


The SawMill Project

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IBM T. J. Watson, Yorktown Heights, NY


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Who's Who?

- IBM Watson (*Paul Horn, Senior VP*)
 - Systems (*Ambuj Goyal, VP*)
 - Server Department (*Nick Bowen*)
 - Afpa + SawMill (*Rich Neves*)
 - Trent Jaeger
 - Yoonho Park
 - Kevin Elphinstone
 - Alain Gefflaut
 - Volkmar Uhlig (*Coop, TU Dresden*)
 - Luke Deller (*Coop, UNSW Sydney*)

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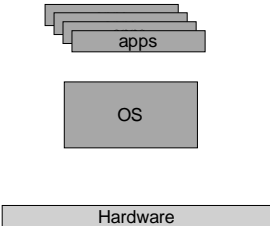
Who's Who?

- Universität Karlsruhe
 - Fakultät für Informatik
 - IBDS
 - System Architecture Group
 - Jochen Liedtke
 - Gerd Liefländer
 - Uwe Dannowski (*07/99*) *TU Dresden*
 - Espen Skoglund (*08/99*) *U Tromsø*
 - Kevin Elphinstone (*03/00*) *IBM Watson*

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The Multi-Server OS Idea

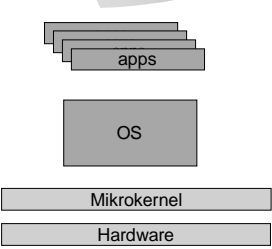
- Monolithic Unix



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The Multi-Server OS Idea

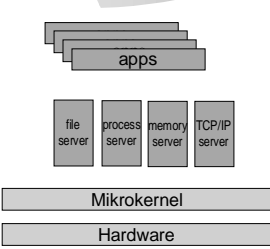
- Monolithic Unix
- Mach Single-Server Unix



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The Multi-Server OS Idea

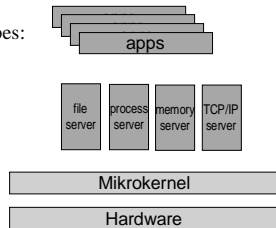
- Monolithic Unix
- Mach Single-Server Unix
- Mach Multi-Server Unix



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The Multi-Server OS Idea

- Monolithic Unix
- Mach Single-Server Unix
- Mach Multi-Server Unix hopes:
 - coexistence of different APIs, file systems OS personalities
 - flexibility
 - extensibility
 - simplicity
 - maintainability
 - security
 - safety

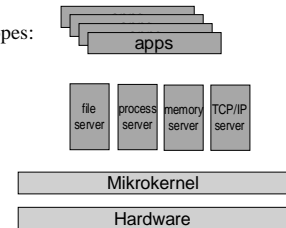


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The Multi-Server OS Idea

- Monolithic Unix
- Mach Single-Server Unix
- Mach Multi-Server Unix hopes:

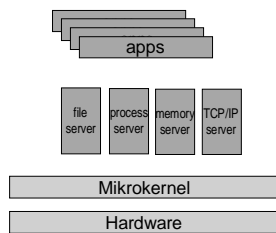
Reality:
unusable



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The Multi-Server OS Idea

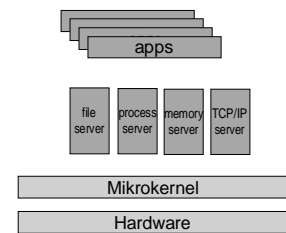
- Monolithic Unix
- Mach Single-Server Unix
- Mach Multi-Server Unix
- GNU Hurd
 - not ready



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The Multi-Server OS Idea

- Monolithic Unix
- Mach Single-Server Unix
- Mach Multi-Server Unix
- GNU Hurd
- SawMill Linux



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Rationale

Enable OS Research Improve Linux

with Multi-Server and related Nucleus-based technology:

- Never need to rewrite an entire OS from scratch.
- Even when experimenting with deep OS modifications.
- Extend existing OS's with new functionality.
- Customize existing OS's; strip them down for specific application requirements.

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Rationale

Enable OS Research Improve Linux

"SawMill" Multi-Server Linux:

- (1) isolate Linux services from each other;
- (2) improve them one by one:
 - VM, scheduling, security (denial of service), reliability, SMP, large memory, mmap, async io, select, large files
- Extend Linux, add value:
 - Alpha, new security policies.
- Customize Linux for special devices.

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Rationale **UKa** *A Research Road*

- for microkernel-based system construction
 - multi-server Linux, composable OS
 - middleware, customized servers, applications
 - mastering complexity in OS construction
- for microkernel evolution
 - L4++, Merced, embedded...
- for pervasive systems

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IBM *Business Impact Research Impact*

- Business units support SawMill-derived and specialized systems.
- Toolkit for pervasive devices

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IBM **UKa** *Business Impact Research Impact*

- Generic Methodology and Technology for constructing highly-configurable and composable OS's.
- Generic M&T for managing and controlling the exploding complexity in OS's.
 - **Strategy:** Explore the Multi-Server approach, "SawMill" Linux.
 - **Strategy:** Develop generic OS and middleware components.
 - **Strategy:** Develop highly-configurable OS's for a wide variety of devices from wristwatches to superservers.

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Intended:

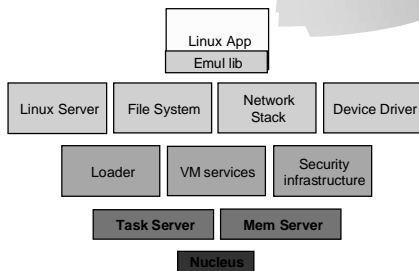


Legal

- *open source - proprietary*
 - Linux modifications: GPL
 - new basic components (e.g. Nucleus, VM framework, process manager): Open Source
 - new specials: proprietary
- *IBM - UKa*
 - UKa develops component
 - IBM gets free unlimited but non-exclusive licence
 - IBM develops component
 - UKa gets free licence without sublicencing rights

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SawMill Linux



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Current State of SawMill Linux

- Basic components
 - Task server, memory server
 - Loader, VM framework
 - Glue: SawMill Flick
- L4 X Nucleus
- Linux 2.2 - multithreaded kernel
- L4 X / Linux 2.2 development environment

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