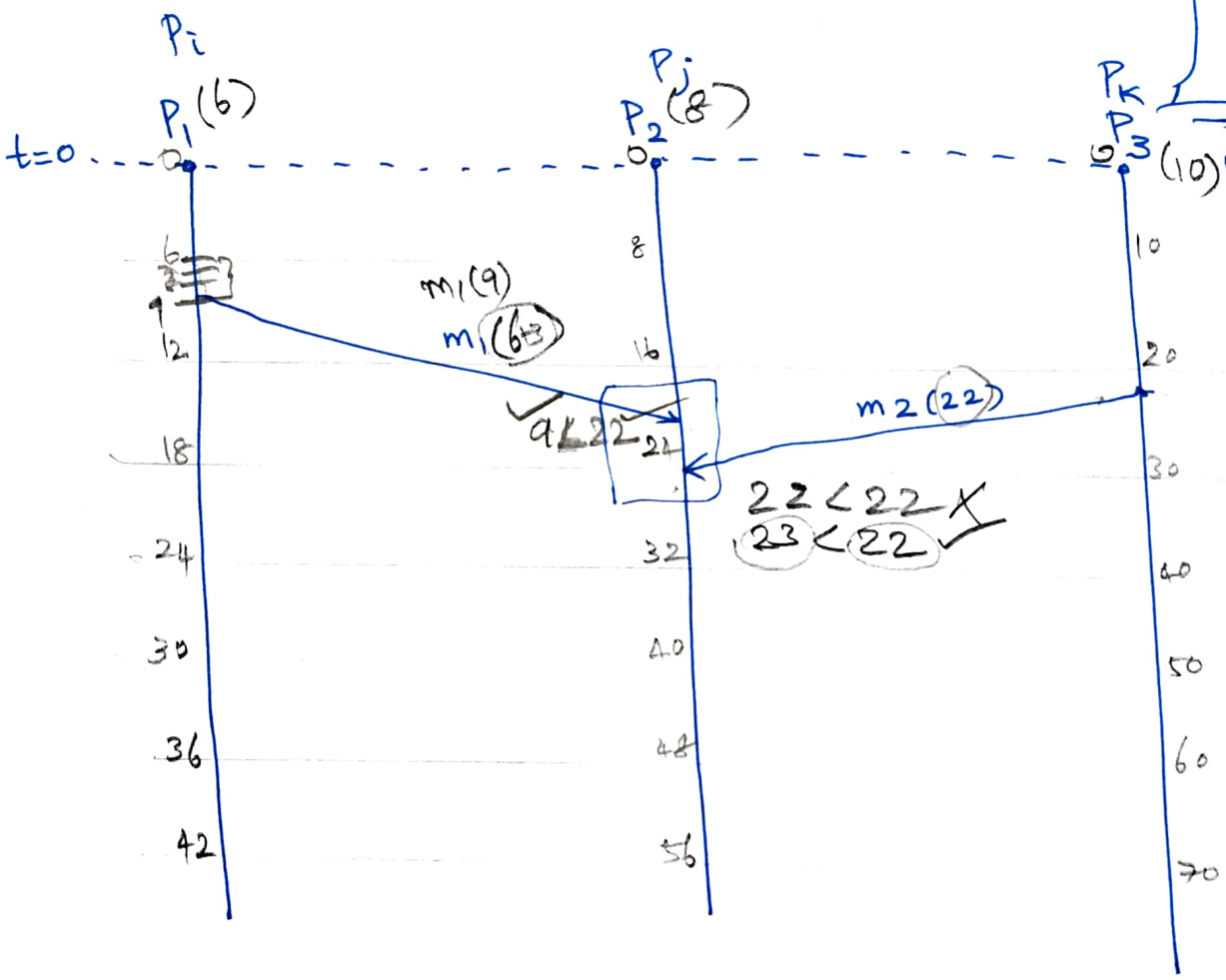
14 Feb 2022 12-1 PM




$LC_j \leftarrow (m, t_k = LC_k)$

$\rightarrow \max(L_j, L_k) + 1$

$\rightarrow$ $LC_1$ → 22 < 22

$\rightarrow 22 + 1 = 23$

(23) < 22

$\max(23, 22) + 1 = 24$ ✓

Potential problem

* ~~Neither~~ $P_2$ not $P_3$ ✗ will know the status of $P_1$

Logical Counter.

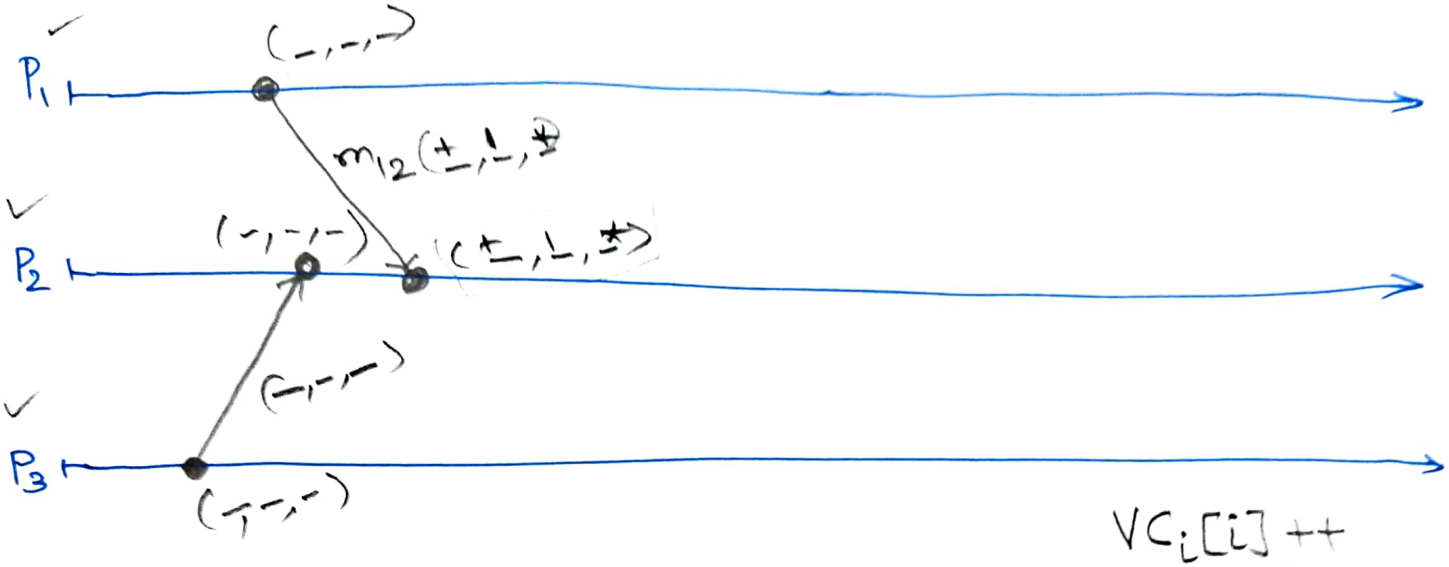
Neither $L_2$, $L_3$ before the receipt of $m_2$.

$P_2$ can see the time (logical) stamp of $P_3$ ✗

# Vector clocks

$n=3$

$VC_i[3] = (\underset{1}{L_i}, \underset{2}{L_j}, \underset{3}{L_k})$




$VC_i[i]$ ++ @ $P_i$

**Rules:**

* $VC(a)$ → an event $a$
* if $VC(a) \leq VC(b)$ for events $a$ & $b$.

  ⇒ event $a$ causally proceeds event $b$.

  $a \rightarrow b$ if $C(a) < C(b)$.

  $VC(a) < VC(b)$

* Each $P_i$ maintains $VC_i$

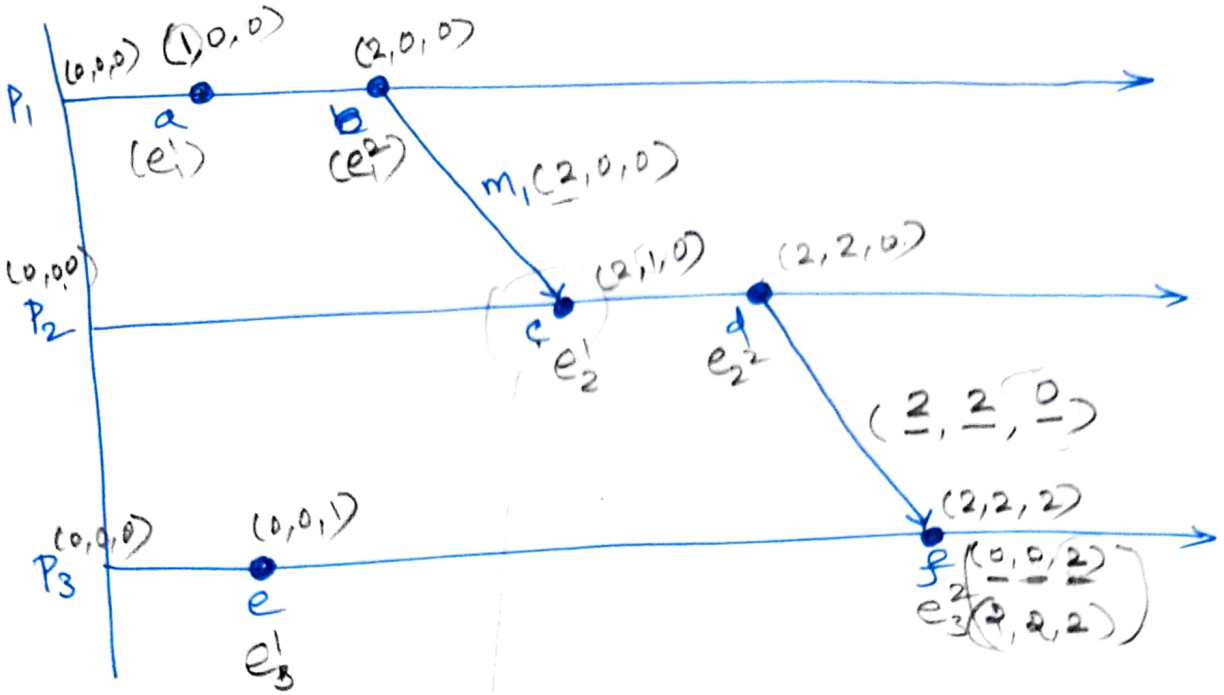
**Properties:**

→ $VC_i[i]$ — # events @ $P_i$

→ $VC_i[i]$ → local logical clock @ $P_i$

→ $VC_i[j] = k$ @ $P_i$ ⇒ $P_i$ knows that $k$ events happened @ $P_j$

⇒ $P_i$ has knowledge of local time @ $P_j$




$$(0,0,0) \xrightarrow{m_{12}} (\overset{2}{\underline{0}}, 1, \underline{0}) \rightarrow (2,1,0)$$

$$\underline{2} \quad 0 \quad 0$$