BILKENT UNIVERSITY

ENGINEERING FACULTY

DEPARTMENT OF COMPUTER ENGINEERING

CS 342 Project 3 Report

Mehmet Ege Acıcan

21602186

Berk Türk

21302520

Table of Contents

Description and RunTime Table

Project Description

In this Project, we were asked to implement a thread-safe memory management library(static library) which will be used by a multithreaded application to allocate memory dynamically.

This Project has been done by pair. Mehmet Ege Acıcan and Berk Türk.

The Project uses synchronization. Since it is a multithreaded program. The Project uses Mutex locks to allow synchronization.

For Dynamic Memory Allocation, 3 methods were asked to implement: First fit, Best fit and Worst Fit:

1. First Fit: In the first fit, the partition is allocated which is first sufficient block.

2. Best Fit Allocate the process to the partition which is the first smallest sufficient block.

3. Worst Fit Allocate the process to the partition which is the largest sufficient block.

The user creates a chunk that he/she adjusts the size of and all of the methods(Allocation, freeing)is being done on this chunk. If there are no available chunksize left for allocation, the commanded allocation won't happen. The program only allocates if there is enough space for it.

Minimum chunk size is 32 KB and maximum chunk size is 32 MB

Minimum request size (size requested for allocation) is 128 bytes and maximum request size is 2048 KB.

Runtime Table and Project Outputs

For different variables, the runtime has been calculated by clock() functions and the runtime results have been recorded. Below are the tables fort he runtime results for different variables.
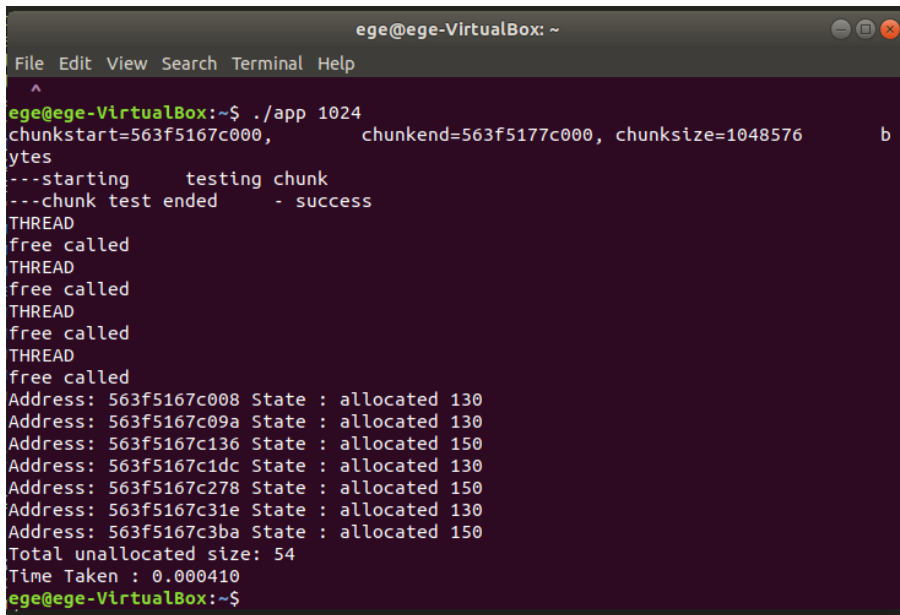
Runtime Table and Outputs for Allocation Algorithms

Below are the output results for First fit, Best Fit and Worst Fit algorithms. The thread size has been held constant as 4. While testing, the typical allocation request sizes were chosen as 130,140 and 150.

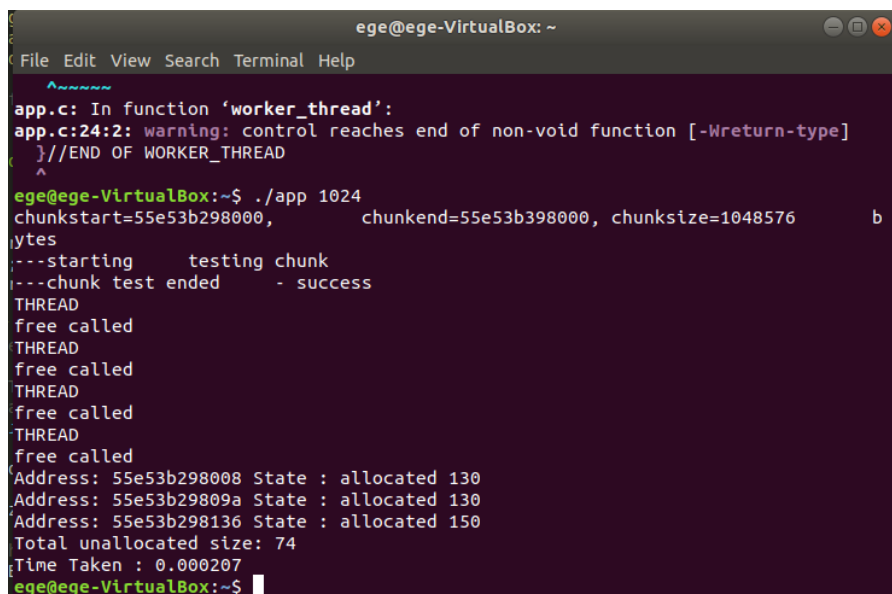| Algorithm	Runtime(s)
First Fit	0.000410
Best Fit	0.000207
Worst Fit	0.000205

Note: (s) indicates seconds

Conclusion: Best Fit and Worst Fit Algorithms seems to work more efficient than first fit algorithms.

Figure 1: Output of the First Fit

Figure 2:Output of the best fit

Figure 3: Output of the Worst Fit

Runtime Table and Outputs for Thread size

Below are the output results and runtimes for different thread sizes(N = 1 to N = 4). The allocation algorithm used is First fit and it is constant. The request sizes has been taken as 130, 140 and 150.

Thread Number	Runtime(s)
1	0..000125
2	0.000164
3	0.000189
4	0.000293

Note: (s) indicates seconds

Conclusion: The thread number and run time are linearly dependent.

Figure 1: Output for thread number = 1

Figure 2: Output for Thread Number = 2

Figure 3: Output for Thread Number = 3

Figure 4: Output for Thread Number = 4