

Foundations of Memory and Consistency Models

Overview

Broadly construed, memory and consistency models rationalize the view of a computation's state as witnessed by its observers. In concurrent systems, a memory model describes how and when an update performed by one thread may be observed by another; in distributed systems, a consistency model dictates the degree of synchronization required among a set of geo-distributed replicas. Not surprisingly, in both cases, there is strong tension between the desire for having simple easy-to-understand models, and the realization that weakening guarantees, resulting in more complex models, is necessary for scalable and performant systems. This tension manifests along multiple dimensions, in the way we specify, design, verify, and implement these systems.

This course will discuss a variety of realistic memory and consistency models, considering their definition in the context of programming language design and semantics, compiler optimizations, runtime systems, and processor architectures. We will cover four broad areas: (1) semantic frameworks for defining and reasoning about consistency; (2) language and processor instantiations expressed in terms of formal and rigorous semantics; (3) the impact of various design choices on compiler and runtime designs; and (4) tools and frameworks for reasoning and verification.

Course participants will be exposed to these topics through lectures and programming exercises.

Dates for the Course	19th Dec, 2016 to 23rd Dec, 2016
Host Institute	IIT Madras
No. of Credits	1
Maximum No. of Participants	60
You Should Attend If...	<ul style="list-style-type: none">▪ You have a bachelors degree in CS / IT and are interested Instudy/research in the area of parallel programming.▪ You are a student / faculty / professional and are interested to explore different aspects of the emerging multicore and GPGPU systems in a fundamental way.
Course Registration Fees	<p>The participation fees for taking the course is as follows:</p> <p>Student Participants: Rs.1000 Faculty Participants: Rs.3000 Government Research Organization Participants: Rs.5000 Industry Participants: Rs.10000</p> <p>The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges. The participants may be provided with hostel accommodation, depending on the availability, on payment basis.</p>

Course Faculty



Prof. Suresh Jagannathan is a Professor of Computer Science at Purdue University. His research interests are in programming languages, with special focus on program analysis and verification, concurrent and distributed systems, and language implementations

Course Coordinator



V Krishna Nandivada is an Associate Professor of Computer Science at IIT Madras. His research interests are Compilers, Program Analysis, Programming Languages, and Multicore systems.

Course Coordinator

Name: V Krishna Nandivada
Phone: +91-44-2257-4380
E-mail: nvk@iitm.ac.in

.....
URL: <http://www.cse.iitm.ac.in/~krishna/>