Desarrollo de Aplicaciones en Red

José Rafael Rojano Cáceres
http://www.uv.mx/rrojano

Distributed System

- As we talked … a DS is a collection of PC … interconnected by a medium.
- Origen in the 80's
- Recall Flynn taxonomy

Flynn Taxonomy '72

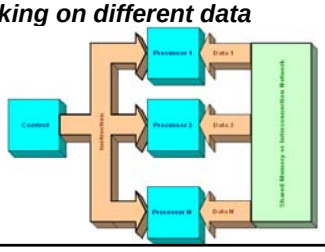
- **Based in to essential characteristics:**
  - ***Instruction flow***
  - ***Data flow***
  - ✓ ***SISD***
    - *All computer with only one flow of each one in one processor*
  - ✓ ***SIMD***
    - *One flow of instructions, multiple data's flow. One computer get an instruction later delegates to other processors to do the task in parallel*
    - *Vector machines*
  - ✓ ***MIMD***
    - *Multiprocessor, shared memory*
    - *Multicomputer, each processor has resources*
  - × ***MISD***
    - *Has not been successful commercial implementations*
    - *Implementation based in pipelined vector processors*

SISD

- **Any algoritmh running in this machine is sequential (serial) it does not have parallelism**

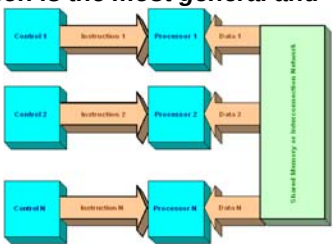
SIMD

- ***N identical processors***
- ***One single instruction stream***
- ***Working on different data***



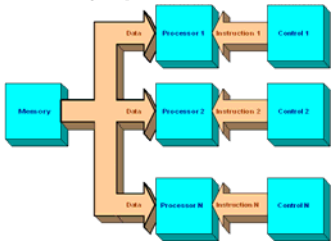
MIMD

- ***The MIMD model of parallel computation is the most general and powerful***



MISD

- *Used in classification problems*
- *Algorithms very specialized*



Distributed System

- As we talked … a DS is a collection of PC … interconnected by a medium.
- Origen in the 80's
- Recall Flynn taxonomy
- **Besides the Flynn taxonomy, we have the factor of communication:**
  - *Systems strongly coupled*
  - *Systems weakly coupled*

Systems strongly coupled

- *The delay experimented by the message between machines is short*
- *Transmition rate is high*
- *Processors wired in the same card*
- *This kind of systems are used in parallel processing*
- *Multiprocessors*
- Distributed Operating Systems

Systems weakly coupled

- *The opposite occurs*
- *Systems interconnected for example by modem*
- *This kind of systems are used for distributed systems*
- *Multicomputers*
- *PVM, MPI, CORBA*

Reading Activity

- *From Tanenbaum book's Distributed System read from pages 10 to 22*
  - **1.3.1 ….**
- *For handing, write a report of 2 pages. If you want you can do it in English!*

Clustering

What's Clustering

- **"Is the name for a collection of computers interconnected by a medium to work in an specific part of a big problem that can be split"**
  - ***It usually has more than two computers***
  - ***Each node is interconnected each one***
  - ***The cluster has special software***

Cluster types

- ***The classification for cluster can be done based in different aspect like: applications, availability, service, hardware, OS, configuration and node's number. In particular we can define:***
  - **High performance computing**
    - Sharing time processor
  - **High reliability**
    - Time real systems
  - **High availability**
    - Try to offers a service 7/24
  - **Fail-over**
    - Use a very high performance connection to check the availability restoring the communication in case of crash
  - **Load balancing**

Cluster models

- NUMA (Non-Uniform Memory Access): it has shared access to memory to execute programs
- MPI (Message Passing Interface): Standard library for communication through message passing.
- PVM (Parallel Virtual Machine): Do the same function that MPI, but it's in disuse.
- Beowulf: Cluster done with equipment not dedicate, like the equipment of a computers lab.

OpenMosix

- ***Openmosix is a cluster of high performance and load balancing***
- ***It's a patch for the Linux kernel***
- ***The internal algorithms achieve migration for load balancing***
- ***The migration process in mosix seem to be like a SMP (Symmetric Multi Processing) where an task can be distributed in the whole system.***

Pros

- ***It does not need extra packages***
- ***Does not requiere source code modifications***

Con

- ***It's depend from kernel***
- ***Migration is not always done***
- ***Sharing memory problems***

References

- ***http://www.tommesani.com/ProgrammingModels.html***
- ***Sistemas operativos distribuidos, Tanenbaumm, 1996***
- ***Implementación de un Cluster openmosix para cómputo científico en el instituto de ingeniería, José Castilo Castillo, 2006***