



# Computer Systems and Networks

ECPE 170 – Jeff Shafer – University of the Pacific

## MIPS Assembly (Branches, Loops)

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# Lab Schedule

## Activities

- **Today / Thursday**
  - **Lab 8 – MIPS**
  - Using the QtSPIM simulator
  - Write mini programs
- **Next Tuesday / Thursday**
  - **Lab 9 – MIPS 2**
  - Write a complete program with functions

## Assignments Due

- **Tuesday, Nov 6<sup>th</sup>**
  - **Lab 8 due by midnight**
- **Tuesday, Nov 20<sup>th</sup>**
  - **Lab 9 due by midnight**

# MIPS Simulator Walkthrough





# MIPS Branches / Loops



# Branches, Tests, Jump

- Branch on Equal (if \$1 == \$2, goto dest)

```
beq <reg1>, <reg2>, <destination>
```

- Set on Less Than (if \$2 < \$3, set \$1 = 1, otherwise 0)

```
slt <reg1>, <reg2>, <reg3>
```

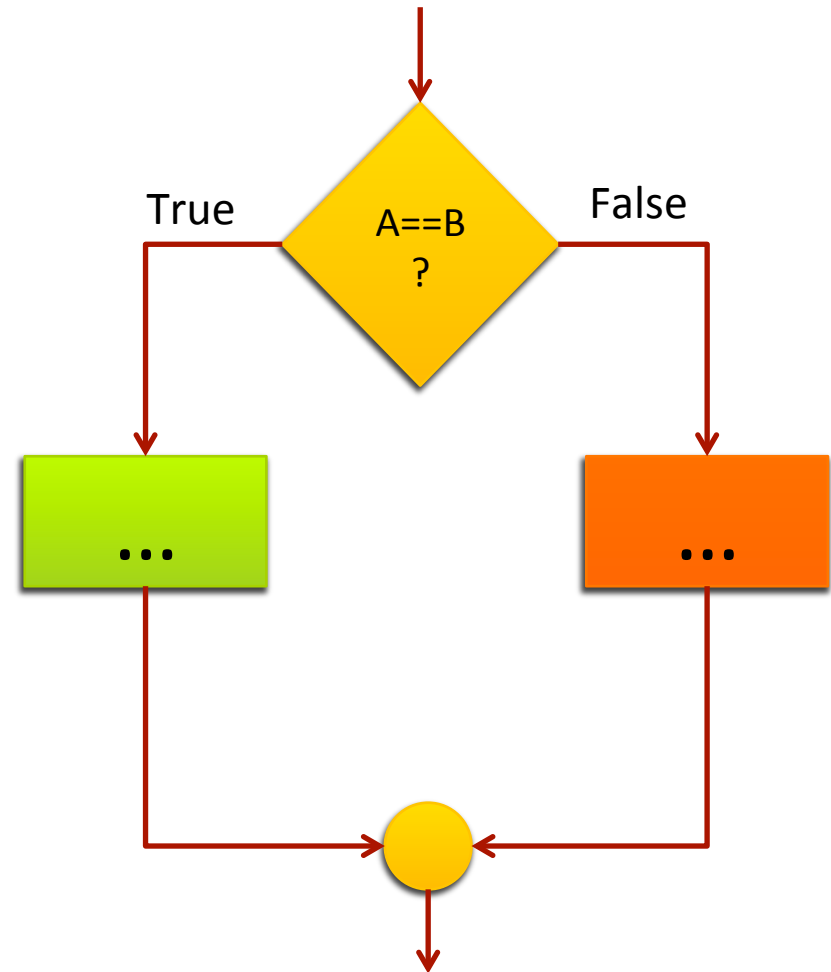
- Jump (goto dest)

```
j <destination>
```

# Task : Write Code

➔ Write MIPS assembly for:

```
if (A == B)
{
    <equal-code>
}
else
{
    <not-equal-code>
}
<after-if-code>
```



# Task : Write Code

## ➤ Write MIPS assembly:

**Map:**`$s0 = A``$s1 = B`**Code:**

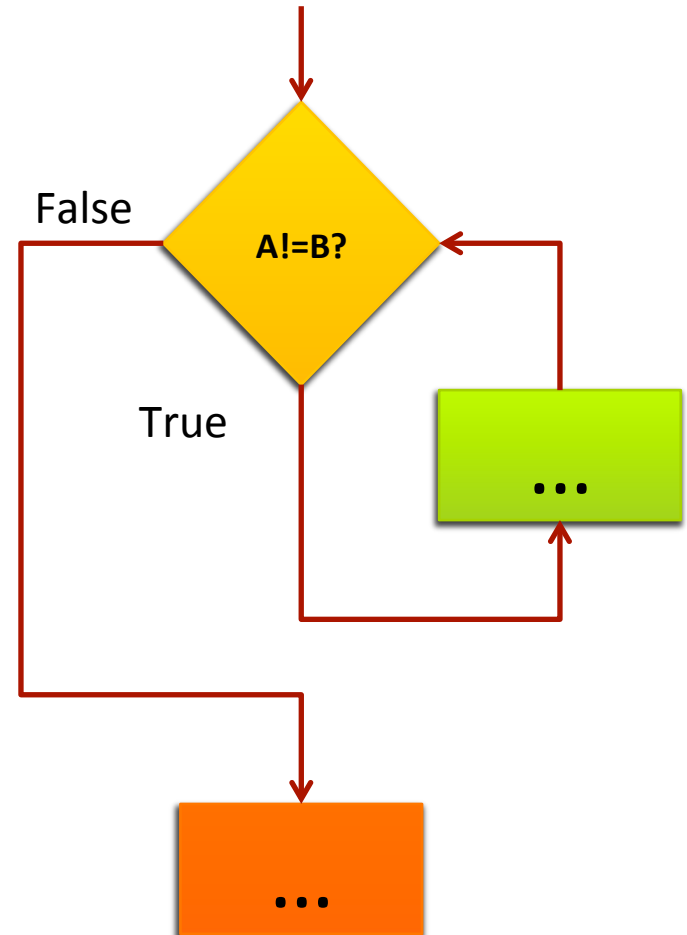
```
beq $s0, $s1, equal
<not-equal-code>
j done
equal: <equal-code>
j done
done: <after-if-code>
```



# Task : Write Code

➔ Write MIPS assembly for:

```
while (A != B)
{
    <loop-body>
}
<post-loop-code>
```



# Task : Write Code

## ➤ Write MIPS assembly:

### Map:

\$s0 = A

\$s1 = B

### Code:

```
start:    beq $s0, $s1, done
          <loop-body>
          j  start
done:     <post-loop-code>
```

There are many, **many**, variations of branch or test instructions intended to simplify programming



1. Show: Appendix A Reference
2. Discuss: Instruction versus *Pseudo-Instruction*

# Resources

- Resources on Website – view “Resources” page
  - **MIPS Instruction Set** (partial guide)
- Resources available in Sakai site (under ECPE 170)
  - **HP\_AppA.pdf**
    - Appendix A from famous Hennessy & Patterson *Computer Organization* textbook
    - Assemblers, Linkers, and the SPIM simulator
    - Starting on page 51 is an overview of the MIPS assembly commands!
  - **MIPS\_Green\_Sheet.pdf**
    - “Cheat sheet” for expert programmers
    - MIPS commands, registers, memory conventions, ...