Critical Construct (10A)

- Task
-

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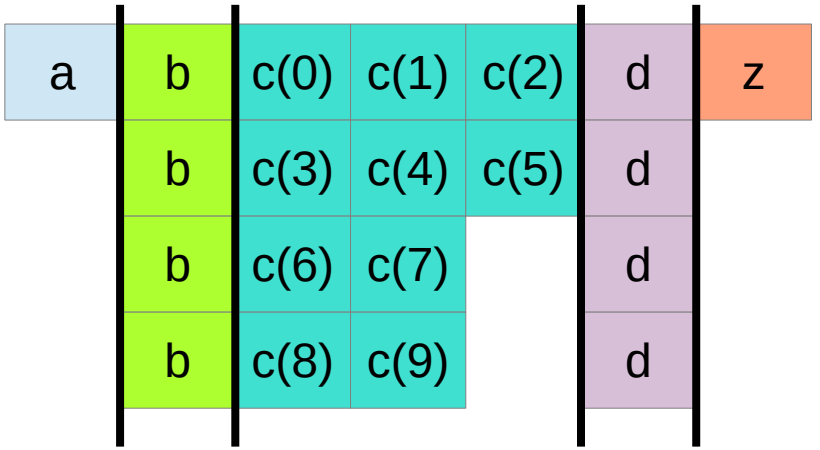
Nowait (1)

In an omp parallel region, automatically wait for all threads to finish
In an omp for loop, a synchronization point after the end of the loop

```
a();
#pragma omp parallel
{
    b();
    #pragma omp for
    for (int i = 0; i < 10; ++i) {
        c(i);
    }
    d();
}
z();
```

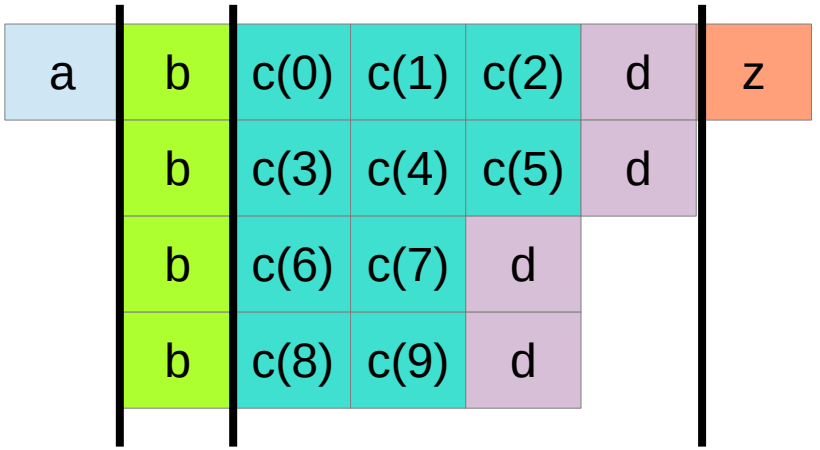


http://ppc.cs.aalto.fi/ch3/nowait/

Nowait (2)

no thread will execute d() until all threads are done with the loop:
However, if you do not need synchronization after the loop, you can disable it with nowait:

```
a();
#pragma omp parallel
{
    b();
    #pragma omp for nowait
    for (int i = 0; i < 10; ++i) {
        c(i);
    }
    d();
}
z();
```

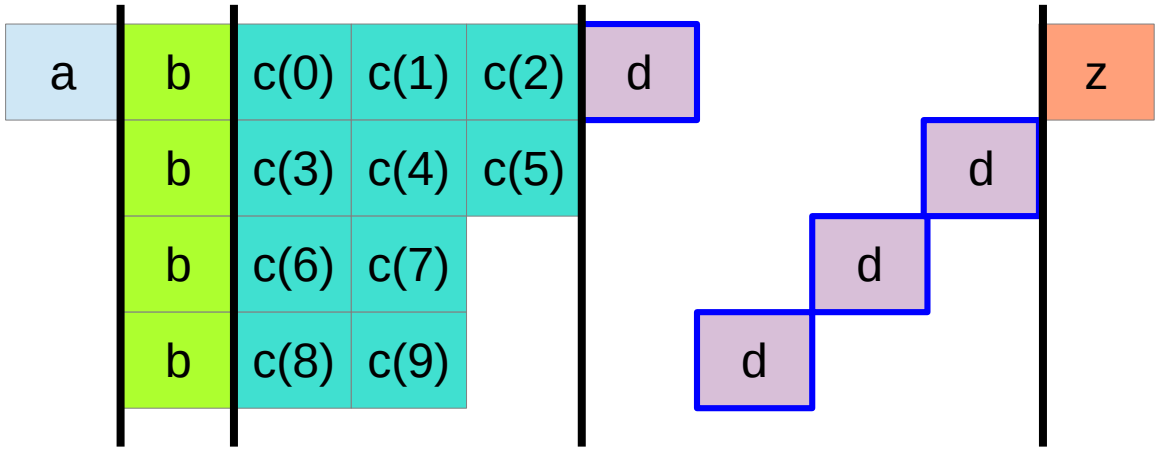


http://ppc.cs.aalto.fi/ch3/nowait/

Nowait (3)

for a critical section after a loop,
first wait for all threads to finish their loop iterations
before letting any of the threads to enter a critical section:

```
a();
#pragma omp parallel
{
    b();
    #pragma omp for
    for (int i = 0; i < 10; ++i) {
        c(i);
    }
    #pragma omp critical
    {       d();    }
}
z();
```

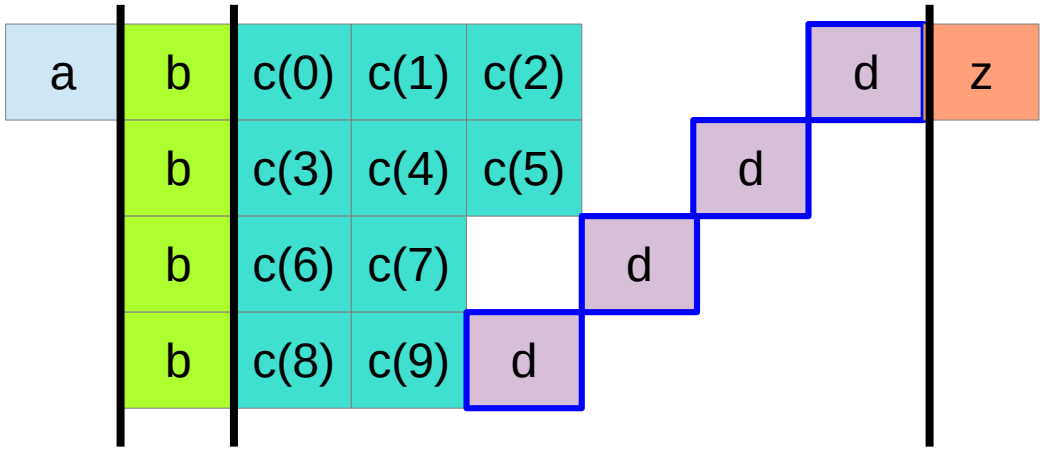


http://ppc.cs.aalto.fi/ch3/nowait/

Nowait (4)

disable this waiting, so that some threads can start doing postprocessing early.
This would make sense if, e.g., d() updates some global data structure based on what the thread computed in its own part of the parallel for loop:

```
a();
#pragma omp parallel
{
    b();
    #pragma omp for nowait
    for (int i = 0; i < 10; ++i) {
        c(i);
    }
    #pragma omp critical
    {       d();    }
}
z();
```

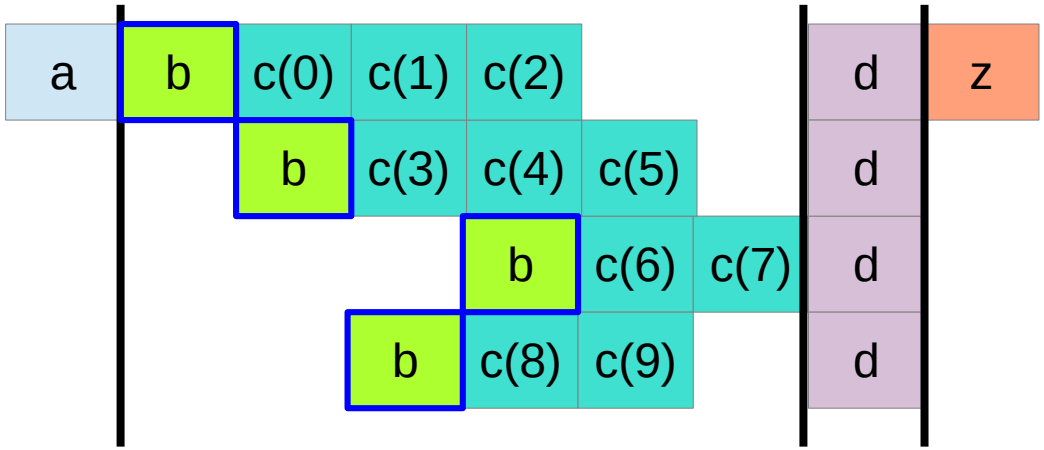


http://ppc.cs.aalto.fi/ch3/nowait/

Nowait (5)

Note that there is no synchronization point before the loop starts. If threads reach the for loop at different times, they can start their own part of the work as soon as they are there, without waiting for the other threads:

```
a();
#pragma omp parallel
{
    #pragma omp critical
    {
        b();
    }
    #pragma omp for
    for (int i = 0; i < 10; ++i) {
        c(i);
    }
    d();
}
z();
```



http://ppc.cs.aalto.fi/ch3/nowait/

References

[1] en.wikipedia.org
[2] M Harris, http://beowulf.lcs.mit.edu/18.337-2008/lectslides/scan.pdf