

1. Concurrent Programming: Conditional Synchronization

When two or more active entities (threads or processes) communicate (...)

In general, how can we perform conditional synchronization with semaphores instead of condition variables?

Consider the following general threaded code:

```
Mutex mtx = new Mutex();
MutexCV cvar = mtx.newCV();
```

```
// wait:
mtx.lock();
while (!condition)
    cvar.wait();
...
mtx.unlock();
```

```
// broadcast:
mtx.lock();
...
cvar.broadcast();
mtx.unlock();
```

We can replace this code with a semaphore version as follows:

```
Semaphore mtx = new BinarySemaphore(1);
int waitingCounter = 0;
Semaphore waitingCondition = new Semaphore(0);
```

```
// wait:
mtx.down();
while (!condition)
{
    waitingCounter++;
    mtx.up();
    waitingCondition.down();
    mtx.down();
}
...
mtx.up();
```

```
// broadcast:
mtx.down();
...
while(waitingCounter > 0)
{
    waitingCondition.up();
    waitingCounter--;
}
mtx.up();
```