

PPT Slide

Mark Bixby csy r&d lab august 22, 2001 open-source development on mpe

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definition of open source

- **a software package for which the source code is freely available**
- **possible modification restrictions**
- **possible redistribution restrictions**
- **many differing license variations, i.e. ASF, BSD, GPL, etc, with strong religious-type feelings by their respective adherents**

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benefits of open source on the e3000

- **one porter can leverage the efforts of hundreds of open source developers**
- **easy way to add leading-edge functionality to the platform**
- **popular open source apps are de-facto standards**
- **easier to hire people knowledgeable about open source apps than it is to hire people knowledgeable about MPE**

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history - in the beginning

- **1971 - what would become the Interex Contributed Software Library is born**
- **1972 - the HP 3000 is born**
- **1977 - first conference software swap tape is produced**
- **1982 - last cumulative CSL tape; switch to "best of" + incremental**
- **1988 - CSL switches to incremental-only format**
- **1990 - CSL split into separate MPE and MPE/XL distributions**

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history - posix arrives

- **1992 - MPE/iX 4.5 arrives with support for POSIX 1003.1 (API) and 1003.2 (shell & utilities). This voluntary release achieved limited exposure, primarily in the ISV community.**
- **1994 - MPE/iX 5.0 "Pull" arrives with more reliable POSIX support. Customers interested in this release had to explicitly request it.**
- **1995 - MPE/iX 5.0 "Push" is distributed to all customers, and represents the first widespread exposure to POSIX**

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history - proliferation

- **1994 - NCSA web server, Lynx web browser, various BSD functionality ported by Mike Belshe & Steve Elmer**
 - **1995 - GNU gcc compiler & related tools ported by Mark Klein**
 - **1996 - Samba ported by Lars Appel**
 - **1997 - Apache, Syslog, BIND, Perl, NTP ported by Mark Bixby**
 - **1998 - Sendmail ported by Mark Bixby**
 - **2001 - PostgreSQL RDBMS ported by Mark Bixby**
- ...and many more ports and porters <http://jazz.external.hp.com/src/>

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history - productization

- **1998 - Syslog, BIND, Samba**
- **1999 - Apache**
- **2000 - HP WebWise MPE/iX Secure Web Server**
- **2001 - Sendmail (announced)**

...all fully supported by HP!

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the good - apps that port easily

- **cryptography**
- **compression**
- **socket networking**
- **graphic manipulation**
- **many GNU utilities**

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the bad - ports unlikely to succeed

- **select()-based terminal I/O**
- **pseudo TTYs**
- **multicasting sockets**

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the ugly - use extra care porting these kinds of apps because "here be dragons"

- threads (though threads are slowly improving on MPE!)
- dynamic loading
- heavy dependence on root uid 0 or setuid()
- reliance on link() and hard links

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hidden pitfalls

- **maximum socket read/write size is 30000 bytes**
- **some functions like link() exist but return errno == EIMPL when called**
- **use telnet instead of VT in the shell to avoid heavy CTRL-Y overhead; set +o vi for more improvement**
- **ld linker doesn't flag unresolved externals by default; to enable this, set the AUTOCONF environment variable to 1**
- **built-in cat command can lose bytes on "here docs" -- use /bin/cat instead, i.e.: /bin/cat <<EOF >outfile foo bar EOF**

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when posix is not enough

- you can call intrinsics instead
- gcc doesn't understand "#pragma intrinsic", so you will need to declare all parameters including any hidden ones
- CSEQ can generate intrinsic declarations for gcc - <http://www.lund.com/Products/DevTool/index.html>
- #include <mpe.h> for ccode() and _mpe_fileno()
- #include <fcntl.h> for _MPE_FILENO() and _POSIX_FILENO()
- gcc needs help for long pointers - <http://raven.utc.edu/cgi-bin/WA.EXE?A2=ind9906A&L=hp3000-I&P=R2477>

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priv-mode

- **POSIX functions requiring root uid 0 on Unix require priv-mode on MPE**
 - bind() to ports < 1024
 - setuid()
- **extern GETPRIVMODE();**
- **extern GETUSERMODE();**
- **PM NMPRGs and NMXLs *must* reside in MPE namespace**

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getting started

- **Choose an application you're already familiar with**
- **Have the following manuals ready:**
 - MPE/iX Developer's Kit Reference Manual Vol I&II
 - HP C/iX Library Reference Man.
 - corresponding Unix docs
- **Make sure you have the latest version of gcc installed**
- **Make sure you have the latest PowerPatch installed**
- **Ready, set, go! Start following the application's installation instructions**

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do I need to be a C or unix expert?

- **No! Most open source apps have already been designed to make porting easy**
- **95-100% of most apps will work as-is on MPE**
- **Almost all of the problems you might encounter have already been solved by other MPE porters; if you get stuck, just ask for help on HP3000-L**
- **Open source is not just C; it could be Java or Perl or Python or ...**

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configure

- **Most apps use a GNU autoconf script to evaluate the build OS to determine which include files and functions exist**
- **GNU autoconf assumes ld will report unresolved externals which does not happen by default on MPE; to enable this:**
 - AUTOCONF=1 configure parms...
 - or regenerate configure from configure.in to get an MPE-specific configure script
- **Sometimes autoconf will guess wrong, so perform a quick visual sanity check of the output before attempting your first compile**

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compile

- **Almost every open source app uses the make command and Makefiles for compiling**
- **Makefiles describe dependency relationships and the rules for compiling**
- **Just type "make" and everything with missing or out-of-date object code will be compiled**

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compile (cont.)

- The most common compile error is for missing **#include** files, of which several really aren't needed on MPE
- If in doubt, try commenting it out!
- **#ifndef MPE /* generic */ #include <sys/param.h> #endif**
- **#ifdef HAVE_SYS_PARAM_H #include <sys/param.h> #endif /* GNU autoconf */**
- But you may have to end up manually **#define**-ing a few missing constants; consult Unix include files for the missing constants

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compile (cont.)

- **Compile-time options determine how #include files are parsed**
- **You will always need -D_POSIX_SOURCE**
- **Socket programs will always need -D_SOCKET_SOURCE**
- **You may very infrequently also need -D_MPEXL_SOURCE**
- **You can usually specify these at configure time, i.e.:
CPPFLAGS="-D_POSIX_SOURCE" \ configure parms...**

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run

- **The moment of truth for unresolved externals! Try running every program with bogus parameters to check for unresolved externals.**
- **Did the autoconf script guess correctly?**
- **Does the app support other OSes where the solutions are more MPE-like?**
- **Were required libraries like `-lsocket` or `-lsvipc` omitted from the link?**
- **Do the jazz Porting Wrappers have an implementation?**
- **Do other ports have an implementation?**
- **If not, ask HP3000-L for advice!**

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test

- **If the app has a test suite, run it and investigate all failures**
- **Perform your own MPE-specific testing on any logic that you had to alter during the porting process**
- **Test the key features that you think MPE users are most likely to need**
- **Consider releasing an alpha test distribution, but be prepared for low participation**

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package

- **For simple apps, a tar or :STORE-to-disk archive may suffice**
- **Complex apps may require a custom INSTALL script to create the proper MPE accounting structure**
- **Think about future updates -- do you want to allow multiple versions on the same machine at the same time?**
- **If you're thinking of doing multiple ports, spend the time on your first port designing a common installation architecture template**
- **Test your package by installing and/or building it on a machine different from your own**

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submit

- You are **NOT** finished until you have submitted your MPE changes back to the original developers for inclusion into future releases!!!
- When making porting changes, copy the same look & feel from changes supporting other OSes
- Submit your changes in GNU diff format, i.e.: `diff -ruN orig_src_dir \ mpe_src_dir`

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software tools

- **GNU gcc bundle - a C/C++ compiler and a whole lot more**

- <http://jazz.external.hp.com/src/gnu/gnuframe.html>
- commercial support available from <http://www.gccsupport.com/>

- **Porting Wrappers - implementations of various missing functions**

- http://jazz.external.hp.com/src/px_wrappers/index.html
- unsupported freeware

- **Porting Scanner - analyzes source and binaries to determine effort**

- <http://jazz.external.hp.com/src/ps/index.html>
- unsupported freeware

- **libbsd (deprecated) - more missing functions and header files**

- <http://jazz.external.hp.com/src/bsd/libbsd.html>
- unsupported freeware

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knowledge resources

- **Various MPE manuals from <http://docs.hp.com/mpeix/all/>**
 - MPE/iX Developer's Kit Reference Manual Vol 1&2
 - MPE/iX Shell and Utilities Reference Manual, Vol 1&2
 - HP C/iX Library Reference Manual
 - HP C/iX Reference Manual
 - Berkeley Sockets/iX Reference Guide
- **Mark Bixby's MPE/iX Porting Guide**
 - <http://www.bixby.org/mark/porting.html>
- **Lars Appel's HPe3000 Page**
 - http://www.editcorp.com/Personal/Lars_Appel/index.html
- **HP3000-L mailing list**
 - Where there is no such thing as a stupid porting question!

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csy public access development system

- **Register for Internet access to a fully-loaded HP e3000 989-400 system**
- **Port or develop new open source software**
- **Develop new closed source software**
- **Test software on the newer releases of MPE**
- **Support not included**
- **For full details, please see <http://jazz.external.hp.com/pads/>**

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partnership

- **Open source works best as a community effort**
- **The original porters will not feel offended if somebody else wants to build on their MPE ports**
- **CSY welcomes community involvement in enhancing HP-supported open source products**
- **Your porting efforts allow CSY to adopt key infrastructure technologies as supported products**

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the future

- **an updated and supported version of Sendmail**
- **periodic updates as needed of Apache, Samba, WebWise and other key open-source based products**
- **investigate fixing certain high-visibility port-enabling issues**

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join the hp3000-L community!

- Available as a mailing list and as the Usenet newsgroup **comp.sys.hp.mpe**
- In-depth discussions of all things HP e3000
- Talk with other people involved with open source and porting on MPE
 - seek advice, exchange tips & techniques
- Keep up with the latest HP e3000 news
- Interact with CSY
- <http://jazz.external.hp.com/papers/hp3000-info.html>

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