

CS6290

High Performance Computer Architecture

Project 2: Design Experiment Results

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Experiments

The values of input parameters to our code, the type of scheduler (Functional Unit based RS and Unified RS) and the number of Reservation Stations (RS) for each type of scheduler, were varied using a script. The constraints placed on these parameter values were such that the total number of RS entries for each scheduler does not exceed 10. This has been described in the experiment methodology section that follows.

Methodology Used

The following constraints were used for the respective schedulers with the three traces 'gen-lin-recc.trc', 'iccg.trc', and 'inner-product.trc':

1. **Unified Scheduler:** The constraints on input parameters for this Scheduler were as follows:
 - The Number of Reservation Stations were swept from 1 to 10
 - With a check on all the valid cases (i.e. RS entries ≤ 10), the results were exported to a log file and the configuration for maximum IPC was identified. The results for the three traces are mentioned under the Design Results section.
2. **Functional Unit (FU) based Scheduler:** The constraints on input parameters for this scheduler were as follows:
 - The Number of Reservation Stations for each of the ADD, DIV, and Memory ALUs were swept from 1 to 8, with the constraint of 10 entries in total for the three Reservation Stations, which is defined as follows for the FU scheduler:
 - Total entries = $a+d+m$
 - Since the sum (total entries) must be less than or equal to 10, and every ALU needs to have at least one RS entry, the number of entries in each RS must be less than 8 (since $8+1+1 = 10$). Thus, the entries were swept from 1 to 8 and all the values for which total entries > 10 were discarded.
 - With a check on all the valid cases (i.e. RS entries ≤ 10), the results were exported to a log file and the configuration for maximum IPC was identified. The results for the three traces are mentioned under the Design Results section.

This methodology is complete because the algorithm it uses includes the following three important constraints:

- Maximum limit on the number of RS entries (10) (for all types of schedulers)
- Maximum number of RS entries for each RS (ADD, DIV, MEM) for FU based scheduler should be 8, since the total sum is a maximum of 10.

Design Results

The highest values of IPC for the three traces with the two types of schedulers are show below. The configurations with the **maximum** and **minimum** IPC are highlighted.

Trace: gen-lin-recc					
Type of Scheduler	Number of ADD RS entries	Number of DIV RS entries	Number of MEM RS entries	IPC	Total No. of entries
FU based	4	2	4	0.190607	10
Unified	-	-	-	0.191071	10

Trace: iccg					
Type of Scheduler	Number of ADD RS entries	Number of DIV RS entries	Number of MEM RS entries	IPC	Total No. of entries
FU based	4	3	3	0.443366	10
Unified	-	-	-	0.572264	10

Trace: inner-product					
Type of Scheduler	Number of ADD RS entries	Number of DIV RS entries	Number of MEM RS entries	IPC	Total No. of entries
FU based	4	2	4	0.570651	10
Unified	-	-	-	0.665613	10