

Addition and Subtraction

2-19-2003

Opening Discussion

- Do you have any questions about the quiz?
- What did we talk about last class?
- Conversions for the decimal number 153.
- Two's complement is not just binary negation. The trick to find it is to do binary negation and add 1.

Addition in Binary

- You do addition in binary in much the same way that you do it in decimal, but with the knowledge that you only have two types of symbols for the digits.
- If you get a value of 2 or more for a column of digits you carry.
- Trying to add three binary numbers at once gets tricky because carries can go up two digits so sticking to 1 is probably safer.

Overflow in Addition

- Overflow in addition can't occur when the operands have different signs.
- When they have the same sign we know overflow has occurred if the result has the opposite sign of the two operands.
- The add, addi, and sub instructions we have looked at cause exceptions (interrupts) on overflow. addu, addiu, and subu don't.

Exceptions/Interrupts

- This will be covered in more detail in chapter 5, but for now a brief description is warranted.
- When an exception occurs the computer saved the address of the offending instruction in a register and jumps to a predefined location. You can use mfc0 to get that value into a normal register to return to it if the exception can be handled.

Exception Return Dilemma

- If you can handle an exception, you often want to be able to return some value telling the code that triggered the exception what happened. The problem is that you also want to restore all the registers in that function because you have no idea which ones were in use. (This wasn't a normal function call.)
- This is the job of the k registers. They aren't preserved in exceptions.

Minute Essay

- Add the 16-bit binary numbers 0001100101101110 and 0011011000110110.
- Remember that assignment #3 is due next class.
