Outline

- Extensibility, Safety and Performance in the SPIN Operating System
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- MSDOS: Extensibility and Performance
- Mach: Extensibility and Safety
- UNIX: Safety and Performance
- Goal: SPIN should have all three

Extensibility

- Applications can dynamically extend system to provide specialized services
- Put extension code in the kernel
  - Communication cost is cheap
- SPIN implements minimal services: Processor execution state, MMU, IO/DMA, Dynamic linker
- Compare with
  - Micro-kernels: Cost to cross protection boundaries
  - Library based: Offers minimal protection boundaries

Safety

- Kernel is protected from actions of extension
- Use language protection features
  - Static safety
- Modula3
  - Memory safe
  - Interfaces for hiding resources
  - Cheap capabilities
  - Restrict access to interfaces at dynamic link-time

Performance

- Extensibility and safety have low cost
- Extensions provide specialized service
  - Customized for the specific task with no extraneous code
- Extensions close to kernel service
  - Invocations cheap
  - Low latency response to interrupts