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

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Why use them?

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

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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

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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)

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Software

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

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