Enhancing Parallel and Distributed Programming Through Software Engineering

Xinghui Zhao
Computer Science, Washington State University, Vancouver WA 98686, U.S.A.

Background

- Washington State University
  - WSU is Washington's original land-grant University based in Pullman, WA
  - Four regional campuses: Spokane, Tri-Cities, Vancouver, and Everett

- WSU Vancouver Campus
  - Small campus with ~3300 students
  - Female: 54%, Male: 46%
  - More than 150 full-time, Ph.D. faculty

- Computer Science Department
  - Offer ABET-accredited BS and MS degree programs
  - 7 full-time faculty
  - Starting from 2013, we have been gradually integrating parallel and distributed computing (PDC) topics into the curriculum

PDC and SE Integration

- Software Engineering Courses
  - CS 320 Software Engineering
    - Distributed software engineering; Multithreaded programming; Scalability; reliability, and security
    - A course project is required

- CS 420 Software Design Project (Capstone)
  - Distributed software; Remote database; Software-as-a-service
  - Students work on team projects sponsored by industry partners

- PDC-focused Courses
  - CS 563 Concurrent Programming
    - Actor model; MPI; OpenMP; Semaphores; Monitors
  - CS 564 Distributed Systems
    - Socket programming; RPC; Distributed file systems; HDFS; MapReduce

Overview of Undergraduate Courses

- Goal
  - Gradually integrate PDC topics into multiple levels of CS courses
  - There is at least one PDC integrated course each semester
  - Multiple PDC integrated courses are taught in each year of study

Evaluation

- To maintain ABET accreditation, a detailed assessment plan is installed for each course
- PDC integrated courses employ PDC related course outcomes designed by instructors

Student Projects

- eLearning System
  - Web-based, multiple clients

- Portland Food Carts
  - Mobile app with a database back-end

- Recipe Genie
  - Web crawler search engine

Acknowledgement

The generous support from the NSF/TCPP Curriculum Early Adopter Award is gratefully acknowledged.

Presented at the 6th NSF/TCPP Workshop on Parallel and Distributed Computing Education (EduPar-16) at IPDPS 2016