

## Assignment 4 - Process Synchronization

In this assignment, you will implement the *Reader-Writer problem*. In this system, you have two *readers* who read from a shared buffer and one *writer* who updates the buffer. The buffer contains a variable **VAR**, which is initialized to zero. After each access, the writer reads the content of the buffer, prints it along with its own PID, and increments the content by one. Each reader also periodically reads the content of the buffer, and prints the current value along with its own PID. The writer and reader should be implemented as separate processes. Use shared memory to implement the shared buffer and use semaphore(s) in order to ensure proper synchronization between the reader and writer processes. The program terminates when the writer writes **MAX** to **VAR**.

Notice that both readers can access the shared content together. The reader who first makes a read operation should lock the shared content for reading. During the time the shared content is locked for reading, the other reader can read it. The last reader done with reading releases the lock. The writer can write only when no reader is reading the shared content. Finally, before the writer finishes writing, no reader can read.

You can insert appropriate delays, e.g., `sleep()`, so that the messages become visible. Here is a sample run for the writer with PID 123, and the readers with PIDs 124 and 125:

```
The first reader acquires the lock.  
The reader (124) reads the value 0  
The last reader releases the lock.  
The writer acquires the lock.  
The writer (123) writes the value 1  
The writer releases the lock.  
The first reader acquires the lock.  
Reader (125) reads the value 1  
Reader (124) reads the value 1  
The last reader releases the lock.
```

### How to submit the assignment

You should zip all your source code and upload it through the edmodo forum. Please use the following format to name your file:

`os_assignment<num>_group<num>.zip`

For example, if your group number is 5, you should submit:

`os_assignment4_group5.zip`

The deadline to submit this assignment is 1393/09/01 at 23:59.