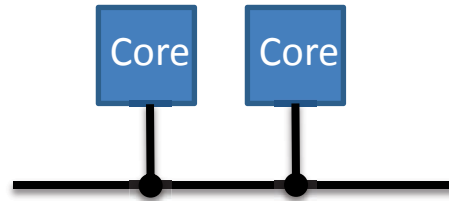
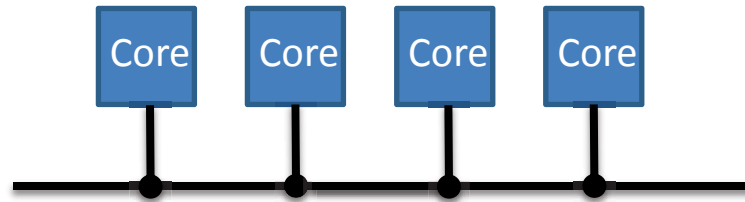


Computer Architecture
ELE 475 / COS 475
Slide Deck 14: Interconnection
Networks
David Wentzlaff
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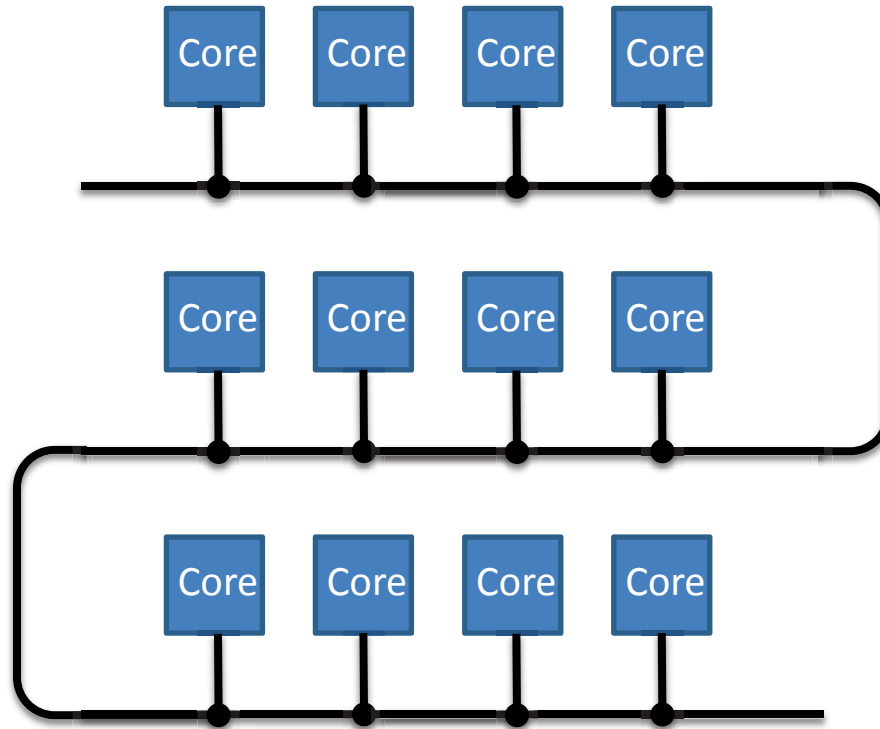
Overview of Interconnection Networks: Buses



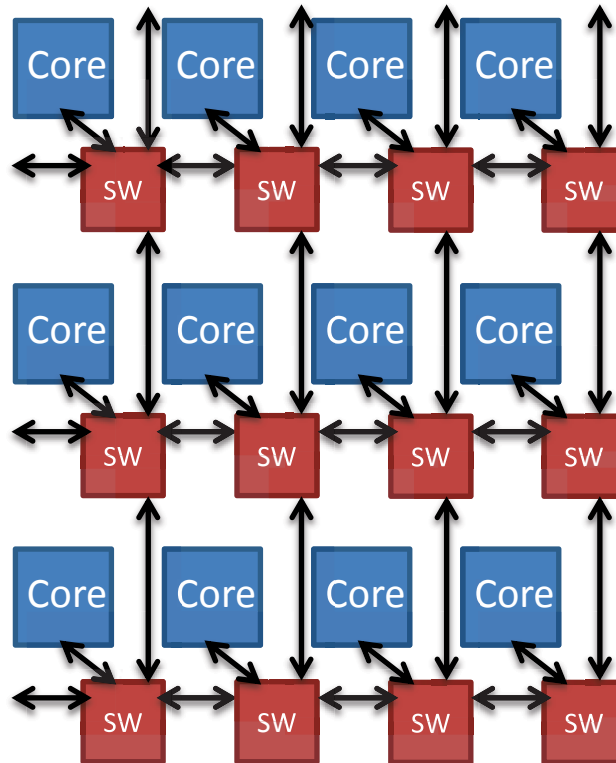
Overview of Interconnection Networks: Buses



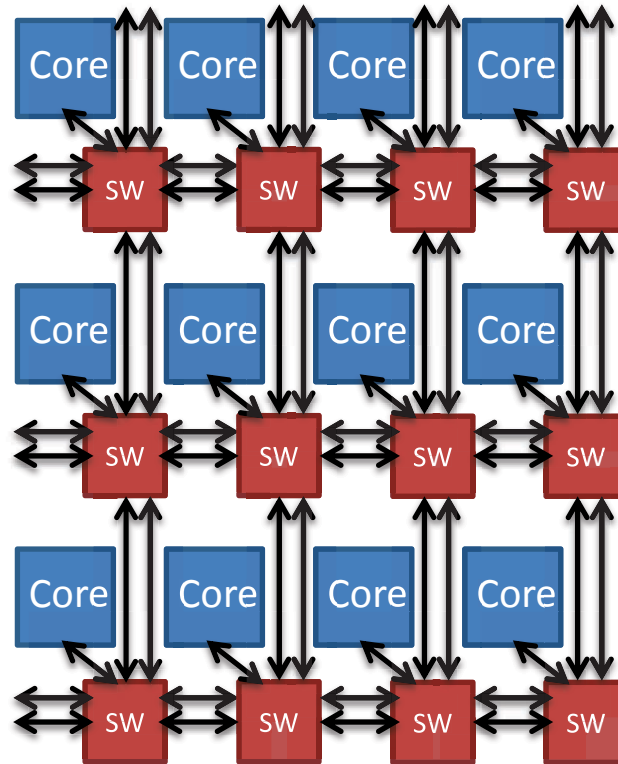
Overview of Interconnection Networks: Buses



Overview of Interconnection Networks: Point-to-point / Switched



Overview of Interconnection Networks: Point-to-point / Switched



Explicit Message Passing (Programming)

- `Send(Destination, *Data)`
- `Receive(&Data)`
- `Receive(Source, &Data)`

- Unicast (one-to-one)
- Multicast (one-to-multiple)
- Broadcast (one-to-all)

Message Passing Interface (MPI)

```
#include <stdio.h>
#include <assert.h>
#include <mpi.h>
int main (int argc, char **argv) {
    int myid, numprocs, x, y;
    int tag = 475;
    MPI_Status status;
    MPI_Init(&argc,&argv);
    MPI_Comm_size(MPI_COMM_WORLD,&numprocs);
    MPI_Comm_rank(MPI_COMM_WORLD,&myid);
    assert(numprocs == 2);
    if(myid==0) {
        x = 475;
        MPI_Send(&x, 1, MPI_INT, 1, tag, MPI_COMM_WORLD);
        MPI_Recv(&y, 1, MPI_INT, 1, tag, MPI_COMM_WORLD, &status);
        printf("received number: ELE %d A\n", y);
    }
    else {
        MPI_Recv(&y, 1, MPI_INT, 0, tag, MPI_COMM_WORLD, &status);
        y += 105;
        MPI_Send(&y, 1, MPI_INT, 0, tag, MPI_COMM_WORLD);
    }
    MPI_Finalize();
    exit(0);
}
```


Message Passing vs. Shared Memory

- Message Passing
 - Memory is private
 - Explicit send/receive to communicate
 - Message contains data and synchronization
 - Need to know Destination on generation of data (send)
 - Easy for Producer-Consumer
- Shared Memory
 - Memory is shared
 - Implicit communication via loads and stores
 - Implicit synchronization needed via Fences, Locks, and Flags
 - No need to know Destination on generation of data (can store in memory and user of data can pick up later)
 - Easy for multiple threads accessing a shared table
 - Needs Locks and critical sections to synchronize access

以上内容仅为本文档的试下载部分，为可阅读页数的一半内容。如要下载或阅读全文，请访问：<https://d.book118.com/367123123015006145>