CPSC313 - Assignment 3
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Problem 1

Error 1:

Bug #1 found in test at Memory 300 (sBHazard)
What should be expected at the end of the test:
    %eax = 17
    %ecx = 18
    %edx = 19
    %ebx = 16

What showed up before the bug fix:
    %eax = 16
    %ecx = 16
    %edx = 16
    %ebx = 16

Erroneous:
    When coming across a data hazard, pipelineHazardControl doesn't check for data hazard in second
    register.

Solution:
    Add an additional coditional in on the checking of data hazard when checking the first register:
    Line 41:
        if (isDataHazardOnReg (d.srcA.getValueProduced()))

    After Fix:
        if (isDataHazardOnReg (d.srcA.getValueProduced()) ||
        isDataHazardOnReg(d.srcB.getValueProduced()))

Error 2:

Bug #2 found in test at Memory 400 (aLoadUse)
What should be expected at the end of the test:
    %eax = 10
    %ecx = 10
    %edx = 10
    %ebx = 30
    %edi = 0x1000 or 4096

What showed up before the bug fix:
    %eax = 10
    %ecx = 10
    %edx = 10
    %ebx = 0
    %edi = 0x1000 or 4096

Erroneous:
    isDataHazardOnReg(int reg), it is not checking for the data hazard on register output port for dstM.

Solution:
    extend the return statement to also check dstM for the output registers on Execute, Memory, and
    Write-back stages.
    Line 32:

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        return reg != R_NONE && (E.dstE.get() == reg || M.dstE.get() == reg || W.dstE.get() == reg);

    After Fix:
        return reg != R_NONE && (E.dstE.get() == reg || M.dstE.get() == reg || W.dstE.get() == reg ||
        E.dstM.get() == reg || M.dstM.get() == reg|| W.dstM.get() == reg);



Error 3
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Bug #3 found in test at Memory 700 (notTKJmp)
What should be expected at the end of the test:
    %eax = 0
    %ecx = 1
    %edx = 1
    %ebx = 0
    %esp = 0

What showed up before the bug fix:
    %eax = 0
    %ecx = 1
    %edx = 1
    %ebx = 1
    %esp = 0

Erroneous:
    pipelineHazardControl does not do a hazard check when executing a conditional jump in Execute Stage

Solution:
    Add an additional conditional in conditional jump hazard check to also do hazard control in execute
    stage
    Line 49:
        else if ((D.iCd.get()==I_JXX && D.iFn.get()!=C_NC))
    After Fix:
        else if ((D.iCd.get()==I_JXX && D.iFn.get()!=C_NC) || (E.iCd.get()==I_JXX && E.iFn.get()!=C_NC))




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Problem 2
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CPI for sum.s
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Cycles per Instruction (CPI)    =   total cycles / instructionRetired Cycles
                                =   cCnt / iCnt
                                =   117 / 45
                                =   2.6 CPI
The CPI for sum.s is approximately 2.6 cycles per instruction.


CPI for max.s
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Cycles per Instruction (CPI)    =   total cycles / instructionRetired Cycles
                                =   cCnt / iCnt
                                =   236 / 98
                                =   2.4081… CPI
The CPI for max.s is approximately 2.4 cycles per instruction.


CPI for heapsort-student.s
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Cycles per Instruction (CPI)    =   total cycles / instructionRetired Cycles
                                =   cCnt / iCnt
                                =   7796 / 3001
                                =   2.5978… CPI
The CPI for heapsort-student.s is approximately 2.6 cycles per instruction.



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Time Spent On Assignment
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Approximately 4.5-5 hours
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