

412 Projects

Dave Eckhardt
de0u@andrew.cmu.edu

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Outline

- Talking about the Plan 9 overview paper
- My evil plan(s)

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Plan 9 Paper

- Goal
 - “Build a Unix out of little machines”
 - Centralize exactly the right resources
- Three core ideas
 - “Everything is a file” – this time for real!
 - Unified protocol for accessing files
 - (i.e., everything*)
 - You own your own namespace

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Plan 9 Paper

- Some nice features
 - Versioned file system
 - Portability at the core: every compile is a cross-compile
 - Unicode spoken here
 - Factotum, the “security file system” (not in the overview paper)

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Actual Status of Plan 9

- Forked a virtual-machine version, Inferno
 - Port VM to multiple OS's, run Inferno inside
 - Sold by Lucent to Vita Nuova
 - Used as a distributed-systems toolkit
- Plan 9 itself released as open source
 - License is roughly BSD/MIT, not GPL

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OS Evolution...Extinction?

- The 1980's & 1990's were a period of OS diversity
 - Mach is ... hidden.
 - Sprite, Amoeba, xok don't seem to be running.
 - KeyKOS/EROS is interesting.
 - Plan 9 is very fringe.
 - “Everybody” runs Windows
 - “Everybody else” runs Linux
- All done?

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OS Development: All Done?

- Recent interest in “virtual machine monitor” (previously “hypervisor”) platforms
 - VMware
 - Xen
 - Bochs, QEMM, PearPC
 - ...even Simics
- Seems like a lot of work if people are happy running the One True operating system...

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My Evil Plan

- I have been exploring Plan 9
 - Why?
- “Right-sized” projects abound
 - aka “target-rich environment”

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Why am I attracted to Plan 9?

- “Everything is a file” was attractive in 1980, when Unix really was that way
 - Since: sockets, shared-memory, ftok()
- It would be nice to try living in a designed distributed-computing environment
- Why voluntarily live without
 - tarfs
 - import other-box:/proc to debug remotely

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Why am I attracted to Plan 9?

- Small community \Rightarrow new things can be tried
 - Good news: Linux is close to re-creating the Windows desktop environment (e.g., OpenOffice)
 - Bad news: Linux is close to re-creating the Windows desktop environment (e.g., OpenOffice)
 - Jef Raskin: “The World Has Changed, But We Forgot To”

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Sample Plan 9 Projects

- Security
 - PubCookie authentication for web server
 - Kerberos support in factotum file system
 - ssh v2
- Kernel hacking around the edges
 - “Do laptops better” - multiple small pieces
 - Kernel crash dumps / better stack traces
 - SMART disk-health monitoring
 - “rewrite x86 vm code”

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Sample Plan 9 Projects

- Software infrastructure
 - port CMU reliable-virtual-memory package
 - How portable is “Apache Portable Runtime”?
 - “most of a Palm synch fs is written”
- Platform port projects
 - sun4 revival (join project in progress elsewhere)
 - aggressive: iMac port!

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iMac Port

- Good news
 - Plan 9 has run on PowerPC
 - embedded systems, BeBox
 - Other things run on iMac
 - NetBSD, Darwin, Gentoo Linux
 - iMac is not a PC (OpenFirmware >> BIOS)
 - Net booting is easy (much easier than PC)
- Serious good news
 - Utility curve of Plan 9 ports rises quickly

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iMac Port

1. “Brain in bottle” (Miss Uumellmahaye)

- Need to be able to boot (OF)
- Need debug-quality console I/O (OF)
- Need to be able to do VM, context switch
 - PPC interval timer built into processor
- Kernel arrives with built-in file system...
 - Operational system: shell, compiler, debugger, ...
 - Semester project for 2-4 people

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iMac Port

2. Join the network community

- PCI device enumeration
 - PCI interrupt management
 - 1 Ethernet device driver
- ⇒ “CPU server”

3a. USB, graphics ⇒ “terminal”

3b. ATA driver, disk labels ⇒ file server

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iMac Port

• Is this crazy?

- Don't we have enough operating systems?
- Why develop something for roughly zero users?
 - ...and it won't even run OpenOffice!?

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iMac Port

- Christo & Jeanne-Claude will decorate Central Park in February
 - 23 miles of saffron-colored fabric gates: “The Gates, Central Park, New York, 1979 to 2005”.
 - 7,500 16-foot vinyl frames throughout park at 12-foot intervals, Feb. 12-27.
 - “All our work is about freedom”.

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Other Projects

- Click “modular router” project
 - Target: Soekris tiny router box (start: simics)
 - Goal: point-and-click DSL link scheduler
- [insert your project here]

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Next Steps

- Read the “other” (non-9) paper for Friday
- Turn things over in your mind...
 - Linux/BSD projects abound
 - We have a Plan 9 warm-up project to try
- Multiple ways to coherence
 - Pick an OS, pick a type of project, pick a partner
 - Any constraint will help you focus

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