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What does NetBSD look like?
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So what is NetBSD?
NetBSD is ...

- A descendant of 4.4BSD Unix
- A “general purpose” Unix/Linux-like Open Source Operating System
- Not Linux – NetBSD has its own kernel and userland
- A small core system that can be adjusted for many purposes via pkgsrc: Desktop, Web and Database servers, Firewalls, ...
- Secure and Performant, of course!
- Focussed on multiplatform portability
Features:

- Thousands of packages via pkgsrc
- Many areas of application
- One Operating System, 1 Source
- Modern & Vintage Hardware
- More than fifty Hardware Platforms
Introducing NetBSD: Some Applications & Products
NetBSD from roof to basement:

- **On Air**: International Space Station, on-plane systems

- **Roof**: WaveLAN routers, surveillance cameras, embedded boards

- **Office**: Highspeed networking, desktop, Embedded development

- **Entertainment**: Various game consoles and robots

- **Basement**: Storage solutions, servers
“Commodity” Networking:

- Various WLAN-Routers and Access-Points by Allied Telesis, IIJ/Root and Apple:

- Seclarity's SiNic Router-on-a-card

- Avocent KVM Switches

- Surveillance- and Webcams by SGI, Panasonic and Brains Inc.
Embedded Boards: PowerPC, MIPS

- MIPS – NetBSD/evbmips
- Malta 4/5kc, Access Cube, AMD Alchemy, Atheros, Meraki Mini

- PowerPC – NetBSD/evbppc
- Virtex-4 ML403 FPGA, Motorola Walnut, Marvell, Plat'Home OpenBlockS
Embedded boards: SH3/4, ARM

• Super-Hitachi - NetBSD/sh3
• CqREEK, Computes 7709, KZ-SH4-01:

• ARM, StrongARM, Xscale – NetBSD/evbarm
• Mesa 4C81, Gumstix + peripherals, Technologic Systems' TS-7200, ...

• Speaking of ARM ...
Of course it runs NetBSD!

# dmesg
NetBSD 3.0_BETA (TS7200) #57: Mon Aug 8 00:34:41 MST 2005
joff@sayan.wifi.home:/home/joff/NetBSD-toaster/obj /sys/arch/evbarm/compile/TS7200
total memory = 32768 KB
avail memory = 28196 KB
mainbus0 (root)
cpu0 at mainbus0: ARM920T rev 0 (ARMPTDMI core)
cpu0: DC enabled IC enabled WB enabled EART
cpu0: 16KB/32B 64-way Instruction cache
cpu0: 16KB/32B 64-way write-back-locking-A Data cache
epco0 at mainbus0: Cirrus Logic EF93xx SoC rev 0E
epco0: fclk 200.03 MHz hclk 100.01 MHz pclk 50.01 MHz
ohci0 at epco0 addr 0x80020000-0x80020fff intr 56
epckl0 at epco0 addr 0x80010000-0x800100ff intr 35
epco0 at epco0 addr 0x80010000-0x8001fff intr 39
epco0: MAC address 00:0D:69:4F:AF:76
ukphy0 at epco0 phy 1: Generic IEEE 802.3u media interface
ukphy0: QEI 0x0010ai, model 0x0021, rev. 9
ukphy0: 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, auto
epcom0 at epco0 addr 0x8080c0000-0x8080c0ff intr 52
epcom0 at epco0 addr 0x8080d0000-0x8080d0ff intr 54
epcom0: consoa
ohci10: OHCI version 1.0
usb0 at ohci10: USB revision 1.0
uhub0 at usb0
uhub0: Cirrus Logic OHCI root hub, class 9/0, rev 1.00/1.00, addr 1
uhub0: 3 ports with 3 removable, self powered
tspld0 at mainbus0: Technologic Systems TS-7200 rev C, features 0x1
tspld0: jumpers 0x7
spld0: board temperature 21.93 degC (71.48 degF)
is0 at tspld0: PC/104 expansion bus
tsdlo0 at isa0 port 0x100-0x107: Technologic Systems TS-DIO24
toasterlcd0 at tsdio0: 4x40 text-mode hd44780 LCD
toasterlcd0: using port C, bits 0-7 as DB0-DB7
viewdd0: using port B, bits 0-3 as RS, WR, ENI, EN2
wds0 at toastercdio0 kbdmux 1
wsmux1: connecting to wds0
wds0 at toastercdio0: internal toaster control output
wds0: using port B, bits 4-7 for front panel LEDs
toaster: using port A, bit 0 for magnetic latch
toaster: using port A, bit 1 for burner element
wds0 at tspld0: on-board CompactFlash socket
atubus0 at wdc0 channel 0
toastersensors0 at tspld0: internal toaster sensor inputs
toastersensors0: using signal DIO_0 for toast down sensor
toastersensors0: using signals DIO_1-DIO_5 for panel buttons
toastersensors0: using 12-bit MAX197-ADC channel 0 for burnlevel knob
wskbd0 at toastersensors0 mux 1
wskbd0: connecting to wds0
uhub1 at uhub0 port 1
uhub1: Chicony Generic USB Hub, class 9/0, rev 1.10/1.00, addr 2
uhub1: 3 ports with 2 removable, bus powered
uhidev0 at uhub1 port 1 configuration 1 interface 0
uhidev0: Chicony FPU-65 USB Keyboard, rev 1.10/1.00, addr 3, iclass 3/1
uhbd0 at uhidev0: 8 modifier keys, 6 key codes
wdo0 at atubus0 drive 0:
wd0: drive supports 1-sector PIO transfers, LBA addressing
wd0: 488 MB, 993 cyli, 16 head, 63 sec, 512 bytes/sect x 100944 sectors
wd0: drive supports PIO mode 4, DMA mode 2
wskbd1 at uhbd0 mux 1
wskbd1: connecting to wds0
boot device:
root on wdo0s dumps on wdo0

# /bin/sh
# /usr/local/bin/toast:
sysctl -w hw.toaster0.magnetic_latch=1
# user presses toast lever down now...
sysctl -w hw.toaster0.burner_element = 1
sleep 60
sysctl -w hw.toaster0.burner_element = 0
sysctl -w hw.toaster0.magnetic_latch=0
echo "Toast is done!"
You can, too!

Embedded development and crosscompiling:

- **Build a crosscompiler:**
  `build.sh -m evbarm tools`

- **Cross-compile the NetBSD system:**
  `build.sh -m evbarm distribution`

- **Cross-compile the X Window System:**
  `build.sh -m evbarm -x distribution`

- **Cross-compile a NetBSD kernel:**
  `build.sh -m evbarm kernel=TOASTER`
High-Performance Networking:

Internet Land Speed Record 2004:

1831GB
in 1 hour
=4.3GBit/s
High-Performance Networking:

- Force10 Ethernet Switches: Up to 1260 1Gbit or 224 10GBit Ports

- Brocade Rhapsody SAN Switches: sold by HP, IBM, Dell, ...
Office Apps

• Firewall solutions by Dubbele and concept04

• Ricoh & Savin fotocopier/printer/fax/scanner

• Thin clients - DEC DNARD “Shark”, IBM NetWork Station, Precedence Netmanager
Desktop use

- KDE, GNOME, you name it
- Flash support via nspluginwrapper, to use Linux-Flash-Plugin with native Firefox
- Native OpenOffice.org
- 3D hardware support starting to evolve, eye candy like Compiz works with ATI cards.

Problem: lack of documentation and support by hardware manufacturers! (Hi Adobe, nVidia & AMD/ATI!)
In other Operating Systems:

- Apple's Mac OS X – userland tools, `ip6config`
- Castle's RISC OS uses parts of NetBSD's networking subsystem
- PSO offers a port of NetBSD's TCP/IP stack to VxWorks
- QNX uses the TCP stack and various userland commands (`ftp`, `libsocket`, ...)
- Probably many others – TELL US!
Entertainment

• Game consoles: Sony PSP and many PS2 games use NetBSD's TCP/IP stack via the EEnet (Emotion Engine) library

• Robots: ITR and MiRai RT with NetBSD-based SpeecysOS
Storage & servers

● TeamASA's NPWRserver
● ... and many others via Wasabi Systems

● Iodata's Landisk (SH4) and compatibles: Plextor PX-EH16L, PX-EH25L and PX-EH40L

● ... plus of course the usual Intel, AMD, Alpha, UltraSPARC, etc. based servers to which NetBSD was ported!
NetBSD 4 and beyond
NetBSD 4

ETA: Early May 2007

Changes:
• Improved platform support
• Kernel changes
• Networking improvements
• Filesystem works

Daily beta builds from ftp.NetBSD.org in /pub/NetBSD-daily/netbsd-4
NetBSD 4 – Platform support

- evbmips: Alchemy Au1550 processors and DBAu1550 board, 4G Systems MTX-1 board (MeshCube / AccessCube), Plat'home OpenMicroServer (OMS-AL400/128)


- NEC's MIPS based EWS4800 workstations

- Support for Xen3 DomU and Dom0, HVM
NetBSD 4 with Xen 3.0.4 & HVM

Une meilleure disponibilité des applications

Des outils d’administration nouveaux et améliorés facilitent le déplacement des technologies de haute disponibilité apportant une meilleure continuité de service à vos applications sensibles.
NetBSD 4 - Kernel

- tmpfs – memory efficient ramdisk
- Added VFS hooks interface and simplified NFS exports list handling
- Stateful read-ahead algorithm
- Switch bufq strategy on the fly
- firmload(9) API for loading firmware
- Multiboot support (GRUB)
- iSCSI target (server) support
- W^X support via paxctl(1)
NetBSD 4 - Networking

- agr(4) for link aggregation
- Common Address Redundancy Protocol (CARP) support added
- Bluetooth support was added
- tftp(1) has multicast support
- Support for Explicit Congestion Notification in the TCP/IP stack
- API for TCP congestion control algorithms, selectable via sysctls
NetBSD 4 – File systems

- UDF file system support for optical media and block devices like harddisc partitions and vnd's.
- Support for System V Boot File System
- `pam_afslog(8)`: Obtain AFS tokens from Kerberos5 credentials and create process authentication group
- SPARC can now boot with `/` on a RAIDframe mirror-set
- `puffs - Pass-to-Userspace Framework File System`
NetBSD 4 - Misc

• mail(1): Got MIME and multi-character set handling; command line editing, thread support, and completion.

• veriexecgen(8) for easy and fast generation of Veriexec fingerprints

• proplib(3) API for sending property lists to/from the kernel using ioctl

• ... besides many updates of 3rd party software, imports of external projects and drivers, bugfixes, security updates, etc.
NetBSD-current

Will eventually be the base for NetBSD 5

Changes:

- SMP with 1:1 threading (no more Scheduler Activations), fine-grained locking (no more Big Lock)
- POSIX Asynchronous I/O, Direct I/O
- Improved PUFFS & FUSE compatibility
- SSH-FS, Plan9 filesystem (via puffs)
- Apple HFS+ support

Daily builds on ftp.NetBSD.org in /pub/NetBSD-daily/HEAD
Thanks!

Questions?

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