E0210 Aug 3:1

Principles of Programming

Instructor

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Department: CSA

Course Time: 2-3:30pm TTh

Lecture venue: CSA225

Detailed Course Page: http://drona.csa.iisc.ac.in/~muralikrishna/teaching/fall2016/e0210.html

Announcements

Brief description of the course

The design and implementation of scalable, reliable and secure software systems is critical for many modern applications. Numerous program analyses are designed to aid the programmer in building such systems and significant advances have been made in recent years. The objective of the course includes introduction of the practical issues associated with programming for modern applications, the algorithms underlying these analyses, and applicability of these approaches to large systems. There will be special emphasis on practical issues found in modern software. The course project will be geared towards building the programming skills required for implementing large software systems.

Prerequisites

Good programming skills (C, Java) and good math background.

Syllabus

The course will introduce the students to the following topics -- bytecode instrumentation; profiling -- BL profiling, profiling in the presence of loops, preferential path profiling, memory profiling; software bloat; lock-free data structures; memoization; map-reduce programming model; approximate computing;

multithreading; fuzzing techniques; record and replay; memory models; data races -- lockset algorithm, happens-before relation, causally-precedes relation; atomicity violations; deadlocks; linearizability; symbolic execution; concolic testing; directed program synthesis; constraint solving; deterministic/stable multithreaded systems; floating-point problems; security -- sql-injection, cross-site scripting, return-oriented programming, obfuscation; malware detection.

Course outcomes

The course project is geared towards building the programming skills required for implementing large software systems.

Grading policy

Projects 50%(Assg1 10, assg2 15, Assg3 25)

Exams/HW 50%

(Midterm 20%

Final 20%

Hw 10%)

Assignments

Resources

pl. see website (lectures)

http://drona.csa.iisc.ac.in/~muralikrishna/teaching/fall2016/e0210.html