Workshop on Connecting Concepts Across the Curriculum

Parallel and Distributed Computing: From Digital Logic to Computer Architecture and Algorithms

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Every field of study has some fundamental concepts that recur in various forms throughout the field. For example, binary trees and recursive decomposition express themselves in the computing field in hardware, software/algorithms, modeling and analysis. Systematically tying together such manifestations of each key concept across multiple courses in a curriculum could improve understanding and retention of the key concepts.

Workshop Focus: The 2016 Workshop on Connecting Concepts across the Curriculum aims to identify

(a) Fundamental (and difficult to understand) concepts that recur across the area, and
(b) Devise approaches to tying these concepts across courses.

To provide more focus, the emphasis of the workshop will be to identify important computing concepts in the setting of four course clusters broadly called

- Digital logic,
- Computer organization and architecture
- Networking and embedded systems.
- Programming and Algorithms

The approach is to introduce a concept (for example, recurrence relations/prefix computations) early on, say in the first digital logic course in the context of carry look-ahead adders, then build on this to explore the concept in detail in a later course (for instance, computer organization). The key point is that introduction of the concept in digital logic should take very little instruction time and, ideally, enhance the understanding of the digital logic topic itself. At the other end, the later course should tie the detailed explanation of recurrences to the carry look-ahead adder context that students have seen before.

We expect participation of about 30 faculty members invited from a range of university/college settings and with experience/interest in teaching in the above course clusters.

The Role of Participants: Prior to the workshop, each participant will be asked to suggest a set of 5-10 important and difficult to understand topics in one of the course clusters; these topics will be the starting point for the workshop. During the workshop, these topics will be revised as needed and tied across the course clusters to develop a set of "concept threads." We will also aim to identify methods that can be used to implement these threads across courses in the clusters.

It is expected that participants will consider implementation of these ideas in their courses.

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