Introduction to Distributed systems An Overview

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DEFINITION

DISTRIBUTED SYSTEM A distributed system is a collection of independent computers that appears to its users as a single coherent system

- Distributed systems becomming more common every year.
- It is important to understand the constraints surrounding the development and usage of distributed systems



WHY USE THEM?

- They allow us to connect users and resources
- Data Sharing
- Supercomputing
- Scalabiltiy



THE WEB

- The largest distributed system in the world
- Allows data sharing and compute cycle sharing
- Built on ubiquitous middleware libraries (http, cgi, etc.)
- Open and Transparent



SUPERCOMPUTERS

- Almost every entry in top 500 supercomputer list uses "off the shelf" hardware
- Relies on running software over clusters of 100,000's CPUs
- Each CPU has its own memory and distributes load (compute cycles and data) over entire cluster



ISSUES

All the problems of concurrency plus...

- Security
- Synchronisation
- Reliability
- Fault Tolerence
- Replication
- Communication
- Scalability
- Naming
- Sharing





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HARDWARE

- Multicore and manycore (Xeon Phi)
- GPU (Nvidea)
- Custom Clusters (Supercomputers)
- Homogeneous multicomputers (see above)
- Heterogeneous Computer Systems (Web, Cloud)



Software

- Distributed Operating System (many attempts)
- Network Operating System (Unix?)
- Middleware (Http, MPI, Corba, RMI, etc.)

