

实验名称：单周期 CPU 设计 lab3

实验人：谢志康

学号：22307110187

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在 lab2 代码基础上仅新增几行代码即可（ALU.sv 中实现计算）

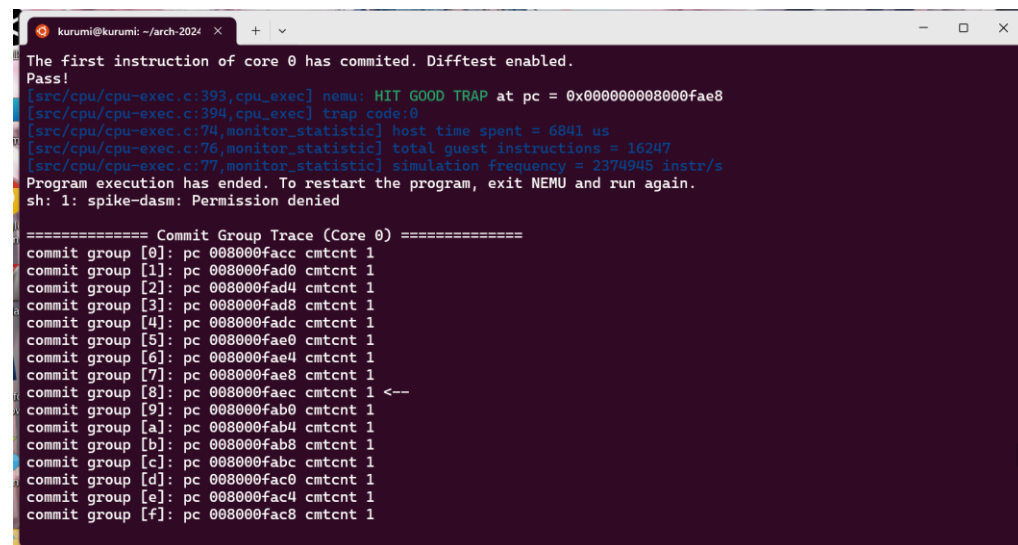
B 型指令和以前实现过的 BEQ 逻辑相同，设置 flag 判断是否跳转即可

```
// lab3 add
`ALU_SLL: begin alu_c = A << B[5:0]; alu_f = 1'b0; end
`ALU_SRL: begin alu_c = A >> B[5:0]; alu_f = 1'b0; end
`ALU_SRA: begin alu_c = ($signed(A)) >>> B[5:0]; alu_f = 1'b0; end
`ALU_SLT: begin alu_c = ($signed(A) < $signed(B)) ? 1 : 0; alu_f = 1'b0; end
`ALU_SLTU: begin alu_c = (A < B) ? 1 : 0; alu_f = 1'b0; end

`ALU_BEQ: alu_f = (A == B) ? 1 : 0;
`ALU_BNE: alu_f = (A != B) ? 1 : 0;
`ALU_BLT: alu_f = ($signed(A) < $signed(B)) ? 1 : 0;
`ALU_BLTU: alu_f = (A < B) ? 1 : 0;
`ALU_BGE: alu_f = ($signed(A) >= $signed(B)) ? 1 : 0;
`ALU_BGEU: alu_f = (A >= B) ? 1 : 0;

`ALU_SLLI: begin alu_c = A << B[5:0]; alu_f = 1'b0; end
`ALU_SRLI: begin alu_c = A >> B[5:0]; alu_f = 1'b0; end
`ALU_SRAI: begin alu_c = ($signed(A)) >>> B[5:0]; alu_f = 1'b0; end
`ALU_SLTI: begin alu_c = ($signed(A) < $signed(B)) ? 1 : 0; alu_f = 1'b0; end
`ALU_SLTIU: begin alu_c = (A < B) ? 1 : 0; alu_f = 1'b0; end
```

通过 test 截图：



```
kurumi@kurumi: ~/arch-2024
The first instruction of core 0 has committed. DiffTest enabled.
Pass!
[src/cpu/cpu-exec.c:393,cpu_exec] nemu: HIT GOOD TRAP at pc = 0x000000000000fae8
[src/cpu/cpu-exec.c:394,cpu_exec] trap code:0
[src/cpu/cpu-exec.c:74,monitor_statistic] host time spent = 6841 us
[src/cpu/cpu-exec.c:76,monitor_statistic] total guest instructions = 16247
[src/cpu/cpu-exec.c:77,monitor_statistic] simulation frequency = 2374945 instr/s
Program execution has ended. To restart the program, exit NEMU and run again.
sh: 1: spike-dasm: Permission denied

===== Commit Group Trace (Core 0) =====
commit group [0]: pc 008000facc cmtcnt 1
commit group [1]: pc 008000fad0 cmtcnt 1
commit group [2]: pc 008000fad4 cmtcnt 1
commit group [3]: pc 008000fad8 cmtcnt 1
commit group [4]: pc 008000fadc cmtcnt 1
commit group [5]: pc 008000fae0 cmtcnt 1
commit group [6]: pc 008000fae4 cmtcnt 1
commit group [7]: pc 008000fae8 cmtcnt 1
commit group [8]: pc 008000faec cmtcnt 1 <--
commit group [9]: pc 008000fab0 cmtcnt 1
commit group [a]: pc 008000fab4 cmtcnt 1
commit group [b]: pc 008000fab8 cmtcnt 1
commit group [c]: pc 008000fabc cmtcnt 1
commit group [d]: pc 008000fac0 cmtcnt 1
commit group [e]: pc 008000fac4 cmtcnt 1
commit group [f]: pc 008000fac8 cmtcnt 1
```