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CS4290

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## Project 2 Design Results

The purpose of the second half of project 2 was to find the best scheduler for each trace in the traces directory, following the constraint of having a budget of 10 total reservation station entries. The goal was to achieve the highest total IPC (instructions per cycle), by experimenting with both the unified and per-FU reservation stations. My initial approach to this challenge was to brute force. While this isn't the most time efficient method, I chose this direction because I believed that I could better determine trends and manipulate the reservation station values from there.

### **Methodology:**

My plan was simple, to test each reservation station combination, starting with the highest possible parameters for each. The idea of using up more of the budget provided is preferred because the more budget used causes less issue stalls and therefore schedules instructions as soon as possible. After my initial idea of testing the highest possible parameters, I later decided to revise the plan for the per-FU reservation station by allocating reservation stations towards the max active values I received for each functional unit, because if there are only a max number of active instructions, we will only ever need that many reservation stations because we cannot fire

any more than what is active due to hazards. This testing process is complete because every possible combination of reservation station size was tested for each type. Brute force is a good method for this project because there is a small amount of combinations available.

## Design Results:

Listed below are the best results per type of reservation station I was able to find per trace.

Number 1 for each trace is the highest performing combination.

- gen-lin-recc.trc:

1. `./schedulersim -r 32 -u 10 < traces/gen-lin-recc.trc`

- IPC: 0.188112

2. `./schedulersim -r 32 -a 6 -d 2 -m 2 4 < traces/gen-lin-recc.trc`

- IPC: 0.188109

- iccg.trc:

1. `./schedulersim -r 32 -u 10 < traces/iccg.trc`

- IPC: 0.290588

2. `./schedulersim -r 32 -a 3 -d 2 -m 5 4 < traces/iccg.trc`

- IPC: 0.269852

- inner-product.trc:

1. `./schedulersim -r 32 -u 10 < traces/inner-product.trc`

- IPC: 0.216406

2. `./schedulersim -r 32 -a 5 -d 1 -m 4 < traces/inner-product.trc`

- IPC: 0.216394