Toward a Modern Curriculum for Computer Engineering

[Workshop Proposal]

Abstract—Participants attending this conference workshop will learn about the development of a computer engineering curricula report. They will also participate in some measure in the revision process and will have the opportunity to provide comment and opinion in updating the joint ACM and IEEE Computer Society document from 2004 titled, “Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering” known also as CE2004. The authors intend that all participants engage in updating parts of the new report that includes contributions to the body of knowledge and assistance through overall comments reflecting diverse computer engineering education communities. The objective is to ensure that the updated document, called CE2016, is a forward-looking, state-of-the-art summary of the educational practices in the computer engineering field.

Keywords—Computer engineering; curriculum guidelines; CE2016; CE2004; ACM; IEEE Computer Society

I. BACKGROUND

In early 2011, the ACM and the IEEE Computer Society created the CE2004 Review Task Force and charged it with reviewing and determining the extent to which the document titled, “Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering” (CE2004) [1] required revision. This exploratory task force developed and issued survey invitations to over twenty thousand industry and academic constituents in the computer engineering field. It also contacted some ABET industry program evaluators to solicit their input.

The exploratory task force reported on its findings to the representative societies in July of 2011. Part of the report included some new or expanded technical skill areas such as system on a chip and hardware-software co-design. It also recommended strengthening specific contemporary topics while de-emphasizing others. While the task force found that the majority of the content is already covered in CE2004, it did identify significant deviations that would guide the revision process toward a document that is appropriately forward looking given the significant advances in computer engineering that have occurred since 2004.

Because of the above, the ACM and the IEEE Computer Society formed the CE2016 Steering Committee composed of up to a dozen professionals sponsored by the two societies. The CE2016 Steering Committee plans to have a preliminary report by mid-2015, with a final report delivered in 2016. This steering committee would make efforts to include a presence at key conferences both within and outside of the United States.

II. CE2016 STEERING COMMITTEE MEMBERS

The CE2016 Steering Committee consists of eleven members, six of whom form its Executive Committee.

A. CE2016 Executive Committee Members

Eric Durant (Milwaukee School of Engineering) is the co-chair of the CE2016 Steering Committee representing the IEEE-Computer Society. Eric was a member of the exploratory task force.

John Impagliazzo (Hofstra University) is the co-chair of the CE2016 Steering Committee representing the Association for Computing Machinery (ACM). John was a member of the exploratory task force as was a principal co-author of the CE2004 report.

Susan Conry (Clarkson University) is the past chair of the Engineering Accreditation Commission (EAC) of ABET. She was a member of the exploratory task force and she represents ACM.

Herman Lam (University of Florida) has worked closely with the Steering Committee and he represents the IEEE Computer Society.

Victor Nelson (Auburn University) has worked closely with the Steering Committee. Vic was a principal co-author of the CE2004 report and he represents ACM.

Robert Reese (Mississippi State University) has worked closely with the Steering Committee and he represents the IEEE Computer Society.

B. CE2016 At-Large Committee Members

Lorraine M. Herger (IBM Research) is the Director of IBM Research Integrated Solutions and she brings an industry perspective to the Steering Committee. Lorraine represents the IEEE Computer Society.

Joseph Hughes (Georgia Tech) brings much experience to the Steering Committee and was a member of the CE2004 committee. Joe represents ACM.

Weidong Liu (Tsinghua University) brings an international perspective to the Steering Committee. Weidong represents ACM in this endeavor.

Junlin Lu (Peking University) brings an international perspective to the Steering Committee. Junlin represents ACM in this endeavor.

Andrew McGettrick (University of Strathclyde) is the Past Chair of the ACM Education Board and the ACM Education
Council. Andrew was a member of the exploratory task force and was a member of the CE2004 committee, and represents ACM.

III. WORKSHOP AND OTHER ACTIVITIES

This conference workshop is an effort to engage the computer engineering educational community in evaluating the current draft, in recommending changes, and in planning further revisions. It builds on earlier activities conducted by the Steering Committee, which include workshops or special sessions conducted at the ACM SIGCSE Technical Symposium in Raleigh, North Carolina, USA (2012) [2], the IEEE Frontiers in Education conferences in Seattle, Washington, USA (2012) [3], in Oklahoma City, Oklahoma, USA (2013) [4], and in Madrid, Spain (2014) [5]. Similar events will take place throughout 2015 and 2016 co-located at major conferences. In addition, the Steering Committee has met in Dallas, Texas (2014), Milwaukee Wisconsin (2014); its Executive Committee meets by conference call as needed.

IV. WORKSHOP DETAILS

The workshop will be highly interactive. After some background and introductory remarks by the presenters, workshop participants will become fully engaged in working on some elements of the body of knowledge and on some particular aspects of the draft document.

A. Goals and Activities

The goals of this workshop are to present the work of the CE2016 Steering Committee, to solicit suggestions for improvement through audience participation, and to share results with professional communities. The audience will engage in areas such as background, goals, and timeline of the revisions effort; overview of existing curricular efforts in computing; knowledge areas, knowledge units, learning outcomes, and the body of knowledge; structure, scope, changes, size, core vs. supplementary outcomes and units; revision progress with brainstorming activities; review of non-technical areas whose content are expected of practicing computer engineers; small group discussions addressing specific challenges to implement a modern curriculum for future computer engineers; additional discussion of items of audience interest.

B. Tentative Agenda

The following agenda assumes that the workshop will last three hours that includes a short break approximately midway through the session. The authors understand that the organizers of the conference may have time constraints that would change this agenda; they would gladly scale this agenda accordingly.

0:00–0:10: Introductions by workshop participants

0:10–0:25: Structural overview of CE2016 draft report in contrast to the CE2004 report

0:25–0:35: Overview of currently established knowledge areas and their scope

0:35–0:45: Overview of representative knowledge units and their associated knowledge areas

0:45–1:05: Contrasting the CE2016 and the CE2004 bodies of knowledge

1:05–1:25: Breakout discussions among the audience participants focused on generating a modern curriculum for computer engineering

1:25–1:35: Break

1:35–1:55: Small group presentations on ways to generate modern computer engineering curricula based on the proposed body of knowledge

1:55–2:15: Breakout discussions focused on generating multiple curricula models based on the proposed body of knowledge

2:15–2:35: Small group presentations on curricula models

2:35–2:50: Bringing closure to knowledge areas and units, the body of knowledge and related curricula models

2:50–3:00: Final thoughts and adjournment

C. Materials Needed

This workshop would require several paper flip charts or their electronic equivalent for breakout discussions in addition to ordinary pens and writing pads.

D. Workshop Presenters

The expected presenters for this workshop are the two co-chairs of the CE2016 Steering Committee: John Impagliazzo and Eric Durant.

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REFERENCES


