CS312 : MIPS Assembly Programming
Assignment 4: Conditional Construct-I

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Conditional Construct

The programming requires a dividing a task, into small unit of work. These unit of work are represented with programming construct that represents part of task. The conditional construct is used if the designated task consists of doing one of two subtasks, but not both

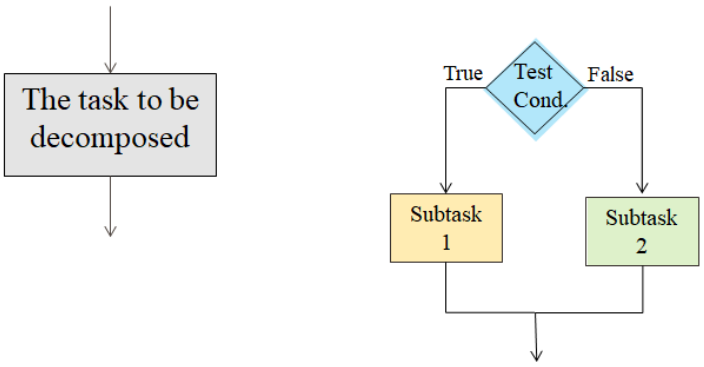

Figure 1: Representational view of Conditional Construct

Conditional Branch Instructions

MIPS provides a large set of Conditional Branch instructions. All conditional branch instructions compare the values in two-register specified within the instruction. If the conditional is evaluated to true, the branch is taken, and the execution flow changes to the new location. Otherwise, the execution flow continues to the next sequential instruction. Note that the details and list of the register is already provided in the instruction manual.

Instruction	Example	Meaning	Comments
Integer Conditional Instructions			
branch on equal	beq $1, $2, 1000	if($1 == $2) go to PC+4+1000	Test if registers are equal
branch on not equal	bne $1, $2, 1000	if($1 != $2) go to PC+4+1000	Test if registers are not equal
branch on greater than	bgt $1, $2, 1000	if($1 >$2) go to PC+4+1000	Test if one register is greater than compared to other
branch on greater than or equal	bge $1, $2, 1000	if($1 >= $2) go to PC+4+1000	Test if one register is greater than or equal to other
branch on less than	blt $1, $2, 1000	if($1 <$2) go to PC+4+1000	Test if one register is less than compared to other
branch on less than or equal	ble $1, $2, 1000	if($1 <= $2) go to PC+4+1000	Test if one register is less than or equal to other
Floating Point Comparison and Conditional Instructions			
Equal Comparison	c.eq.s $f2, $f4	if($f2 == $f4) set code = 1 else code = 0	Test if floating point registers are equal
Less than or Equal to Comparison	c.le.s $f2, $f4	if($f2 <= $f4) set code = 1 else code = 0	Test if one floating point register is less than to equal to another one
Lesst than Comparison	c.lt.s $f2, $f4	if($f2 <$f4) set code = 1 else code = 0	Test if one floating point register is less than to another one
Greater than or Equal to Comparison	c.ge.s $f2, $f4	if($f2 >= $f4) set code = 1 else code = 0	Test if one floating point register is greater than or equal to another one
Greater than Comparison	c.gt.s $f2, $f4	if($f2 >$f4) set code = 1 else code = 0	Test if one floating point register is greater than another one
branch on set code	bclt label	if code == 1 then jump to label	Jump to the label if code is set
branch on reset code	bclf label	if code == 0 then jump to label	Jump to label if code is reset

Table 1: List of Conditional Branch Instructions with their details and explanations

Problem 1: Write a MIPS assembly program that takes two number (can be anything floating point or integer) as an input and print maximum between two of them as follows:

```
32.6 is greater than 25.0
```

Problem 2: Write an assembly program that takes year as an input from the user and check whether the input year is leap year or not. If it is leap year prompt the message

```
Input year is a leap year
```

Otherwise, prompt the message

```
Input year is not a leap year
```

Problem 3: Write an assembly program that determines whether the student is allowed to sit the examination provided his/her attendance is 75%. For the given problem statement, the MIPS assembly program takes the following input: The name of student, Total number of class held and Total class attended by the student. The output format is as follows:

```
Ajay is allowed to sit in the exam.
or
Ajay is not allowed to sit in the exam.
```

Problem 4: Write an MIPS assembly program that takes the marks of the student as an input (in the range of 1-100) and assign the grade. The grading policy are as follows:

```
Grade: A if marks >= 80
Grade: B if 80 < marks >= 60
Grade: C if 60 < marks >= 40
Grade: F otherwise
```

Note: Usage of other instructions (other than the instructions given in the table 1 and the instructions given in assignment-1 and 2) to solve the problem results into the zero marks. Submit all of your source code and final screen shot of the register panels (both integer and floating point) to the google classroom portal on the end of the day of 20th Feb 2021 (Indian Standard Time). Further any copy case between the assignments results into the zero marks. In case of any doubt(s) regarding the assignment, you can contact TA: Deepika.