Compilers and Software Development Tools

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Europe 2009 Technical Update Days

Agenda

- Compilers

- Distributed Netbeans

- GNV

- DECset

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General Development Notes

- Use the latest versions of the compilers before porting to OpenVMS IA64

- Object file and image file sizes are larger on OpenVMS IA64 than on OpenVMS Alpha

- Pay attention to floating point format

  - Integrity supports IEEE only in hardware

  - Alpha supports IEEE and VAX Float in hardware

  - http://h71028.www7.hp.com/ERC/downloads/i64-floating-pt-wp.pdf

- Alignment faults are more costly on IA64 than on Alpha

- Runtime behavior may be different on IA64 if you're relying on "undefined" results

  - For example: COBOL divide by zero

- Refer respective product's Release Notes

  - list of fixes, problems and restrictions

HP C for OpenVMS

- Current version
  - C V7.3 for OpenVMS I64/Alpha
- v7.3 Features
  - Multiple versions coexist
  - New option for /POINTER_SIZE=LONG (=ARGV)
  - Fixes for issues related to /OPT
  - RETPARMCONST error
  - #line directive with large integer values – LINETOOLARGE warning
- Future version
  - C V7.4 for OpenVMS I64/Alpha

HP C – Migration to IA64

- Language features and command line options same as HP C V6.5
- /ARCH and /OPTIMIZE=TUNE qualifiers are accepted but Alpha-only arguments and ignored
  - Allows existing command files to continue to work
- Inline assembly language code (ASM) is not supported
- #pragma linkage maps the Alpha registers to IA64 registers
- #pragma linkage_alpha and #pragma linkage_ia64 have been added
  - Used to specify the platform specific register names to use
- Compiler is installed using PRODUCT INSTALL
  - Earlier Alpha compiler installed using VMSINSTAL

Migration to IA64 - Built Ins

- Most existing Alpha builtins continue to work

- Compiler issues diagnostic message where different builtin preferable
  - Significant number of __PAL builtins implemented as system services

  - The compiler generates code to call the appropriate system service

  - Builtins that take a retry count provoke a warning and are ignored
    - Absence of the load-locked/store-conditional sequences on IA64

  - __CMP_STORE_LONG and __CMP_STORE_QUAD
    - Warning or Error depending the source and destination addresses

  - Consult builtins.h and pal_builtins.h for details

Migration to IA64 - Floating point

- Use /FLOAT= qualifier to use VAX floating point format
- Floating point defaults
  - /FLOAT=IEEE_FLOAT
  - /IEEE_MODE= DENORM_RESULTS

- Compiler predefined macros:
  - __ia64 and __ia64__
  - Do not define the macro __ALPHA as a quick "hack"

C++ For OpenVMS

- Current version
  - C++ V7.3 for OpenVMS I64/Alpha
- v7.3 - New Features
  - PURE_UNIX – Process wide exception processing mode
  - Symbol DEBUGGING in top level unnamed namespaces
  - /EXPORT_SYMBOLS and __declspec(dllexport)
  - /POINTER_SIZE=LONG=ARGV
  - Multiple Versions co-exist
  - Fixes for optimization and bug fixes
- Future version
  - C++ V7.4 for OpenVMS I64/Alpha

HP C++ - Migration to IA64

- New compiler technology differing substantially from HP C++ for OpenVMS Alpha

  - Mostly source compatible with HP C++ V6.5 with some differences

- Inline assembly language code is not supported

- /STANDA10RD=CFRONT is not supported

- The object model is different than Alpha

- Name mangling scheme different than Alpha

- Compiler is installed using PRODUCT INSTALL

  - Alpha compiler installed using VMSINSTAL

Migration to IA64 - Command line

- Command line differences
  - Comma lists are not supported
  - Below Qualifiers not supported
    - /INSTRUCTION_SET=NOFLOATING_POINT not supported
    - /L_DOUBLE_SIZE=64 is not supported/L_DOUBLE_SIZE=128 used
  - /POINTER_SIZE=(LONG,64) is now supported
  - Identify / Fix qualifier problems
    - Use /WARN=ENABLE=QUALCHANGE and =QUALNA
  - Floating point defaults
    - /FLOAT=IEEE_FLOAT
    - /IEEE_MODE= DENORM_RESULTS

Migration to IA64 - Built Ins

- Most existing Alpha builtins continue to work
- Issues diagnostic message if different builtin preferable
  - Most of __PAL builtins implemented as system services
  - Generates code to call appropriate system service
  - Builtins that take a retry count provoke a warning and are ignored
    - Absense of the load-locked/store-conditional sequences on IA64
  - __CMP_STORE_LONG and __CMP_STORE_QUAD
    - Warning or an error depending on source and destination addresses
  - Consult builtins.h and pal_builtins.h for details

Migration to IA64 - Template

- Template instantiation
  - IA64 only uses COMDAT section groups
    - Alpha had numerous models
    - Similar to /TEMPLATE=LOCAL on Alpha
    - Linker removes duplicate copies
    - Model eliminates distinct data in each section
  - Little differences if you're using
    - /TEMPLATE=LOCAL or /TEMPLATE=IMPLICIT_LOCAL
  - No repository is needed. Builds that manipulate objects in the repository will need to be changed

Migration to IA64 - Exception Handling and Standard Library

- Exceptions and Condition Handlers
  - /EXCEPTIONS=NOCLEANUP is not implemented
  - On IA64 the stack is unwound before calling
    - On Alpha the stack is not unwound
  - Asynchronous exceptions will not work
- C++ Standard Library has been upgraded and organized as a shareable image
  - Tasks and Complex Package have been removed
    - Replace with pthreads routines and complex template class
  - The char*() operator has been removed form the String Class
    - use const char*() operator instead
  - Upgraded to Version 3.0 of the Rogue Wave C++ Standard Library
  - New Standard Library is stricter about requiring library headers

FORTRAN

- Current version
  - Fortran V8.2 for IA64 and Alpha
- Language features and command line options same as earlier
- Floating point defaults – IEEE_FLOAT
- /FLOAT qualifier to use VAX floating point format
- /OLD_F77 switch is no longer supported

- New Features in V8.2
  - /ASSUME=64_BIT_STRING_PARAMS
  - Bug Fixes

- Future version
  - Fortran V8.3 for IA64 and Alpha

COBOL for OpenVMS

- Current version
  - COBOL V2.9 for OpenVMS IA64 and Alpha
    - /NAMES=AS_IS qualifier
    - /VERSION qualifier
    - Bug Fixes
- Future version
  - COBOL V3.0 for IA64 and Alpha

Pascal for OpenVMS

- ## Current version
  - Pascal V6.1 for OpenVMS IA64 and Alpha
    - Several new qualifiers based on customer requests for DCL level control of module-ident, PEN file checking, and CDD quadword translations.
    - New statements (Select and Selectone)
    - Bug Fixes
  - I64 RTL ECOs for RTL memory leak

- ## Future version
  - Pascal V6.2 for IA64 and Alpha

BASIC for OpenVMS

- Current version
  - BASIC V1.7 for OpenVMS IA64 and Alpha
    - Some RTL performance improvements on I64 systems (RTL bundled in OS, not in compiler kit)
    - RTL feature to reduce file-not-found/record-not-found overhead with file I/O
    - Bug Fixes

- Future version
  - BASIC V1.7 ECO release for IA64 and Alpha

Macro-32 for OpenVMS

- Bundled with OpenVMS OS

- Current version
  - Available with OpenVMS OS
  - Bug Fixes
  - ECOs for V8.3 and V8.3-1H1 on IA64

- Future version
  - Bundled with OS

BLISS

- HP BLISS V1.012 for IA64 and Alpha
- Builtins, PALcode builtins, and register naming are significantly different on IA64 than on Alpha
  - Consult the Release Notes for details
- /ANNOTATIONS command line qualifier will provide information in the listings about compiler optimizations
- GRANULARITY - To control granularity of stores and fetches
  - Implemented as a command line qualifier, switch, and data attribute
- Short Data Sections are supported
  - PSECT attributes GP_RELATIVE and SHORT

Java for OpenVMS Integrity and Alpha

- Current releases
  - JAVA 6.0 (only available on Integrity)
    - JDK and JRE 6.0 available on OpenVMS Integrity
  - JAVA 5.0
    - JDK and JRE 5.0-6 available for OpenVMS Alpha
    - JDK and JRE 5.0-5 available for OpenVMS Integrity
  - JAVA 1.4.2
    - Supported on Integrity and Alpha

DIBOL

- Synergex Synergy/DE is DIBOL compiler on OpenVMS, both Alpha and IA64

- Designed to be 100% source code compatible

- Millions and millions of lines of code ported with no changes required

Ada for OpenVMS

- GNAT Pro 6.2-1 (Ada) OpenVMS for IA64 and Alpha
  - Support for Ada 2005,Ada83 and Ada 95
  - Compatible with HP Ada on OpenVMS Alpha and VAX
  - Porting guide for migrating application to Integrity
  - Comprehensive GNAT Pro toolset and libraries
  - Debugging via OpenVMS Debug
- HP Ada
  - Ada 83 compiler for OpenVMS Alpha and VAX are mature products.
  - HP Ada V3.5A for OpenVMS Alpha and VAX.
  - HP Ada not being ported to Integrity.
- Customers can consult with AdaCore on Alpha/VAX to Integrity migration plans.
  - sales@adacore.com , www.adacore.com

Compiler Migration at a glance

| Alpha		Porting	Integrity
Compiler	**Version**	Action	Version
C	**V6.5**	Ported	V7.3
C++	**V6.5**	New from Intel	V7.3
Fortran 77		Not Ported	
Fortran 90	**V7.5**	Ported	V8.2
Cobol	**V2.8**	Ported	V2.9
Basic	**V1.5**	Ported	V1.7
Pascal	**V5.9**	Ported	V6.1
Java	**V1.4.2**	Implemented	V6.0
ADA 83		Not Ported	
ADA 95		New from ACT	V6.2-2
AMacro		IMacro created	
BLISS	**V1.01**	Ported	V1.12
Macro64		Not Ported	
IAS	**N/A**	Available	v7.0U (7.00.4160)
Dibol		Ported by Synergex	
Acucorp Cobol		Ported by Acucorp	
PL/I		Not Ported	

Agenda

- Compiler Differences on IA64
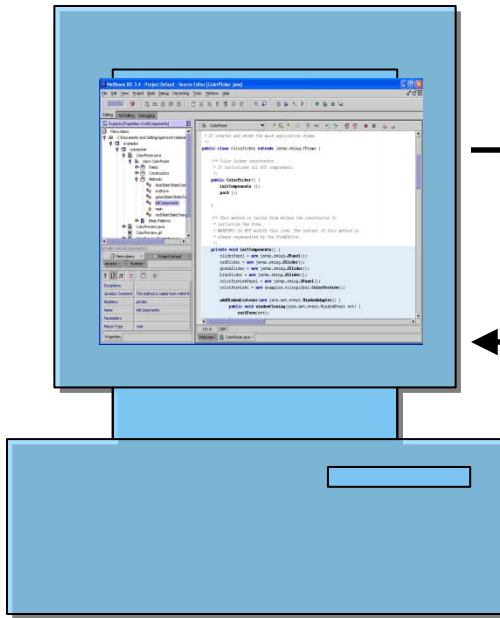- Distributed Netbeans
- GNV
- DECset

Distributed NetBeans

- Allows any desktop (Windows, Linux, HP-UX, etc.) to be used

- NetBeans runs on the desktop, with our plug-in installed (Windows, Mac-OS, Linux, HP-UX…)

- Provides

  - Editing with syntax highlighting

  - Remote compilation

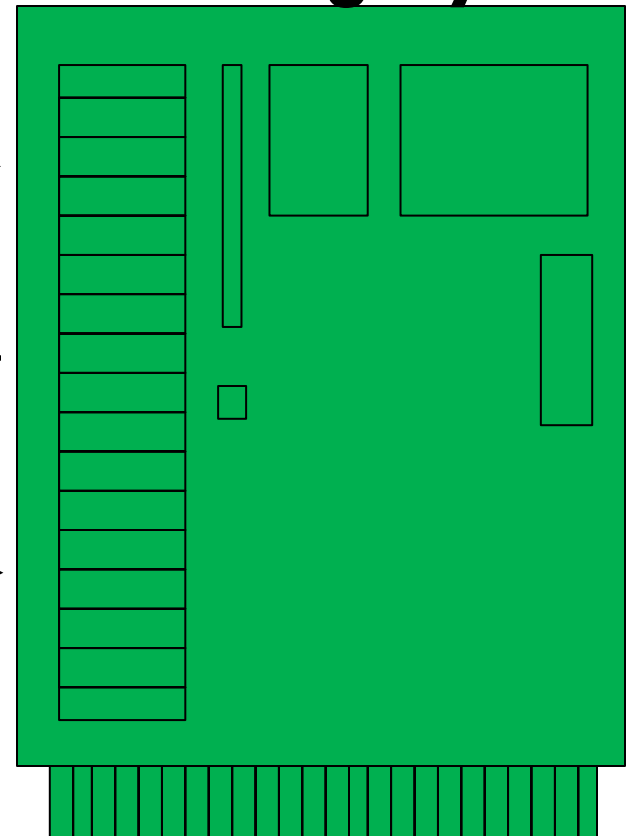 - Error navigation

  - Remote execution

  - Remote debugging
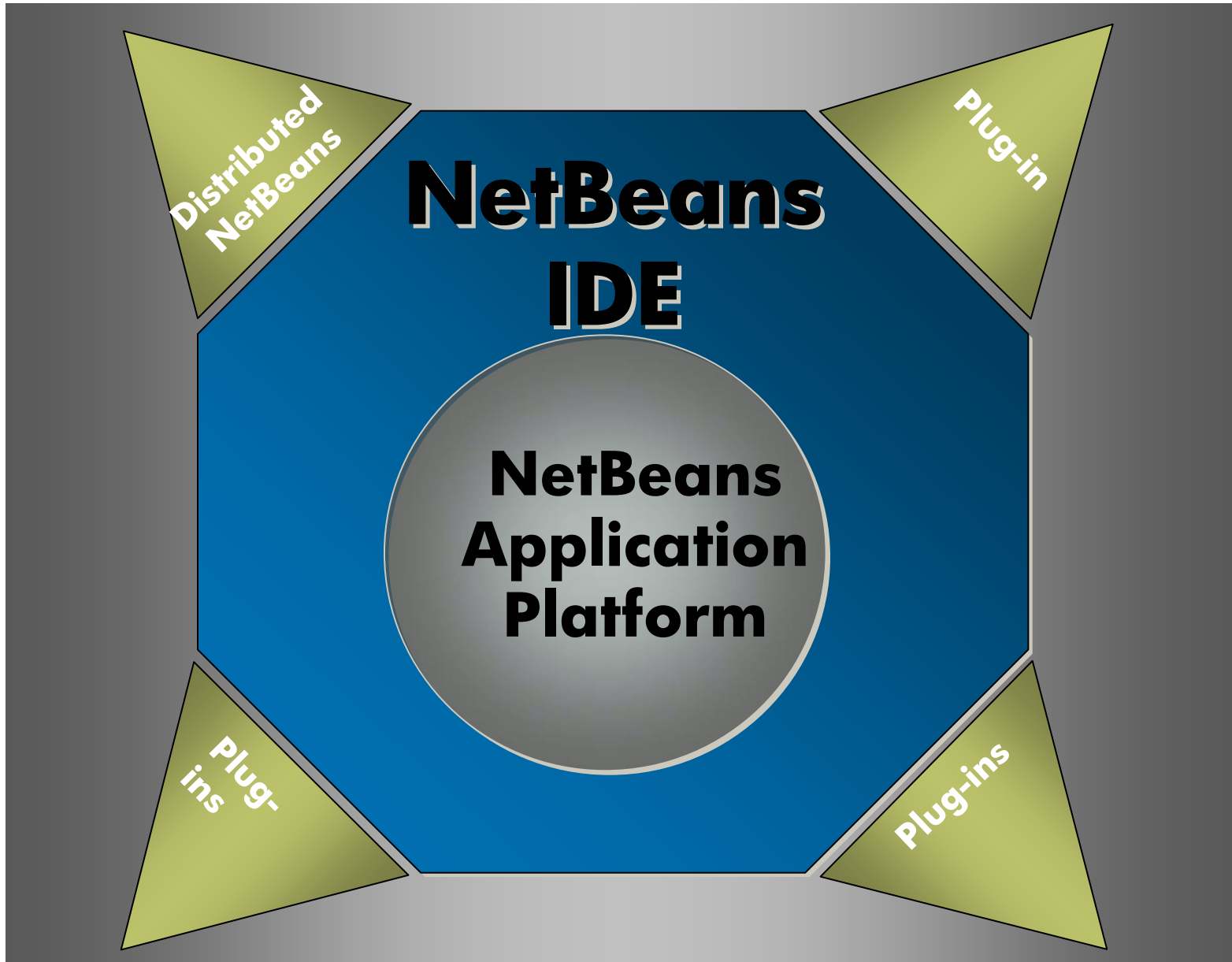
Distributed NetBeans

HP Desktop Computer

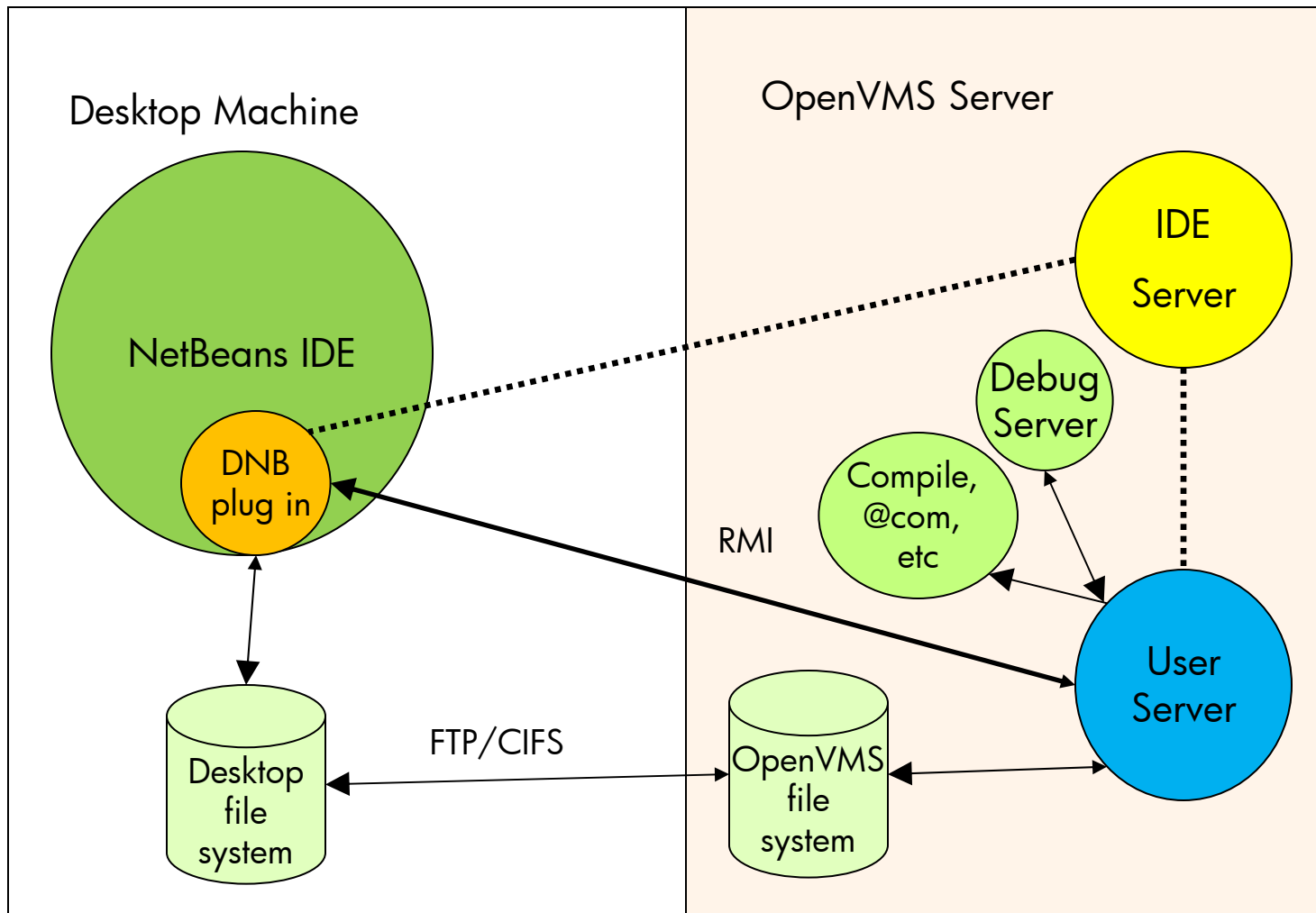**OpenVMS Alpha or Integrity**

DCL Commands

DCL Command Output

FTP/CIFS

Anatomy of Distributed NetBeans

Desktop Machine

OpenVMS Server

NetBeans IDE

DNB plug in

IDE Server

Debug Server

Compile, @com, etc

User Server

RMI

Desktop file system

FTP/CIFS

OpenVMS file system

Distributed NetBeans for OpenVMS

- Distributed Netbeans V5.5 – Current version
- Native NetBeans
  - OpenVMS Version 8.3 Alpha and Integrity last releases on which NetBeans 3.6 for OpenVMS is supported.
  - NetBeans 3.6 will be supported over the support life of OpenVMS 8.3.
  - Only supported on Java Platform, Standard Edition, Development Kit (JDK) v 1.4.2-x. Media Distribution

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GNV

- GNV – **G**NU is **N**ot **V**MS
- Delivers Unix tools and utilities
- Implements Unix BASH shell
- Provides many typical Unix tools and utilities for:
  - General purpose
  - Command manipulation
  - Program creation
  - File manipulation
  - Text processing
  - Printing
  - Networking
- Current version – 2.1
- Future – 2.2 would get released soon.

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DECset for OpenVMS

- Current version
  - DECset V12.8-1 for OpenVMS I64 and Alpha Q2 2007
    - Provide full ODS-5 Disk Structure Support
    - Improve CMS memory management
    - Updated LSE templates for C, C++, Pascal and Fortran
    - Implement JAR file support in CMS
    - Technical documentation updates
- Future version
  - DECset V12.9 for OpenVMS I64 and Alpha
    - Gathering customer requirements

Application Development – Compilers and Deployment Tools

Future Releases:

- **Fortran V8.3 (Integrity and Alpha)**
- **Basic V1.8 (Integrity and Alpha)**
- **C and C++ V7.4 (Integrity and Alpha)**
- **Pascal V6.2 (Integrity and Alpha)**
- **DECset V12.9 (Integrity and Alpha)**
- **COBOL V3.0 (Integrity and Alpha)**
- **Distributed Net Beans V6.0 (Integrity and Alpha)**

Current Releases:

- **Distributed NetBeans V5 (Integrity and Alpha)**
- **C and C++ V7.3 (Integrity and Alpha)**
- **Basic V1.7 (Integrity and Alpha)**
- **Pascal V6.1 (Integrity and Alpha)**
- **Fortran V8.2 (Integrity and Alpha)**
- **Cobol V2.9 (Integrity and Alpha)**
- **GNAT Pro 6.0.2 (Ada) (Integrity only)**
- **DECset V12.8 (Integrity and Alpha)**

Time

Dates and content subject to change without notice.

Resources and Contact Information

Resources

http://h71000.www7.hp.com/commercial/cace.html

Contact

Product Manager – Ankit Jain

(Ankitj@hp.com)

Or

Office of OpenVMS Programs

(openvms.programs@hp.com)

Questions?