A Brief History of FreeBSD/mips

Warner Losh FreeBSD Core Team Cisco Systems <u>imp@freebsd.org</u> BSDCan 2008 Ottawa, ON, Canada www.freebsd.org/~imp/bsdcan2008.pdf

FreeBSD/mips in 3.x!

- Early port of FreeBSD to custom MIPS platform by Juniper Networks
- Juniper Networks quietly shopped the code around the community in late 1990s
- Early community efforts in 1999, R4000PC machines, OpenBSD base went no where
- No publicly available results: lack of volunteer time and suitable hardware





FreeBSD/mips Languishes

- Libc and build tool support added 1999
- MIPS support removed 2002
- Talk about the need for MIPS support and requests for it
- Main champions have not time for it





A Fresh Start: Perforce mips

- Julie Mallett starts Halloween 2002
- Targets SGI R4k and newer (no R2k/R3k)
- NetBSD/mips based
- Boots single SGI boxes single user
- Never was completely stable
- Garners little developer interest
- Much code mined in "mips2" efforts
- Active development ended 2005, although minor work triclked in through 2006





Perforce "Cabal mips"

- Started at BSDcan 2006 by Warner Losh, Peter Wemm and John Baldwin
- Reaction to growing importance of embedded processors (MIPS, ARM, PowerPC)
- Lots of enthusiasm at BSDcan 2006, little follow through after initial push
- Kernel, build tools part of initial push
- Bogusly tried to do it in "secret" part of p4





Perforce "mips2"

- Moved from "secret" part of perforce repo to developer accessible //depot/projects/mips2
- Wojciech Koszek, Oleksandr Tymoshenko spearhead efforts to create bootable kernel
- Warner Losh and Olivier Houchard mentor
- Late 2006 FreeBSD/mips boots on emulated Malta board
- In early 2007 FreeBSD/mips reaches single user on real hardware: ADM5120 and IDT RC32434





Perforce "mips2" (cont)

- Cavium Networks picked up mips2 port snapshot and ported it to Octeon CPU (commercial only port)
- Bruce Sampson ports to Broadcomm MIPS CFE boot loader and parts
- Small, incremental improvements to FreeBSD/mips
- Port slowly limping along towards stability





Juniper Mips (again)

- Juniper's JunOS upgraded from FreeBSD 4.x to 6.1
- Mips port upgraded as well
- Mips port sanitized and released to key FreeBSD/mips developers
- Code review begins in September 2007
- Efforts stall due to lack of time





Perforce mips2-jnpr

- Warner changes jobs to work on FreeBSD/mips full time.
- Warner Losh, Randall Stewart and Ollivier Houchard merge the Juniper mips code base (good core features) with "mips2" tree (good driver and platform support)
- Boots multiuser with 32-bit kernel
- Self hosting





FreeBSD/mips today

- Targets mips32, mips32r2, mips64 and mips64r2 processors (and close relatives)
- Runs o32 binaries
- Kernel is o32 with special hacks for 64-bit processors
- SMP support present, but untested
- Support for 4 SoC families
- At least two other SoC support in the wings





FreeBSD/mips today (cont)

- ADMTek ADM5120
- IDT RC32432
- Broadcomm MIPS
- MIPS 4Ke core
- Others to come soon





FreeBSD/mips ADM5120

- Platform glue code for EdiMAX designs
- Built-in NIC
- Serial Console
- PCI bus support
- Other board support desirable





FreeBSD/mips IDT RC32432

- RB533 board supported
- Built-in NIC
- PCI bus
- Serial Console





FreeBSD/mips Broadcomm

- CFE boot loader support
- Built-in NIC
- Serial port
- Sibus device enumeration





FreeBSD/mips RMI au1xxx

- Port just started
- Targetting Plat'Home OpenMicroServer
- RMI au1550 @400MHz
- 1 FastEthernet port with POE
- 2 GigE ports (Intel LU82541PI)
- Serial Ports, DIO, etc
- Plat'Home provided hardware
- http://www.plathome.com/products/microserv er/oms/oms_spec.html





FreeBSD/mips TODO

- N32 and N64 ABI support
- Multilib support in toolchain
- QEMU support
- 64-bit mips pmap for mips64isa kernel
- More SoC support
- Finish CVS integration
- Make Plat'Home appliance work





Embedded FreeBSD News

- Two Google Summer of Code Projects

 Port to PowerPC e300 CPU
 - Aggressive size reduction
- PowerPC e500 support in CVS
- ARM Marvell Orion support in perforce
- ARM Atmel AT91SAM926x hardware
- Native cross architecture support





FreeBSD Embedded TODO

- Cross OS development (LIMITED)
- Cross Platform /usr/ports support (NOT)
- Flash file system support (NOT)
- Integrated image preparation (LIMITED)
- m0m0wall (out of tree)
- /etc/rc.d optimizations
- More/easier board support
- Wiki HOWTO pages needed
- Greater marketing of efforts





Questions

Warner Losh

Imp@freebsd.org

http://people.freebsd.org/~imp/asiabsdcon.pdf



