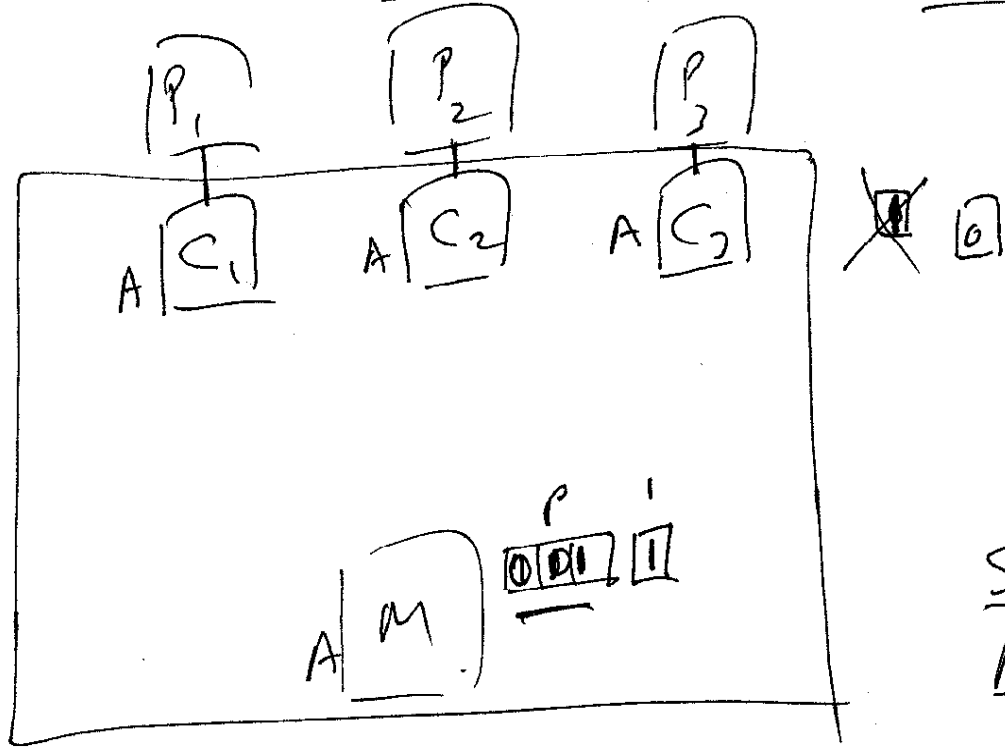


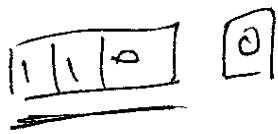
CACHE COHERENCE (DIRECTORY) C.C./1



SHARED
MEMORY

Each cache line
in memory has
 $p+1$ bits

Each cache line
in each cache
has 1 bit



101
001

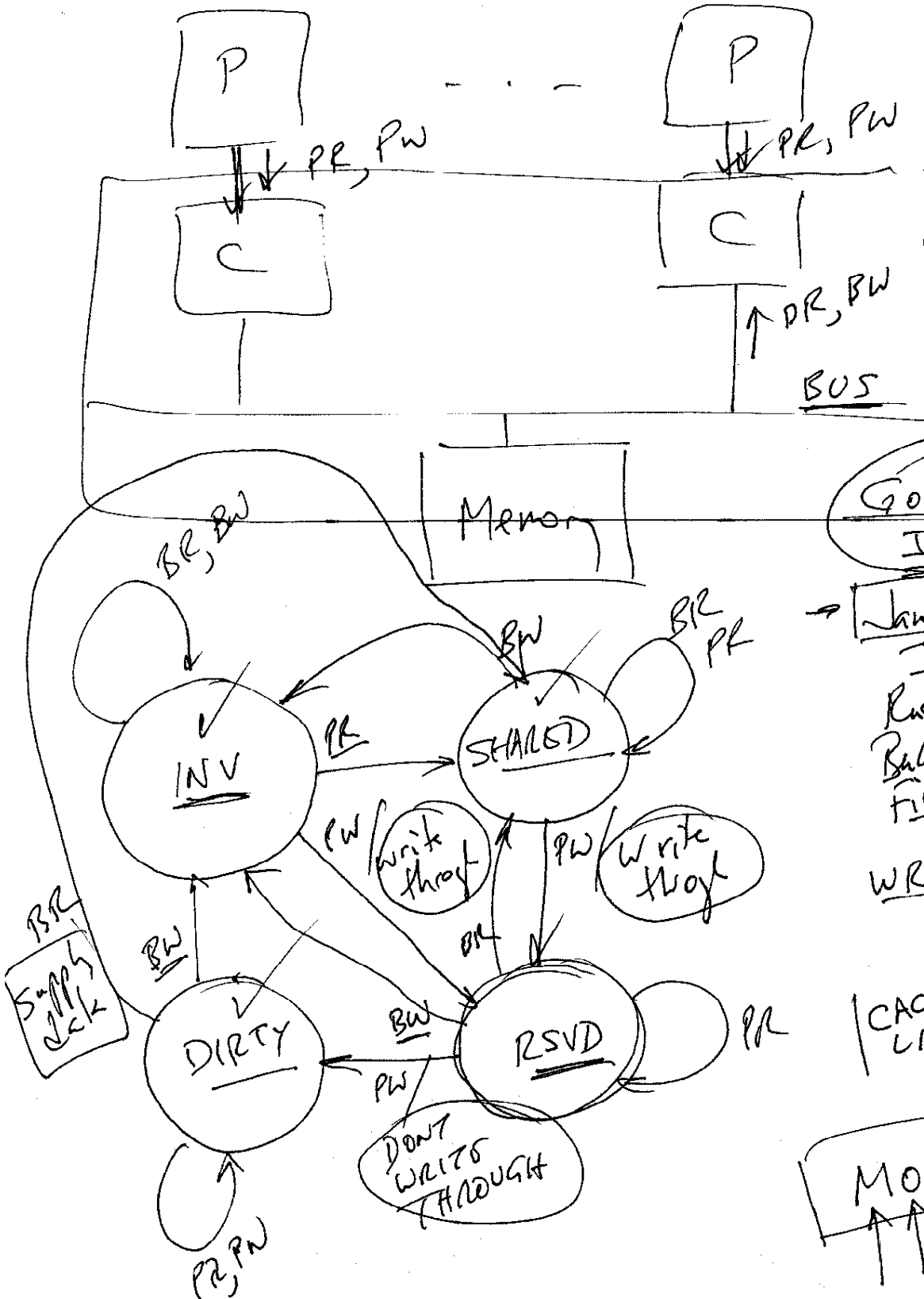


001
010
100



Cache Coherency (Snoopy Cache)

c.c./2



Update
In invalidate

Goodman
ISCA 1983

→ Jamal Patel | Illinois
ISCA 1984
Ruckelshaus / Sepall 1984
Baker / 1985
Fitz / Dragon

WRITE ONCE

| CACHE LINE | = | DATA ELEMENT |
| SYNOPSIS |

MOESI
↑↑↑↑↑

S. FRANK

Memory Consistency

c.c. / 3

CRITICAL SECTION

~~A~~ L1 = 0

L2 = \emptyset



A: L1 = 1
B: if (L2 = \emptyset)
 { critical section }

X: L2 = 1
Y: if (L1 = \emptyset)
 { critical section }

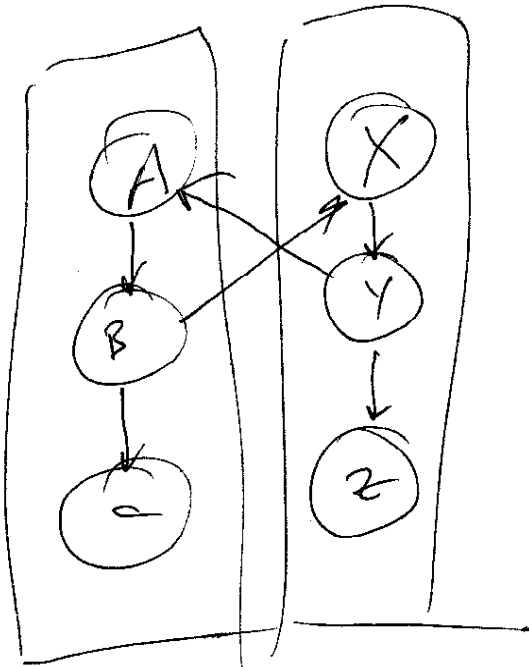
C: L1 = \emptyset

Z: L2 = \emptyset

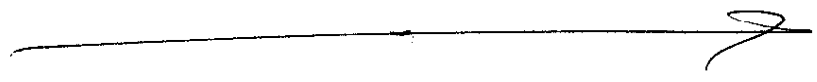
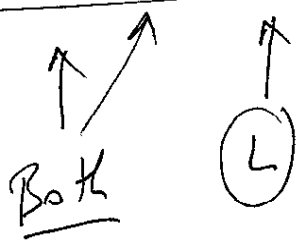


LESIE
LAMPORT
~1978

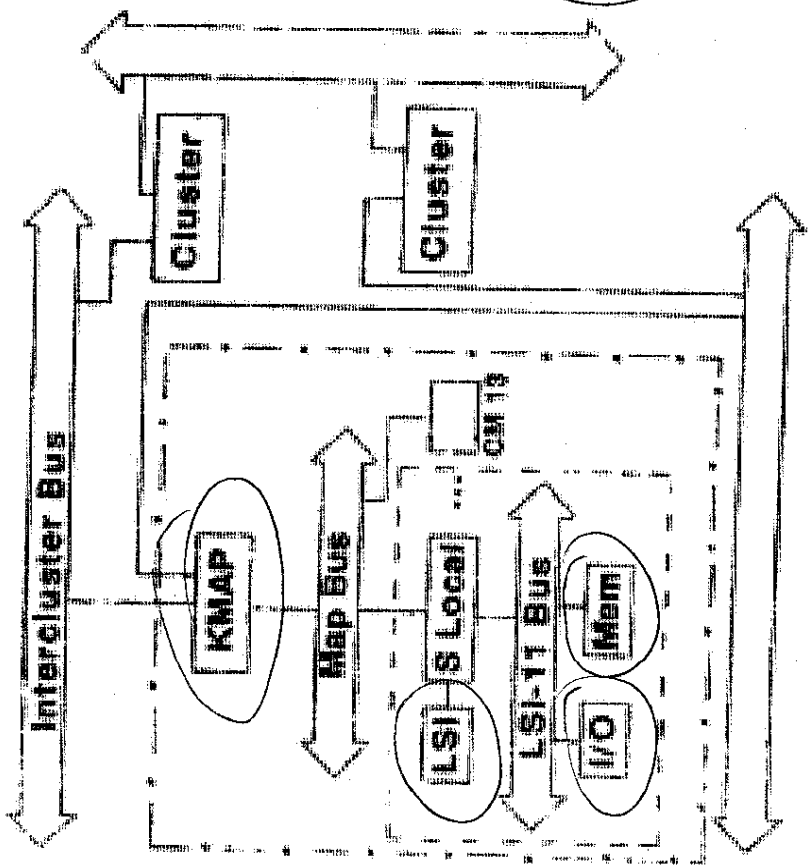
SEQUENTIAL
CONSISTENCY



A	A	A	A	A	A	A	A	A	A
B	B	B	B	X	X	X	X	X	X
C	X	X	X	B	B	B	Y	Y	Y
X	C	Y	Y	C	Y	Y	B	B	Z
Y	Y	C	Z	Y	C	Z	C	Z	B
Z	Z	Z	C	Z	Z	C	Z	C	C

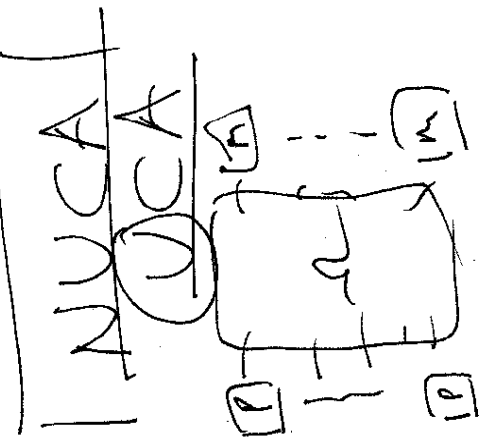


CMU ~ 1978



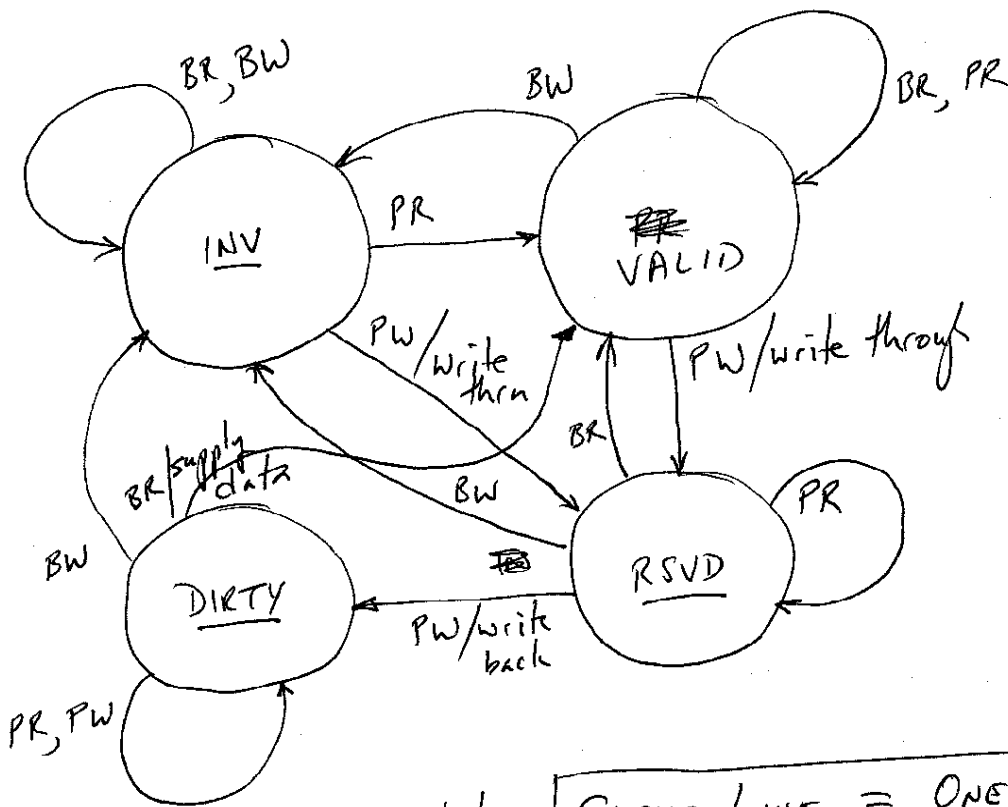
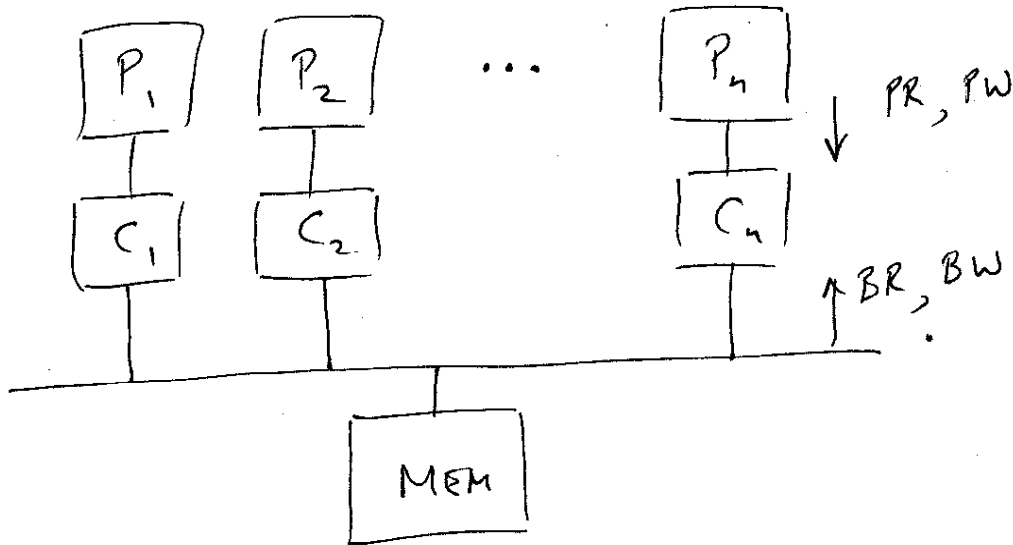
DAN
SLOWIATKOWICZ
ANITA JONDS

DISTRIBUTED
→ SHARED
→ MEMORY



Note: A well-meaning student told me to get rid of this slide. cm* is old. People will think you are an old man, and not take you seriously.

SNOOPY CACHE



Note: CACHE LINE = ONE ELEMENT

MESI / MOESI /