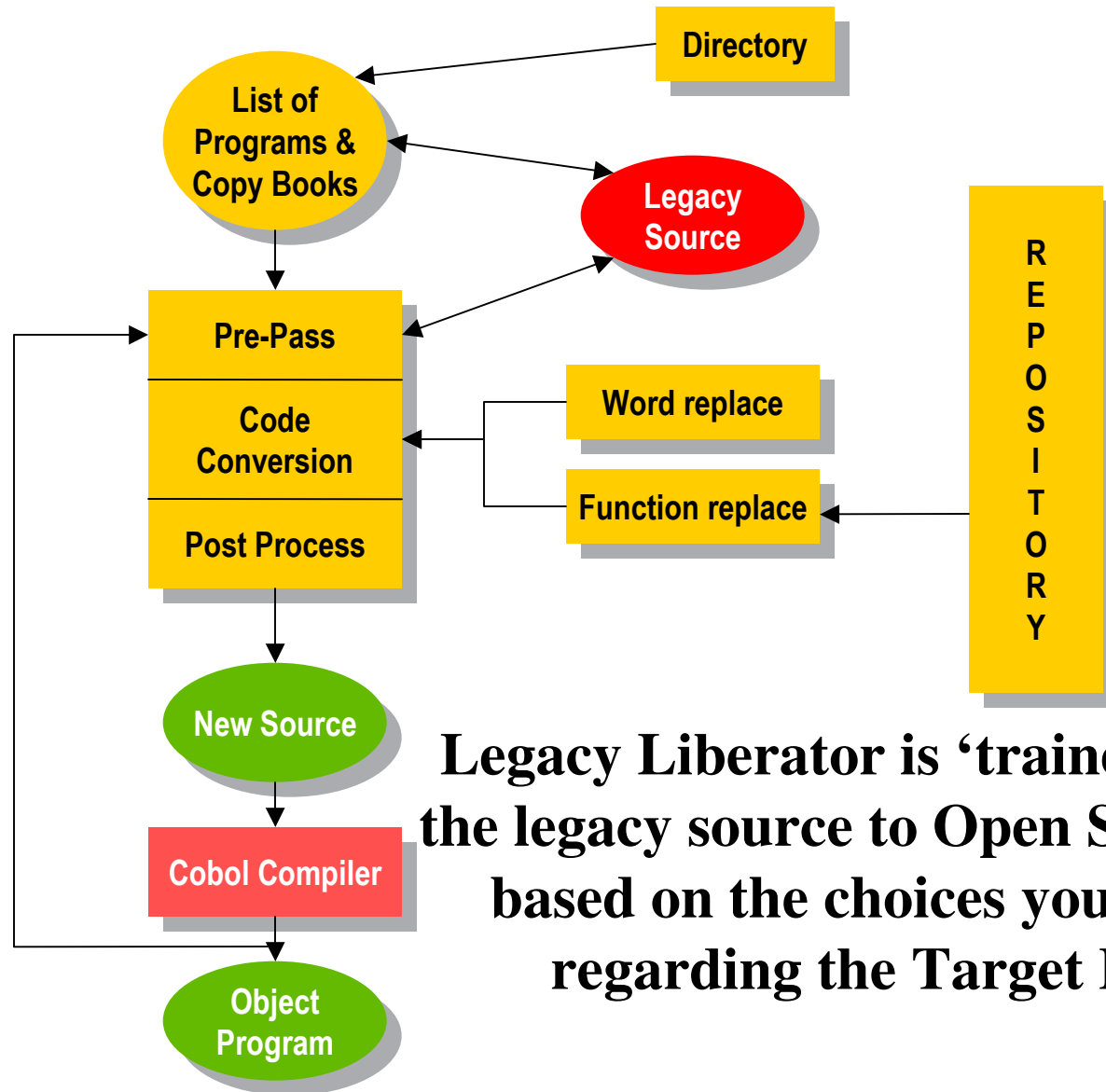
The Transoft solution

- Code conversion
 - MicroFocus: Adapts code to work with MicroFocus compiler
 - Cross-compiler outsource-based service required
 - AcuCOBOL: Uses the AcuCOBOL-GT MPE switch and converts the MPE-specific code to a platform native equivalent
- Uses their technology and services: Transoft intelligent adapters
- Converts MPE-specifics to platform-native equivalents
 - Supports MPE intrinsics
 - Supports file intrinsics
 - Supports Database intrinsics or can convert to SQL
 - Converts MPE commands to platform-native equivalents
- Migrates databases and files
- Replaces VPLUS using their GUI intelligent adapters

Transoft – solution overview

- Solution sold as Consulting Service
- How it works
 - Source code statistics sent to Transoft
 - Quote provided based on code complexity
 - Based on acceptance, code sent to Transoft
 - Converted code installed/tested at customer site with Transoft or PP

Transoft – solution overview



Legacy Liberator is ‘trained’ to convert the legacy source to Open Systems source based on the choices you have made regarding the Target Platform.

Conclusion

- How to choose a solution vendor
- Final advice
- Q&A

How To Choose A Solution Vendor?

- Factors that influence vendor choice
 - Time requirements
 - Some solutions gets you started faster than others
 - Resource availability
 - Do you prefer being directly involved with the migration?
 - Budget restrictions
 - Some solutions cost more than others
 - End result
 - Explicit native code solutions take more time and cost more
 - Faster solutions use run-time emulators or mappers
 - Preference for migration methodology / technology
 - Willingness to pay ongoing support for emulator/mapper runtime
 - Strategic IT Direction

How To Choose A Solution Vendor?

- Solution is based on what best fits the customers needs
 - Customer wants to do it themselves
 - Best Fit: AMXW is the only solution that is sold as a toolset for customers to do it themselves.
 - Alternative: ViaNova 3000 (Ordina Denkart) is a quick way for someone else to do 90%+ of the migration automation.
 - Finishing work is done manually by the customer (no tools)
 - Customer wants it outsourced
 - ViaNova 3000 (Ordina-Denkart) can provide a 100% outsourced solution
 - AMXW with a platinum partner's assistance can provide a 100% solution.
 - Customer wants the result as Native as possible (no MPE / Image emulation)
 - Best Fit: Transoft will replace all MPE / Image references with native counterparts, however, this will take longer and cost more.
 - Alternative: ViaNova Flex service from Ordina-Denkart

Final Advice

- Seek advice from Platinum Partners
 - Chosen by HP for their migration and integration expertise
 - They have done the homework on who is good at what
 - Platinum partners offer one-stop shopping for all these tools
 - Think of Platinum partners as “General Contractors” or “Migration advisors and engineers”
- Don't under-estimate how many resources a manual migration might take
 - Especially for testing
- Choose the right compiler / migration tool combination
 - Clearly identify target, budget, resource constraints, and desired end result.

Q&A

- THANK YOU!