

HPSC - High Performance Scientific Computing SS 2005, University of Salzburg

1. Course Details

Lectures:	In four blocks, during summer semester 2005, monthly on two consecutive days: Tuesday and Wednesday, 10-12 a.m. and 14-16 p.m, Room T05.
Labs:	After lectures, 12-13 a.m. and 16-17 p.m., Computer Room, (see detailed schedule).
Instructor:	Roman Trobec, Room 0.23, roman.trobec@ijs.si
Course Materials:	http://www-e6.ijs.si/~roman/usalz/hpsc05
Office Hours:	During Labs

2. Textbooks

1. M.T.Heath: *Scientific Computing: An Introductory Survey, Second Edition*, McGraw Hill, New York 2001, (SC); Lecture notes accessible on: <http://www.cse.uiuc.edu/heath/scicomp/notes>
2. I.Foster: *Designing and Building Parallel Programs*, Addison-Wesley, 1996, (PP); Network version accessible on: <http://www-unix.mcs.anl.gov/dbpp/>
3. A. Grama, A. Gupta, G. Karypis, V. Kumar: *Introduction To Parallel Computing*, Second edition, Addison Wesley, 2003, Notes available on: <http://www.booksites.net/kumar/>

3. Course Overview and Objectives

This course will cover some issues form designing and implementing parallel programs particularly in the field of **partial differential equations** (PDE). Besides PDE, it covers, in short, parallel architectures and design of parallel algorithms. **Practical examples of parallel programs within MPI** environment will be implemented and their calculation and communication complexity will be analysed. After attending this course, students will understand how parallel computers work and where are their strengths and weaknesses. They will be able to develop parallel algorithms and implement parallel programs.

4. Prerequisites

The study material is prepared as an **autonomous course**. It is focused toward students who have some background form the area of computer science, programming languages, operating systems and mathematics. No specialised knowledge is expected from these fields.

5. Course Work

Two hours of lectures (lecture notes are available on Class-web page) will be followed by one hour of labs. MPI library and MatLab program environment will be used for implementation of simple examples.

Homework: Seven homework assignments will be given to each student for individual work.

Class Projects: Up to three students will work together on class projects, that has to involve some practical problem. Working program code and a written report is expected.

Final Exam: The final written exam will cover the course material including review questions from the text book and solved homework exercises. Students can use notes and books.

5. Schedule for HPSC SS2005

Table below shows the tentative schedule of HPSC in SS 2005. There might be some variations.

#	Date	Day	Topic	Reading	Homework/ Project
1	Mar. 15	Tuesday a.m.	Parallel Architectures & Algorithms	CA Ch.1-3	
2	Mar. 15	Tuesday p.m.	Exam terms: HPSC and CMDIE	PP Ch.2	
3	Mar. 16	Wednesday a.m.	Programming Tools	PP Ch.5,6,7	
4	Mar. 16	Wednesday p.m.	Communication & MPI	PP Ch.8	HW - 1, 2
5	Apr. 12	Tuesday a.m.	Ordinary Differential Equations	SC Ch.9	
6	Apr. 12	Tuesday p.m.	Case Studies 1	PP Ch.2	
7	Apr. 13	Wednesday a.m.	Initial Value Problem - IVP	SC Ch.9	
8	Apr. 13	Wednesday p.m.	Case Studies 2	PP Ch.2	HW - 3, 4
9	May 24	Tuesday a.m.	Boundary Value Problems	SC Ch.10	
10	May 24	Tuesday p.m.	Case Study-MD		
11	May 25	Wednesday a.m.	Iterative Solution - Linear System	SC Ch.11	
12	May 25	Wednesday p.m.	Iterative Solution - Linear System	SC Ch.11	HW - 5, 6
13	Jun. 21	Tuesday a.m.	Partial Differential Equations	SC Ch.11	
14	Jun. 21	Tuesday p.m.	Case Study-Heat Transfer		HW - 7
15	Jun. 22	Wednesday a.m.	Partial Differential Equations	SC Ch.11	
16	Jun. 22	Wednesday p.m.	Exam terms: HPSC and CMDIE	Project & HW, due to exam	

6. Candidates

For those interested in, please write your name, E-mail and ID number in the table below, or send an e-mail on address: roman.trobec@ijs.si. HPSC lessons will start on March 15nd 2005 at 10 a.m. in T05. Check class WWW page for latest news!

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