

The background of the image is a collage of various items: a magnifying glass with an Apple logo on its handle, a green pen holder with several pens, a globe, and some papers. The text is overlaid on this background.

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Conference



# **Rhapsody Core OS: Kernel and Runtime**

*John C. Signa*

**Rhapsody Core OS  
Evangelist**

# John's First Experience with the Mock Colonel



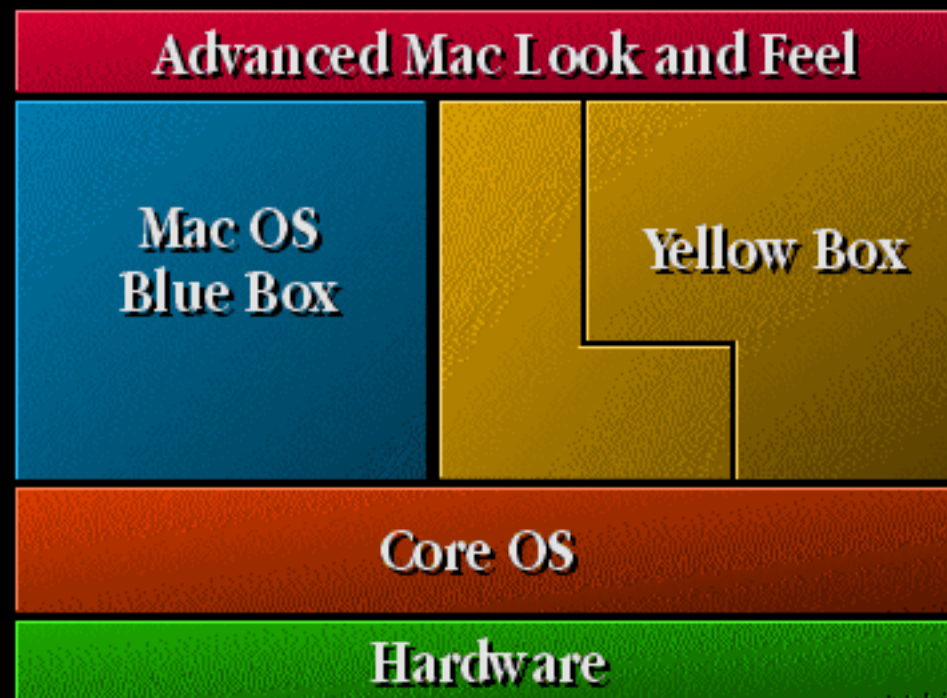


# **Rhapsody Core OS: Kernel and Runtime**

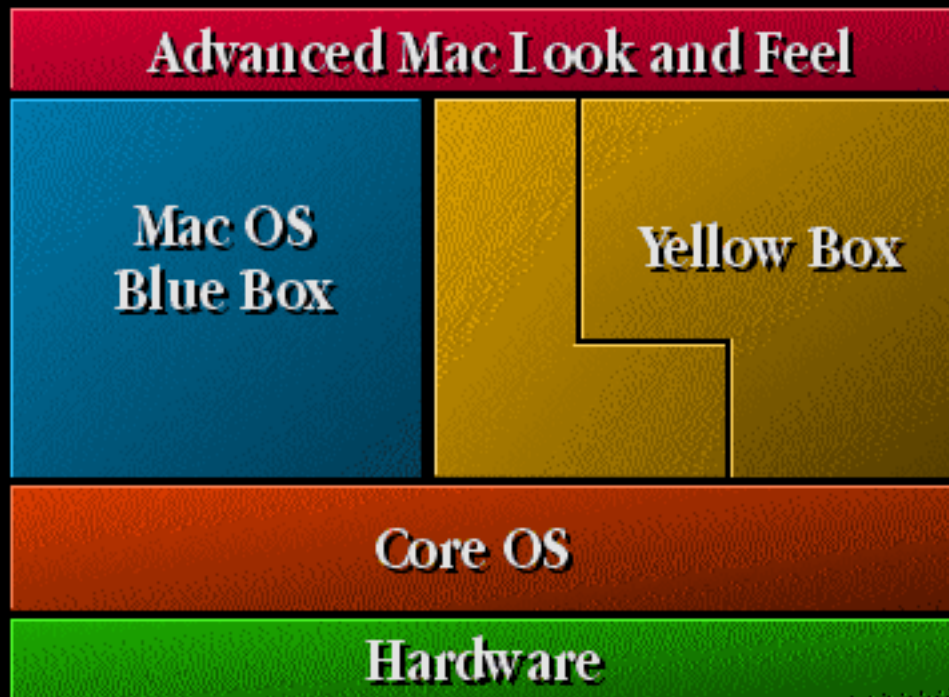
***Brett R. Halle***

**Manager  
Core OS Kernel Group**

# Rhapsody Core OS



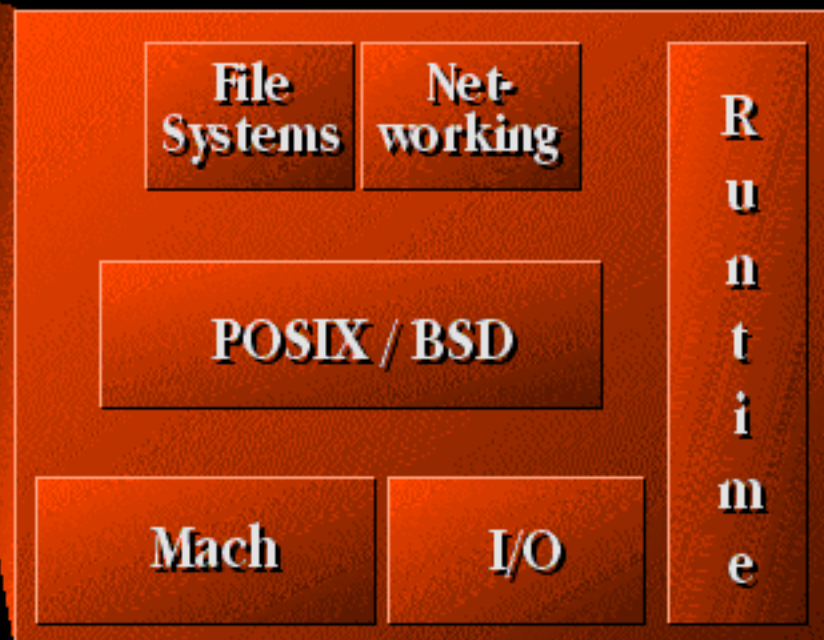
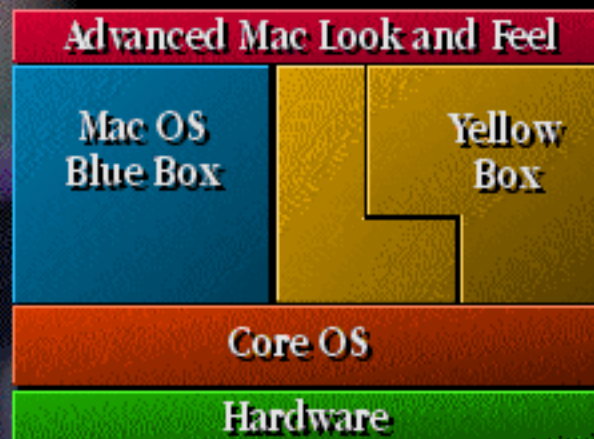
# Rhapsody Core OS



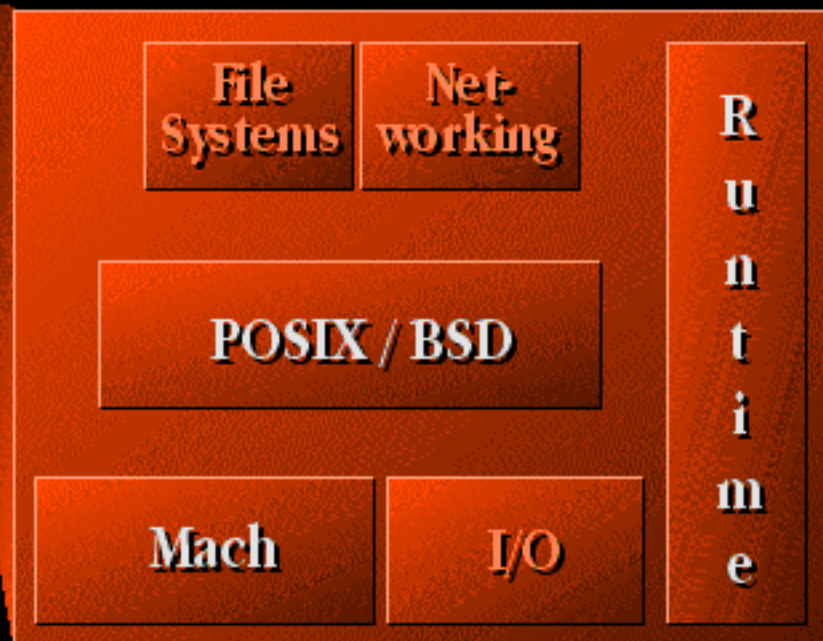
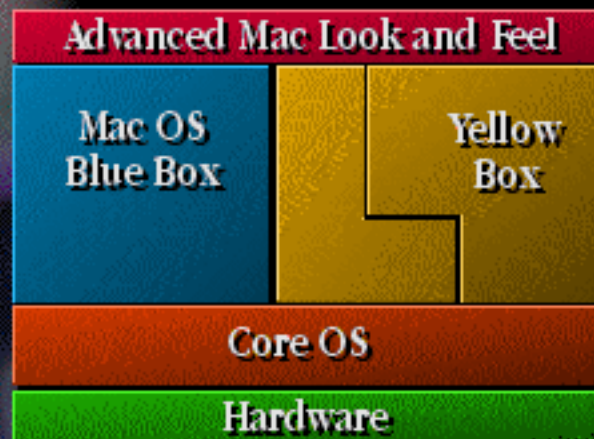
◀ You are here



# Rhapsody Core OS



# Rhapsody Core OS

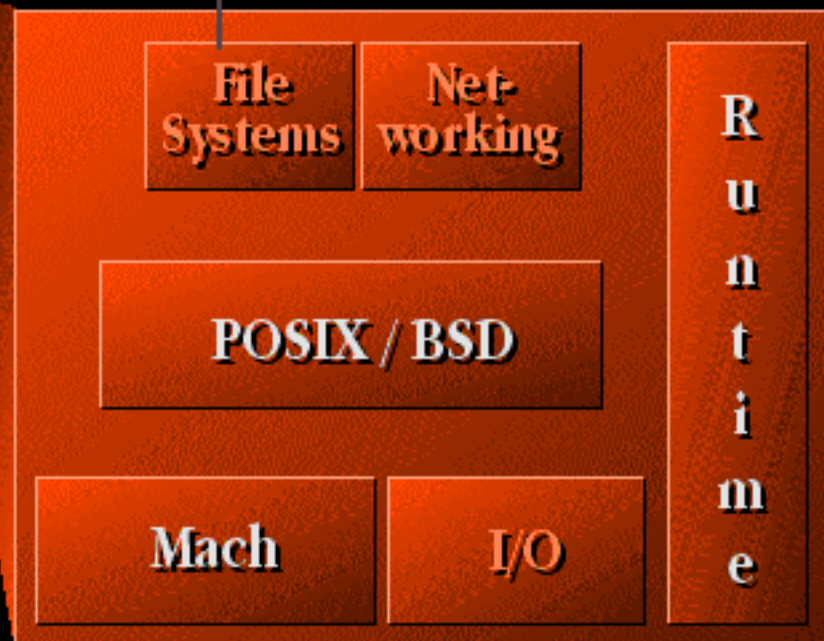




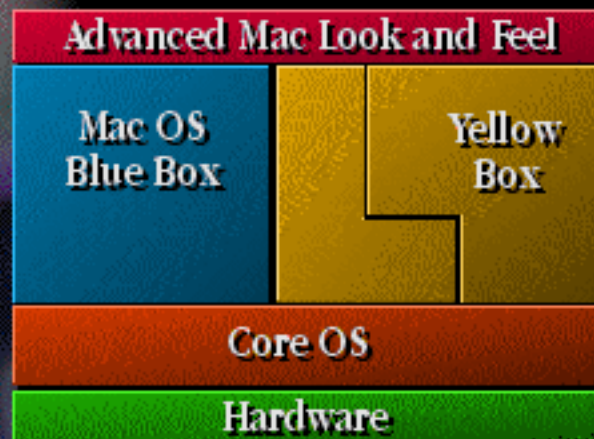
# Rhapsody Core OS



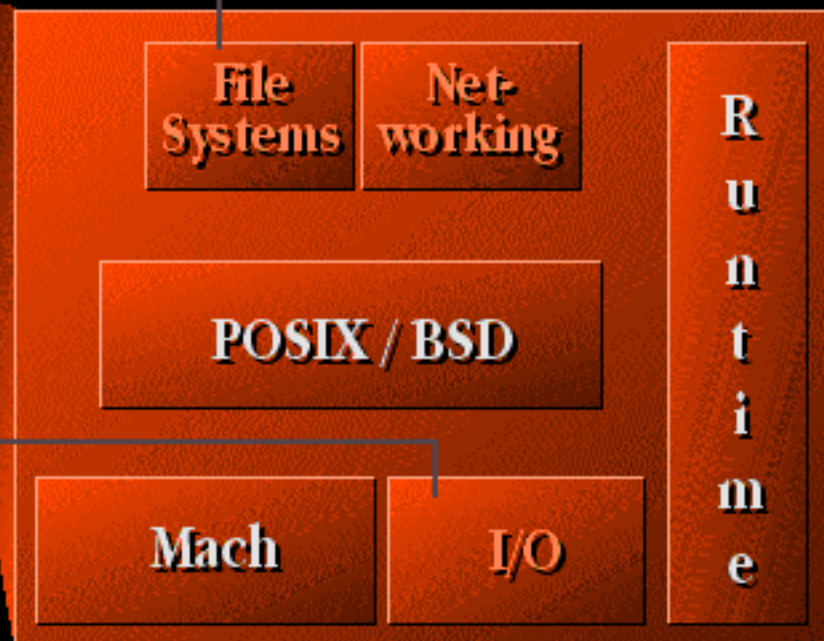
## Session 202



# Rhapsody Core OS



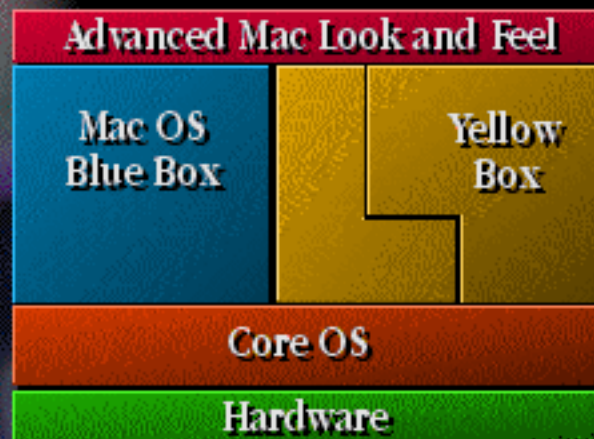
Session 202



Session 203



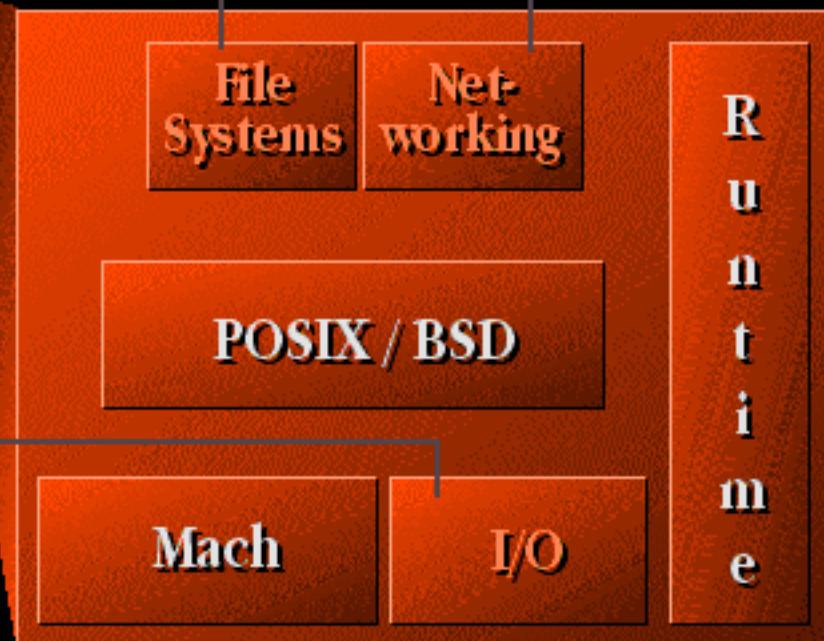
# Rhapsody Core OS



Session  
202

Session  
220

Session 203



# Core OS Kernel

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## *Mach*

- **History/Overview**



# Core OS Kernel

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## *Mach*

- **History/Overview**
  - **Key features**
    - **Tasking (tasks and threads)**
    - **Interprocess communication**
    - **Virtual memory**
    - **Multi-processor architecture**



# Core OS Kernel

---

## *Mach*

- **History/Overview**
  - **Key features**
    - Tasking (tasks and threads)
    - Interprocess communication
    - Virtual memory
    - Multi-processor architecture
  - **For more information**
    - "Programming Under Mach"
    - Net resources...



# Core OS Kernel

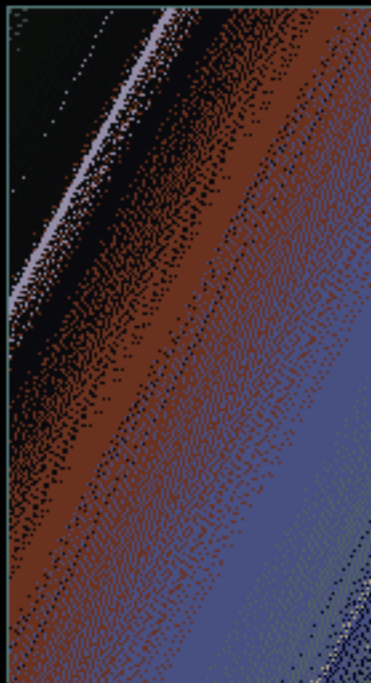
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*Mach Tasks, Threads*



# Core OS Kernel

## *Mach Tasks, Threads*



Task





# Core OS Kernel

## *Mach Tasks, Threads*



Task



# Core OS Kernel

## *Mach Tasks, Threads*



Task



# Core OS Kernel

## *Mach Tasks, Threads*



Task



# Core OS Kernel

## *Mach Tasks, Threads*



Task



Task

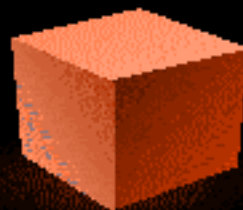


# Core OS Kernel

## *Mach IPC*

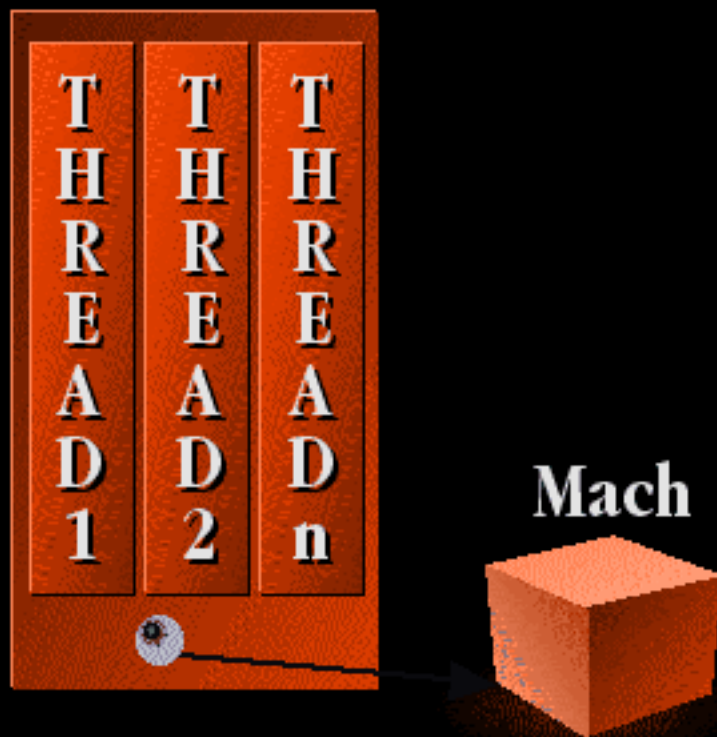


**Mach**



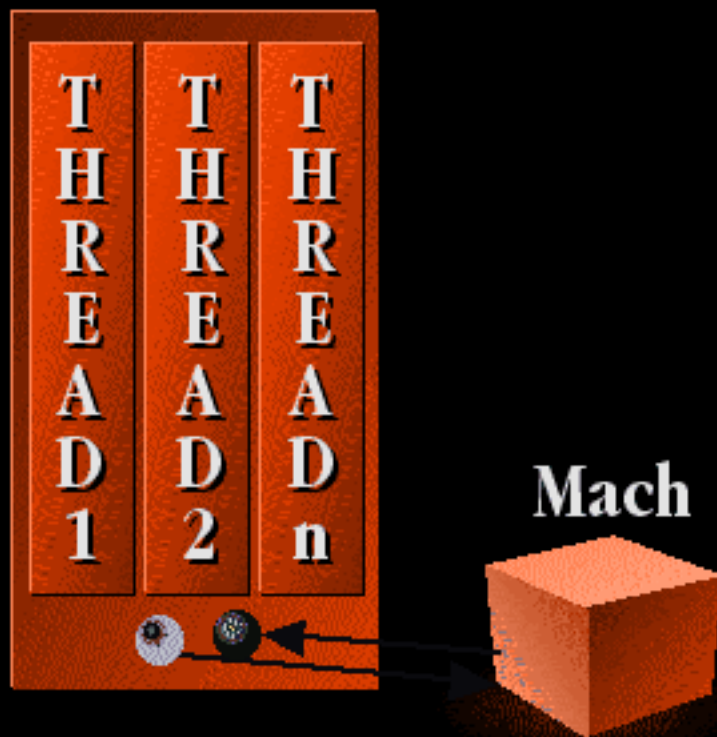
# Core OS Kernel

## *Mach IPC*



# Core OS Kernel

## *Mach IPC*



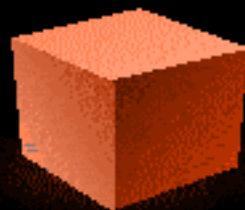
# Core OS Kernel

## *Mach IPC*



Task 1

Mach



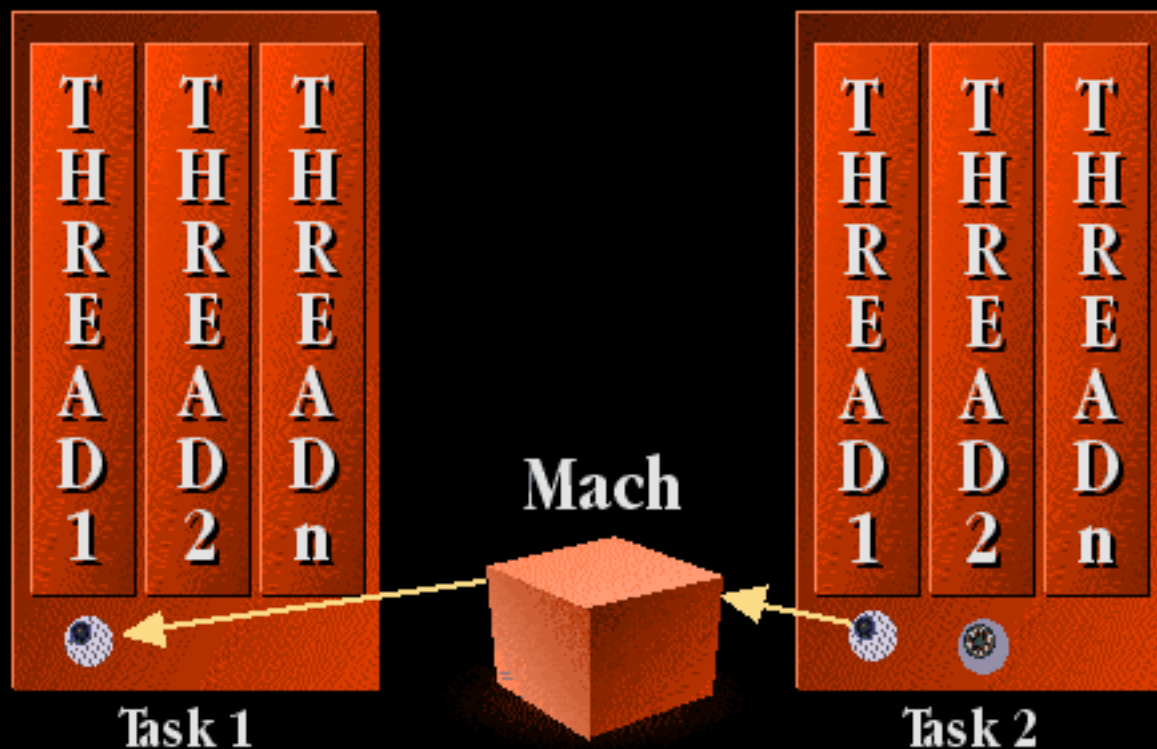
Task 2





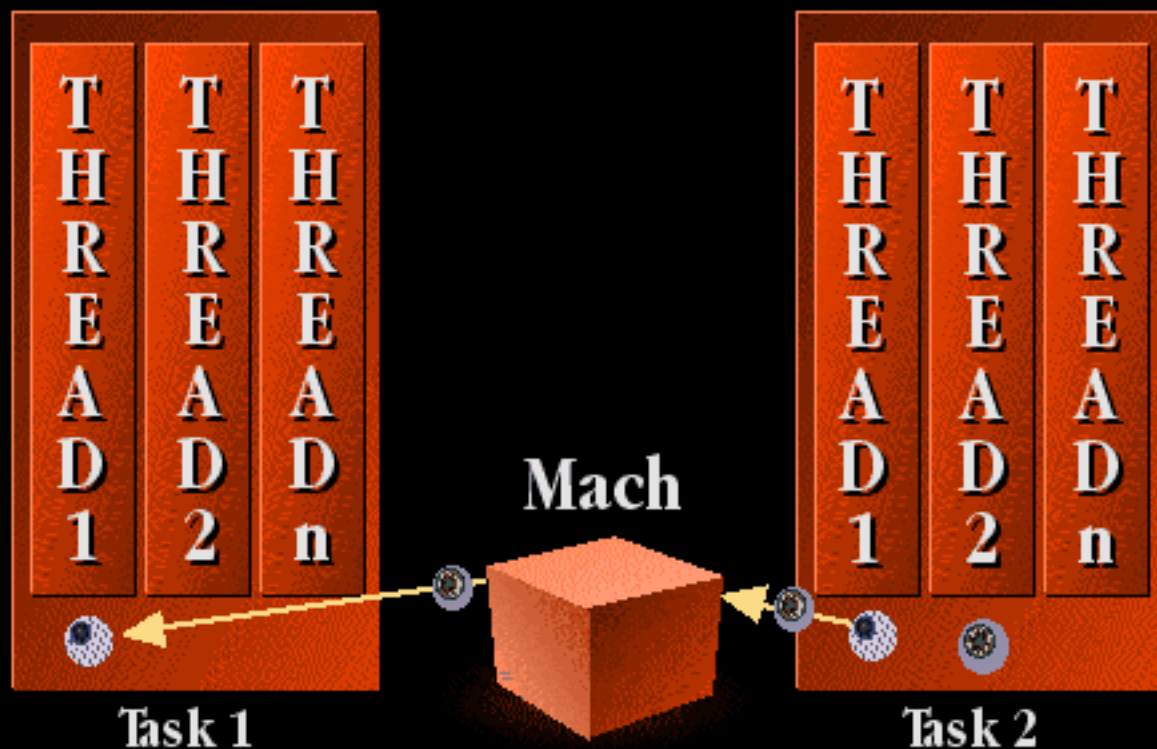
# Core OS Kernel

## *Mach IPC*



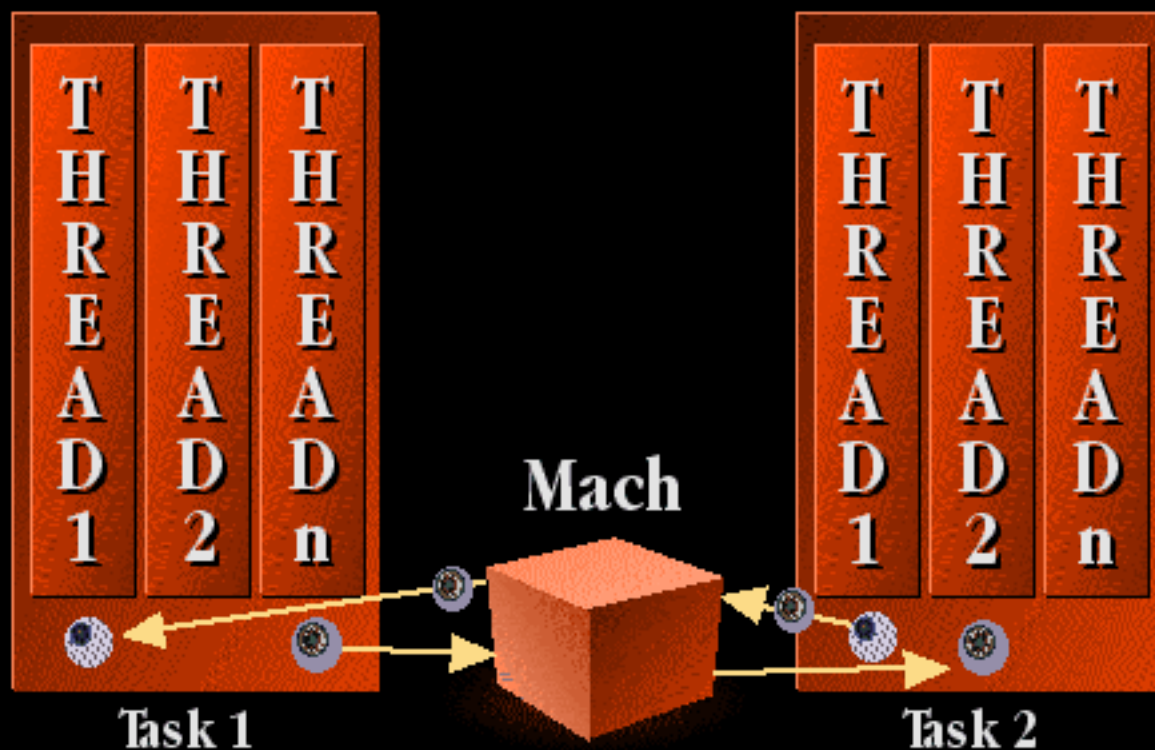
# Core OS Kernel

## *Mach IPC*



# Core OS Kernel

## *Mach IPC*



# Core OS Kernel

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## *Mach Memory Management*

- **Memory management**



# Core OS Kernel

---

## *Mach Memory Management*

- **Memory management**
  - **VM paging/Backing store**
    - Lazy, dynamic (sparse), backing store allocation
    - Copy-on-write



# Core OS POSIX/BSD

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## *BSD 4.4*

- Provides the OS “personality” APIs and services
  - Filesystem access
  - Networking access
  - Security policy



# Core OS POSIX/BSD

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## *BSD 4.4*

- Provides the OS “personality” APIs and services
  - Filesystem access
  - Networking access
  - Security policy
- For more information...
  - Numerous books available
  - Net resources...





Demo



# Core OS Runtime

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- **Architecture**
  - Position independent code
  - Dynamic shared libraries



# Core OS Runtime

---

- **Architecture**
  - Position independent code
  - Dynamic shared libraries
- **Object runtime**
  - Late bound
  - Be sure to see **Session 415**



# Core OS Runtime

---

- **Architecture**
  - Position independent code
  - Dynamic shared libraries
- **Object runtime**
  - Late bound
  - Be sure to see **Session 415**
- **Packaging**
  - Mach-O
  - App wrappers



# Core OS

---

- **For 99% of you...**
  - **Use Foundation (see Session 207)**
    - **Portable**
    - **Thread safe**



# Core OS

---

- **For 99% of you...**
  - **Use Foundation (see Session 207)**
    - **Portable**
    - **Thread safe**
- **For UNIX daemons, CLI tools**
  - **Use POSIX, BSD 4.4**
    - **Lots of free BSD compatible code out there**



# Core OS

---

- **For 99% of you...**
  - Use Foundation (see Session 207)
    - Portable
    - Thread safe
- **For UNIX daemons, CLI tools**
  - Use POSIX, BSD 4.4
    - Lots of free BSD compatible code out there
- **For Debugger developers, monitoring tools, etc.**
  - Use Mach and all of the above





Demo

# Additional Sessions

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- **Rhapsody Core OS: File System**
  - Tuesday, 6:10 pm, Hall 1
- **Understanding Rhapsody Drivers**
  - Thursday, 8:30 am, Room A1
- **Rhapsody Networking APIs and Services**
  - Friday, 5:50 pm, Room A1





# Additional Sessions (*cont.*)

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- **Uncommon Object Model:  
The Rhapsody Runtime**
  - Wednesday, 9:50 am, Room A1
  - Thursday, 9:50 am, Room C
- **Intro to the OpenStep  
Foundation Framework**
  - Wednesday, 4:30 pm, Hall 1
  - Friday, 3:10 pm, Room B



# Core OS Feedback

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- **Rhapsody Core OS Feedback Forum**
  - Thursday, 11:10 am, Room J4
- **E-mail**
  - [rhapsody-dev-feedback@apple.com](mailto:rhapsody-dev-feedback@apple.com)





Q&A

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