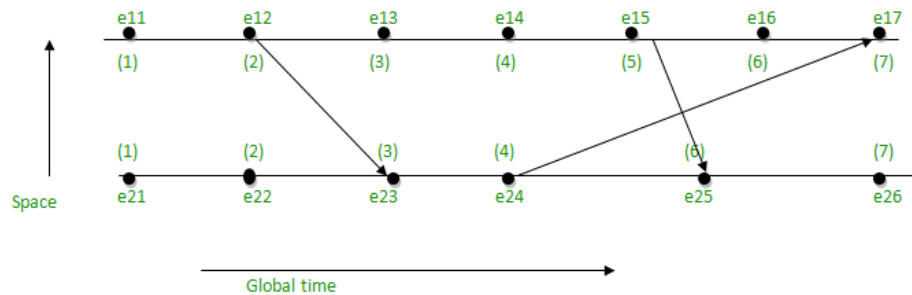


1. Reproduce Lamport clock or Vector clock in Java/C/Python/... and label the time sequence for the following example.



Output:-

- For the starting points :-
  - ◆  $e_{11}=1$
  - ◆  $e_{21}=1$
- The value of the next point will increase by  $d(d = 1)$ , if there is no receiving value
  - ◆  $e_{12} = e_{11} + d = 1 + 1 = 2$
  - ◆  $e_{13} = e_{12} + d = 2 + 1 = 3$
  - ◆  $e_{14} = e_{13} + d = 3 + 1 = 4$
  - ◆  $e_{15} = e_{14} + d = 4 + 1 = 5$
  - ◆  $e_{16} = e_{15} + d = 5 + 1 = 6$
  - ◆  $e_{22} = e_{21} + d = 1 + 1 = 2$
  - ◆  $e_{24} = e_{23} + d = 3 + 1 = 4$
  - ◆  $e_{26} = e_{25} + d = 6 + 1 = 7$
- When there will be receiving message, then follow **[IR2]** i.e., take the maximum value between  $C_j$  and  $T_m + d$ .
  - ◆  $e_{17} = \max(7, 5) = 7$ , [ $e_{16} + d = 6 + 1 = 7$ ,  $e_{24} + d = 4 + 1 = 5$ , maximum among 7 and 5 is 7]
  - ◆  $e_{23} = \max(3, 3) = 3$ , [ $e_{22} + d = 2 + 1 = 3$ ,  $e_{12} + d = 2 + 1 = 3$ , maximum among 3 and 3 is 3]
  - ◆  $e_{25} = \max(5, 6) = 6$ , [ $e_{24} + 1 = 4 + 1 = 5$ ,  $e_{15} + d = 5 + 1 = 6$ , maximum among 5 and 6 is 6]

Actual output:-

```
Run Main x
"C:\Program Files\Java\jdk1.8.0_202\bin\java.exe" ...

    e21 e22 e23 e24 e25 e26
e11   0  0  0  0  0  0
e12   0  0  1  0  0  0
e13   0  0  0  0  0  0
e14   0  0  0  0  0  0
e15   0  0  0  0  1  0
e16   0  0  0  0  0  0
e17   0  0  0 -1  0  0

The time stamps of events in process P1:

1 2 3 4 5 6 7
The time stamps of events in process P2:

1 2 3 4 6 7
Process finished with exit code 0
```

Command to compile the code :-

Command :- `javac LamportClock.java`

Command to run the code :-

Command :- `java (.class file name)`

For instance :- `java LamportClock`