

# OpenMP

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# Nested parallelism

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## Library routines

- `omp_set_nested`
- `omp_get_nested`
- `omp_set_max_active_levels`
- `omp_get_max_active_levels`
- `omp_get_level`
- `omp_get_ancestor_thread_num`

## Environment variables

- `OMP_NESTED`
- `OMP_MAX_ACTIVE_LEVELS`

See examples `nested-?.c`

## Example - Overlapping IO with computation

```
#include <stdio.h>
#include <stdlib.h>

#define N 1000

int main( void )
{
    int iter = 0;
    float buff_read[N], buff_write[N];

    while (1)
    {
        read_input( buff_read );
        process( buff_read, write_buff );
        write_output( buff_write );
        iter++;
    }
}
```

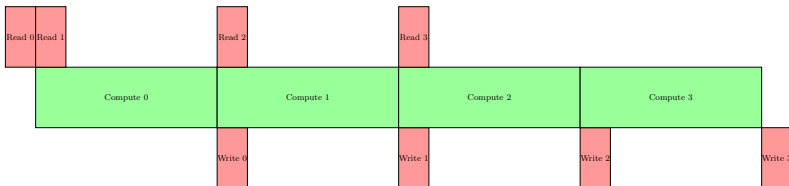
- Here, `process` is computationally expensive and parallelized internally with OpenMP

## Example - Overlapping IO with computation

- We can add a second level of OpenMP parallelism to pipeline the process
- Sequentially, the loop looks like



- With sections we can pipeline and overlap like



- See `pipeline.c`