Operating system I

Assignment # 3

**Java Synchronization & Threading**

1. **The Reader-Writer Problem**

**Description:**

* A **data object (buffer/Text)** is to be shared among several concurrent processes. Some of these processes may want only to **read** the content of the shared object, whereas others may want to **update** (that's to read and write) the shared object.
* We distinguish between these two types of processes that are interested in only reading as **readers** and to the rest as **writers**
* Obviously, if two **readers** access the shared data object simultaneously, **no adverse effects will result**
* However, if a **writer** and some other process (either a reader or a writer) access the shared object simultaneously, chaos may ensue.
* To ensure that these difficulties do not arise, we require that the **writers** have exclusive access to the **shared object**.
* Write a program to simulate the Reader-Writer concept using **Semaphores** and **Java Threading**

**Program Input :**

1. Initial Buffer contents
2. Nr : Total Number of reader threads
3. Nw : Total Number of writer threads
4. For each reader thread enter the following data

* **[ThreadName]**

1. For each writer thread enter the following data

* **[ThreadName]** **[Text to be written]**

**Program Output :**

* The execution order of the threads and the output of the read/write operation for readers and writers

Example:

Input:

Initial Buffer Content: Hello !

Number of reader threads : 3

Number of writer threads : 2

Reader Threads:

T1

T2

T3

Writer Threads:

T4 World1

T5 World2

Possible output **(Depending on threads execution order)**

T1 Start Reading

T4 Start Writing

T4 Blocked

T1 Read : Hello!

T1 Finished reading

T4 Writing : Hello! World1

T4 Finished writing

T2 Start Reading

T3 Start Reading

T2 Read : Hello! World1

T3 Read : Hello! World1

T2 Finished reading

T3 Finished reading

T5 Start Writing

T5 Writing : Hello! World1 World2

T5 Finished writing

Another possible output

T4 Start Writing

T1 Start Reading

T1 Blocked

T4 Writing : Hello! World1

T4 Finished writing

T1 Read : Hello! World1

T1 Finished reading

T5 Start Writing

T5 Writing : Hello! World1 World2

T5 Finished writing

T2 Start Reading

T3 Start Reading

T2 Read : Hello! World1 World2

T3 Read : Hello! World1 World2

T2 Finished reading

T3 Finished reading