

Indian Institute of Technology (IIT-Kharagpur)

AUTUMN Semester, 2023

COMPUTER SCIENCE AND ENGINEERING

Computer Organization and Architecture Laboratory

MIPS Assignment 2

August 9, 2023

AIM: To get acquainted with MIPS assembly language and the system calls. Partial marks will be awarded for incorporating interactive interface as specified, appropriate use of system calls for printing and taking inputs, suitable commenting and correct implementation of the logic.

INSTRUCTIONS: Make one submission per group in the form of a single zipped folder containing your source code(s). Name your submitted zipped folder as Assgn.1_Grp_GroupNo.zip and (e.g. Assgn.1_Grp.25.zip). Inside each submitted source files, there should be a clear header describing the assignment no., problem no., semester, group no., and names of group members. The file name should be of the format QuestionNo_Grp_GroupNo.s (e.g. Q1_Grp.25.s). Liberally comment your code to improve its comprehensibility.

Question 1

1. We consider the permutation (c d f b e a) as an arrangement of the six objects a, b, c, d, e, f in a straight line. Read like: “a becomes c, b becomes d, c becomes f, d becomes b, e becomes e, f becomes a.”
2. In cycle notation : (a c f)(b d)
3. The product can be formulated following Fig. 1.
4. In cycle notation: (a c f)(b d) x (a b d)(e f) = (a c e f b).
5. Implement a MIPS code that takes as input a set of permutations in cycle notation and computes the product permutation and prints the result in cycle notation.
6. Expected Run:

$$\begin{aligned}
\begin{pmatrix} a & b & c & d & e & f \\ c & d & f & b & e & a \end{pmatrix} &\times \begin{pmatrix} a & b & c & d & e & f \\ b & d & c & a & f & e \end{pmatrix} \\
&= \begin{pmatrix} a & b & c & d & e & f \\ c & d & f & b & e & a \end{pmatrix} \times \begin{pmatrix} c & d & f & b & e & a \\ c & a & e & d & f & b \end{pmatrix} \\
&= \begin{pmatrix} a & b & c & d & e & f \\ c & a & e & d & f & b \end{pmatrix}.
\end{aligned}$$

Figure 1: Product

- (a) Enter no of cycles in permutation :
 - (b) Enter cycle ... //in form of an array of ints
 - (c) Enter cycle ...
 - (d) Enter no of cycles in permutation :
 - (e) Enter cycle ... //in form of an array of ints
 - (f) Enter cycle ...
 - (g) Product permutation cycle 1 is :
 - (h) Product permutation cycle 2 is :
7. Upload instruction:
- (a) Upload a program with suitable comments
 - (b) A report which discusses the algorithm you have designed in detail.