CS 241 - Foundations of Sequential Programs **Spring 2017**

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Conditional Branches

In order to check conditions, conditional branches are needed. Conditional branches check if two registers are equal and then jump a specified number of lines.

- `beq $s $t 2` - Checks if `$s` and `$t` are el and jumps 2 lines (Address = PC + (2 x 4))
- `bne $s $t 2` - Checks if `$s` and `$t` are not equal and jumps 2 lines (Address = PC + (2 x 4))

Comparison Operators

To check is values are less than or greater than a value, `slt` or `sltu` are required.

- `slt $d $s $t` - Checks if `$s` is less than `$t` and sets `$d` to either 0 or 1 depending on the result
- `sltu $d $s $t` - Functions the same as `slt`, but works on the assumption that `$s` and `$t` are unsigned

After using the `slt` and `sltu` commands, you need to use `bne` or `beq` to test if the result of `$d` is 0 or not.

Multiplication and Division

In order to multiply two values, you must use `mult` and `div`. Both commands don't have a destination register, as the result is stored in the low and high register, as the result could exceed the capacity of 1 register.

- `mult $s $t` - Multiplies `$s` and `$t` and stores the least significant digits into `low` and the most significant digits into `hi`
- `div $s $t` - Divides `$s` by `$t`
- `multu` and `divu` function the same as `mult` and `div`, but assume all given values are unsigned.

Once the operation has been completed, you must move the values from the hi and lo registers using the `mfhi` and `mflo` commands.

Labels

Instead of utilizing addresses, we can place a label in the first column followed by a column. Then we can reference the label instead of the address when jumping around within the program.