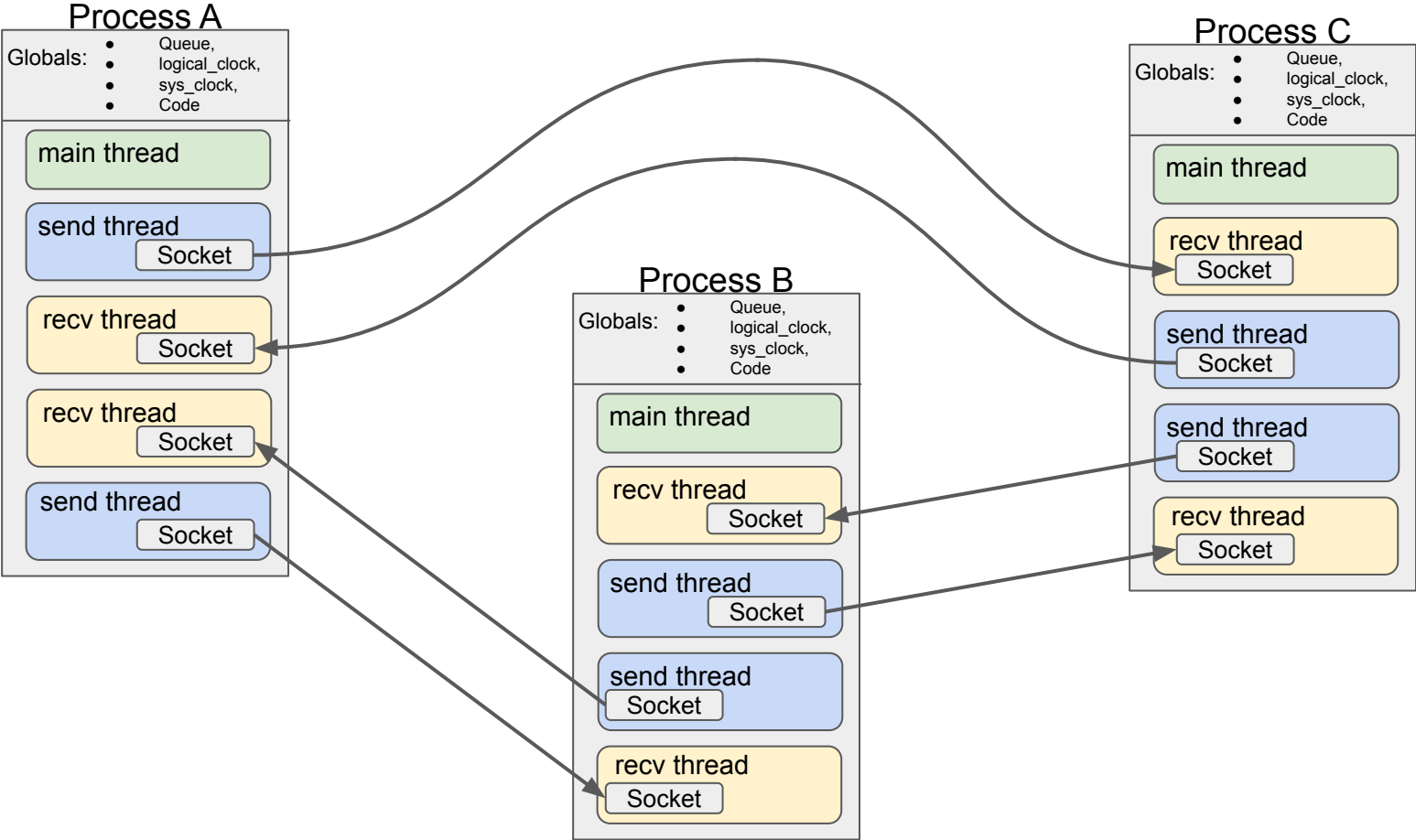


Design



Example log

Random number generated or -1 when queue non-empty

Hello from process P2 with pid 20992 at rate 0.25

```
event: RECEIVE MESSAGE, sys_clock: 1, logical_clock: 1, code: -1, queue_length: 0, msg: 1
event: RECEIVE MESSAGE, sys_clock: 2, logical_clock: 2, code: -1, queue_length: 0, msg: 2
event: RECEIVE MESSAGE, sys_clock: 3, logical_clock: 3, code: -1, queue_length: 1, msg: 1
event: RECEIVE MESSAGE, sys_clock: 4, logical_clock: 4, code: -1, queue_length: 1, msg: 3
event: RECEIVE MESSAGE, sys_clock: 5, logical_clock: 5, code: -1, queue_length: 2, msg: 5
event: RECEIVE MESSAGE, sys_clock: 6, logical_clock: 6, code: -1, queue_length: 2, msg: 6
event: RECEIVE MESSAGE, sys_clock: 7, logical_clock: 7, code: -1, queue_length: 4, msg: 7
event: RECEIVE MESSAGE, sys_clock: 8, logical_clock: 8, code: -1, queue_length: 3, msg: 8
event: RECEIVE MESSAGE, sys_clock: 9, logical_clock: 9, code: -1, queue_length: 3, msg: 3
event: RECEIVE MESSAGE, sys_clock: 10, logical_clock: 10, code: -1, queue_length: 2, msg: 9
event: RECEIVE MESSAGE, sys_clock: 11, logical_clock: 11, code: -1, queue_length: 1, msg: 10
event: RECEIVE MESSAGE, sys_clock: 12, logical_clock: 12, code: -1, queue_length: 0, msg: 13
event: INTERNAL EVENT, sys_clock: 13, logical_clock: 14, code: 3, queue_length: 0
event: RECEIVE MESSAGE, sys_clock: 14, logical_clock: 15, code: -1, queue_length: 1, msg: 19
event: RECEIVE MESSAGE, sys_clock: 15, logical_clock: 20, code: -1, queue_length: 0, msg: 20
event: RECEIVE MESSAGE, sys_clock: 16, logical_clock: 21, code: -1, queue_length: 0, msg: 22
event: SENT to 2056, sys_clock: 17, logical_clock: 23, code: 2, queue_length: 0
event: SENT to 4056, sys_clock: 17, logical_clock: 23, code: 2, queue_length: 0
event: SENT to 2056, sys_clock: 18, logical_clock: 24, code: 0, queue_length: 0
event: RECEIVE MESSAGE, sys_clock: 19, logical_clock: 25, code: -1, queue_length: 0, msg: 27
```

Logical clock time received from other process

'True' system clock for process

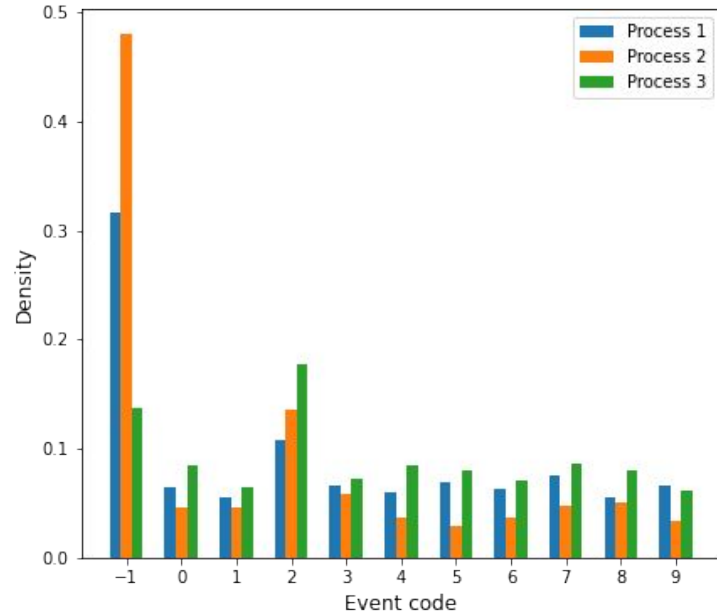
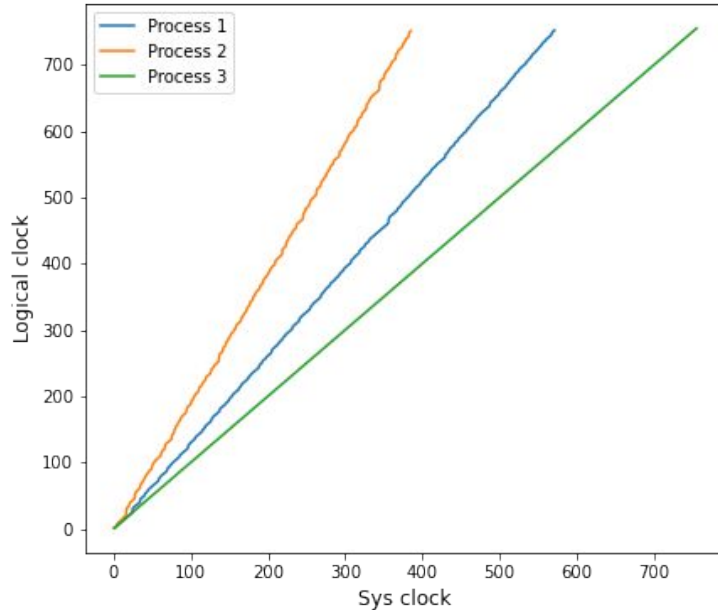
Size of the queue after popping at event schedule time

Experiments & insights summary

- Running processes with different (random) clock rates for 200s each
 - Plot of sys clock time vs logical clock time always has slope 1 ($y = x$) for the slowest of the communicating processes
 - The greater the relative difference between the clock rates, the greater is the difference between the slopes of the plot
 - Message queue grows larger for slower processes, especially if the faster ones are sending messages at a significantly faster rate
 - The fastest process is able to keep the message queue always between 0 and 1
- Running processes with different distribution of events
 - Decreases the proportion of internal events to communication events highlights the results above and we get much larger message queues for slower processes, wider difference in the curves between faster and slower processes
- Running processes with order of magnitude difference in clock rates
 - The results are the same as above but the difference between curves for processes with different rates is sharper

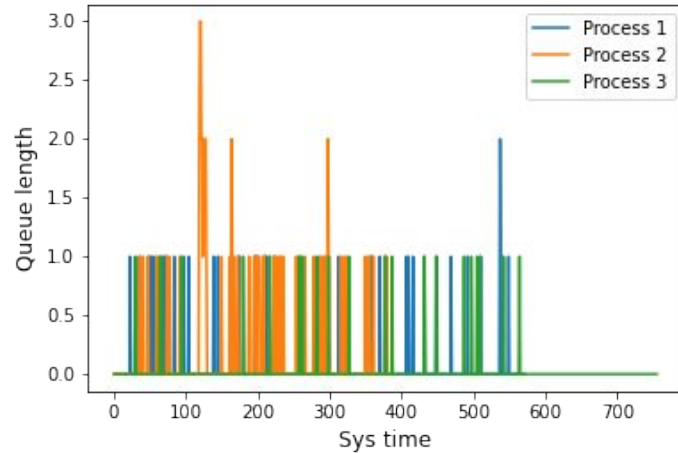
Processes at different random clock rates range ($\frac{1}{6}$, 1):

P3 rate: 0.25, P2 rate: 0.5, P1 rate: 0.3333, max event code: 9

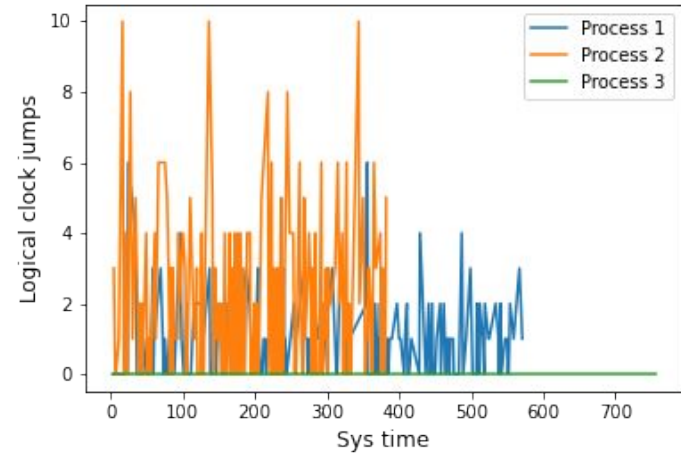


Processes at different random clock rates range ($\frac{1}{6}$, 1):

P3 rate: 0.25, P2 rate: 0.5, P1 rate: 0.3333, max event code: 5

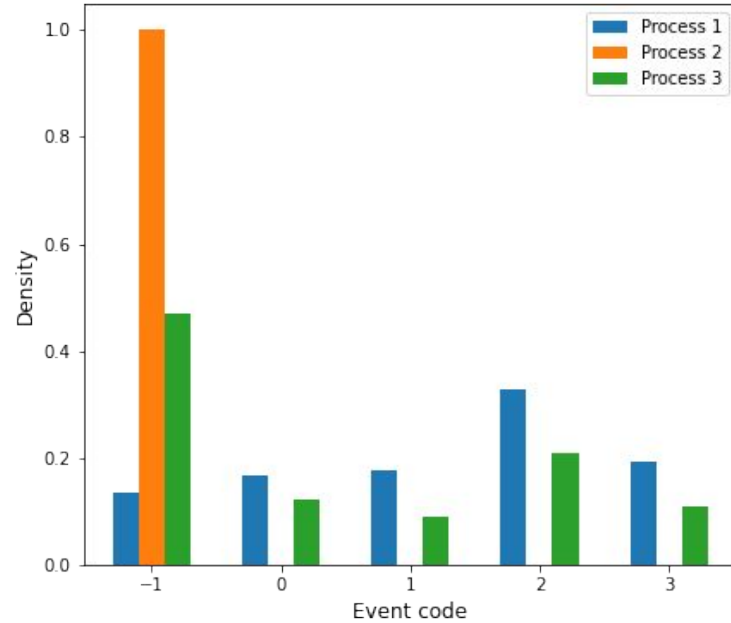
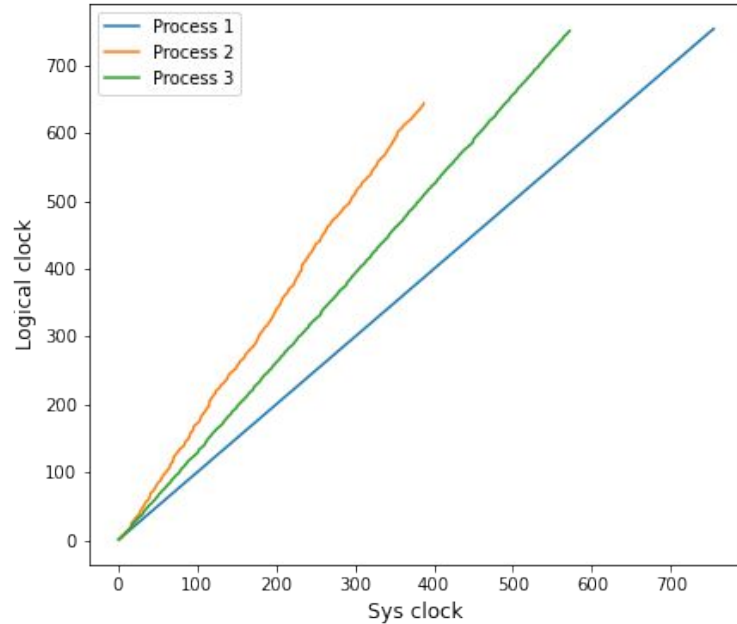


P3 rate: 0.25, P2 rate: 0.5, P1 rate: 0.3333, max event code: 5



Varying distribution of events:

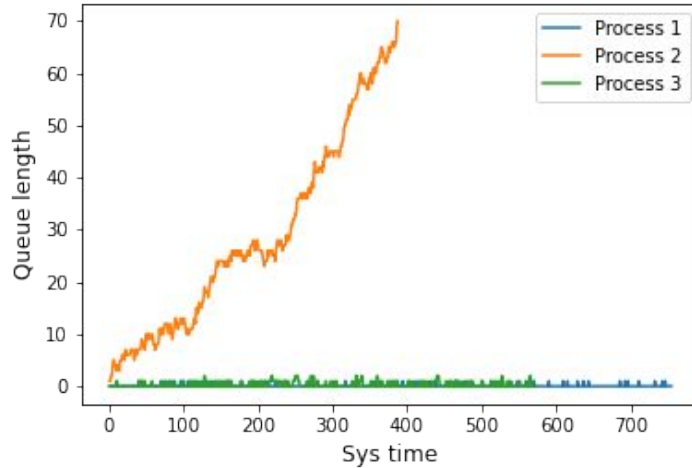
P1 rate: 0.3333, P2 rate: 0.5, P3 rate: 0.25, max event code: 3



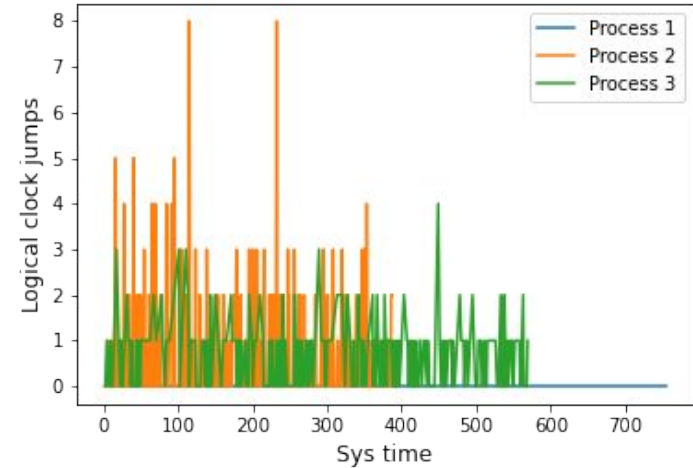
(same clock rates as previous slides but fewer internal events)

Varying distribution of events:

P1 rate: 0.3333, P2 rate: 0.5, P3 rate: 0.25, max event code: 3



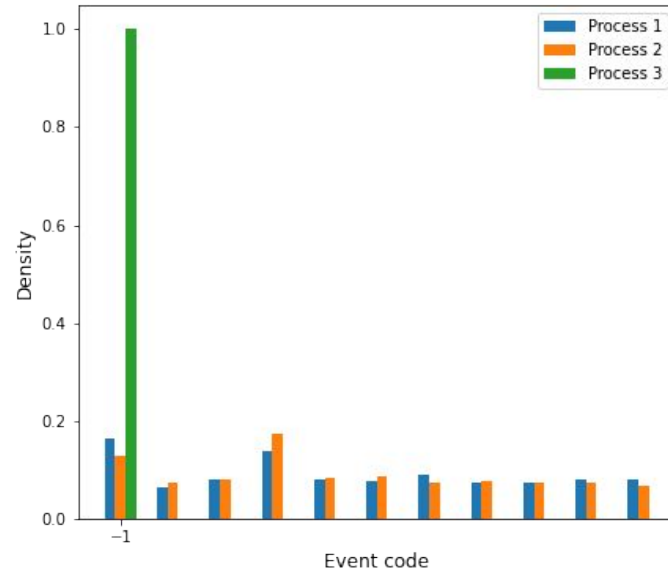
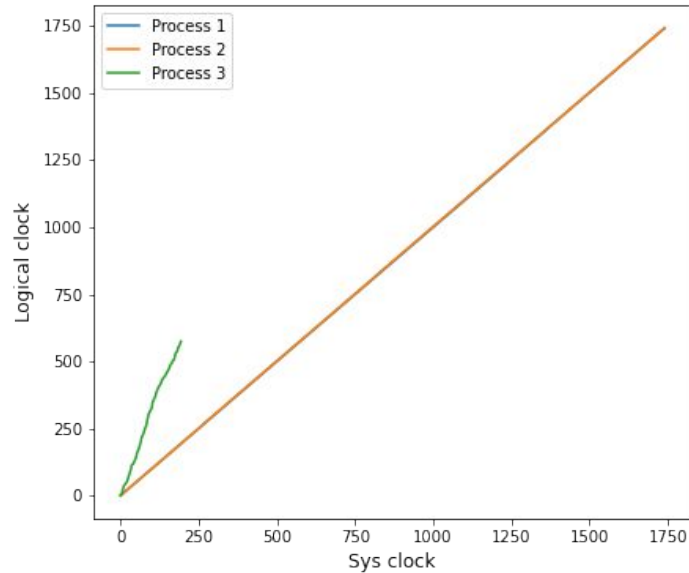
P1 rate: 0.3333, P2 rate: 0.5, P3 rate: 0.25, max event code: 3



(same clock rates as previous slides but fewer internal events)

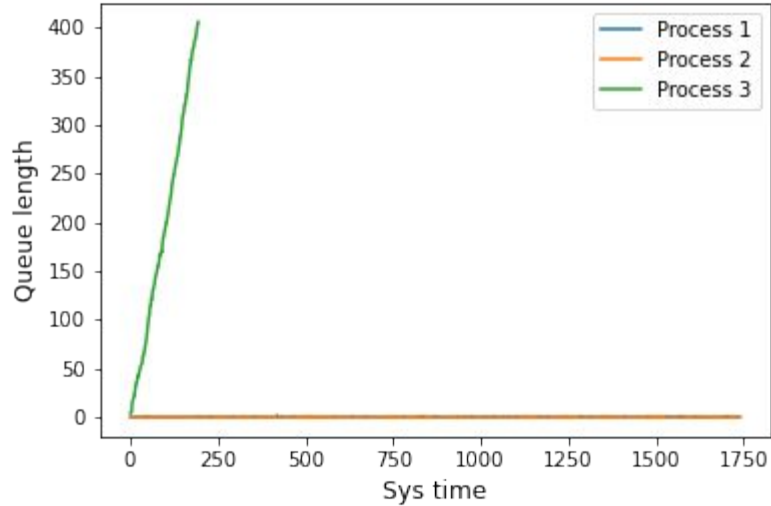
Order of magnitude difference in clock rates:

P3 rate: 1.0, P2 rate: 0.1, P1 rate: 0.1, max event code: 9



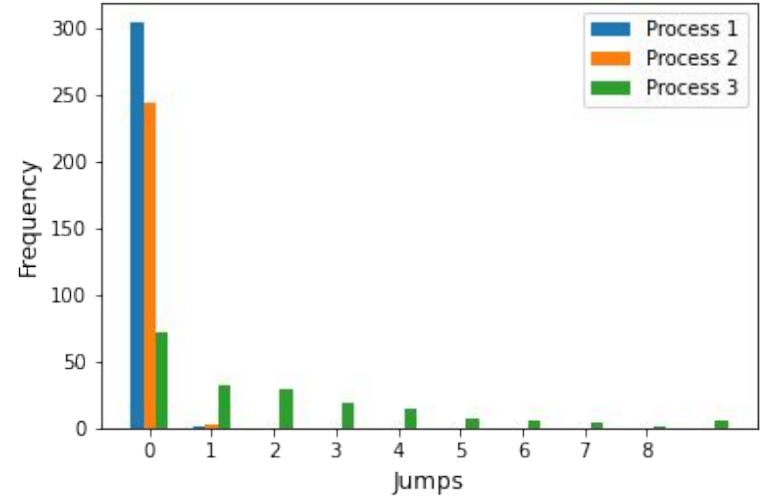
Order of magnitude difference in clock rates:

P3 rate: 1.0, P2 rate: 0.1, P1 rate: 0.1, max event code: 9



Tracking queue length per process

P3 rate: 1.0, P2 rate: 0.1, P1 rate: 0.1, max event code: 9



Tracking logical clock jumps per process