

**COMP 222 Computer Organization**  
**Assignment #1—Measuring Performance**

**Objective:**

To calculate the average CPI, the execution time, and MIPS of a sequence of instructions, given the number of instruction classes, the CPI and total count of each instruction type, and the clock cycle rate (frequency) of a particular machine.

**Inputs:**

- Number of instructions classes (types)
- CPI each type of instruction
- Total count of each type of instruction (in billions)
- Clock rate of machine (GHz)

**Output:**

- Average CPI of the sequence of instructions
- Total CPU processing time (seconds) of the sequence of instructions
- MIPS of the sequence of instructions

**Specification:**

The program calculates the output based on choosing from a menu of choices, where each choice calls the appropriate procedure, where the choices are:

- 1) Enter parameters
- 2) Calculate the average CPI of a sequence of instructions
- 3) Calculate the execution time of a sequence of instructions
- 4) Calculate the MIPS of a sequence of instructions
- 5) Quit program

**What to do:**

- Make sure all calculations are displayed truncated to 2 decimal fractional places, using the format “%.2f” in the printf statements.
- Make sure that the total execution time is measured in seconds.
- Make sure your code compiles with zyBooks’ zyLabs compiler--if it does not compile with zyBooks’ compiler it will be graded as not compiling, even if it compiles on your compiler on your desktop/laptop at home
- To typecast an int  $x$  to a float  $y$ , use  $y=(float)x$  or simply  $y=1.0*x$
- Feel free to use the template “skeleton” code provided on Canvas for the assignment

**What NOT to do (any violation will result in an automatic score of 0 on the assignment):**

- Do NOT modify the choice values (1, 2, 3, 4, 5) or input characters and then try to convert them to integers--the test script used for grading your assignment will not work correctly.
- Do NOT turn in an outdated version of the assignment downloaded from the Internet (coursehero, github, etc.) or a version that was coded by someone else (former student, tutor, etc.)
- Do NOT use any self-created or external libraries that cannot be located/utilized by zylabs
- Do NOT turn in your assignment coded in another programming language (C++, C#, Java, Python, Perl, etc.)—it will NOT compile under zyLabs C compiler.

**What to turn in:**

The source code as a single C file uploaded to Canvas (<http://canvas.csun.edu>) by the deadline of 11:59pm PST (-20% per consecutive day for late submissions, up to the 4<sup>th</sup> day—note 1 minute late counts as a day late, 1 day and 1 minute late counts as 2 days late, etc.).

Sample test run (Inputs: 1 3 2.5 1 6 3 4 5 2 2 3 4 5)—Note: inputs in the test run may not show up on the output display

Measuring Performance:

-----

- 1) Enter parameters
- 2) Calculate CPI of a sequence
- 3) Calculate Execution time of a sequence
- 4) Calculate MIPS of a sequence
- 5) Exit program

Enter selection: 1

Enter the number of instruction classes: 3

Enter the frequency of the machine (GHz): 2.5

Enter CPI of class 1: 1

Enter instruction count of class 1 (billions): 6

Enter CPI of class 2: 3

Enter instruction count of class 2 (billions): 4

Enter CPI of class 3: 5

Enter instruction count of class 3 (billions): 2

Measuring Performance:

-----

- 1) Enter parameters
- 2) Calculate CPI of a sequence
- 3) Calculate Execution time of a sequence
- 4) Calculate MIPS of a sequence
- 5) Exit program

Enter selection: 2

The average CPI of the sequence is: 2.33

Measuring Performance:

-----

- 1) Enter parameters
- 2) Calculate CPI of a sequence
- 3) Calculate Execution time of a sequence
- 4) Calculate MIPS of a sequence
- 5) Exit program

Enter selection: 3

The execution time of the sequence is: 11.20 sec

Measuring Performance:

-----

- 1) Enter parameters
- 2) Calculate CPI of a sequence
- 3) Calculate Execution time of a sequence
- 4) Calculate MIPS of a sequence
- 5) Exit program

Enter selection: 4

The total MIPS of the sequence is: 1071.43

Measuring Performance:

-----

- 1) Enter parameters
- 2) Calculate CPI of a sequence
- 3) Calculate Execution time of a sequence
- 4) Calculate MIPS of a sequence
- 5) Exit program

Enter selection: 5