Laboratory 4 tasks

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**Task 1**

*• Explain how each of the ALU functions are defined. In particular, you need to be able to*

*explain how subtraction works, including the use of two's complement.*

*• How did you implement the logic for the Zero output port? Did you consider any*

*alternatives? Be prepared to explain your design choices.*

*• What is the purpose of the ALU? Why are several functions grouped together into one*

*component?*

**Task 2**

*• Explain if the read operation or the write operation, or both operations are clocked (updated*

*at the clock edge). Why is it implement this way?*

*• Explain the semantics of reading from and writing to $0, and how you implemented this*

*behavior.*

*• How many bits of data can this register file store? If the address width was the same size as*

*for a complete 32-bits MIPS processor, how many bits would in such a case such register*

*file store?*

**Task 3**

*• Explain how you have implemented the control signals for the beq instruction. Why is this a*

*correct solution?*

*• Be prepared to explain why the RegDst control signal or the AluSrc signal is hooked up to*

*certain signals. You should be prepared to explain this using the following figure.*

**Task 4**

*• Explain how the bit selection works for the alternatives that are controlled by the RegDst*

*control signal. Which instructions are using what logic and why?*

*• Explain how the beq instruction is implement, how the address is calculated, and how the*

*signals are controlled by the control unit.*

**Task 5**

*• Show and explain how the factorial function works for arbitrary input value n (the teaching*

*assistant will give you the value that you should test). Be prepared so that you know how to*

*change the input value easily.*

*• Explain how you implemented unconditional jumps in your program.*