

Real-Time Systems and APIs

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Real-Time... Real Solutions

Performance-Critical Systems

Abstractions:

- **A multi-threaded application model with invocation and synchronization semantics**
 - **Periodic, Aperiodic, and Statistically invoked threads**
 - **Shared Resources**
 - **Resource creation**
 - **with accompanying arbitration,preemption, and consumption parameters**
 - **currently done tediously by hand with lower level system libraries (set priority, POSIX_PRIO_PROTECT, etc.)**
 - **Needs unified semantic model conveying purpose of resource creation and traceability to “protected” operations**
Protected operations require locking, critical regions, and an arbitration policy



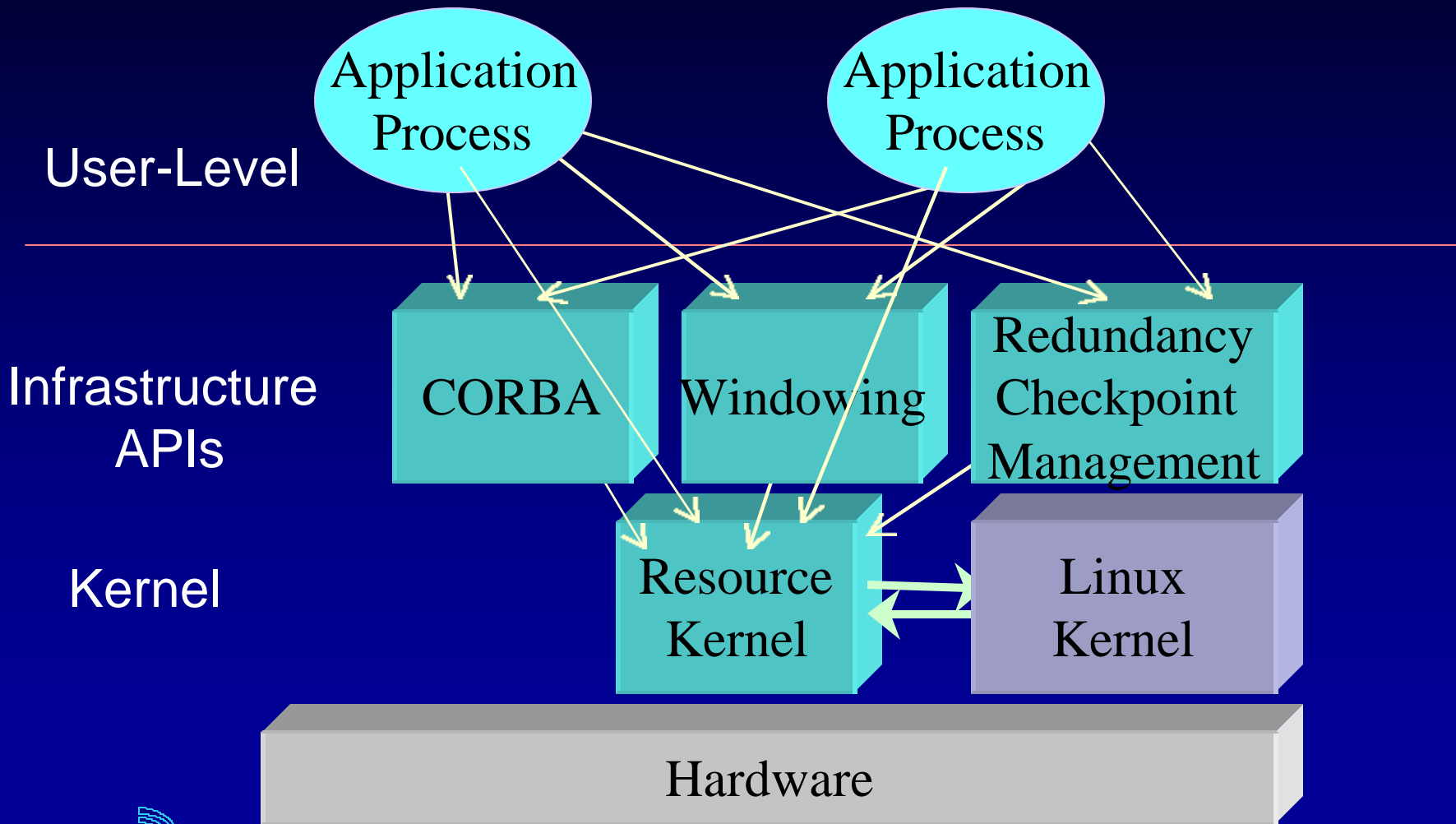
Real-Time Systems - Today's Technology

New Functionalities means new or extended APIs

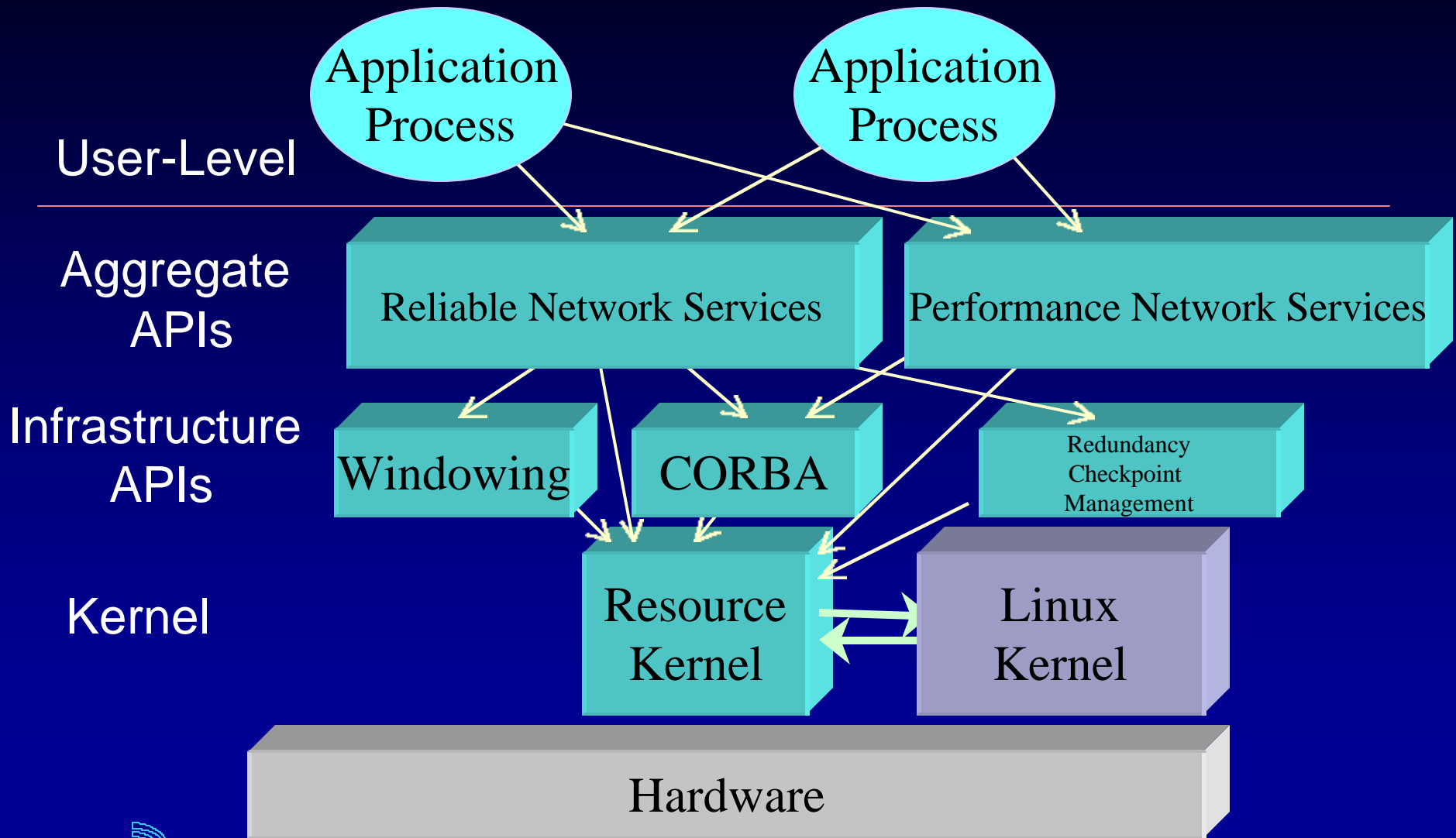
- New Kernel related services:scheduling
 - Resource Kernel Capabilities
 - Reservation-based scheduling with utilization bounds guarantee
 - hard, firm,soft reservations
 - Reservations Sets of executable applications with aggregate utilization limits
 - support for guaranteed Quality of Service (QoS)
 - Multi-level virtual machine scheduling
 - Dynamic Scheduling Support
 - Earliest Deadline First
 - Value Based Scheduling
 - For each operation: blocking behavior and blocking time QoS



Adding More System Architecture - “Non-Aggregate APIs”



Adding More System Architecture - “Aggregate APIs”



Details

- **Reliable Network Services**
 - **Failure, Availability parameter meanings**
 - **Recovery Strategies available -e.g. hot spare, shadow, rollback**
 - **Knowledge of processor existence and usage**
 - **Knowledge of messaging and communication infrastructure available**

An extension of the “optimization” capabilities of a compiler within a distributed reliable systems domain

The “Target” consists of the processors, networking communications, and enhanced kernel services



Details (2)

- **Performance Network Services**
 - **Performance Goals**
 - **Average, Worst Case required response information**
 - **Knowledge of processor topology available**
 - **Knowledge of communications capabilities and associated costs of use**
 - **Optimization goals specifiable - extension of tunable properties currently within OMG Object Link Adapter:**
 - **Bounded Client Response**
 - **Throughput**
 - **Extensibility**
 - **Could later be combined with Reliability**



Opinions??

- If you agree about the need for these APIs.

Come to the Workshop!

- If you disagree about the need for these APIs.

Come to the Workshop!

See You at the Workshop!

