

The Influence of Globalization on Computer Science Education

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CRA Snowbird Conference, June, 2006

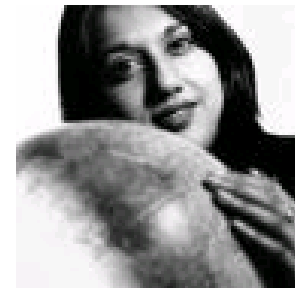
CONTENTS

- Perspectives from the ACM Job Migration Task Force:
 - Non-profound Findings (Overall)
 - Complexities (with respect to Education)
 - Motherhood and Apple Pie Recommendations (regarding Education)
- One novel approach: Georgia Tech's Threads Curriculum



The New Face of Computing

- The future of computing is not in merely being a good programmer.
 - Those skills are now commodities that can be outsourced anywhere.
- When “The World is Flat” (Friedman), we become competitive by bridging areas and differentiating.



The ACM Job Migration Task Force:

“Globalization and Offshoring of Software”,
W. Aspray, F. Mayadas, M. Vardi, Eds.

Purpose of the study: To examine the issues surrounding the migration of jobs worldwide within the computing and information field and industry, and to provide a deeper understanding of the trends in, and forces behind, the globalization and offshoring of software.

Non-Profound Findings (Overall)

1. *Globalization of, and offshoring within, the software industry are deeply connected and both will continue to grow.* Key enablers of this growth are information technology itself, the evolution of work and business processes, education, and national policies.

Non-Profound Findings, continued

2. *Standardized jobs are more easily moved from developed to developing countries than are higher-skilled jobs.* These standardized jobs were the initial focus of offshoring. Today, global competition in higher-end skills, such as research, is increasing.

Non-Profound Findings, continued

- 3. To stay competitive in a global IT environment and industry, countries must adopt policies that foster innovation.* To this end, policies that improve a country's ability to attract, educate, and retain the best IT talent are critical. Educational policy and investment is at the core.

Complexities

- Many different IT occupations
- Multiple degree programs
(CS, CE, IT, Soft. Eng., Info.Sys.)
- Many non-degree education/training opportunities
- Multiple career paths
- Many application domains
- Competing goals of education
(Foundational, vocational, grad-preparation)
- Relationship between education and career?

Motherhood and Apple Pie Recommendations regarding Education

1. *There is a need to consider the levels of IT work that are predominant in the national or multinational economy being served by the educational institution, and which are likely to be predominant in the coming years.*

Motherhood and Apple Pie Recommendations, continued

- 2. There is a need for computing / IT education to evolve, whether due to globalization or not.*

An Example Major Curriculum:

- Requirements: Programming I and II, Discrete Structures, Formal Models, Data Structures, Programming Languages, Digital Design (ECE), Machine Organization and Assembly Language
- Electives: Compilers, Software Engineering, Algorithms, Complexity, Databases, Operating Systems, Computer Vision, Computer Graphics, Networks, Artificial Intelligence

Motherhood and Apple Pie Recommendations, continued

- 3. There is a need for education to begin to prepare students for a global economy and its possible impacts on their careers.*

Motherhood and Apple Pie Recommendations, continued

- 4. Educational systems that help prepare students to be creative and innovative will create advantages for those students and their countries.*

Motherhood and Apple Pie Recommendations, continued

5. *Educational systems that not only pay attention to current business and industry needs but also provide a core foundational knowledge will create advantages for those students and their countries.*



Threads™

An Undergraduate Degree Curriculum for the
New Face of Computing





The Threads™ Curriculum

- We have defined 8 Threads in the Future of Computing:
 - Computing and People
 - Computing and Information Internetworking
 - Computing and Media
 - Computing and Platforms
 - Computing and Intelligence
 - Computing and Foundations
 - Computing and Computational Modeling
 - Computing and Embodiment



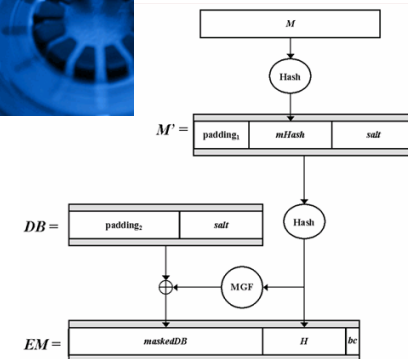
The BS in Computer Science under Threads™

- Each Thread specifies the courses needed to know that area well.
 - From introductory computing, through advanced courses, to beyond Computer Science (Psychology, Physics, Computer Engineering).
- A degree is the union of *any two* Threads.
 - Every Combination is a full Computer Science degree, but bridging disciplines and clearly different from “just programming.”
 - No Thread choice is necessary in first year, Can always choose different Threads during degree.



Want a job in Information Security?

- Information Internetworking + Foundations
 - Encoding and storing information securely for organizations
- Information Internetworking + Platforms
 - Making information flow securely between large databases and small cell phones and PDAs.





Next steps in Threads: Roles

- Threads are about conceptual focus.
- Within any Thread, might play different roles:
 - A Master Practitioner
 - An Entrepreneur
 - A Researcher
 - (Others...)
- We will define recommendations for elective classes in software engineering, management, and other areas for these Roles.



For More Information...

<http://www.cc.gatech.edu/threads>