Directory based Protocol

Distributed Memory Multi-processor

P_i: Proc.
C_i: Cache
M_i: Memory bank
D_i: Directory

For each memory block in M_i maintain its state:
- Shared: read only
- Uncached
- Modified

Sharers: set of processors caching this memory block

Address Space

Interconnection N/W

N_0, N_1, N_2, N_3, N_4
Local node: Request originates at home node: where the memory location and directory entry reside.

Local node: $P_2$  
Home node: $P_3 (P_3 + N_3 + D_3)$  
(assume that memory block with addr $A$ is uncached)

Change the state of Block $A$ to Modified.  
Sharers (Blocks):  
$\{ P_2 \}$

Remote node:  
that has a copy of the cache block

Cached block is invalidated.  
(shared)

Read miss to block $A$  
$P_4$, $A$  
fetch/invalidates data write back