

Study Guide

Week 6 February 15th, 2016 – February 21st, 2016

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Study Materials on Moodle

- *PowerPoint Slides*
 - Introduction to Patterns
 - Suzaku Framework, Version 0
- *Video*
 - Lecture 10 video: 75-minute video of Lecture 10 in Fall 2014 introducing patterns and the Suzaku framework.
- Previous mini-quizzes for review

Tasks

- **Test 1:** Take the 75-minute Moodle test. *See Moodle for scheduled day/time.*
- **Continue working on Assignment 3** MPI tutorial, using command line and Eclipse-PTP
 - Assignment 3 Due: *Sunday February 28th, 2016 (Week 7)*

Moodle Saba meeting – 6 pm Thursday February 18th, 2016 (*Note day*)

Quiz 1: In week 6, you will need to prepare for and take a 75-minute Moodle test. The test will have 20 multiple choice questions (20 points) similar to the mini-quizzes plus three questions requiring typed in answers:

- Write a small C program (6 points)
- Modify it to be an OpenMP program (6 points)
- Modify it to be an MPI program (8 points)

for a total of 40 points. The test covers all the materials in week 1 through week 5 inclusive, including materials in Assignment 1 and Assignment 2 but not Assignment 3. The test includes both OpenMP and MPI. The mini-quiz questions are representative for the 20 multiple choice questions and could re-appear although not necessarily. This test is closed book except for what is provided with the test. Summaries of OpenMP and MPI routines will be provided for download before taking the test. Do not refer to any other material, or persons. This is extremely important. Any collusion will result in zero for the test at the very least. Remember to start the quiz at least 75 minutes before the end of the period allocated to the test. If you start later, the quiz will automatically close at the end and automatically submit any open submissions.

Usually there is only one correct answer for each multiple choice question although two different answers may be very occasionally accepted because there is an ambiguity or impreciseness in the question. Occasionally the test may need to be re-graded if there a mistake is discovered. Please let us know if you discover any mistakes.

The materials in Week 6 are not on Test 1 but may be on Test 2 in Week 13.

Introduction to Patterns introduces the pattern programming concept – the use of design patterns for parallel programming. It then goes through various message-passing parallel design patterns starting with low-level patterns - point to point data transfer, broadcast, scatter, gather, reduce, all-to-all broadcast. It then describes some higher-level message-passing patterns – workpool, pipeline, divide and conquer, all-to-all, iterative synchronous patterns, iterative synchronous all-to-all, and stencil. Patterns provide a structured approach to parallel programming that can be compared to design patterns in software engineering. One of the advantages of using a pattern-based approach to programming is that higher level tools can be used that implement the patterns and avoid using low level MPI routines. UNC-Charlotte and UNC-Wilmington have developed such pattern programming tools with various levels of abstraction:

- Seeds framework – high-level Java-based software
- Paraguin compiler – C-based compiler directive approach that creates MPI code.
- Suzaku framework – Pre-written pattern-based routines and macros that hide the MPI code.

Suzaku Framework Version 0 describes Suzaku as of Fall 2014, so-called Suzaku version 0. For completeness the slides from Fall 2014 are posted. However Suzaku has been completely re-designed since then. Assignment 5 (Week 9) will use the re-designed Suzaku and more details will be provided in that assignment. You will not be tested about Suzaku Framework Version 0.

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