Question 5: Readers/Writers + Singleton pattern

IT-SDJ2-A21

Software Engineering

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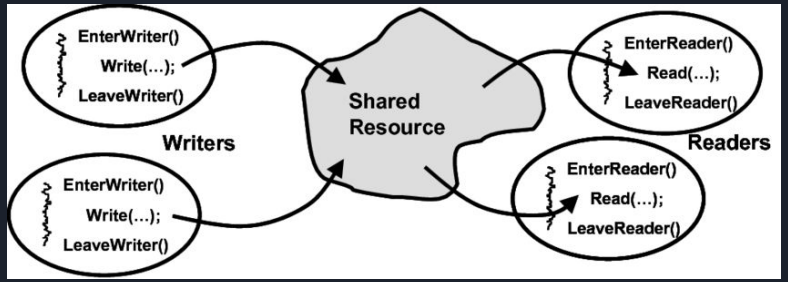
Readers/Writers

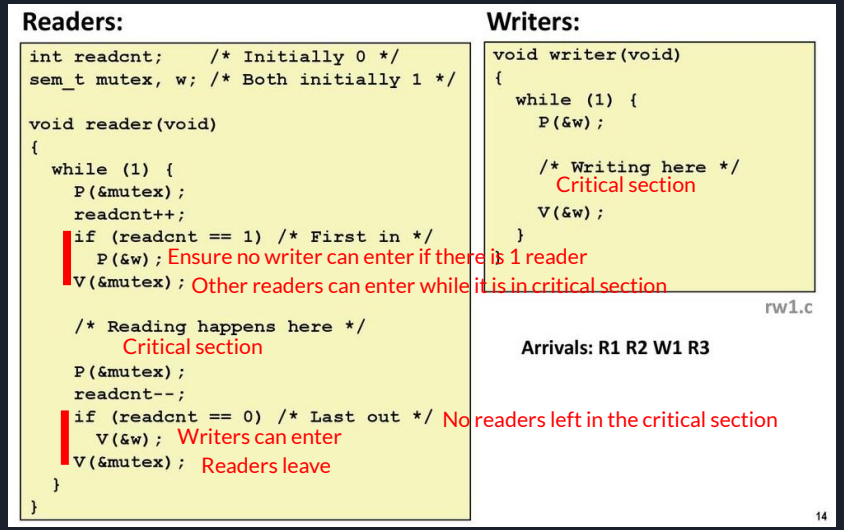
Readers-Writers Problem

- The readers-writers problem relates to an object such as a file that is shared between multiple processes. Some of these processes are readers i.e. they only want to read the data from the object and some of the processes are writers i.e. they want to write into the object.



Problem analysis

- The readers-writers problem is used to manage synchronization so that there are no problems with the object data. For example - If two readers access the object at the same time there is no problem. However if two writers or a reader and writer access the object at the same time, there may be problems.
- To solve this situation, a writer should get exclusive access to an object i.e. when a writer is accessing the object, no reader or writer may access it. However, multiple readers can access the object at the same time.
- This can be implemented using semaphores.



Java example

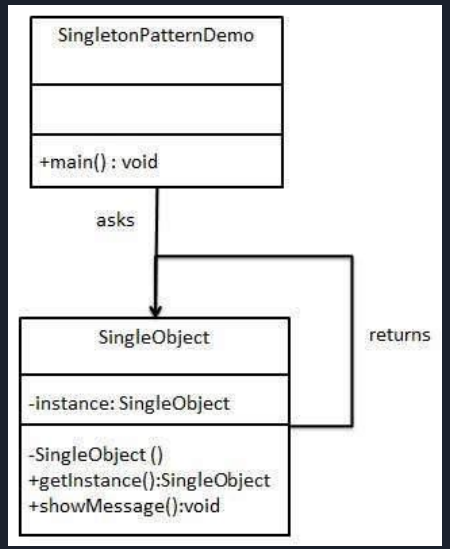
Singleton pattern

What is the purpose?

- Singleton pattern is a software design pattern that restricts the instantiation of a class to one "single" instance.
- This is useful when exactly one object is needed to coordinate actions across the system.
- Ensure that a class only has one instance.
- Easily access the sole instance of a class.
- Control its instantiation.
- Restrict the number of instances.
- Access a global variable.
- This method either creates a new object or returns an existing one if it has already been created

What are the different parts involved?

- *SingleObject* class have its constructor as private and have a static instance of itself.
- *SingleObject* class provides a static method to get its static instance to outside world.



Java example