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open-source
development on mpe

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, ie. ASF, BSD, GPL, etc, with strong religious-type feelings by their respective adherents

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

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

history - posix arrives

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

history - proliferation

- 1994 -NCSA web server, Lynx web browser, various BSD functionality ported by Mike Belshé & Steve Emmer
- 1995 -GNU gcc compiler & related tools ported by Mark Klein
- 1996 -Samba ported by Lars Appel
- 1997 -Apache, Sysbg, 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/>

history - productization

- 1998 - Sysbg, BIND, Samba
 - 1999 - Apache
 - 2000 - HP WebWise MPE/iX
Secure Web Server
 - 2001 - Sendmail (announced)
 - ???? - Perl (under investigation)
- ..all fully supported by HP!

the good – apps that
port easily

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

the bad - ports unlikely
to succeed

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

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

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

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
```

when posix is not enough

- you can call `__intrinsic` 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 `forccode()` and `_mpe_filen()`
- `#include <fcntl.h>` for `_MPE_FILENO()` and `_POSIX_FILENO()`
- gcc needs help for long pointers -
<http://raven.uts.edu/cgi-bin/WA.EXE?A2=ind9906A&L=hp3000-&P=R2477>

priv-m ode

- POSIX functions requiring rootuid 0 on Unix require priv-m ode on MPE

- bind() to ports < 1024
- setuid()

- **extern GETPRIVMODE();**

- **extern GETUSERMODE();**

- PM NM PRG s and NM XLs *m ust* reside in MPE nam espace

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

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 ...

configure

- Most apps use a GNU autoconf script to evaluate the build OS to determine which include files and functions exist
- GNU autoconf assumes it 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

com pile

- 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

compile (cont.)

- The most common compile error is 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 #defining a few missing constants; consult Unix include files for the missing constants

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, ie.:

```
CPPFLAGS="-D_POSIX_SOURCE" \  
configure parms...
```

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 `-socket` or `-svipc` omitted from the link?
- Do the jazz Porting Wrappers have an implementation?
- Do other ports have an implementation?
- If not, ask HP 3000-L for advice!

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

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

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
```

software tools

- GNU gcc bundle – a C / C++ compiler and a whole lot more
 - <http://aazz.external.hp.com/src/gnu/gnufamily.html>
 - commercial support available from <http://www.gccsupport.com/>
- Porting Wrappers – implementations of various missing functions
 - http://aazz.external.hp.com/src/px_wrappers/index.html
 - unsupported freeware
- Porting Scanner – analyzes source and binaries to determine effort
 - <http://aazz.external.hp.com/src/ps/index.html>
 - unsupported freeware
- libbsd (deprecated) – more missing functions and header files
 - <http://aazz.external.hp.com/src/bsd/libbsd.html>
 - unsupported freeware

knowledge resources

- Various MPE manuals from <http://docs.hp.com/mpeix/all/>
 - MPE /X Developer's Kit Reference Manual Vol1&2
 - MPE /X Shell and Utilities Reference Manual, Vol1&2
 - HP C /X Library Reference Manual
 - HP C /X Reference Manual
 - Berkeley Sockets /X Reference Guide
- Mark Bixby's MPE /X Porting Guide
 - <http://www.bixby.org/mark/porting.html>
- Lars Appels HPe3000 Page
 - http://www.edicorp.com/Personal/Lars_Appel/index.html
- HP3000-L mailing list
 - Where there is no such thing as a stupid porting question!

csy public access development system

- Register for Internet access to a fully-banded 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://azz.external.hp.com/pads/>

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

the future

- an updated version of Sendmail
- investigating some future version of Perl as a fully supported product
- periodic updates as needed of Apache, Samba, WebWare and other key open-source based products
- investigate fixing certain high-visibility port-enabling issues

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>