Models of Computing

In this course we will study a number of different models that appear in distributed systems:

- object model
- tuple space model
- agent model
- metasystem model
- transaction model

Object Model

![Object Model Diagram]

Tuple Space Model

![Tuple Space Model Diagram]

Agent Model

![Agent Model Diagram]

Metasystem model

Cluster: very high speed, low latency network (e.g. myrinet)

Grid:
examples of models

- fixed computation-transportable data
  - object-based
  - CORBA (OMG)
  - RMI (Java)
  - COM/DCOM (MS)

- transportable computation-transportable data
  - Metasystems
  - Globus
  - Legion
  - Agents
  - Voyager
  - Aglets

major topics

- concurrency, synchronization, coordination
  - safety vs. liveness
  - safety: insuring consistency of system
  - liveness: insuring progress of system's activity

- conservative vs. optimistic:
  - conservative: refuse to perform any action unless the system's consistency can be guaranteed
  - optimistic: perform actions with the expectation of their successful completion and be prepared to recovery to a consistent state if they cannot be completed

forms of synchronization

- mutual exclusion - preventing concurrent access to shared objects to preserve the consistency of the object

- condition synchronization - blocking attempted operations on a shared object until that object is in a state where the operation will preserve the consistency of the object

java as a concurrency programming language

- language:
  - language concepts for threads and synchronization
  - platform independent

- libraries for basic network programming
  - sockets
  - Remote Method Invocation

- used to implement distributed systems
  - Aglets
  - Voyager