TDTS08: Lab Report

Lab 2: Instruction Pipelining

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Contents

1 Introduction

The purpose of this lab is to learn how instruction pipelining works and how branch prediction affects the performance of the pipeline.

2 Pipeline basics I

IF	DA	CO	FO	EX	WB

Figure 1 – Six stage pipeline.

3 Pipeline basics II

When we have a short pipeline we get less time penalty due to that its only one step that needs redoing and therefore its detected earlier.

	1	2	3	4	5
1	IF	EX			
2		IF	EX		
3			IF	EX	
4				IF	EX

Figure 2 – Ideal pipeline operation.

	1	2	3	4	5	6
1	IF	EX				
2		IF	EX			
25			IF			
4				IF	EX	
5					IF	EX

Figure 3 – Pipeline operation during conditional jump.

4 Branch prediction

Here we analyze how the different branch prediction algorithms perform.

4.1 Desciption

For each predictor a benchmark was run according to the following command

```
sim-outorder -bpred predictor ~/TDTS08/bin/go.ss 3 8
```

4.2 Solution

The performance result can be seen in figure 4 below.

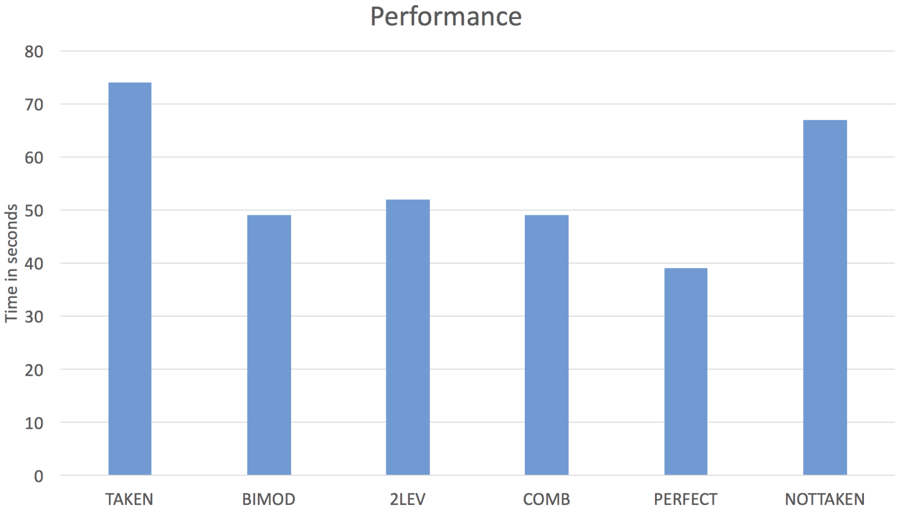

Figure 4 – Performance of the different branch prediction algorithms