

## CMPEN431 Programming Project-1

In this first programming project of CMPEN431, you will use SimpleScalar to perform experiments. Specifically, you are going to explore the effects of branch prediction on performance. Please use sim-outorder for each benchmark run, and we already have bzip2, equake, hmmer, mcf, milc and sjeng totally 6 benchmarks ready for you to use. All the benchmarks can be found in “/home/software/simplesim/ss-benchmark” You should copy these files to your own directory. The sample command for your runs can be found in “SimpleScalar/SimpleScalar\_Lab\_Setup.pdf” on canvas.”

### Requirement:

You need to use three different branch prediction strategies below to run all 6 benchmarks. Each benchmark needs to be run for 2,000,000 instructions.

**M1-Predict taken/not taken:** This is the baseline for this set of simulations. Make sure that you are using both taken and not-taken as your branch prediction strategy for the baseline.

**M2-Bimodal branch prediction:** Next, just change the branch predictor to bimodal with a 2,048 BHT (the default) and a 512 set, 4 way associative BTB (also the default). You should manually add all the configurations in the tmp.cfg file.

**M3-Perfect branch prediction:** To see how good (or bad) these two branch prediction schemes are, experiment this time with a perfect branch prediction.

For your set of three experiments for each benchmark, you should write a report in tabulated form. Show the total number of branches executed as well as sim\_IPC for each benchmark. Here is the sample table. You just need to fill up all the blanks in the tables.

Always take:

	bzip2	equake	hmmer	mcf	milc	sjeng
sim_total_branches						
sim_IPC						

Always not-take:

	bzip2	equake	hmmer	mcf	milc	sjeng
sim_total_branches						
sim_IPC						

Bimodal:

	bzip2	equake	hmmer	mcf	milc	sjeng
sim_total_branches						
sim_IPC						

perfect:

	bzip2	equake	hmmer	mcf	milc	sjeng
sim_total_branches						
sim_IPC						

### **Project policy**

- i) For this project, you may choose to pair up with another student (this is not a requirement; if you want, you can do it alone).
- ii) Each group should submit a single file(pdf) with four tables of described above. You also need to submit the output file from SimpleScalar (totally 24 files, 4 files per benchmark).
- iii) Please indicate the names and PSU IDs of the group members in your submission.
- iv) This project is due Nov 17<sup>th</sup> 11:59pm.