



# Easily migrate your HP COBOL applications

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**SPEEDWARE**



# HP COBOL

- About HP COBOL
  - An implementation of ANSII 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
- Specific areas (code, database, OS, terminal)
  - Syntax
  - Extensions
  - Concepts



# Challenges with 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
    - 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?
  - 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



# Understanding HP COBOL Terminal interface – VPLUS

- Character-based
  - 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
  - Intrinsic must be converted or “mapped” with a VPLUS intrinsic library



# Understanding HP COBOL Database / File interface

## ■ Database

- TurboImage: Does not exist on other platforms
  - TurboImage is accessed with HP Image intrinsics
  - 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.

## ■ 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



# Understanding HP COBOL OS interface

- Areas that need attention
  - Calls to MPE system intrinsics
  - 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





# Understanding HP COBOL OS interface

- Cobol Concepts
  - Copylibs
    - KSAM files need to be migrated
    - Concept is done differently with other compilers
  - \$INCLUDE is done differently
  - Macro expansion does not exist with some other compilers
  - Arrays may need some manipulation
  - Record structures
  - Sharing file IDs (FDs as Intrinsic parameters)
- Externals
  - Passing of parm and info in run command
  - File equations
  - SORT files
  - Entry points
  - CIERROR
  - Job/session environment (e.g. Temp files)



# SUMMARY: So what is required?

- Code conversion
  - Compiler-friendly syntax
  - MPE-specifics
- Database and file migration
- Additional challenges
  - External utilities replacement
  - Job files and command files
  - Inter-application or system communication
  - Use of ODBC, ADO or JDBC



# Possible Migration Solutions

- Manual conversion
- Speedware's AMXW
- Ordina-Denkart's ViaNova 3000
- Transoft (outsourced solution)
- others



# 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
- Migrates databases and files
- Handles user interface including VPLUS replacement solutions



# Product Overview

- Migrates HP 3GL applications written in COBOL, FORTRAN, SPL, C and PASCAL to UNIX, Linux or Windows
- Solves most challenges involved in a migration process
- Flexible purchasing model: Use the tool yourself or outsource the project
- Most cost-effective solution which yields quick results and fast Return-On-Investment (ROI)



# 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 Intrinsic

- Developed most commonly used intrinsic (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, Iodontwait, Iowait, Print, Printfileinfo, Read, Readx,...*)
  - **PROCESS** (*Activate, Create, Createprocess, Father, Getprocid, Getprocinfo, Kill, Quit, Suspend, Terminate,...*)
  - **COMMANDS** (*Command, Hpcicommand, Mycommand,...*)

\* Sample listing only – several more intrinsic 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	PCDELETEVAR	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		

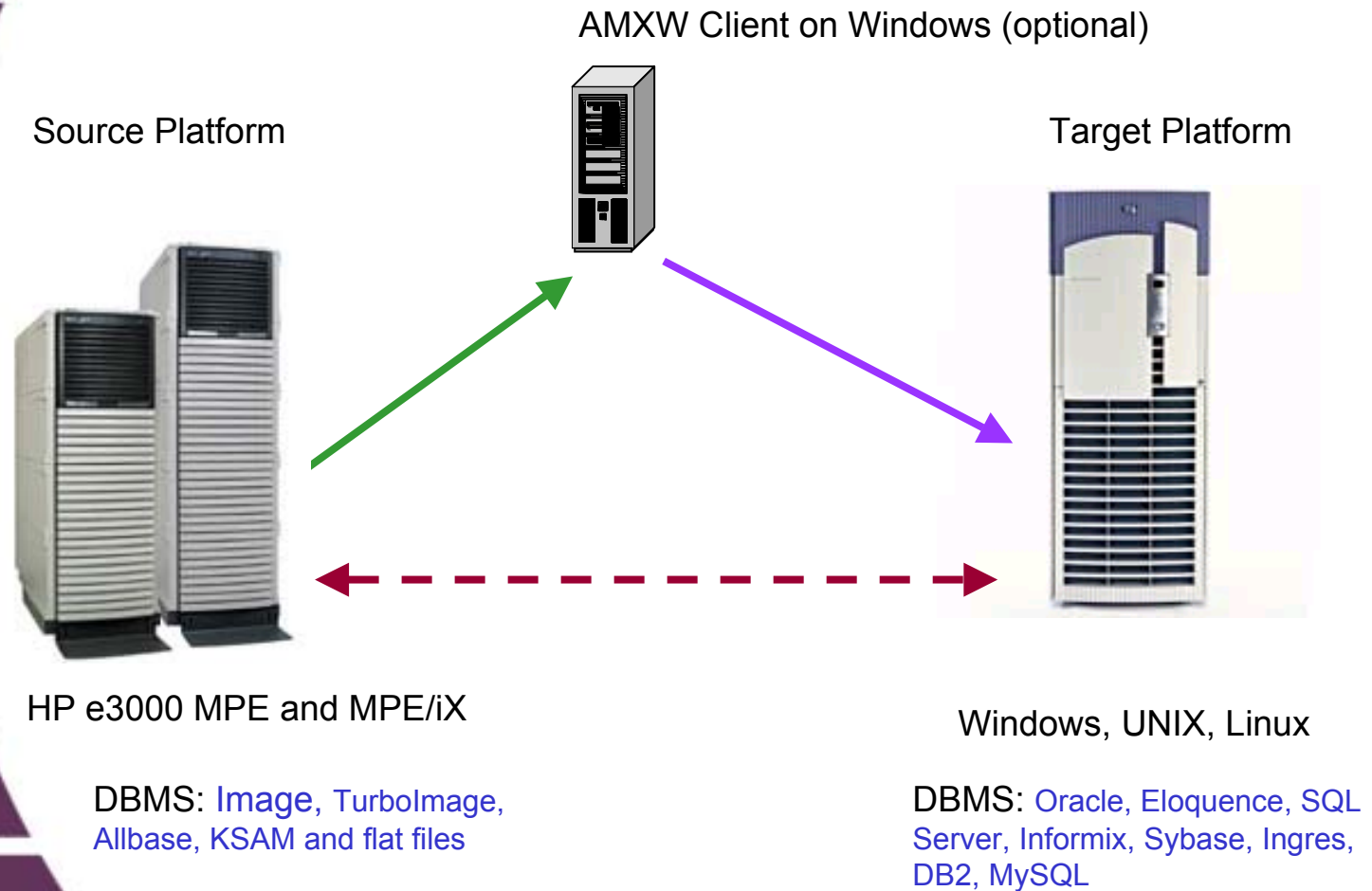


# Solution to MPE Concepts

- 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



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



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-COMPILED
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 "vopenformf"	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 "vopenformf" 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

```

Wed 09/17/2003
04:24 PM
Preprocessor used: no migration required for C:\Nearthek\NEWLAB\MPEXL\tUTOR\COB\SPDEMO.DB.CLC
Wed 09/17/2003
04:24 PM
Wed 09/17/2003
04:24 PM
Preprocessor used: no migration required for C:\Nearthek\NEWLAB\MPEXL\tUTOR\COB\UCOMAREA.CLC
Wed 09/17/2003
04:24 PM
Wed 09/17/2003
04:24 PM
Preprocessor used: no migration required for C:\Nearthek\NEWLAB\MPEXL\tUTOR\COB\UCOMSUB.CLC
Wed 09/17/2003
04:24 PM
  
```




# Supported Platforms

- Target Environments

- Most common UNIX, including HP-UX, IBM AIX, Sun Solaris
- Linux RedHat
- Windows 2000 / XP



# Supported Databases

- AMXW supports numerous databases
  - ORACLE 
  - ELOQUENCE 
  - MICROSOFT SQL SERVER 
  - INFORMIX, INGRES, SYBASE, DB2\*\*, MYSQL\*\*  
\*\* 3rd-party tool
- AMXW offers optimal performance by mapping the database intrinsics to RDBMS-native equivalents

# COBOL Compiler Options

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

ACUCORP™

```
CALL "NLWHO" USING IN069-MODUS
IN069-CAPABILITY
IN069-LOCALATTR
IN069-USERNAME
IN069-GROUPNAME
IN069-ACCTNAME
IN069-HOMENAME
IN069-TERMINALNR.

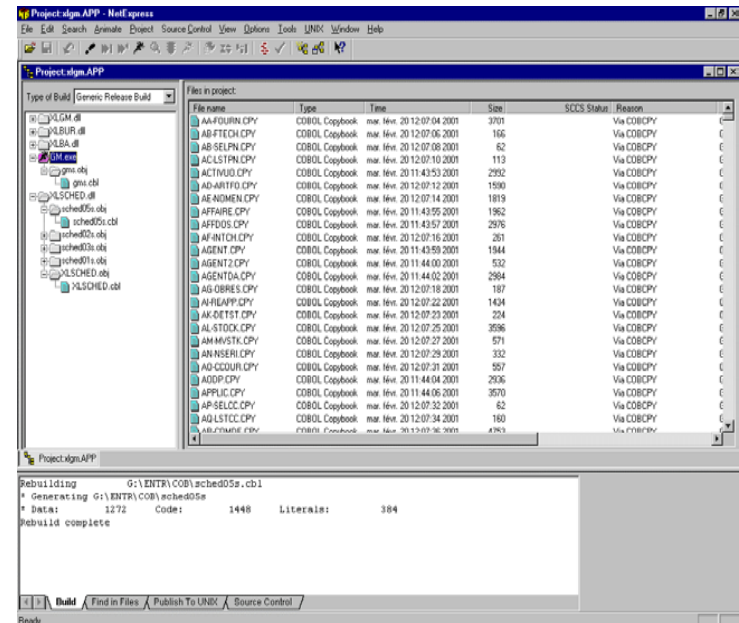
* suchen nach JCM SK70TERMR fuer Terminalnr im Netz
CALL "FINDJCM" USING IN069JCM-NAME
IN069JCM-WERT
IN069JCM-STATUS.
IF IN069JCM-WERT NOT = ZERO
MOVE IN069JCM-WERT-ALPHA TO IN069-TERMINALNR-ALPHA
ELSE
IF IN069-TERMINALNR < 100
MOVE IN069-TERMINALNR TO IN069-TERMINALNR-NUM
ELSE

----- Compilin
Compile
Z077C0CQ.acu - 0 E IN069-GROUPNAME = "HEARTEK "
Z077C0CQ.acu - 0 E IN069-ACCTNAME = "AMXTRN "
```



# COBOL Compiler Options

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





# AMXW and User Interfaces

- AMXW maintains terminal I/O functionality
- AMXW is compatible with the most popular VPLUS replacement technologies
  - EdWin/3K (Ordina-Denkart)
  - LookVP (Cheops)
  - AcuBench screens using Screenjet (Screenjet)



# Demo

- Source Environment

- Platform: HP e3000
- Compiler: HP COBOL
- Database: TurbolImage
- User Interface: Terminal I/O and VPLUS

- Target environment

- Platform: HP 9000
- Compiler: AcuCOBOL-GT (Acucorp)
- Database: Eloquence (Marxmeier)
- User Interface: Edwin/3K (Ordina-Denkart)

- Migration solution: AMXW



# AMXW for Other 3GLs

- FORTRAN
  - Migrate FORTRAN 77 to FORTRAN 77
- SPL
  - Migrate to C
- Pascal
  - Migrate to Pascal on UNIX or Windows
- C
  - Migrate to C on UNIX or Windows



# AMXW Success

- **ORDAT**

- ERP vendor
- Has been using AMXW for more than 10 years
- Reference platform: HP e3000
- 12,000,000 lines of code migrated every day to all their target platforms: HP-UX, RS6000, Sun, Linux and Windows



# AMXW Success

- Expeditors
  - 160 HP e3000 data centers worldwide
  - 300,000 lines of code written in COBOL, SPL and C
  - HP e3000 and TurboImage Migration to Sun and DB2
  - Using multiple job queues
  - Extensive use of AMXW's MPE shell and MPE system intrinsics



# AMXW Customers

- ISVs (software vendors)
  - ARES, CIRIL, DATASTREAM, EDS-GFI, IMPULSION, ORDAT, RCS, TJ-SYSTEMS, UNILog, eBOOTIS, CORTIS-LENTINI
- Companies that migrated their own sources:
  - PITNEY BOWES, TEFAL, IMSS, EXPEDITORS
- Customers using AMXW:

ALEXANDER BINZEL  
GMBH, AUTOPRATIC,  
BRODARD  
GRAPHIQUES, BROSE,  
BUZIL, BVA, CGEP,  
CHAPELLE DARBLAY,  
COHLINE, DALIM, DETIA,  
DHW, DOLE, DUNLOP,  
EHLEBRACHT, EMIG  
GMBH & Co, EOSA,  
FRANCELOG, GTI,  
HELIO-CORBEIL, HAL,  
HELLA, HETTICH,  
HUTTENES ALBERTUS  
GmbH, ICI, IMV,  
INOTECH, INOPLAST

KRUPP AUTOMOTIVE  
SYSTEMS GMBH, LA  
ROCHETTE-VENIZEL,  
LEMM, LUXOPLAST,  
MONTAVIT, NASCO,  
OTOR, PAD, PIAZZA,  
QUATP, RADSYSTEM  
GMBH, SACRED, SAS,  
SAXONIA, SCHI, SEB,  
SECURIT ST GOBAIN,  
SOPELEM, TJ SYSTEMS,  
VALOUREK, VAMAV,  
VENTREX, WALTER  
MADER AG,  
WERKSTOFF, WOESTE,  
ZALTECH, ZEIT



# AMXW Distributors

- Speedware
- Hewlett-Packard
- LUND Performance Solutions
- Managed Business Solutions
- M.B. Foster
- Open Seas
- Cheops France
- Cortis-Lentini
- Ordat
- e.bootis





# Pricing

- Flexible pricing based on
  - Number of lines of code
  - Number of CPUs on the target server(s)
- For ISVs, contact Speedware
- Enterprise license available
- ASP license model available



# Support

- Technical Support for AMXW is available through Speedware's SCP-certified Call Center
- Also available through certain distributors



Thank You



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