

HP-UX 11 GNU Compiler Toolchain and the Linux Open Source Toolkit

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Agenda

- **Goals**
- **Product Overview**
- **GNU Compiler Toolchain**
- **Linux API s**
- **Linux Software Transition Kit**
- **Summary**
- **References**

Goals

- Facilitate the availability of Linux applications on HP-UX by providing:
 - a source compatible compiler toolchain
 - APIs/libraries
 - other utilities

Goals

Facilitating the Porting Steps

- **Unpack** open source tools (e.g. zip tools, tar)
- **Configure** GNU compiler preprocessor, open source tools
- **Port** Linux APIs, misc langs/libs (e.g. perl, Python, TCL/Tk)
- **Build** GNU compiler toolchain (including gmake, gcc, g++)
- **Install** open source tools (e.g. sed, gawk)
- **Debug** open source tools (e.g. gdb)
- **Tune/Analyze** GNU compiler toolchain
- **Execute** open source tools (e.g. bash, tcsh)

Product Overview

11.x Linux & Open Source Toolkit

Source and binaries for:

✓ GNU Compiler Toolchain

✓ Open Source Tools (e.g. perl5, emacs, ...)

✓ Linux glibc/headers subset

✓ Other Linux APIs (other libs, cmds)

✓ Linux Software Transition Kit

✓ Linux Porting White Papers

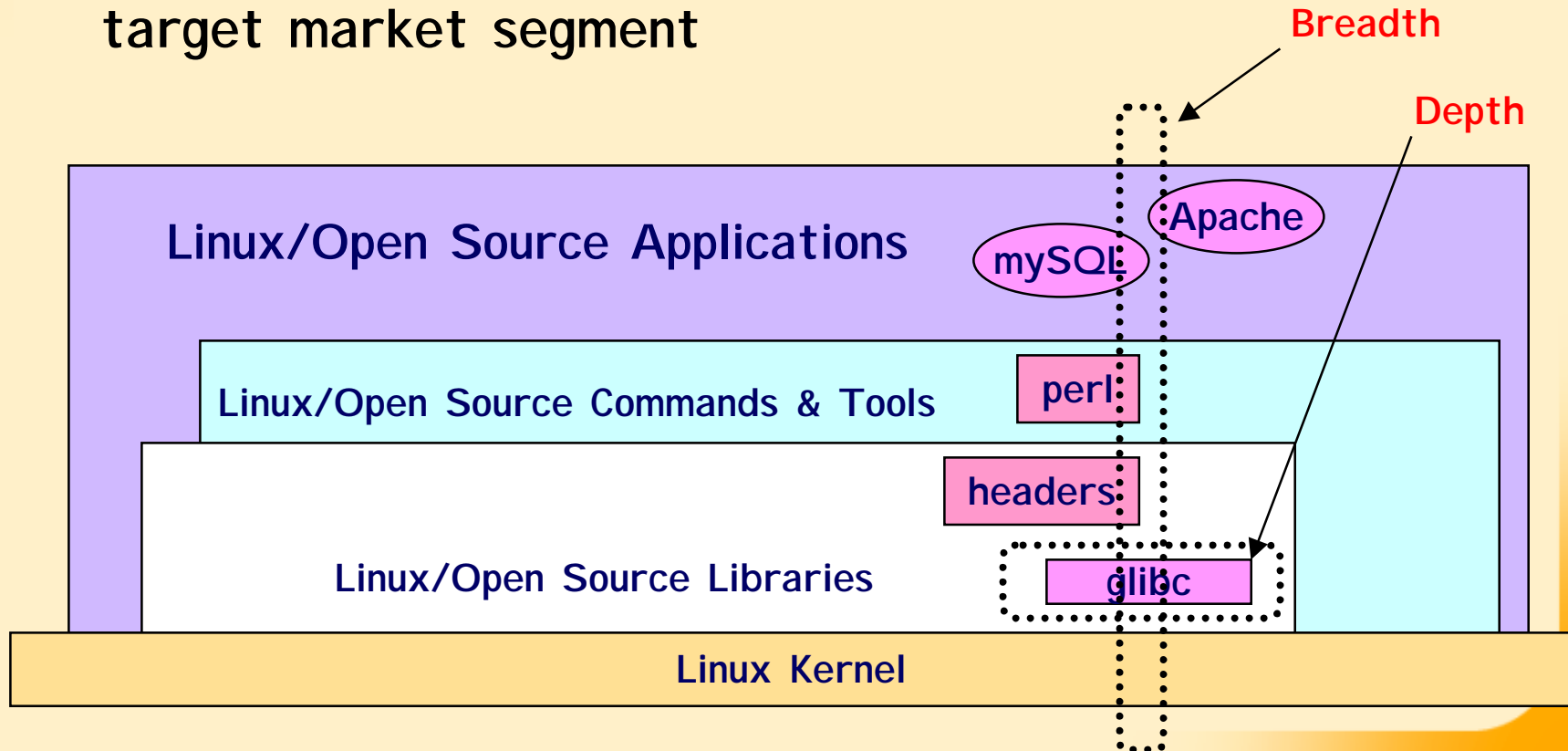


GNU Compiler Toolchain

Product Overview

API Selection Scope

- **Depth:** addressing glibc portability issues
- **Breadth:** address portability issues in applications in target market segment



Product Overview

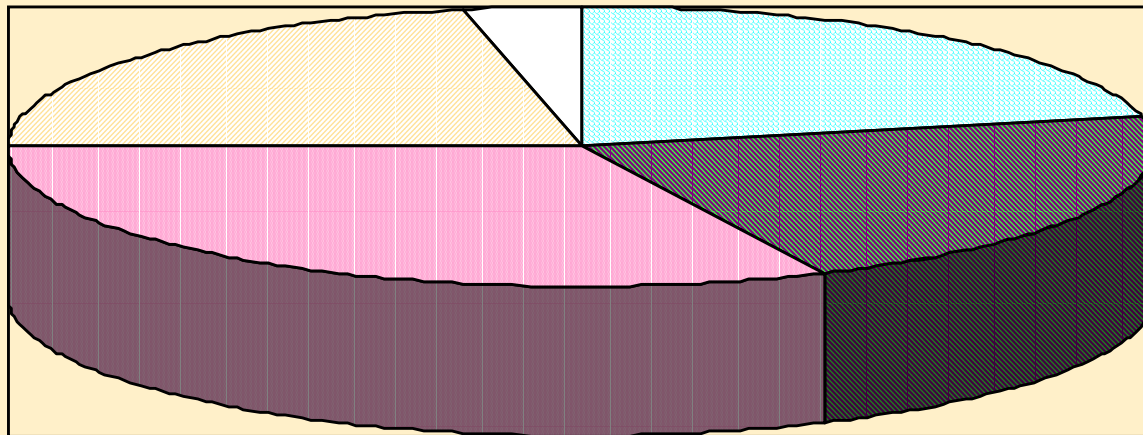
Open Source Applications (internet, e-services, e-commerce)

Application	Description
Apache	Open source web server
AOL Server	Open source web server
Squid	Open source high performance web proxy cache
mySQL	Open source database server
WebTrends	Open source enterprise reporting server
libwww	Open source lib for building www apps
Dante	Open source firewall
Samba	Open source PC/UNI X file sharing
MiniVend	Open source on-line shopping cart
EasyStat	Open source traffic analysis
qmail	Open source mail server
phpAds	Open source ad server

Product Overview

glibc API Landscape

Read Clockwise



- APIs to be ported to HP-UX
- Not ported - kernel, administration, privileged APIs
- Not ported - APIs obsoleted/to-be-obsoleted on HP-UX
- Not ported - some undocumented APIs
- Not ported - incompatible APIs

Product Details

Examples: ~300 glibc APIs being Ported to HP-UX 11.x

- **Environment & args** - *argz*(), envz*(), getopt*(), setenv()*
- **Msg cat extensions** - **gettext(), setcat(), [bind]textdomain()*
- **malloc() extensions** - *malloc*(), mcheck(), mprobe(), m*trace()*
- **Object stack** - *obstack*()*
- **Math** - *qf*(), finitel, frexp*(), is*(), ldexp*(), ll*(), mod*(), scal*()*
- **String/memory extensions** - *st[p|r]*(), *mem*()*
- **Print & error** - **print*(), *err*(), *warn*(), psignal()*
- **Filesystem** - *fts*(), dirfd(), fopencookie(), get_current*dir_name()*
- **I/O** - *getline(), pselect(), hton*(), *tty*(),*
- **Misc** - *set*id(), *wtmp(), re_*()*

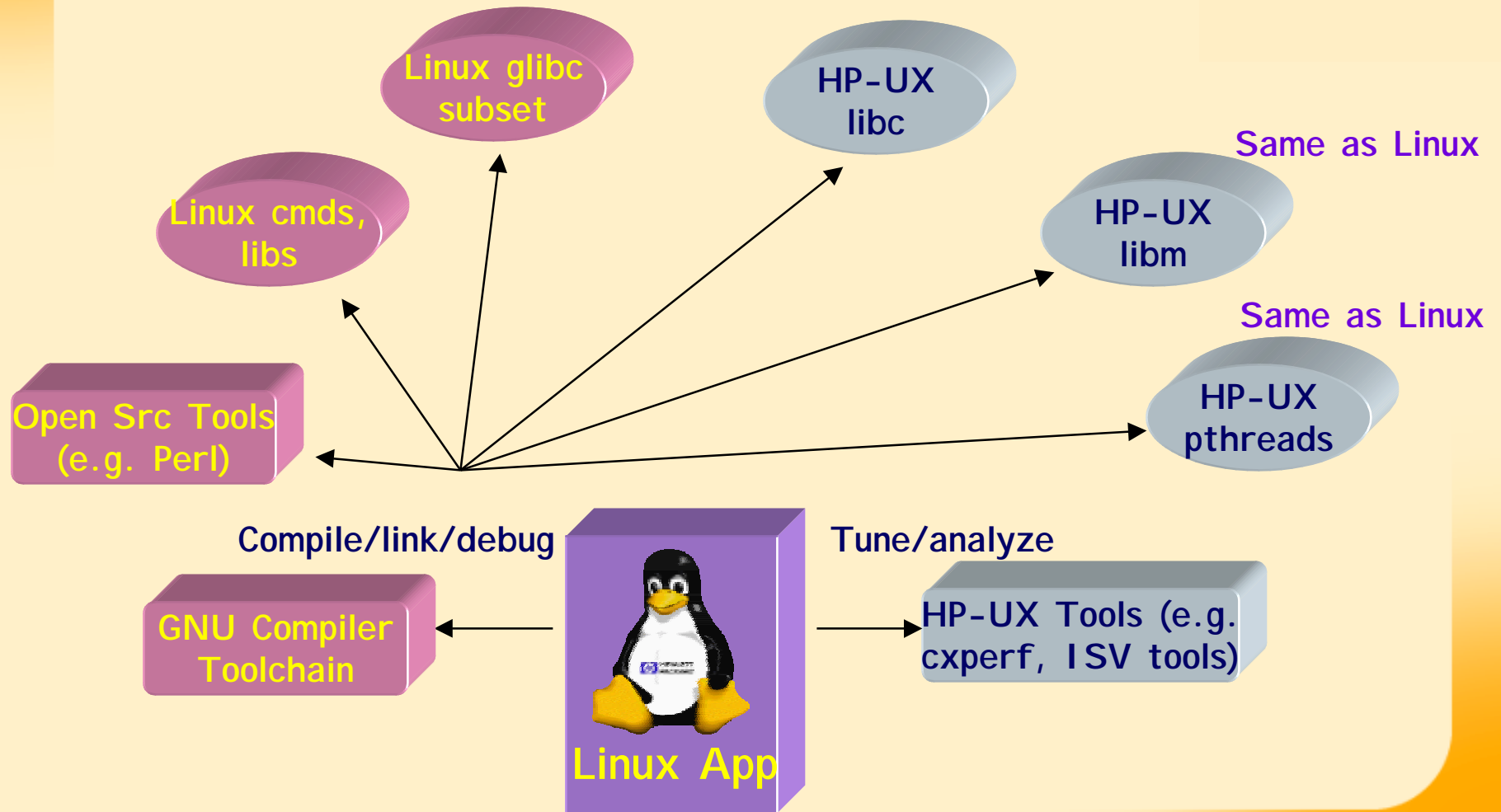
Product Details

Examples of glibc APIs **NOT** Ported to HP-UX 11.x

- **Linux kernel-specific APIs**
 - `/proc` - use `pstat()` on HP-UX
 - `clone()` - use `pthread`s
 - `adjtimex()` - tune kernel clock
 - `bdflush()` - start, flush, or tune buffer-dirty-flush daemon
 - `*_module()` - kernel loadable module
 - `flock()` - apply or remove an advisory lock on an open file
 - `mremap()` - re-map a virtual memory address
 - `personality()` - set the process execution domain
 - `sysv_signal()`, `sig*` - signal APIs
 - `sysctl()` - read/write system parameters
 - `uselib()` - select shared lib
 - `llseek()` - reposition r/w file offset
 - `get*` - kernel APIs, use `pstat()`
 - `vm86()` - virtual 8086
- **Linux-specific system administration APIs**
 - `chflags()`, `fchflags()`, `iopl()`
- **Obsoleted/to-be-obsoleted APIs**
 - POSIX draft 4 threads APIs - `*_r()`, `*_unlocked()`
- **Some undocumented APIs**
 - `re_*()` private `re` APIs, `time*`, `tr_break()`, `ether*`, `euidaccess()`, `freeaddrinfo()`, `groupmember()`, `revoke()`, `vlimit()`

Product Details

Linux API Usage Model on HP-UX 11.x



Customer Actions

Porting Needed for the Following Issues

Issue	Recommended Solution
Drivers, kernel modules, use of private Linux APIs.	Port to HP-UX PA.
Use of the /proc pseudo filesystem, /dev/[k]mem (system, kernel memory)	Port to HP-UX <i>pstat()</i> .
Use of <i>clone()</i> for threads	Port to pthreads for kernel threads
Linux object file format (ELF32) or debug file format aware	Need to be ported to SOM PA
Not endian-clean	Make endian-clean
Directly manipulate persistent system files	Access data via relevant APIs
Architecture dependent (e.g. directly manipulate the graphics framebuffer/backing store)	Port to HP-UX PA
<i>mmap()</i> of /dev/zero for anon. memory regions	Use MAP_ANONYMOUS on HP-UX PA
<i>mmap()</i> MAP_FIXED with same address	Port to HP-UX (no address aliasing)
>1.9GB large process data space, >2.75GB shared memory	Convert to 64-bit application, other solutions coming

Conclusions

Linux Software Transition Kit

- **Tools to detect coding issues that require attention in porting from Linux to HP-UX**
 - Supports C, C++, Fortran, COBOL, scripts, makefiles
 - Helps assess amount of work
 - Identifies specific lines of source code with issues
 - generates a web (or text) report
- **Documentation library**
 - white papers
 - online documents
 - man pages

Conclusions

Summary

Conclusions

References

- Give us your feedback on your HP-UX porting experiences and what you would like to see change opensource@cup.hp.com
- Watch for further news about this from the SPP Newsletter
- Check <http://www.devresource.hp.com/> for development solutions including this product when it is available.