
Data Structures and Algorithms

XMUT-COMP 103 – 2026 T1

Priority Queues

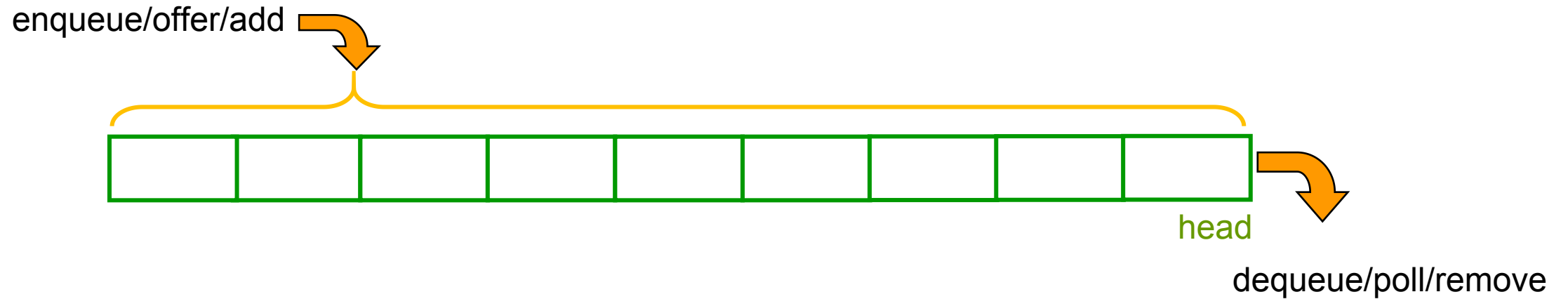
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Priority Queues

- Priority Queues
 - Items ordered by priority, instead of arrival order
 - dequeue/poll: highest priority item (earliest in the ordering)



Priority Queues: ordering

Ordering:

- Highest priority = earliest in ordering.
- Typically high priority = 1, low priority = 10 (large number)

Specify ordering like with Collections.sort():

either

- use natural ordering of the items using compareTo (if they are Comparable)

```
Queue<Patient> waitingRoom = new PriorityQueue<Patient>();
```

or

- give the Priority Queue a compare(...) function when created:

```
Queue<Patient> waitingRoom =
    new PriorityQueue<Patient>((Patient p1, Patient p2) ->{
        if (p1.getPri()>p2.getPri()){ return -1;} else if (p1 ... } );
```

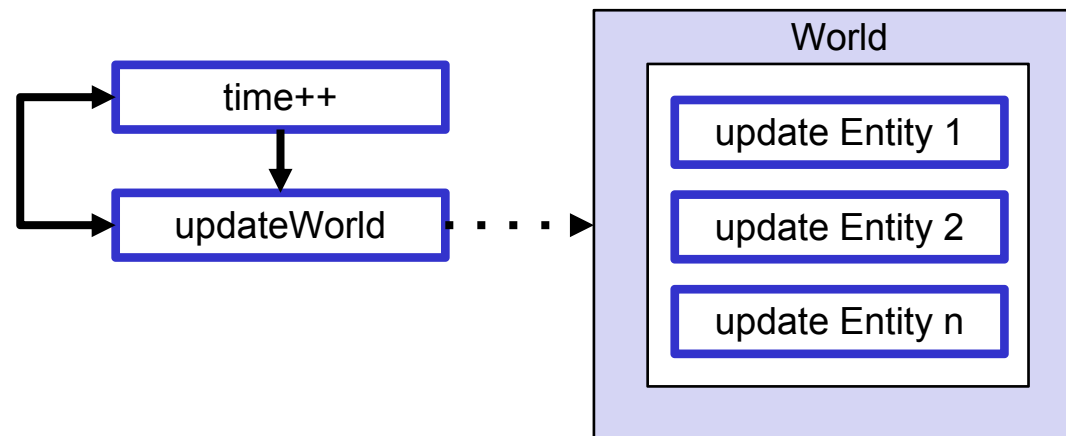
Applications of Queues and PriorityQueues

Many applications! (and many specialised Queue classes)

- Operating Systems, Network Applications, Multi-User Systems
 - Handling requests/events/jobs that must be done in order
 - (often called a “buffer” in this context)
- Simulations
 - Representing queues in the real world (traffic, customers, deliveries,)
 - Managing the events that must happen in the future
- Programs to control delivery of orders or manage customers/clients
- Search Algorithms
 - breadth-first search

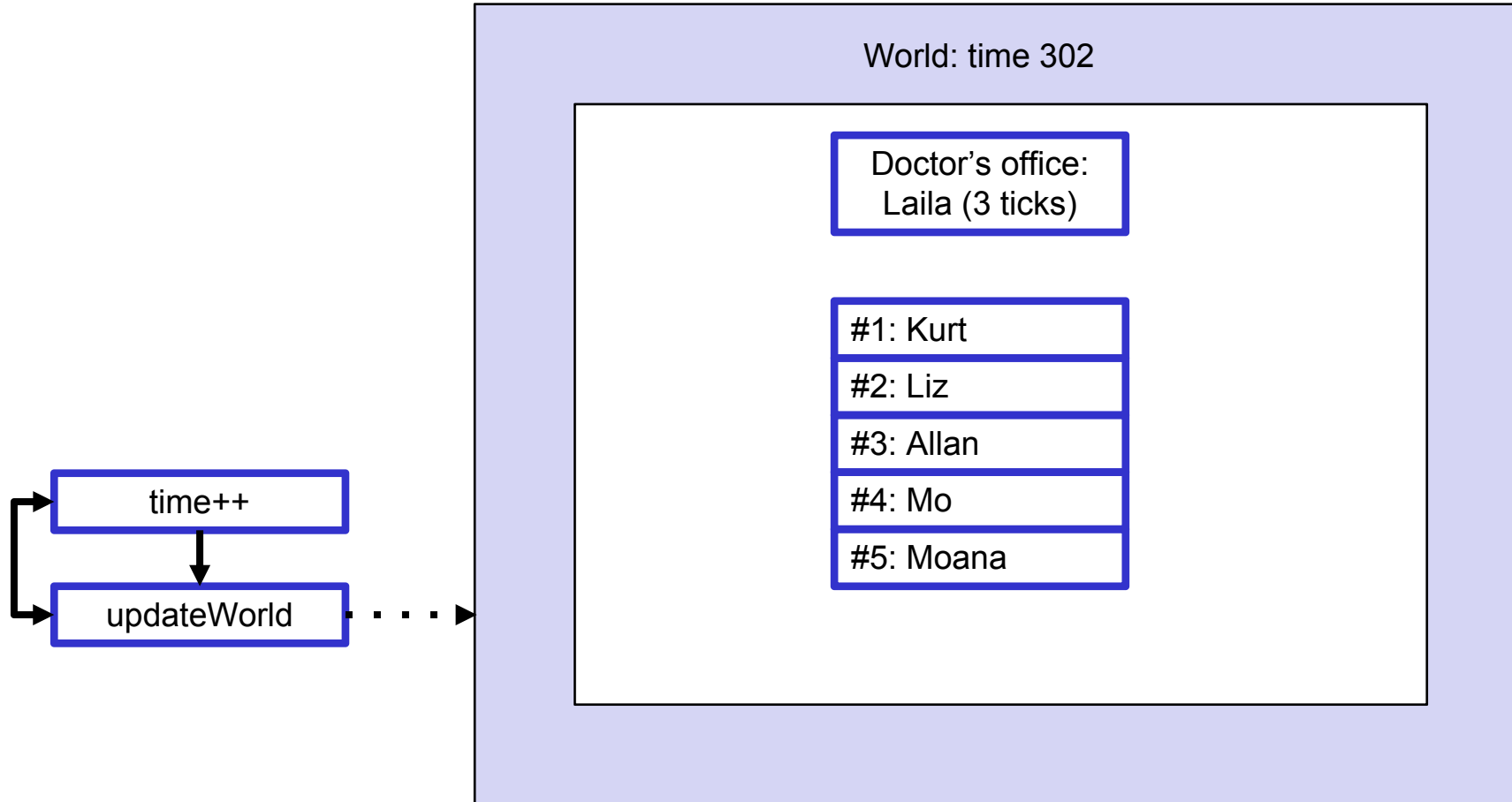
Simulation

- Tick-based simulation
 - Time is discrete
 - Main loop advances time by one tick for each iteration
 - Each tick, update the state of every entity in the world by one tick
 - Efficient if every entity changes every tick;
May be inefficient if not very much happens most of the time
 - Often used in games



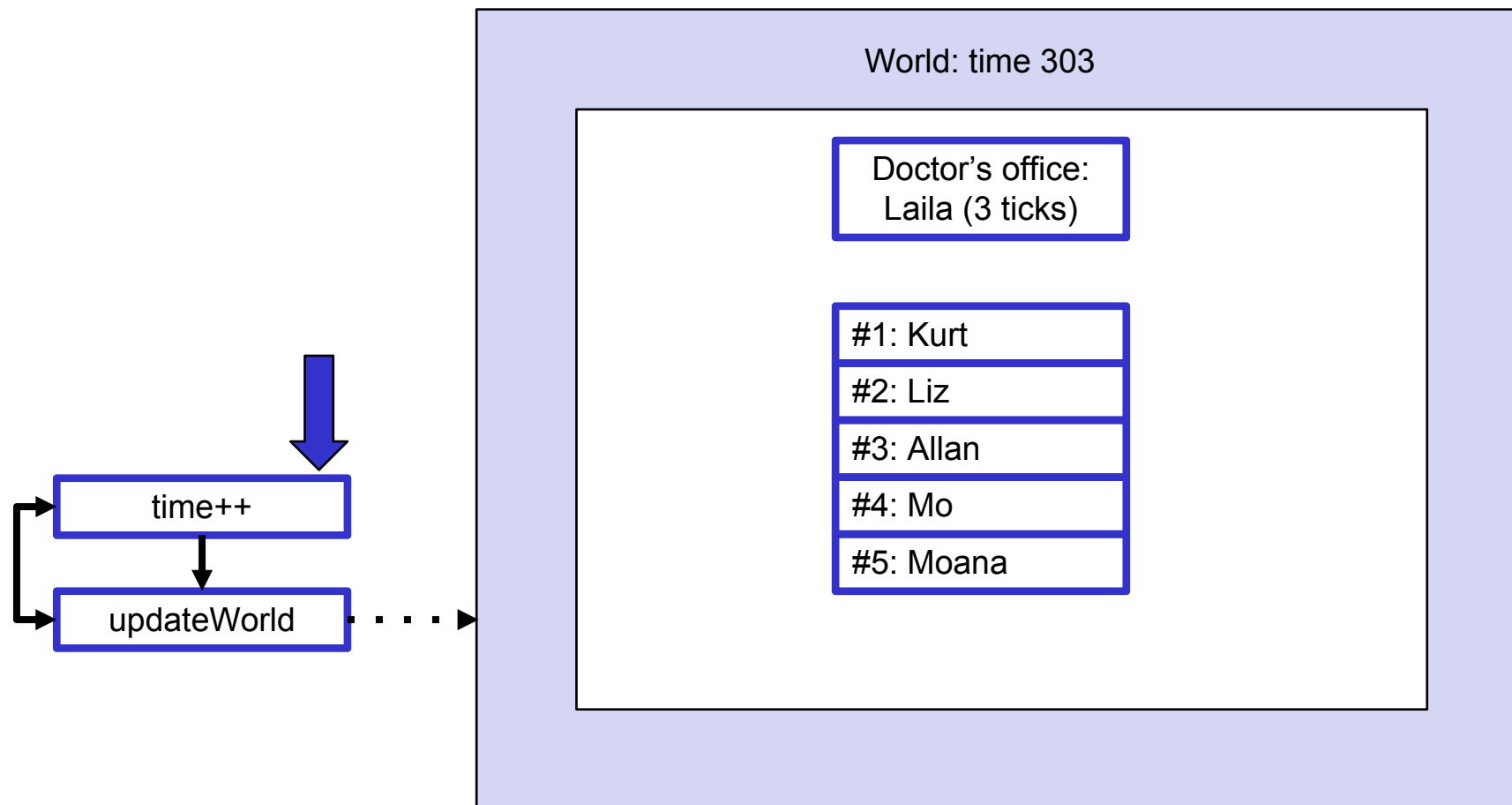
Simulation of Queues

- Doctor's waiting room



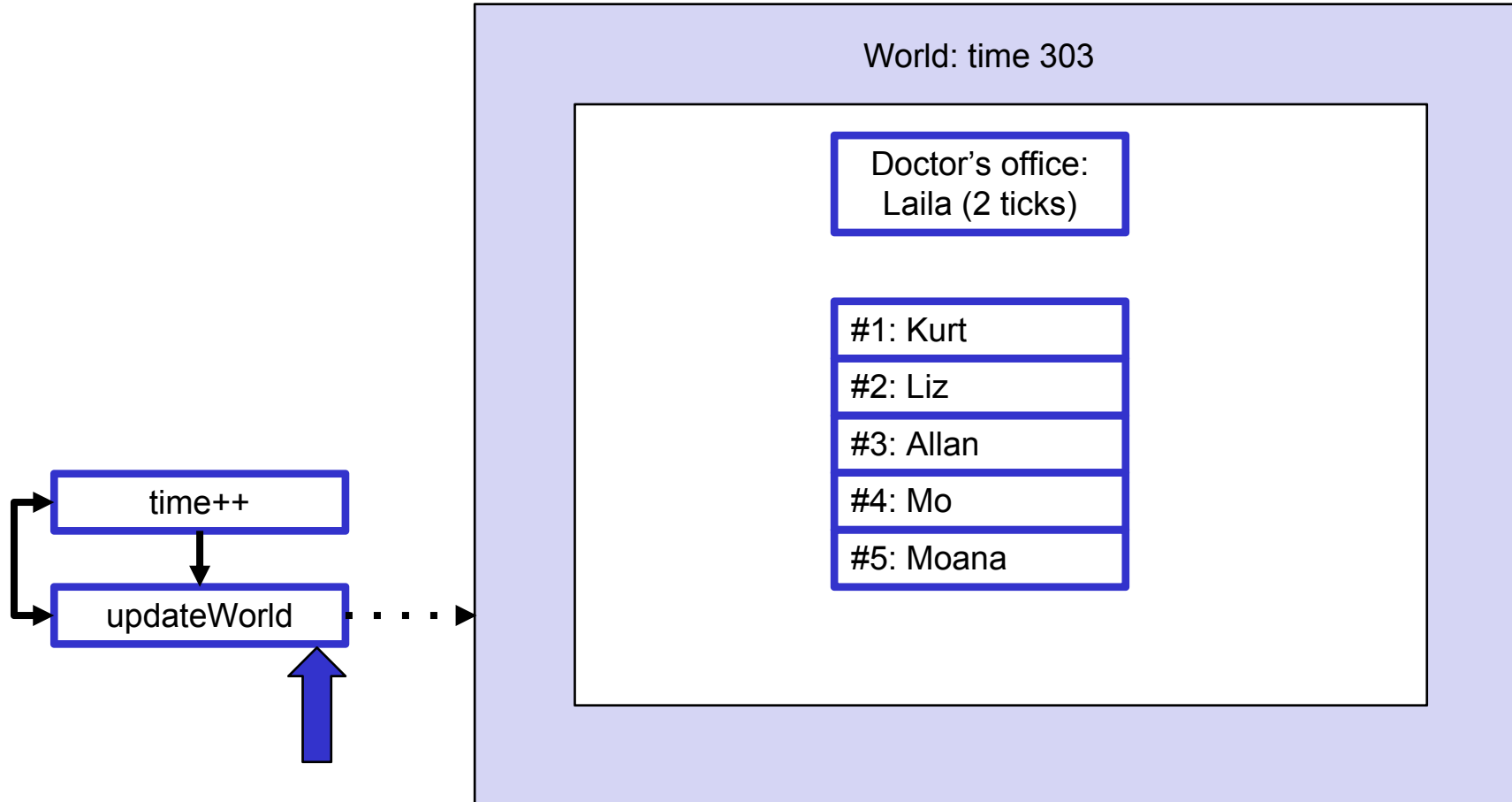
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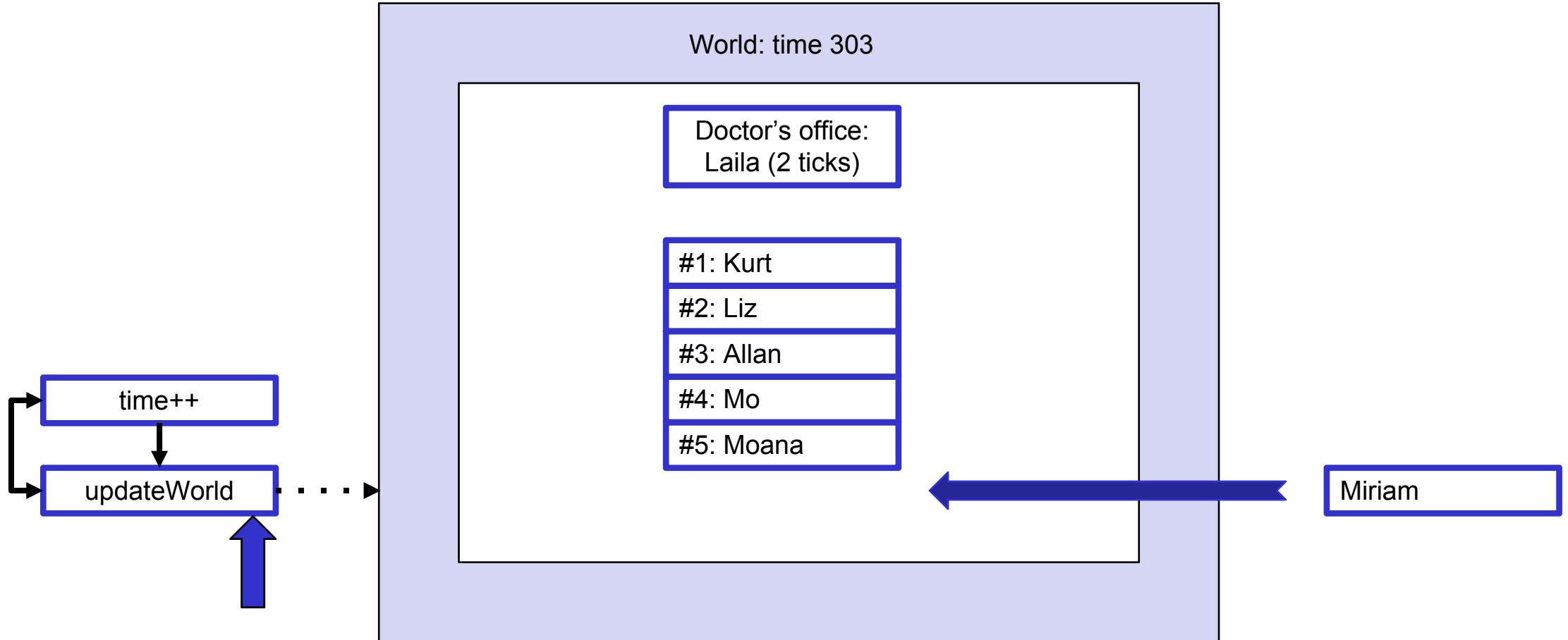
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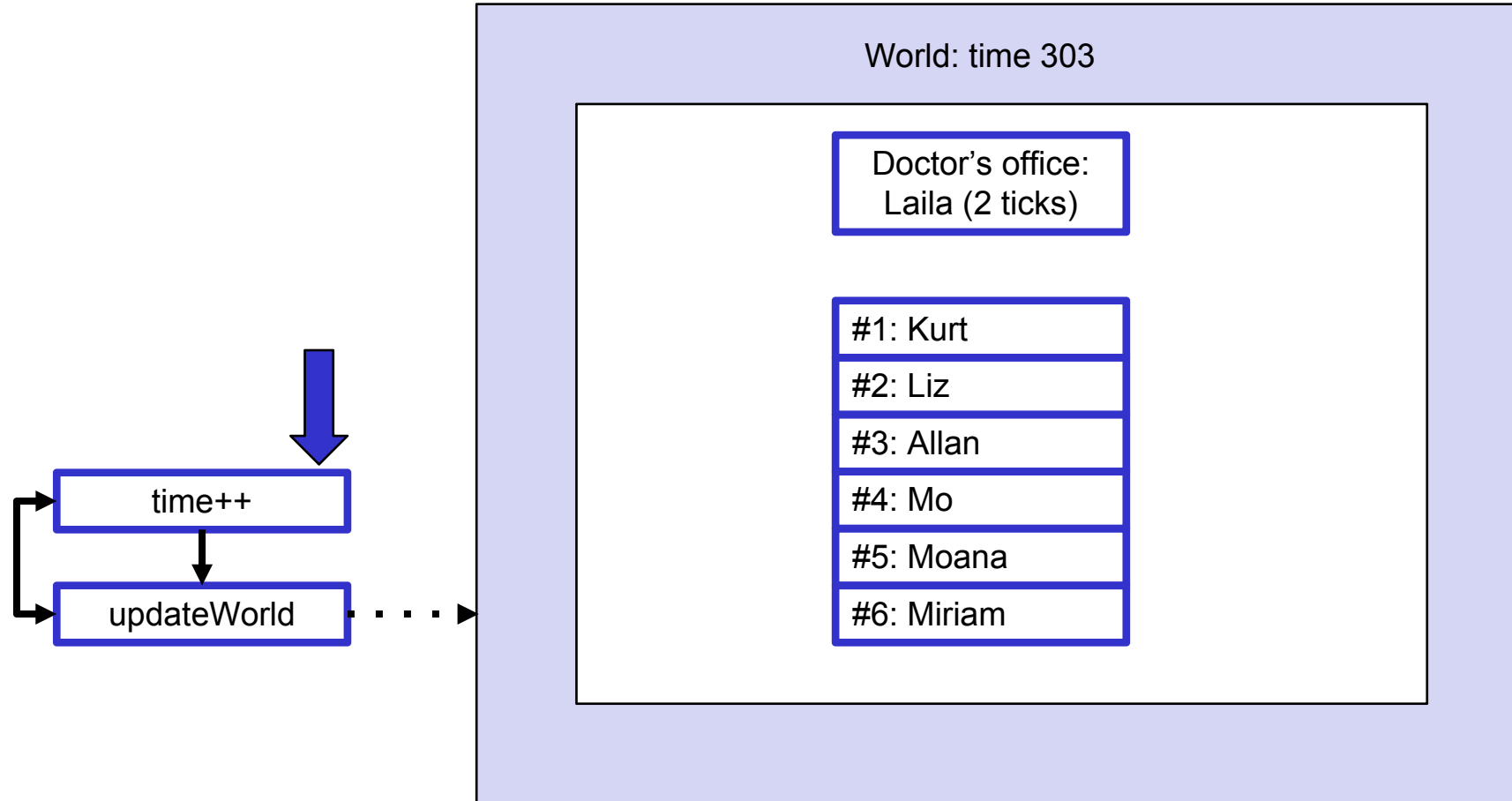
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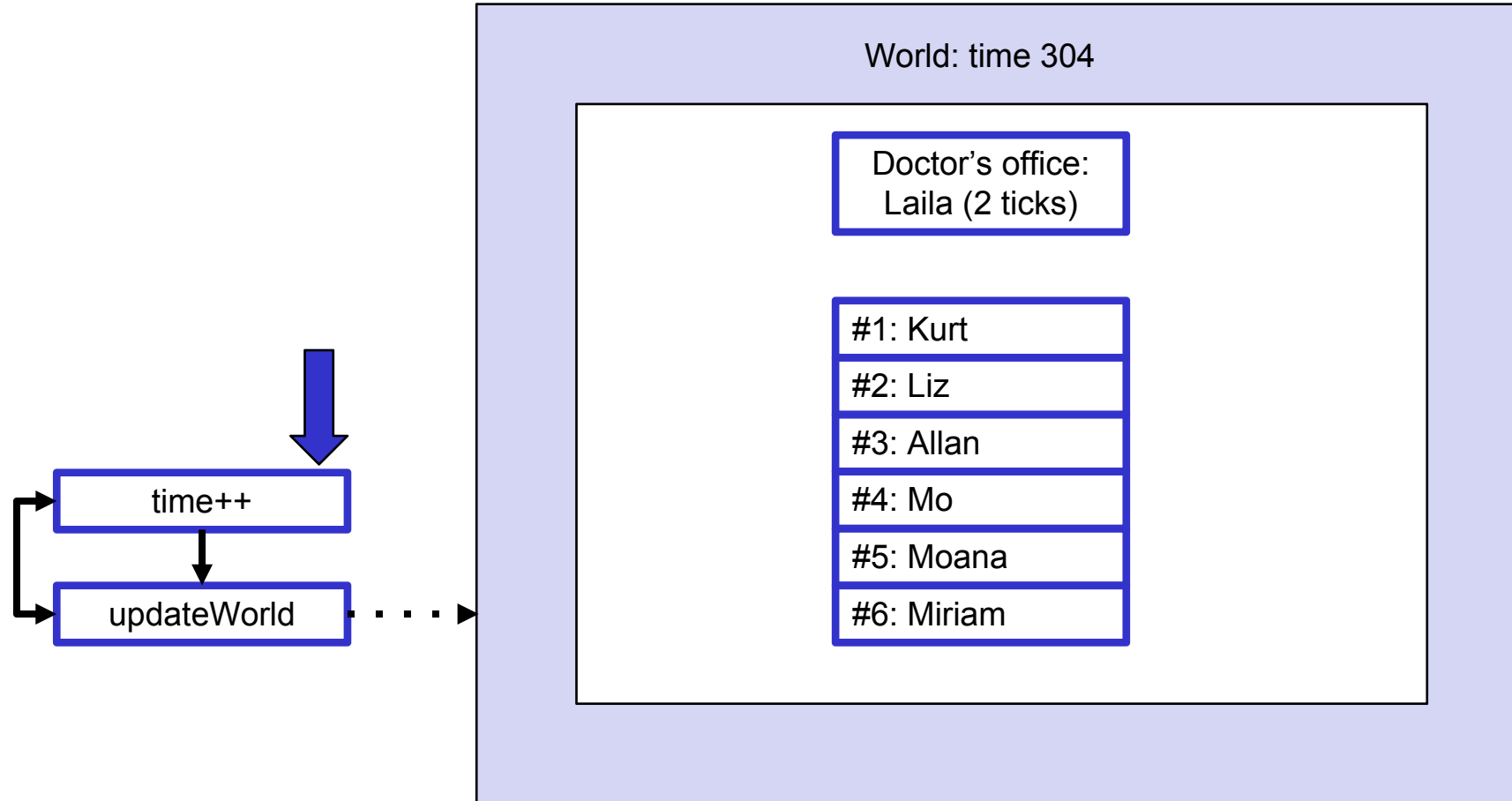
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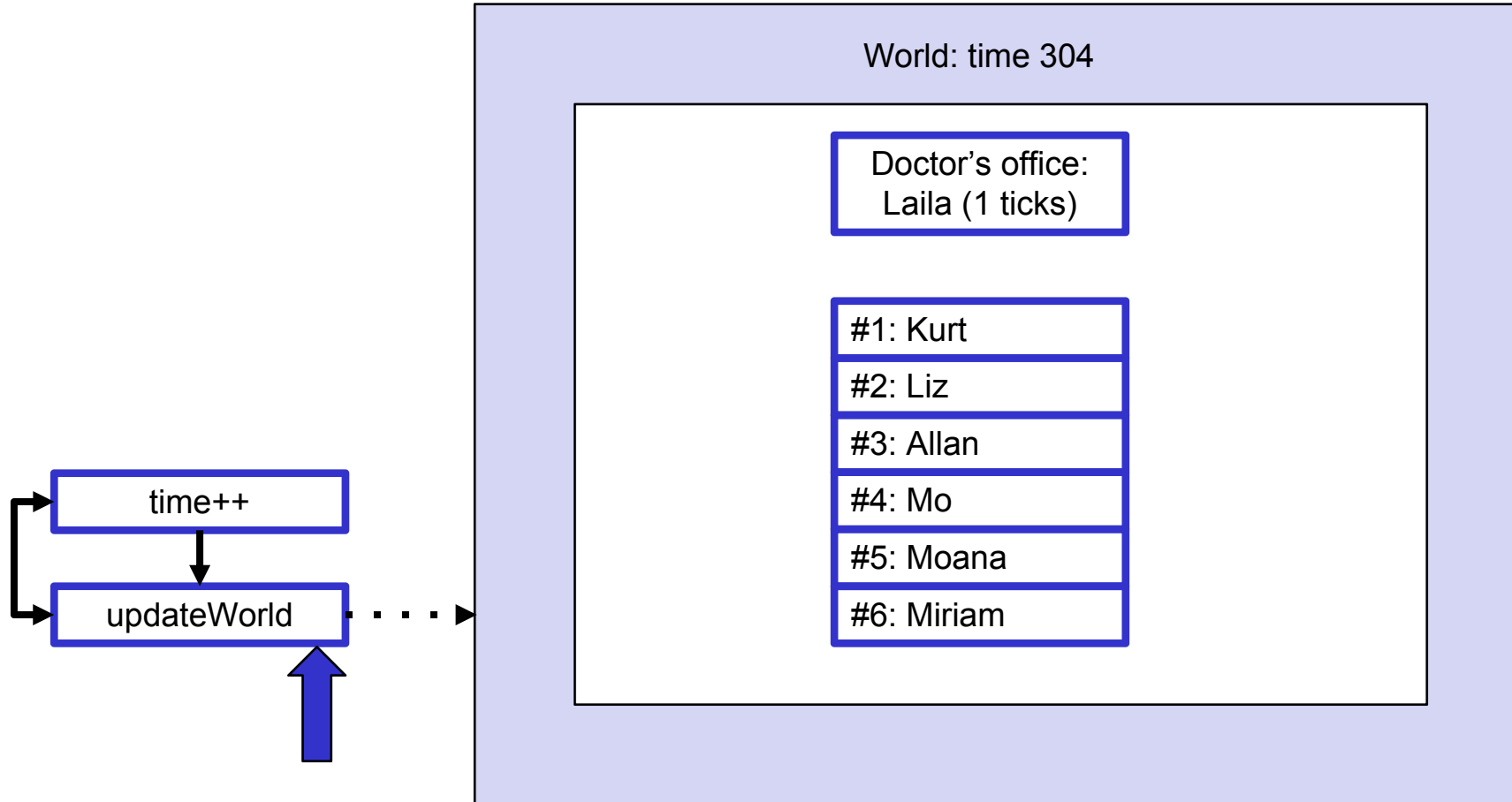
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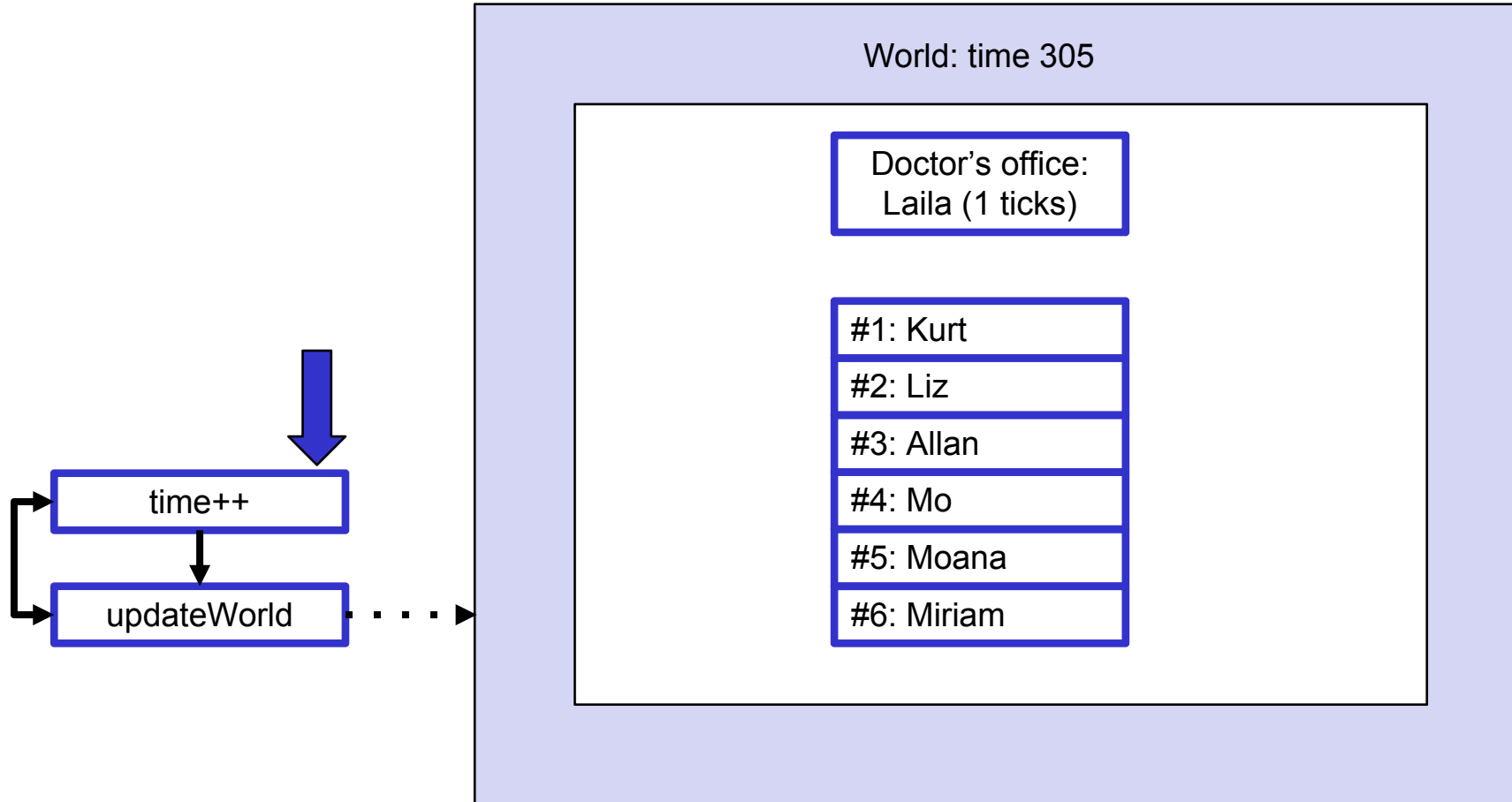
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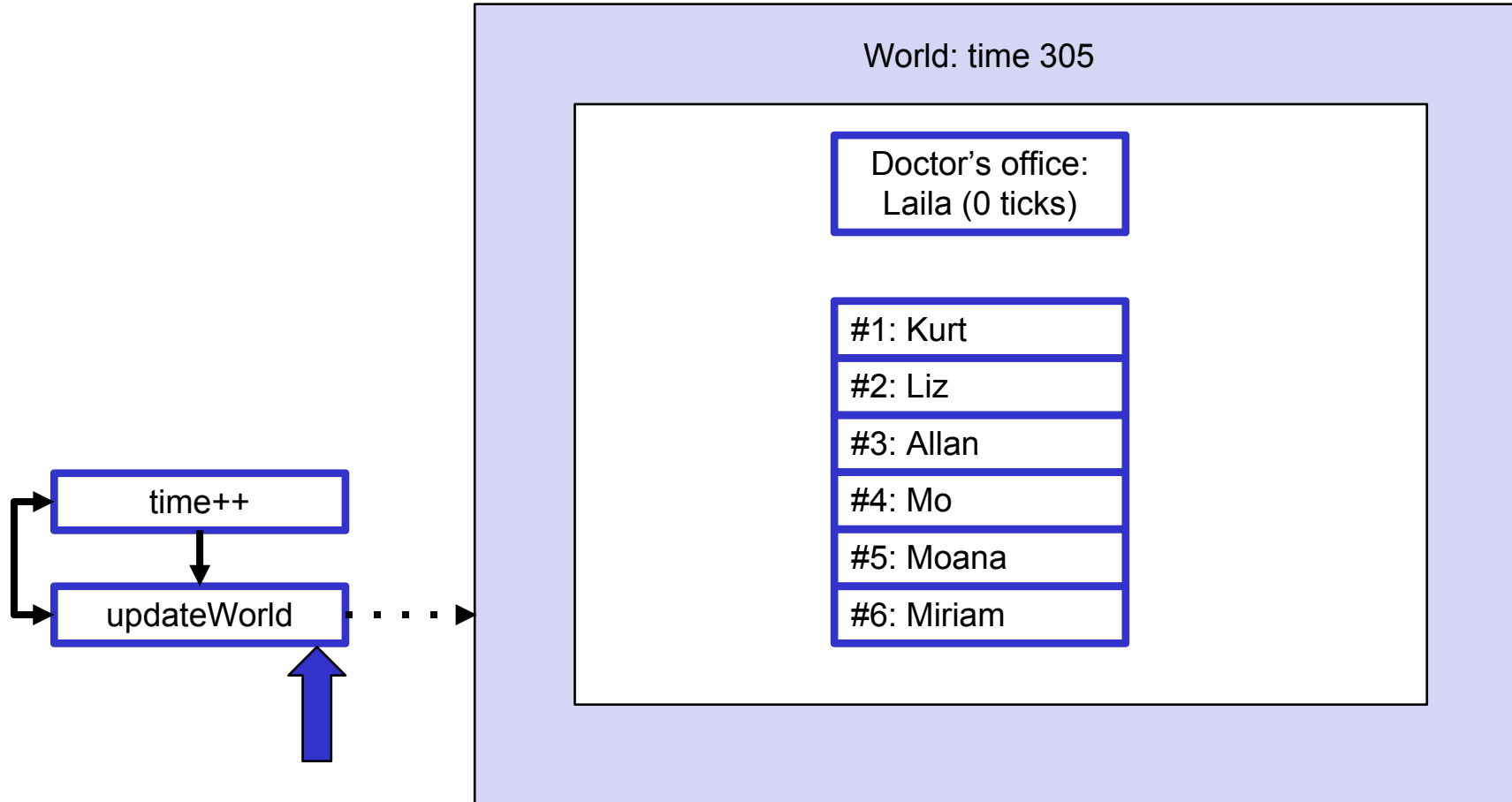
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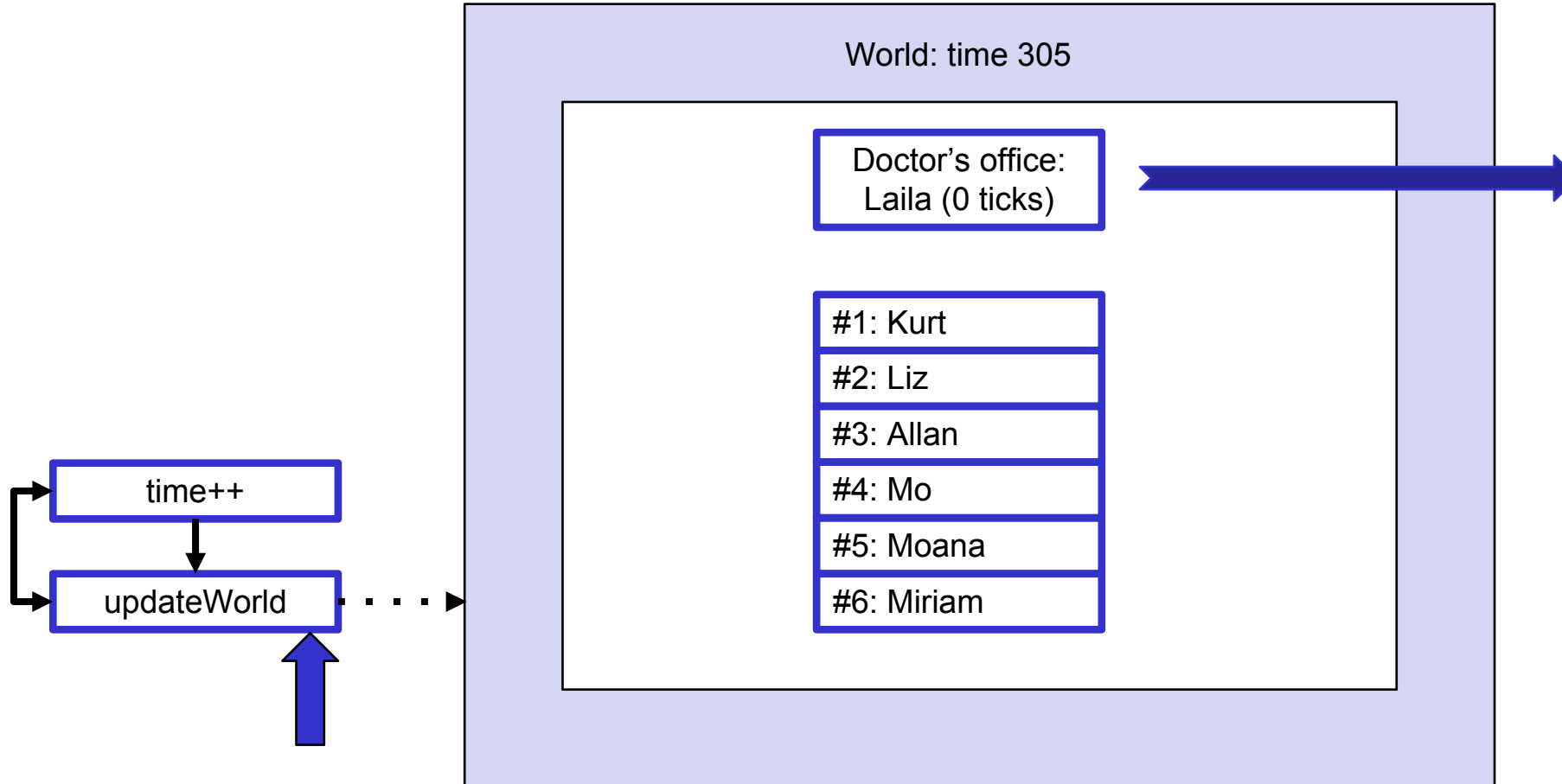
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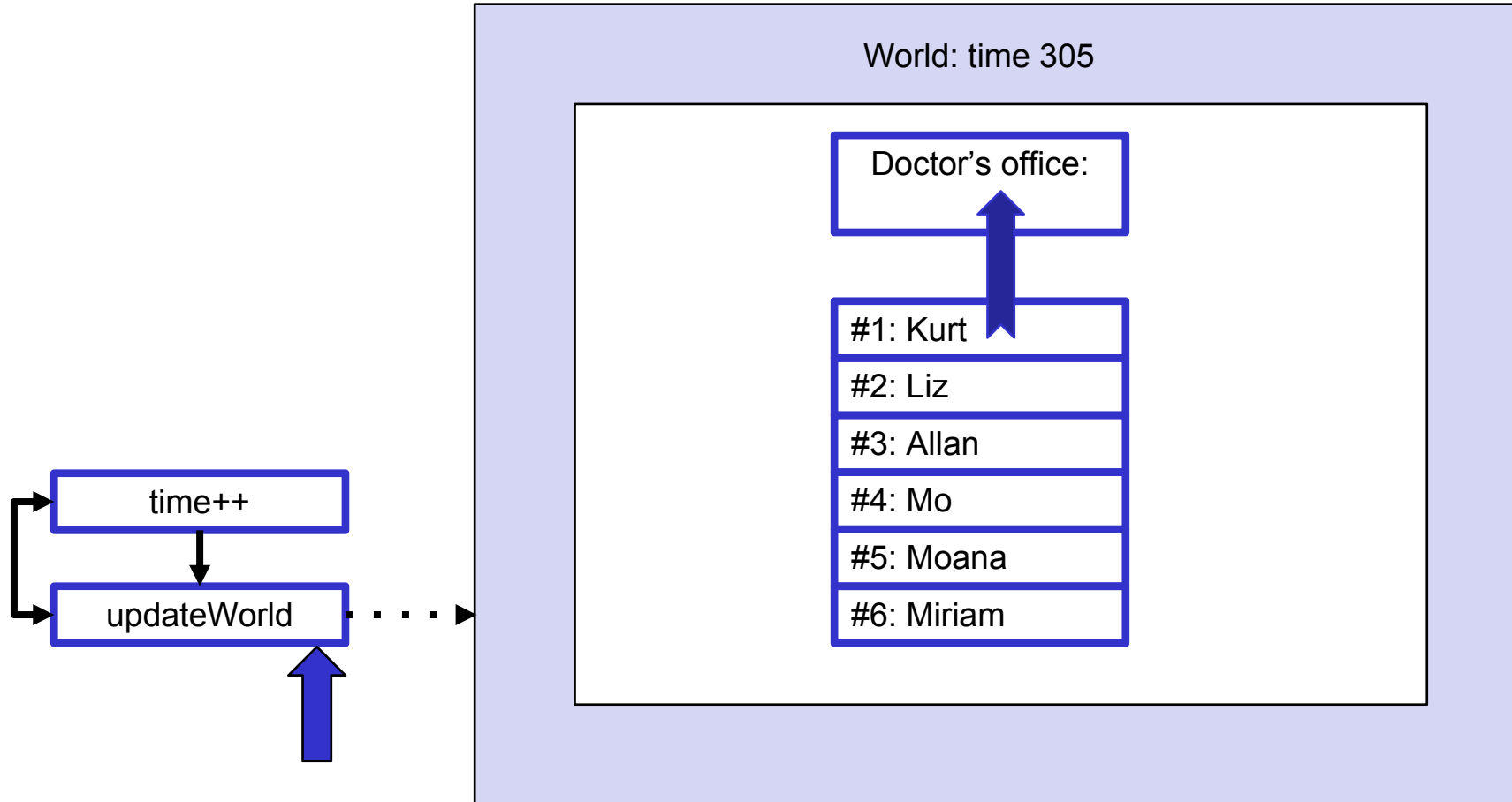
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