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FreeBSD Project
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• BoF
  – Birds of a Feather
• Nominally a BSD BoF
  – But I'll talk mostly about FreeBSD
  – A brief talk on FreeBSD status
  – Q&A, problems, etc
FreeBSD is a production-quality operating system derived from BSD UNIX

- Widely deployed as a component, and in its own right
  - Workstation, server, and high-end embedded markets
- Berkeley permits broad commercial re-use in open and closed source products
  - i386, ia64, amd64, sparc64, alpha
Releases over the Past 13 Months

- FreeBSD 4.x-STABLE continues incremental feature, performance, stability development
  - FreeBSD 4.8 (April, 2003)
  - FreeBSD 4.9 (October, 2003)

- FreeBSD 5.x-CURRENT continues higher risk development, approaches -STABLE
  - FreeBSD 5.0 (January, 2003)
  - FreeBSD 5.1 (June, 2003)
  - FreeBSD 5.2 (January, 2004)
  - FreeBSD 5.2.1 (February, 2004)
FreeBSD 4.8

- Port of OpenBSD crypto framework, drivers
- FAST_IPSEC; IP fragment DoS resistance
- Firewire, more USB serial drivers; more device polling support for ethernet drivers
- Hyper-threading hits 4.x
- Various security fixes
- Third party software upgrades, etc
Incremental development continues
- PAE – Intel's >4GB physical memory extensions
- Hardware accelerated crypto enhancements, USB ethernet device drivers, etc.
- O_DIRECTIO
- Various contributed software updates (OpenSSL, OpenSSL, sendmail, etc)
- Various security fixes
FreeBSD 5.0

- First cut off of the 5.x Technology Branch
  - SMPng, sparc64, ia64, UFS extended attributes, ACLs, Mandatory Access Control, GEOM, GBDE, OpenPAM, ACPI, TIRPC, IPFW2, Firewire, UFS2, bgfsck, ufs snapshots, bluetooth, atapicam, devd, FAST_IPSEC, gcc 3.2, CardBus, devfs, ...

- Motivate stability, performance improvements

- Provide early access to consumers, product developers, etc.
FreeBSD 5.1

• Features
  - PAE, NSS, libkse, libthr, HTT, amd64, NFS locking, jail management, lazy context switch, SCHED_ULE, no major numbers, EHCI, various USB network drivers, reduced tcp state on connection close, volume labels on UFS and UFS2, / on vinum, DIRECTIO, dump snapshots, thread-safe rtld, ACPI updates, ...

• More stability, performance
  - Lock pushdowns
  - Much broader exposure, testing
FreeBSD 5.2

Features

- Full Tier-1 support for UP/SMP AMD64 systems
- Dynamically linked root partition
- IDE SATA, 802.11a/b/g devices, ACPI upgrades
- NFSv4 client
- IP forwarding plane now runs without Giant lock
- Gnome 2.4, KDE 3.1

And more stability, performance
FreeBSD Development Tree

4.x-STABLE

5.x-STABLE

5.x-CURRENT

6.x-CURRENT
FreeBSD 4.10 in 2004Q2

- FreeBSD 4.10 incremental release
  - Stability, performance enhancements
  - Bug fixes
  - Additional driver updates
  - Contributed software updates
  - ACPI power management
  - KDE 3.2
FreeBSD 5.3 in 2004Q3

- FreeBSD 5.3-RELEASE: Maturity!
  - KSE “M:N” threading the default
  - SMP enhancements
    - SCHED_ULE scheduler the default
    - Network stack running Giant-free
    - VM running entirely Giant-free
  - NDISulator
    - Use Windows network device drivers
- OpenBSD's 'pf' packet filter integrated
- Experimental support for Vinum in GEOM
KSE Status

- KSE: M:N threading implementation similar to Scheduler Activations
- libthr: 1:1 threading using KSE kernel primitives (not Linux semantics)
- Default in -CURRENT (shipped in 5.3)
- Runs KDE, Java, OpenOffice, ...
- SCHED_ULE offers thread affinity bits, especially in HTT context, per-cpu queues
SMPng Status

- Process locking complete
- File descriptor locking about done
- Pipe locking except VM optimizations
- VM is about 2/3
- GEOM storage
- IP stack in progress
- Kernel memory allocation
- Support for HTT
- SMP scheduler (ULE)
- MAC Framework
- Buffer cache ¾
- VFS cleanups
- Lazy TLB
Developer Summit IV

• Two-day developer summit
  - June 10-11 2003 in San Antonio
  - June 10: unstructured working groups, hacking...
  - June 11: structured presentations, moderated discussion

• Very productive
  - Roadmap towards 5.2, 6.x clarified; 4.x life cycle
  - Removal of buffer cache, network stack/storage lockdown, prebinding, bridge burning, HTT scheduler optimization, lazy context switches, ...
Dev Summit IV
Conclusion

• Things are very exciting
  – 5.x branch is maturing well
    • Aggressive feature set
    • SMPng work progressing; optimization, stability
    • M:N/1:1 threading support increasingly productionable
  – 4.x branch continues to offer high performance and stability
    • Will continue to see incremental improvements, optimizations; will remain most widely deployed
Q&A

• Any questions