NSF/TCPP Curriculum: Early Adoption on Parallel and Distributed Computing for Undergraduates
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Abstract
This poster describes the integration of the NSF/TCPP curriculum on parallel and distributed computing (PDC) into four undergraduate courses in the Department of Computing and New Media Technologies at University of Wisconsin-Stevens Point, and its evaluation plans. The involved courses including:
- CIS 110: Object-Oriented Programming,
- CIS 225: Data Communications & Networks,
- CIS 345: Mobile Computing - Android Application Development, and
- CIS 499: Independent Study - Distributed System and Hadoop.

CNMT Department at UW-Stevens Point
University of Wisconsin-Stevens Point (UWSP) is ranked as the top ten percent of all regional comprehensive public universities in the Midwest. The Department of Computing and New Media Technologies (CNMT) provides unique opportunities through its two programs:
- Computer Information Systems (CIS), and
- Web and Digital Media Development (WDMD).

The CNMT curriculum provides a wide range of opportunities and has been recognized nationally and internationally, by both industry and other academic institutions, as a leader in several areas of computing and media technologies. Our department has long standing partnerships at regional, national, and international level with some of the best companies and organizations in the world by which students enjoy numerous internship and employment opportunities.

Curriculum Integration
Object-Oriented Programming (CIS110) is a required entry level course in the current curriculum for all students in Computer Information System and Web and Digital Media program.

The course is being offered every semester and the topics include introduction to OO programming paradigm, fundamentals of OO design, development of OO programming language principles, and programming skills for coding in Java.

TCPP Integration:
- Floating point range and precision
- Basic thread programming

- CIS 225: Data Communications & Networks:
  Data Communications & Networks (CIS225) is one of the core courses in the current Computer Information System curriculum at UWSP. This course is being offered every semester. Topics covered in the course include, but not limited to, the basics of data communications, networking technologies, networking protocols and security. Most of the independent study topics, pursued by students, are based on the knowledge from this course.

TCPP Integration:
- Client Server
- Peer-to-Peer networks
- Cloud Computing
- Cluster Computing

- CIS 345: Mobile Computing - Android Application Development:
  Android Application Development (CIS345) is a selective class in the current curriculum at CNMT Department. However, the class is very popular. We had the full enrollment for CIS345 in Fall 2012 semester. This course is designed with Google mobile application development team based on current market requirements. Currently fundamental skills of mobile application development on Android device are covered in this class, such as UI design, provider, service implementation and advanced feature development.

TCPP Integration:
- Client Server
- Concurrency
- Task/thread spawning
- Tasks and threads
- Web services
- Mobile computing

- CIS 499: Independent Study (topic: Distributed System and Hadoop):
  Upper class CIS students are suggested to have independent study with faculty members. Topics are determined based on faculty members’ expertise and students’ interest. Most of the previous students take network related topics as their independent study topics. We had 1 student wrote simple MapReduce application in this class.

TCPP Integration:
- Concurrency
- Cluster
- Cloud/grid
- Fault tolerance
- Distributed transactions
- Web search
- Social Networking/Context
- Collaborative Computing

Future Plan
With our TCPP integration experiment and current PDC technologies development, more and more faculty members are willing to introduce PDC topics in their courses. Below are some courses we can foresee which will cover PDC topics in the near future.
- CIS 340: Advanced Techniques in Application Development (Spring Semester)
  Developing software applications using C#.NET; studying advanced programming concepts including collections, threads, delegates, exception handling, parallel programming.
- CIS/WDMD 345: Multi Core and Parallel Computing (Summer 2013)
  Study multicore processor architectures, the implications of hardware designs, software challenges, and emerging technologies relevant to hardware and software for multicore systems.
- CNMT 480: Applied System Development Project (Provided each semester)

Evaluations: Sample Projects
- CIS 345: Mobile Computing - Android Application Development:
  Multi-thread programming and AsyncTask application development: a) Understand multi-thread mechanism in Android system; b) Understand how service works on Android; c) Implement the service in an app using AsyncTask mechanism on Android.

- CIS 499: Independent Study (topic: Distributed System and Hadoop):
  Features of distributed systems including cluster computing and cloud computing are studied. Specifically, Hadoop is the main topic in this class. Students had hands-on experience on installing Hadoop, experienced the MapReduce application demo, and wrote simple MapReduce application in this class. Also, Students wrote reading reports on the PDC-related topics.