# Workshop 05 - Computer Architecture

[**Pracmarker**](https://cs.adelaide.edu.au/services/pracmarker/)**Link**

#### Workshop 5 - Computer Architecture

The questions in this workshop are derived primarily from the content of [chapter 5 of the textbook.  (Links to an external site.)Links to an external site.](http://www.nand2tetris.org/chapters/chapter%2005.pdf)Read this chapter as a guide to these questions.

#### Question 1 - Memory Mapped I/O

The Hack Machine has memory-mapped I/O. Briefly describe what Memory Mapped I/O is. What alternatives are there to mapped I/O? Why is memory mapped I/O better than this alternative?

#### Question 2 - Writing to the Screen

Write a program that writes 15 black pixels to the first word of screen memory.

Now write a program that writes 16 black pixels to the first word of screen memory (this is going to involve slightly different code).

#### Question 3 - Reading from the Keyboard

Write code that puts the scan code of the most recently pressed key into a variable called *scan.* Note that - the value of the key pressed may only appear in the keyboard register while the key is being held down so you will have to find a way for this last value read to be retained.

#### Question 4 - C-Instruction to Input Wires to ALU

Look at the tables on slide 14 of lecture 9 from this course. This contains the tables describing the function of the bits of the C-instruction. Look at the diagram of the ALU below:

briefly describe which bits (wires) of the c-instruction map to the input wires: zx, nx, zy, ny, f and no? You may also find table 2.6 from the textbook useful in answering this question.

#### Additional Questions

#### Question 5 - ALU Outputs

What are the ng and zr wires that leave the ALU? What do they indicate. What are they used for?

#### Question 6 - JGT

Draw an implementation of the logic that implements a JGT instruction. Remember the inputs will be:

* the jump bits of the c-instruction and
* the output status wires of the ALU.

The output will be the load wire of the PC register.

#### Question 7 - Addresses

In the CPU simulator – what happens if we write to an address beyond 24576?

##### End of Questions