Threads:

Multi-Threading is the ability of CPU to execute multiple process or threads concurrently.

Process:

A process is an instance of a program execution.

Thread:

* A Thread is a lightweight process.
* A thread is a unit of execution within a process and each process may contain several threads.
* Each thread in a process shares memory and resource.

Advantages of Multithreading:

* We can design more responsive application.
* Improved CPU utilization
* We can improve performance. By utilizing multiple cores and running threads in parallel

Join()🡪 Waits for thread to complete execution.

Deamon Threads-

* are low priority threads that runs in the background
* are used for I/o operations or services in the background
* Deamon Threads are terminated by JVM, while Worker Threads are not executed.

|  |  |
| --- | --- |
| Stack Memory | Heap Memory |
| Local variables,methods,method calls are in stack | Objects are stored in heap memory as long as it is referenced from application |
|  | Each thread share heap memory |
|  |  |
|  |  |

The purpose of Synchronization is the sharing of resources without interference using mutual exclusion.

A yield () method is a static method of Thread class and it can stop the currently executing thread and will give a chance to other waiting threads of the same priority

Wait () and notify()

* They are used for inter-thread communication.
* They will be used in scenario where threads share same intrinsic lock
* Threads that are locking on the same intrinsic lock can release the lock(wait ()) until the other calls notify()

**What is the difference between wait and sleep?**

Let's discuss the difference between sleep and wait. They may seem to be very similar but there are fundamental differences between them.

* you call wait on the **Object**while on the other hand you call sleepon the **Thread**itself
* wait can be interrupter (this is why we need the *InterruptedException*) while on the other hand sleep can not
* wait (and notify) must happen in a synchronized  block on the monitor object whereas sleep does not
* sleep operation does not release the locks it holds while on the other hand wait releases the lock on the object that wait() is called on

So as you can see there are some differences between wait and sleep operations!

Volatile Keyword stores the variable in the main memory(RAM)

Dead Lock is a situation where two or more threads waiting for each other and the requested resource is hold by each other and enters waiting state infinetly.

Multithreading Framework:

With increase in number of cores available in processor nowadays ,multi-threading is getting crucial

Java provides multi-threading framework Called Executor Frame Works

With the help of thread pool we can manage worker threads efficiently

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Thread Pool Types:

* Fixed Thread pool
* Cached Thread pool
* Scheduled Thread pool
* Single Threaded Pool

A screenshot of a computer program

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A screenshot of a computer

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STREAMS:

Stream is a sequence of elements from a data source that supports data processing

Data structures are used for data storing and streams are used for data processing(computation)

Stream operations can be performed sequentially or parallel