Title: Parallel computing
Lecturer: Senior Lecturer A.M. Gusenkov.
Term:
Lectures + Labs : 15+30 academic hours
ECTS credits:
FEL www:

Anotation: This course focuses on the study of the principles of parallel computing system creation. A mathematical model of parallel computing for analysis of efficiency is presented. Also the examples of specific methods for solving typical problems of computational mathematics are considered..

Course Objectives:

Students who have completed the study of this discipline have to understand the fundamental concepts and principles of parallel computing system architecture and to be able to design the topology of communication networks. Also they have to be familiar with the methods of analysis and programming in multiprocessor operating systems.

Syllabus:

1. Principles of Parallel Computing System creation.
2. Classification of parallel computers and systems: Flynn, Hackney, Schneider. Comparison of classifications.
3. GRID concept and meta computing, features of task distribution and data transmission, classification of GRID systems.
4. Parallel programming technology, programming for shared-memory: Open MP, Linda System, programming for message-passing interface: MPI.
5. Modeling and analysis of parallel computing, Graph models,. circuit description of parallel execution. Execution time of the parallel algorithms. Performance efficiency indicators of the parallel algorithms.
6. The Parallel Program Execution Models. The process and Resource concepts. Representing programs as a system of processes. Communication and mutual exclusion of processes. Program model as a discrete system.
7. Petri net models.
8. Message exchange between processes. Combining requests for communication. Combined receive / transmit messages.
9. Collective communications, Process Synchronization, running the group of processes. Groups and switches.

References:

1. Воеводин В.В., Воеводин Вл.В. Параллельные вычисления. — СПб.: БХВ-Петербург, 2002.С.
2. Воеводин В.В. Модели и методы в параллельных процессах. - М.: Наука, 1986..
3. Гергель В.П., Стронгин Р.Г. Основы параллельных вычислений для мнгоопроцессорных вычислительных систем. – Н.Новгород, ННГУ, 2001.
4. Шпаковский Г.И., Серикова Н.В. Программирование для многопроцессорных систем в стандарте MPI: Пособие / Минск: БГУ, 2002, -324 с.
5. Антонов А.С. Параллельное программирование с использованием технологии MPI. –М.: изд. Московского университета, 2004, -71 с.