



**Bilkent University**

**Department of Computer Engineering**

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# **Project 2**

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# Introduction

In this report, the results of the experiments that are performed on the Thread Support Library (TSL) will be discussed. In the first experiment, the effect of different numbers of threads on the performance is evaluated when the First Come First Served (FCFS) algorithm is selected. Variables other than the number of threads were untouched. In the second experiment, the same procedure was conducted with the Random Selection algorithm. The effect on the performance was evaluated by measuring the elapsed time between the library initialization and termination of the main thread.

## Experiments with FCFS Algorithm

Initially, the library was initialized with the First-Come-First-Served (FCFS) algorithm. Later, two for loops are used to measure the effect of different numbers of threads on the performance. In the first for loop, the `tsl_create_thread` function is called and return values, which are TIDs of the threads, are stored in an array. In the second loop, the `tsl_join` function is called with the TID values stored in the previous loop. Both loops were iterated N times. The experiment was conducted with different N values and the resulting elapsed times were recorded as follows.

Number of Threads (N)	Time Elapsed (ns)
32	158381000
64	326568000
96	650790000
128	666094000
160	947865000
192	1099824000
224	1336480000
256	1470525000

Table 1: Time elapsed for each number of threads in FCFS algorithm

The results demonstrate that elapsed time increases as the number of threads increases. This is because the system has to handle more tasks as the number of threads increases.

## Experiments with Random Selection Algorithm

With the exception of initializing the TSL with the Random Selection algorithm, the exact same procedure mentioned in the previous section is reiterated. The elapsed time values for the different N values are recorded in the following table.

Number of Threads (N)	Time Elapsed (ns)
32	218999000
64	299620000
96	525059000
128	863100000
160	1045943000
192	1176059000
224	1212766000
256	1505789000

Table 2: Time elapsed for each number of threads in Random Selection algorithm

With these results, we can observe that none of the algorithms dominates the other. However, observing some patterns is possible. In the FCFS algorithm, the completion time is increasing nearly linearly as the thread number is increased. However, in the RANDOM SELECTION algorithm, even though completion time is increased depending on the input size and it also seems linearly dependent, we can observe that fluctuations are sharper than in the FCFS algorithm. This may be caused by the randomness, as this algorithm needs to assign a random thread to run.