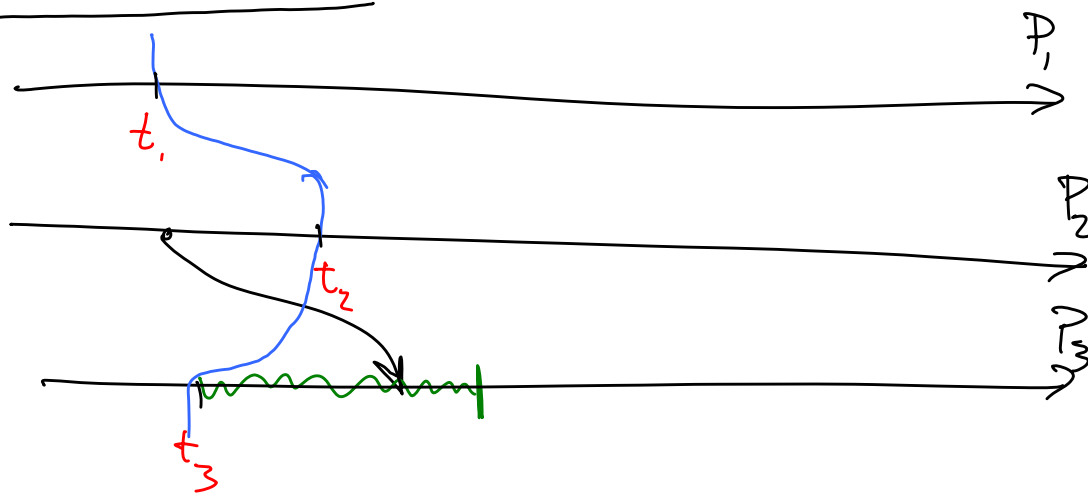


Lecture 12

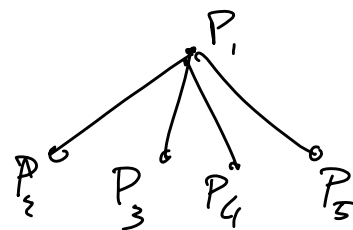
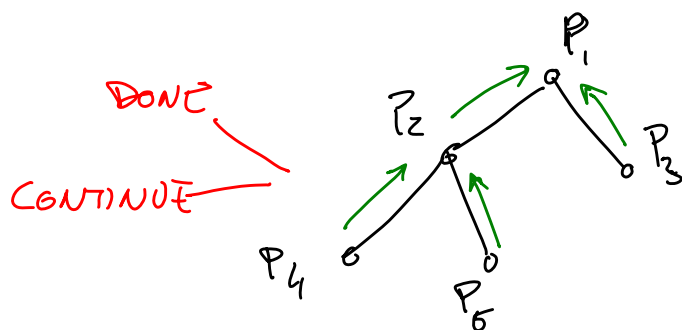
Note Title

9/30/2004

Termination Detection



Collect snapshots until individual processes are "accepting" msg (blocking)
and no message on-the-air.



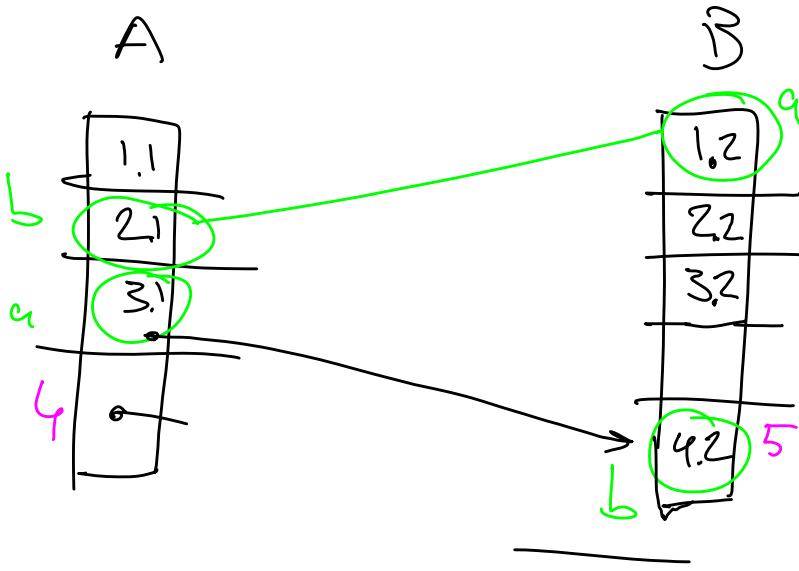
Vector timestamp

$$C: E \rightarrow \mathbb{R}$$

$$a \rightarrow b \Rightarrow C(a) < C(b)$$

$$\forall a, b \quad a \neq b \Rightarrow C(a) \neq C(b)$$

Q: $C(a) < C(b)$ but not necessarily $a \rightarrow b$?



$C(a) < C(b)$
 $a \rightarrow b$? NO

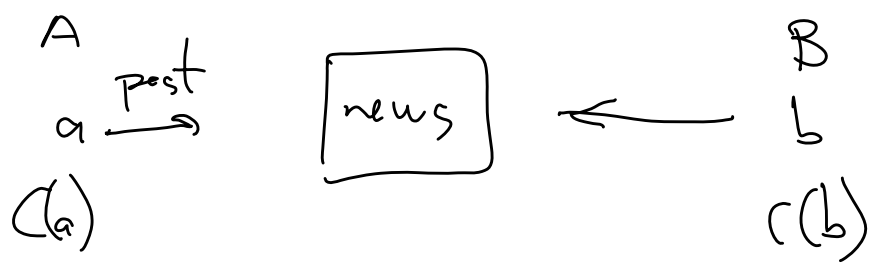
$a \rightarrow b$? YES

Logical time

$a \rightarrow b$ iff either

1. a, b events in same process, execution of a precedes exec of b
2. $a = \text{send a msg}$
 $b = \text{receive it.}$

Logical time (property) $a \rightarrow b \Rightarrow C(a) < C(b)$

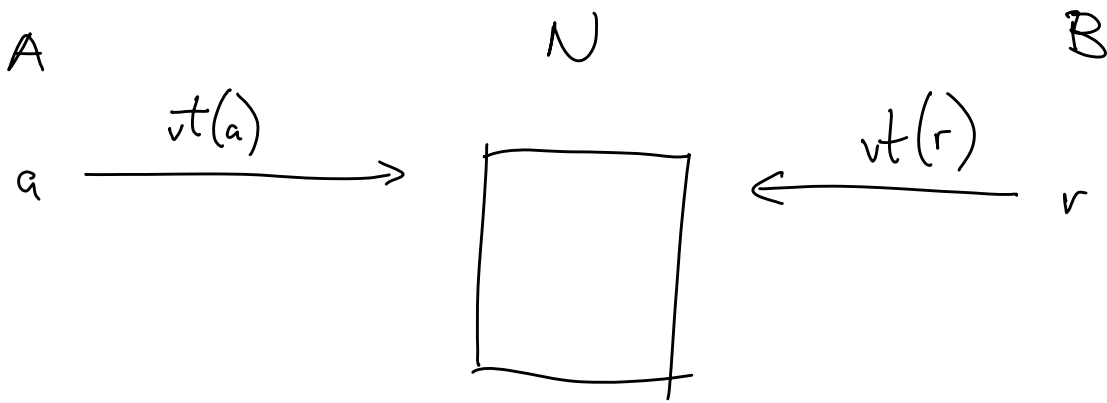


$a \rightarrow b \iff C(a) < C(b)$

$V_i[j] = K$ then i knows that K events happened at j .

(in particular, $V_i[i] = \# \text{ events at } i$).

$$i \quad V_i \xrightarrow{V_i} j \quad V_j: \quad V_j[q] = \max\{V_j[q], V_i[q]\}$$



If a happened before r , $vt(r)[B] > vt(a)[B]$

Deliver message r to user at N iff:

$$1. vt(r)[B] = V_N[B] + 1 \quad (\text{define events} = \text{msg}).$$

$$2. vt(r)[A] \leq V_N[A] \quad (A \neq B)$$