C PROGRAMMING AND ASSEMBLY LANGUAGE

PROF. JANAKIRAMAN VIRARAGHAVAN
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IIT Madras

TYPE OF COURSE: Rerun | Elective | UG
COURSE DURATION: 4 weeks (20 Jul’ 20 - 14 Aug’ 20)
EXAM DATE: 27 Sep 2020

PRE-REQUISITES: Students are expected to have done a course on C programming and Microprocessors

INDUSTRIES APPLICABLE TO: Almost all software companies and many hardware companies

COURSE OUTLINE:
Students who complete their bachelors degree (BE/ BTech) in computer science or electrical engineering do extensive course work in Microprocessors and then in C programming. However, what is missing in the current curriculum is to explicitly establish the link between the two. Specifically we look at how a C program is translated to assembly language and how it eventually gets executed on a microprocessor. Through, animations we show what happens in the stack, data and code segment, of the microprocessor when a C program is executed.

Learning objectives of the course are:
• Explain how function calls are translated to assembly
• Explain how parameters are passed to a function
• Explain what it means to say that local variables are stored on stack
• Explain what it means to say local variables go out of scope after the function call
• List out the instructions that need to be executed before entering a function and before exiting it
• Explain the various calling conventions for C functions

ABOUT INSTRUCTOR:
Dr. Janakiraman Viraraghavan is an assistant professor at the Department of Electrical Engineering, IIT Madras and is part of the Integrated Circuits and Systems (ICS) group. His research interests include porting machine-learning algorithms on to hardware and statistical analysis in VLSI. He also has a keen interest in Microprocessors and Programming in general.

COURSE PLAN:
Week 1: Introduction to Microprocessors and Assembly language Programming
Week 2: Introduction to C and Inline Assembly
Week 3: Compiling C to Assembly Language
Week 4: C++ and Some special Functions