Learning Computer Organization and Assembly Language with the EasyCPU Visual Environment

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Abstract

Several simulators currently available that teach computer organization are described in [1, 2, 3]. There are also professional tools, such as debuggers, available for the development of assembly language programs. However, these tools are generally too sophisticated and complex to meet the special needs of introductory-level students. This paper describes an interactive visual learning environment EasyCPU especially designed for teaching Computer Organization and Assembly Language at the introductory level.

Description of EasyCPU

The EasyCPU environment is based on a simplified model of an 8-bit version of the Intel 80X86 microprocessor family. The model includes three main units: the CPU, memory segments, Input/Output, and the bus-connection between them. The CPU includes the essential general registers, instruction and stack pointers registers, flags, and the clock. The Memory is partitioned into three segments: Data, Stack, and Code. The environment offers two modes of operation. In the Basic Mode the student learns the internal structure of the computer, the processes, and information transactions involved during execution of single instructions in assembly language (figure 1).

The Advanced mode is designed for students with prior basic knowledge of Assembly language instructions. The advanced mode provides students with the development tools needed to write, run and debug their own programs and with the ability to visualize the details of the execution processes (figure 2).

References

