

Bilkent University

Faculty of Engineering

Computer Science



CS-342 – Operating Systems

Project 3 Report

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Section 2

23.4.2021

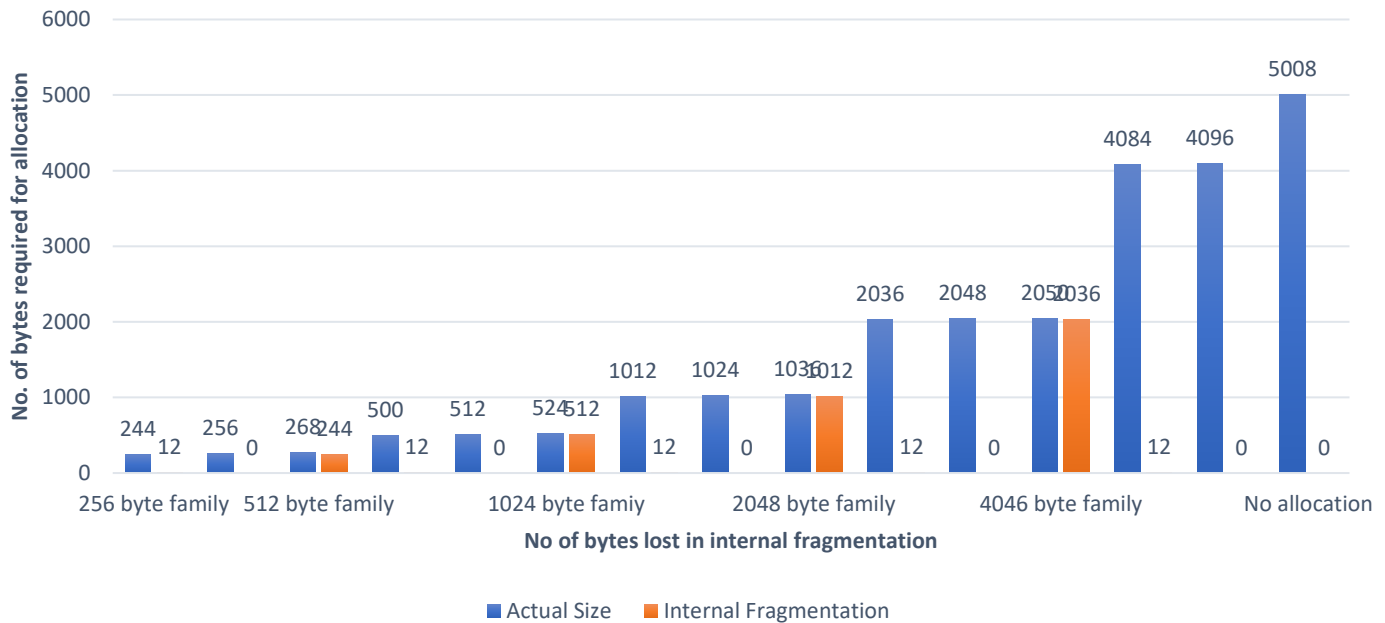
Internal Fragmentation Experiment

We will measure the internal fragmentation which happens when an overhead of 12 bytes is added to the requested size and the memory is allocated accordingly. The difference between the memory to be allocated to the real required size and the requested size is `nextPower(12 + reqsize)`.

In this experiment we will run the file `app.c` with different request size of 232, 244, 256, 488, 500, 512, 1000, 1012, 1024, 2024, 2036, 2048, 4072, 4084, and 4096.

Requested Size	Actual Size	Allocated Size	Internal Fragmentation
232	244	256	12
244	256	256	0
256	268	512	244
488	500	512	12
500	512	512	0
512	524	1024	512
1000	1012	1024	12
1012	1024	1024	0
1024	1036	2048	1012
2024	2036	2048	12
2036	2048	2048	0
2048	2050	4096	2036
4072	4084	4096	12
4084	4096	4096	0
4096	5008	No allocation	No allocation

Relation between actual size of space needed for allocation and internal fragmentation



Conclusion of Experiment

When the actual number of bytes required for allocation approaches a power of 2, the amount internal fragmentation decreases by $2^n - \text{required no. of bytes}$. This means that when the actual number of bytes required increases past a power of 2, the amount of internal fragmentation is the highest for that power of 2 and is again $2^{n+1} - \text{required no. of bytes}$. As the number of bytes requested past a power of 2 increases, so does the internal fragmentation.

We had an overhead of 12 bytes, which came from the three integer values location, limit and next stored in the block struct.

Conclusion about Project

We could not implement a working sbmem.c file, where some of the functions were not working properly. However, the rest of our functions and create and destroy files were working properly. The reason we were unable to implement a working project was because of certain conceptual problems; we understood the linked list implementation of buddy system wrong at first and we ended up changing our implementation and starting from scratch, and we even had to change some major details later again. This cost us a lot of time. We also had some problems outside of the project which we could not help fixing that delayed our finished product. It can be seen in our GitHub repository that we worked a long time on our project, using multiple branches and files over a 5–6-day period and this link can be seen below. Many of the problems

we encountered were unfortunate and coincidences hence, we could not finish the project in working way.

<https://github.com/emredermann/CS342Project3/tree/developer>