

**CSE341 Computer Organization, Spring 2018 Project 3 Due: 05/11/2018 5pm**  
**Cache memories – Using Dineo**

This project is due Friday May 11th by 5pm. No late submissions will be accepted. This project is designed to help you understand cache better and help prepare you for the final exam.

This project is on cache memories and you will need to work on timberlake to complete this project. The objective is to evaluate different cache organizations using the cache simulator called dinero. You will need a memory trace to complete this assignment. The memory trace information is provided at the end. You can use dinero on timberlake. via the command "dineroIV filename.din".

1. Set dinero as a unified cache, and use block size 32, associativity 1 and write-back options. **Vary the cache size** as 1k, 2k, 4k, 8k, 16k and 32k and plot the number of misses for the trace file prog\_trace.din. The trace files can be found in the directory given at the end.
2. Set instruction cache size 8192 and data cache size 8192 and **vary the block size** as 8, 16, 32 and 64 using the write back protocol. Generate a plot showing hit ratio versus block size.
3. Set instruction cache size 8192 and data cache size 8192 and **vary the associativity** as 1, 2, 4 and full using the write back protocol. Generate a plot showing the hit ratio versus the associativity. (Assume a block size of 32)
4. Same as 3 but use write-through.
5. Set instruction cache size 8192, data cache size 8192, block size 32 and associativity level 4 and **vary the replacement policy** using LRU, FIFO and random. Generate a plot showing the hit ratio versus the replacement policy.
6. Same as 5 but use full associativity

Write up your results. Explain how the parameters varied in steps 1 through 6 affect overall performance. For plotting the graphs, you may use tools such as excel or any other tool of your choice. Provide a single report per person answering the questions above. For each of the 6 cases, explain why your graph is the way it is and explain the relation between the modified parameters and the results obtained. The entire report should be submitted as a single pdf file with the name lastname\_userid\_p3.pdf

**Hints:**

Use "dineroIV -help" for options. For example, ./dineroIV -dineroIII maps command line options from version III to version IV

You have to redirect the memory trace files to standard input of dinero.

Example: dineroIV -l1-isize 16k -l1-dsize 8192 -l1-ibsize 32 -l1-dbsize 16 -informat p  
</projects/rsridhar/dinero/prog\_trace.din > trace1.out

Redirect the screen output to a text file so that you can record the results for plotting

Example Command:

Cache size = 512Kb, Block size = 64byte, Input = prog\_trace.din, Output = results.txt  
dineroIV -l1-ubsize 64 -l1-usize 512k -l1-uassoc 4 -l1-urepl 1 -l1-uccc -informat D  
</projects/rsridhar/dinero/prog\_trace.din > results.txt

prog\_trace.din file is in directory /projects/rsridhar/dinero/ on timberlake.cse.buffalo.edu