# Assignment 1.7

# Difference between threads and processes

| Threads | Processes |
| --- | --- |
| Share memory and resources within the same process | Run independently with separate memory spaces and resources |
| Faster and consumes fewer resources | Slower and resource-intensive |
| Lightweight; share resources allocated to the parent process | Heavyweight, require their own memory space and resources |
| Lower overhead in terms of resource consumption | Higher overhead due to separate memory space |
| Used for Parallelism within the same process. Running concurrently on a multi-core CPU | Used to achieve true parallelism by running independent tasks on separate CPU cores or processors |
| Less fault-tolerant on error can potentially crash entire process | More fault tolerant as processes are running independently |

# Difference between multi-threading and multi-processing

| Multi-Threading | Multi-Processing |
| --- | --- |
| Concurrent execution technique where a single process is divided into multiple threads that run within the same process. | Running multiple independent processes each with their own memory space and resources on multiple CPU cores and processors. Task can be processed concurrently. |
| Resource Efficiency sharing memory, file handles and other resources | Resource Isolation would require own memory space and resources |
| Easy to communicate with each other though shared memory which can make coordination and data sharing more efficient | Would require inter-process communication mechanisms like pipes, sockets or message queues which causes slower communication and would involve data serialization/deserialization |
| Suitable for applications that require responsiveness and parallelism within a single process | Suitable for tasks that require true parallelism, fault tolerance and resource isolation. |