

# National University of Technology



## Computer Science Department

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**Program:** Artificial intelligence

**Course:** Operating System

### Submitted By

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## **Program Question: Implementing Threads with Join and Detach**

```
#include <stdio.h>
#include <pthread.h>
#include <unistd.h>

// Function for first two joinable threads
void* joinable_thread(void* arg)
{
    int thread_no = *(int*)arg;
    int sleep_time = (rand() % 3) + 1; // Sleep between 1 and 3 seconds

    printf("Thread %d: Started. Sleeping for %d seconds.\n", thread_no,
sleep_time);

    sleep(sleep_time); // Simulate time-consuming task

    printf("Thread %d: Finished.\n", thread_no);

    return NULL;
}

// Function for daemon detached thread
void* daemon_thread(void* arg)
{
    int sleep_time = (rand() % 3) + 1;

    printf("Daemon Thread: Started. Sleeping for %d seconds.\n", sleep_time);

    sleep(sleep_time); // Simulate task

    printf("Daemon Thread: Finished independently.\n");

    return NULL;
}
```

```
int main()
{
    pthread_t t1, t2, t3;
    int id1 = 1, id2 = 2;

    // Initialize random number generator
    srand(time(NULL));

    // Create first two joinable threads
    pthread_create(&t1, NULL, joinable_thread, &id1);
    pthread_create(&t2, NULL, joinable_thread, &id2);

    // Create third thread and make it daemon detached
    pthread_create(&t3, NULL, daemon_thread, NULL);
    pthread_detach(t3);

    // Main thread waits for first joinable thread
    printf("Main thread: Waiting for Thread 1 to finish.\n");
    pthread_join(t1, NULL);

    // Main thread waits for second joinable thread
    printf("Main thread: Waiting for Thread 2 to finish.\n");
    pthread_join(t2, NULL);

    // Main thread exits without waiting for daemon thread
    printf("Main thread: Exiting program.\n");

    return 0;
}
```