lab3实验报告

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改动

1. 更多指令：主要修改了decoder和execute。将原本memory阶段的beq跳转放到execute阶段。rtype和itype指令的新增主要通过在alu中添加alufunc完成。
2. 握手总线：修改hazard。设置i_wait=ireq.valid && ~iresp.data_ok,d_wait=dreq.valid && ~dresp.data_ok作为hazard输入信号。i_wait期间，阻塞pcreg，flush freg。如果在i_wait期间有跳转信号产生，则还要阻塞ereg（维持跳转信号和跳转地址）flush mreg（防止重复执行）。在d_wait期间阻塞pcreg，flush freg（相当于插入nop），阻塞mreg（防止地址丢失），flushwreg（防止重复执行）。
3. 根据提供的代码在memory中新增readdata和writedata模块。适当修改防止多驱动。

测试通过截图

```
* checktick: start=3.358000
* checktick: start=3.361000
* checktick: start=3.364000
* checktick: start=3.366000
* checktick: start=3.369000
* checktick: start=3.372000
* checktick: start=3.375000
* checktick: start=3.377000
Your clock granularity/precision appears to be 1999 microseconds.
Each test below will take on the order of 54000 microseconds.
   (= 27 clock ticks)
Increase the size of the arrays if this shows that
you are not getting at least 20 clock ticks per test.
-------------------------------------------------------------
WARNING -- The above is only a rough guideline.
For best results, please be sure you know the
precision of your system timer.
-------------------------------------------------------------
Function    Best Rate MB/s  Avg time     Min time     Max time
Copy:             4.7     0.007333     0.007000     0.008000
Scale:            0.1     0.333889     0.333000     0.335000
Add:              0.6     0.080111     0.078000     0.085000
Triad:            0.1     0.394667     0.392000     0.400000
-------------------------------------------------------------
Solution Validates: avg error less than 1.000000e-13 on all three arrays
-------------------------------------------------------------
Run conwaygame
Play Conway's life game for 200 rounds.
seed=12056
          **
         * *
         * *                    *
          *                    * *
                               * *
                    *           *
                   * *   **
                   * *  * *
                    *    **

[src/cpu/cpu-exec.c,320,cpu_exec] nemu: HIT GOOD TRAP at pc = 0x0000000080015200
[src/cpu/cpu-exec.c,321,cpu_exec] trap code:0
[src/cpu/cpu-exec.c,62,monitor_statistic] host time spent = 25156355 us
[src/cpu/cpu-exec.c,64,monitor_statistic] total guest instructions = 59205022
[src/cpu/cpu-exec.c,65,monitor_statistic] simulation frequency = 2353481 instr/s
Program execution has ended. To restart the program, exit NEMU and run again.
```

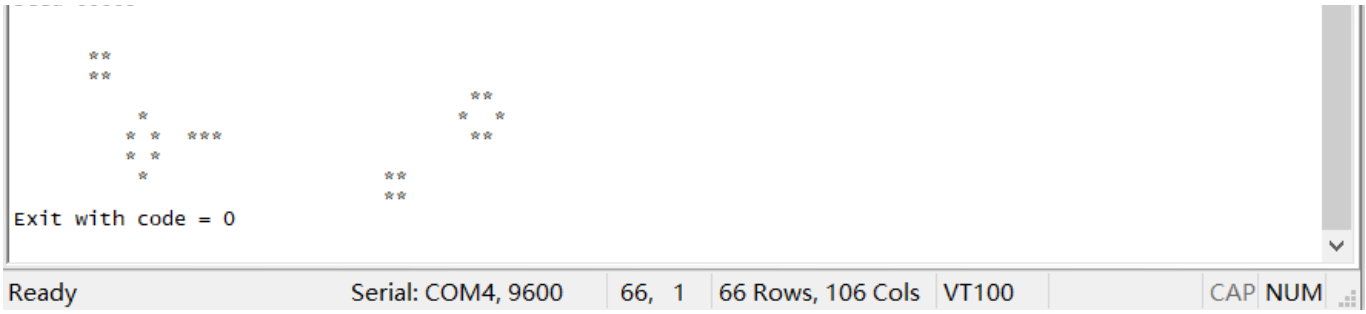
serial-com4 - SecureCRT

File Edit View Options Transfer Script Tools Window Help

Enter host <Alt+R>

serial-com4

```
Run stream
-------------------------------------------------------------
STREAM version $Revision: 5.10 $
-------------------------------------------------------------
This system uses 8 bytes per array element.
-------------------------------------------------------------
Array size = 2048 (elements), Offset = 0 (elements)
Memory per array = 0.0 MiB (= 0.0 GiB).
Total memory required = 0.0 MiB (= 0.0 GiB).
Each kernel will be executed 10 times.
 The *best* time for each kernel (excluding the first iteration)
 will be used to compute the reported bandwidth.
-------------------------------------------------------------
* checktick: start=16.882000
* checktick: start=16.926000
* checktick: start=16.971000
* checktick: start=17.016000
* checktick: start=17.060000
* checktick: start=17.104000
* checktick: start=17.148000
* checktick: start=17.193000
* checktick: start=17.237000
* checktick: start=17.282000
* checktick: start=17.326000
* checktick: start=17.370000
* checktick: start=17.415000
* checktick: start=17.460000
* checktick: start=17.504000
* checktick: start=17.549000
* checktick: start=17.593000
* checktick: start=17.638000
* checktick: start=17.683000
* checktick: start=17.727000
Your clock granularity/precision appears to be 43999 microseconds.
Each test below will take on the order of 260000 microseconds.
   (= 5 clock ticks)
Increase the size of the arrays if this shows that
you are not getting at least 20 clock ticks per test.
-------------------------------------------------------------
WARNING -- The above is only a rough guideline.
For best results, please be sure you know the
precision of your system timer.
-------------------------------------------------------------
Function    Best Rate MB/s  Avg time     Min time     Max time
Copy:             1.0     0.035333     0.034000     0.036000
Scale:            0.0     1.602444     1.601000     1.605000
Add:              0.1     0.385333     0.374000     0.407000
Triad:            0.0     1.893333     1.881000     1.918000
-------------------------------------------------------------
Solution Validates: avg error less than 1.000000e-13 on all three arrays
-------------------------------------------------------------
Run conwaygame
Play Conway's life game for 200 rounds.
seed=60665
```


Exit with code = 0
Ready
Serial: COM4, 9600
66, 1
66 Rows, 106 Cols
VT100
CAP
NUM