Discussion 5

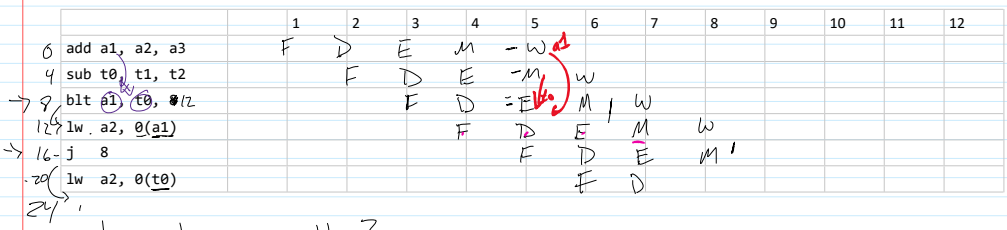
Thursday, February 7, 2019 2:16 PM

Outline

- Go over test
- How to improve performance of control hazards
- Summary of hazards

Test

Control hazards

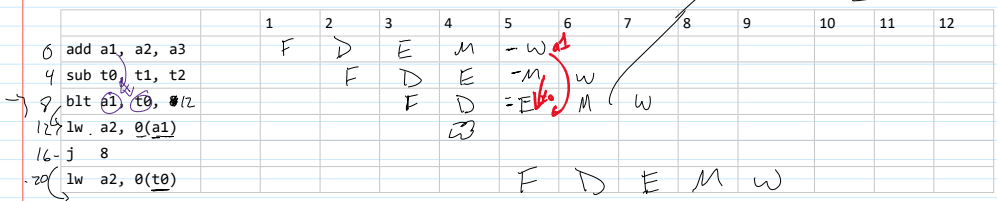


how to improve this?

- just execute next inst as if not branch
  - ↳ Branch not taken
  - ↳ Branch taken
  - ↳ jumps (unconditional)

not

assume taken



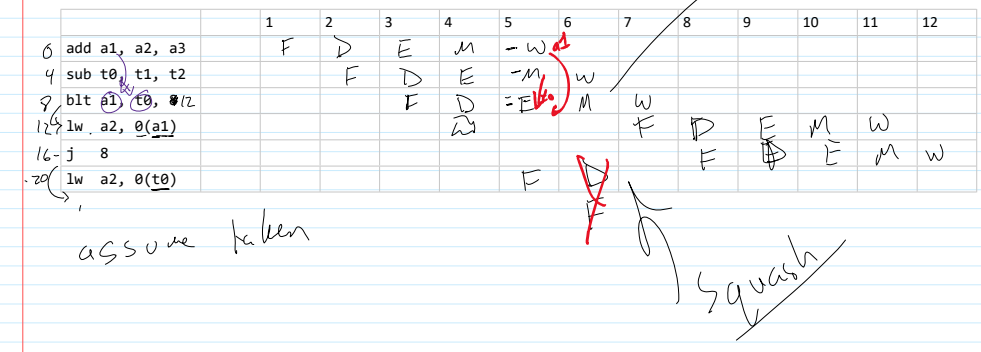
how to improve?

guess ↳ execute the taken path

Branch prediction

branch prediction techniques

assume branch taken



assume taken

branch misprediction penalty is 4 cycles

Right for always not taken

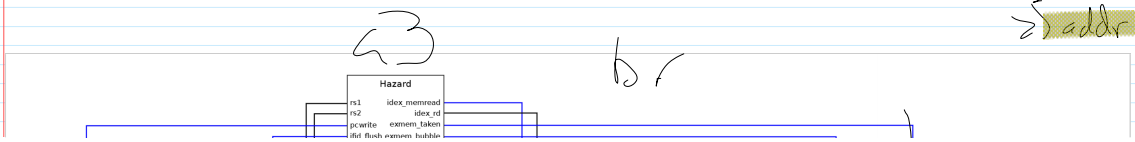
no penalty

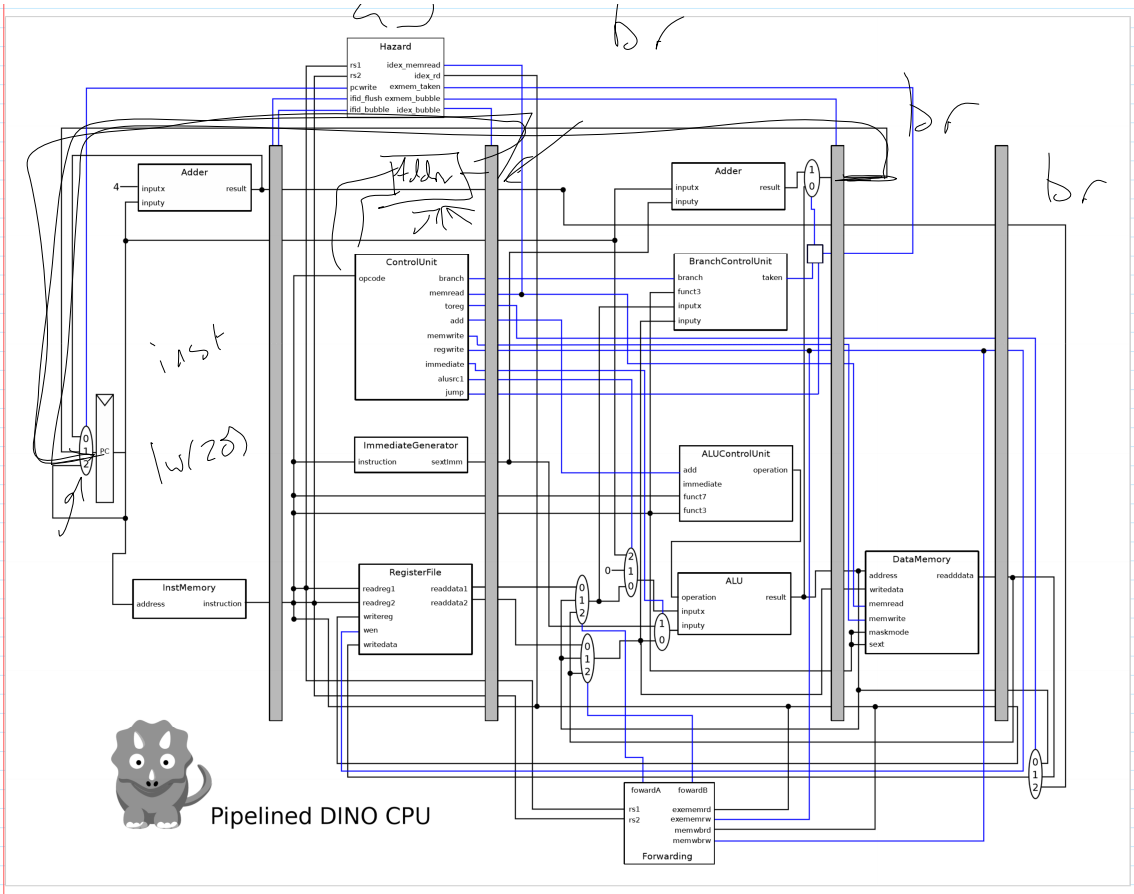
for always taken penalty?

1 cycle

branch pred needs 2 infos

1) taken or not
2) addr jumping to if taken





Jumps
↳ to improve perf
Save 1 cycle
bubble

Branch prediction

1000 insts 20% branches 75% taken 25% not taken

Branches resolved in 4th cycle + 2 cycles for target
↳ addr jumping to

Always taken or not taken? What's speedup?

baseline always stall → 800 + 200·4 = 1600 cycles

not taken → 800 + 50·1 + 150·4 = 1450
(1: not taken; 4: taken (wrong))

next taken speedup = 1600/1450 = 1.1x

taken → 800 + 50·4 + 150·2 = 1300
(4: not taken (wrong))

1600/1300 = 1.23x

Hazard summary