M.I.T. DEPARTMENT OF EECS

6.033 - Computer System Engineering **Handout 12 - March 2, 1999**

Quiz Review 1 Outline

Definition of a Complex System

·Large # of nodes/components
·Large # of interactions
·Interacting functions
·Surrounded by an environment
·Lack of methodical description
·Cannot be completely understood by just one or two people

Problems found in Complex Systems

·Emergent Properties
·Propagation of Effects
·Incommensurate Scaling

Design Methodologies

·Modularity --- Soft vs Hard
·Abstraction
·Hierarchy
·Level Definition

Client/Server

·Modular, can prevent failure of entire system, levels of protection depend on implementation
·Encourages Abstraction, look at Xwindows

Virtual Memory

·Abstraction, one address in program, lower levels in software deal with where it really is
·Modularity, separating one program's memory from others
·Locality and Replacement Strategies
·Tradeoffs, size (cost)/speed (latency and throughput)

Kernels

·Trusted intermediate: applications communicate with each other and the hardware devices through the kernel

- Tradeoffs, small kernel (fault isolation) fewer interactions (speed) many more
- Monolithic, includes management of most things
- Micro, separate many things out into user space
- Exo, separate policy from management only control protection, let users choose method of managing resources

Threads

- Modular, separate programs, separate virtual processors
- Scheduling policies -- Preemptive vs Nonpreemptive

Coordination

- Mutual Exclusion
- Atomicity!

Networking

- Level definition, the protocol stack
- Isochronous vs asynchronous models
- Possible errors in network, where does data get lost?
- Contracts: knowing what states are possible, and the plan to deal with errors

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