

## 4<sup>th</sup> February

### Threads vs Processes

Threads have shared address space while the process has separate address space.

### Condvar and trylock in pthreads

#### Semaphore

- Generalized lock
- Introduced by Dijkstra
- Supported in Linux
- 2 states : open / closed
- 2 operations: wait – blocking unit  
semaphore is open P( )
- signal – allows other threads to enter critical section V( )
- A semaphore is associated with a queue of waiting processes or threads
- If wait is called by a thread,
  - a. If semaphore is open, thread continues
  - b. If semaphore is closed thread blocks on the queue
- Signal semaphore open the semaphore
  - a. If a thread is waiting on the queue, the thread is unblocked
  - b. If no threads are waiting on the queue, the signal is remembered for the next thread.

#### High performance Fortran

##### Extension to Fortran 90

- add PRAGMAs
- FORALL – all loop iterations are independent
- PURE – only works on local data

#### Partition Global Address Space(PGAS)

- single address space that is partitioned
- each partition has affinity with a thread processes

Chapel (Cray) – allows programmers to specify the placement of data and also tasks

Linda – Manages data in tuples spaces

- Bell labs

#### Unified Parallel C

- Extension to C
  - Single, partitionable, address space
- Uses a SPMD model – fixes mapping of computation to data at compile time
- Cilk – provides extensions to C and C++ to express fork – join operations.

#### Computer Arithmetic

Integers – 16,32,64 signed or unsigned

Floats – used to represent small numbers as well as larger numbers IEEE 754

$(-1)^s * c * b^q$	Single precision(32 bits)	64 bits
b – base	2	2 implied
s – sign	1 bit	1 bit
c – significance	24( 1 stored implicitly)	53 bits
q – exponent	8 bits	11 exp

