

Nizhni Novgorod State University

HPC Competency Center Based on Microsoft Technologies



Paralab

**A Visual Way to the World of Parallel
Computations**

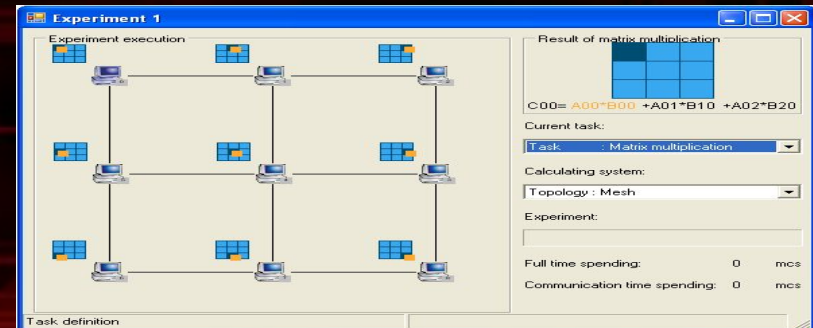
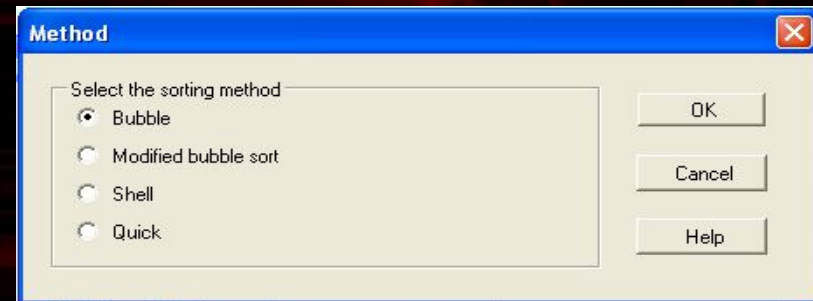
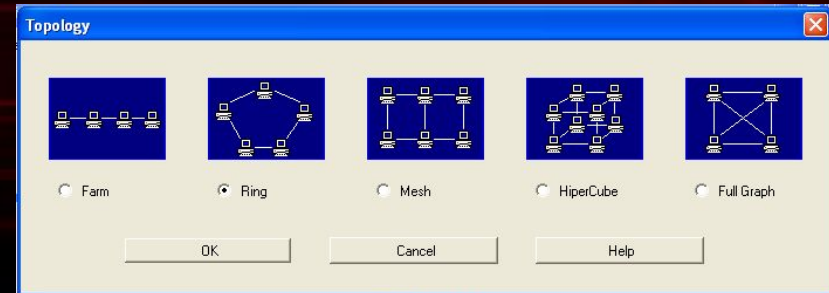
ParaLab Objective

- Intensive use of research and education software systems for modeling computations on various multiprocessor systems and visualization of parallel computation processes:
 - The system **Parallel Laboratory (ParaLab)** – the software system for studying and investigations parallel methods for solving time-consuming problems



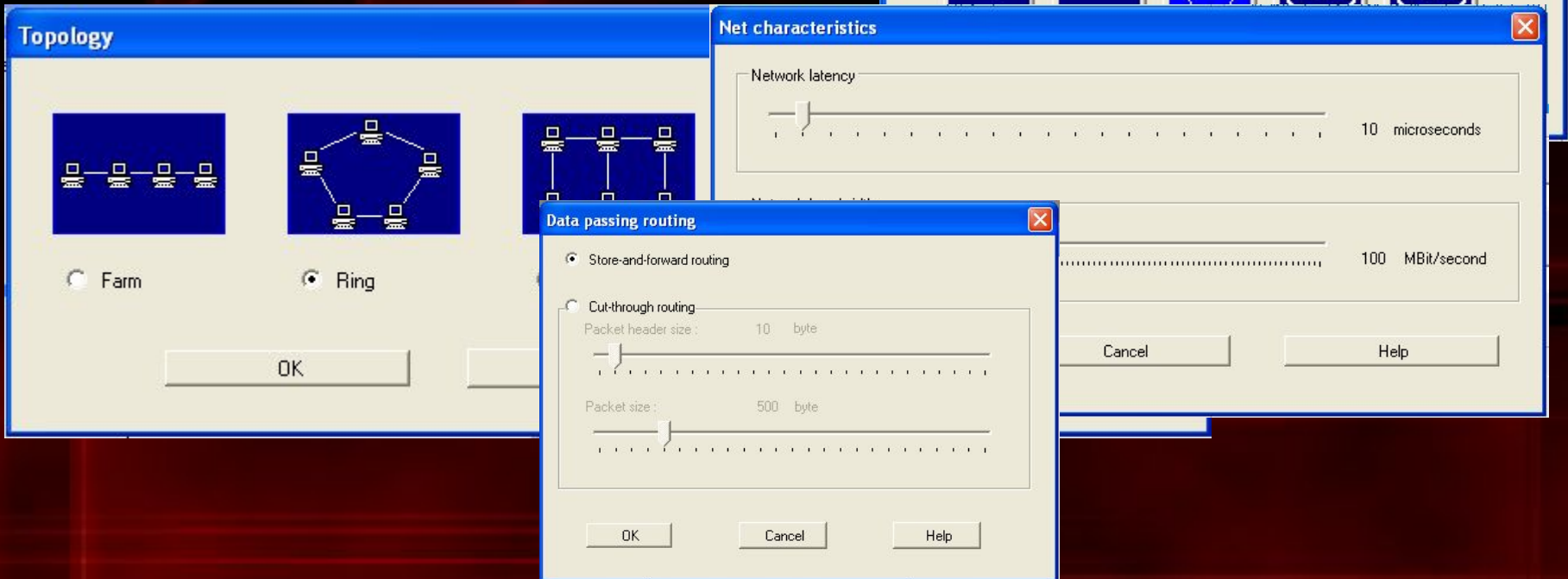
ParaLab Overview...

- Modeling a parallel computing system
- Choosing a studied problem and a method to solve it
- Carrying out computational experiments with visualization of parallel calculations
- Information gathering and analyzing the results ("experiment log")
- Data archiving



ParaLab Overview...

- Modeling a parallel computing system



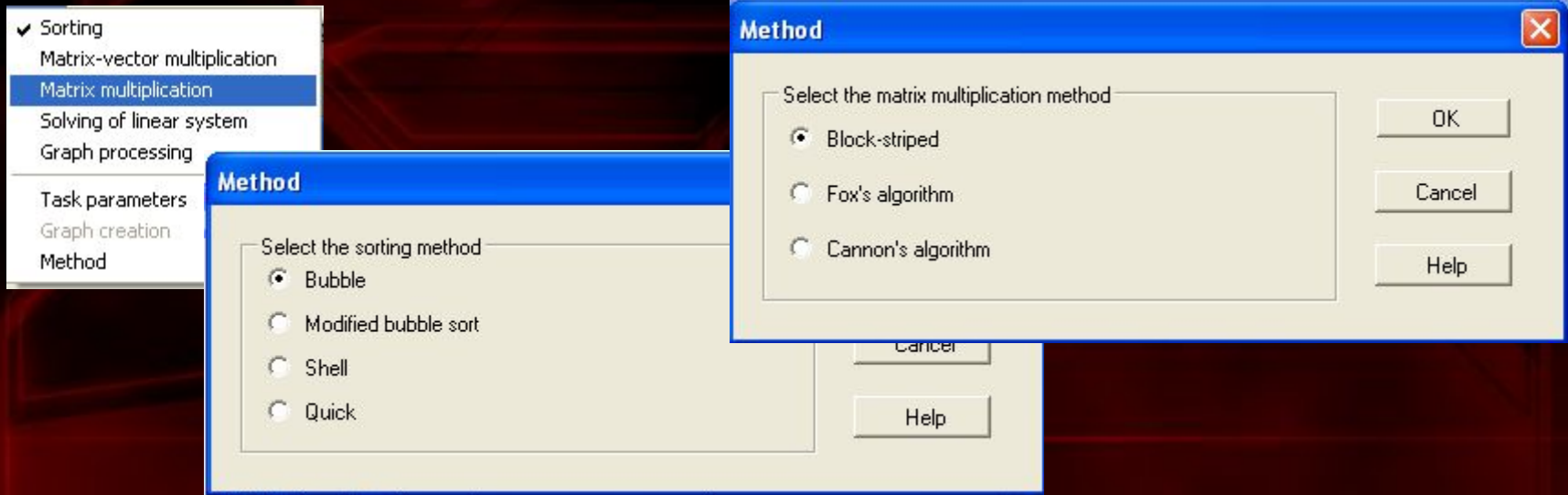
ParaLab Overview...

- Choosing a studied problem and a method to solve it...
 - Sorting,
 - Matrix calculations,
 - Systems of linear equations,
 - Graph processing,
 - Optimization,
 - Solving differential equations in partial derivatives



ParaLab Overview...

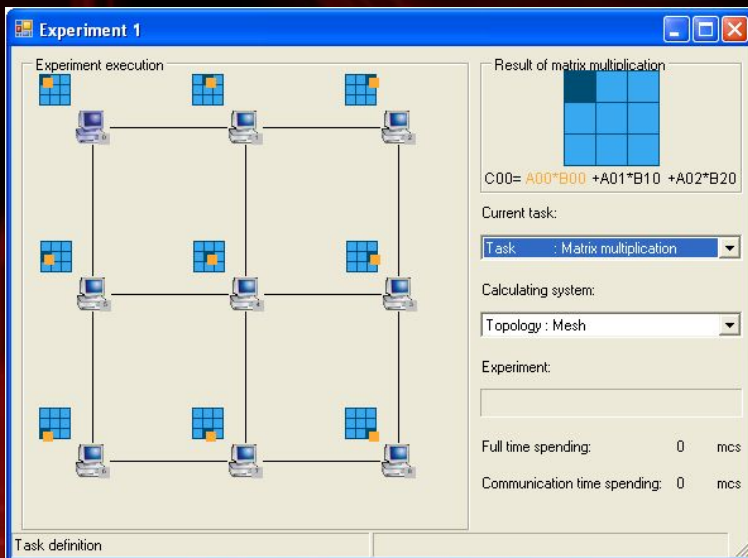
- Choosing a studied problem and a method to solve it...



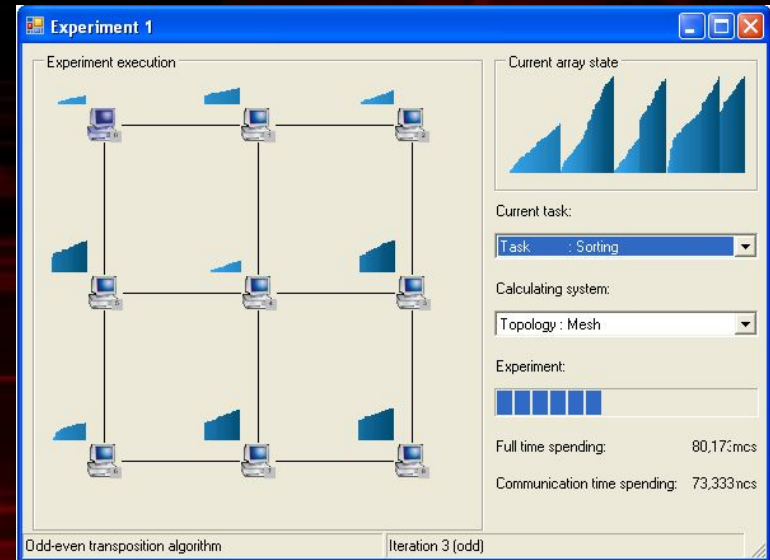
ParaLab Overview...

- Computational experiments and visualization of parallel calculations

Matrix computations

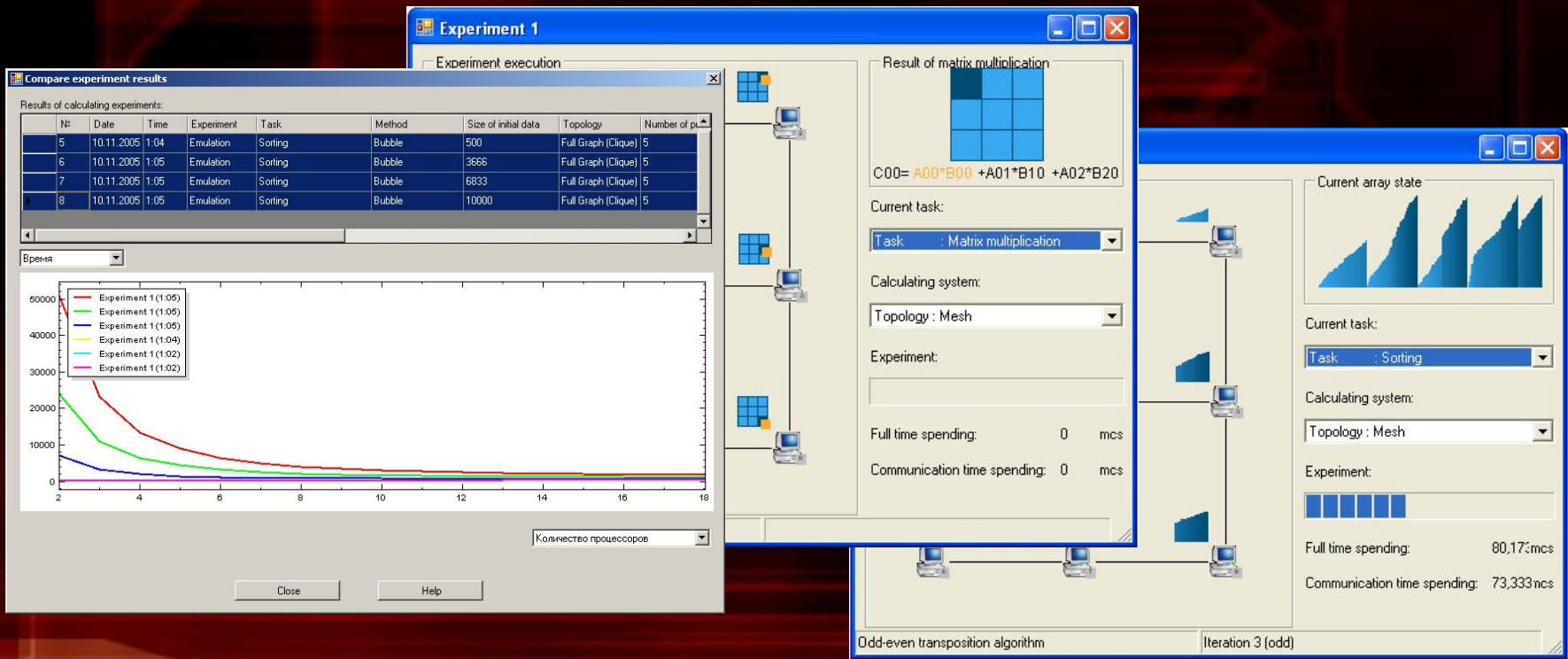


Sorting



ParaLab Overview...

- Information gathering and analyzing the results ("experiment log")

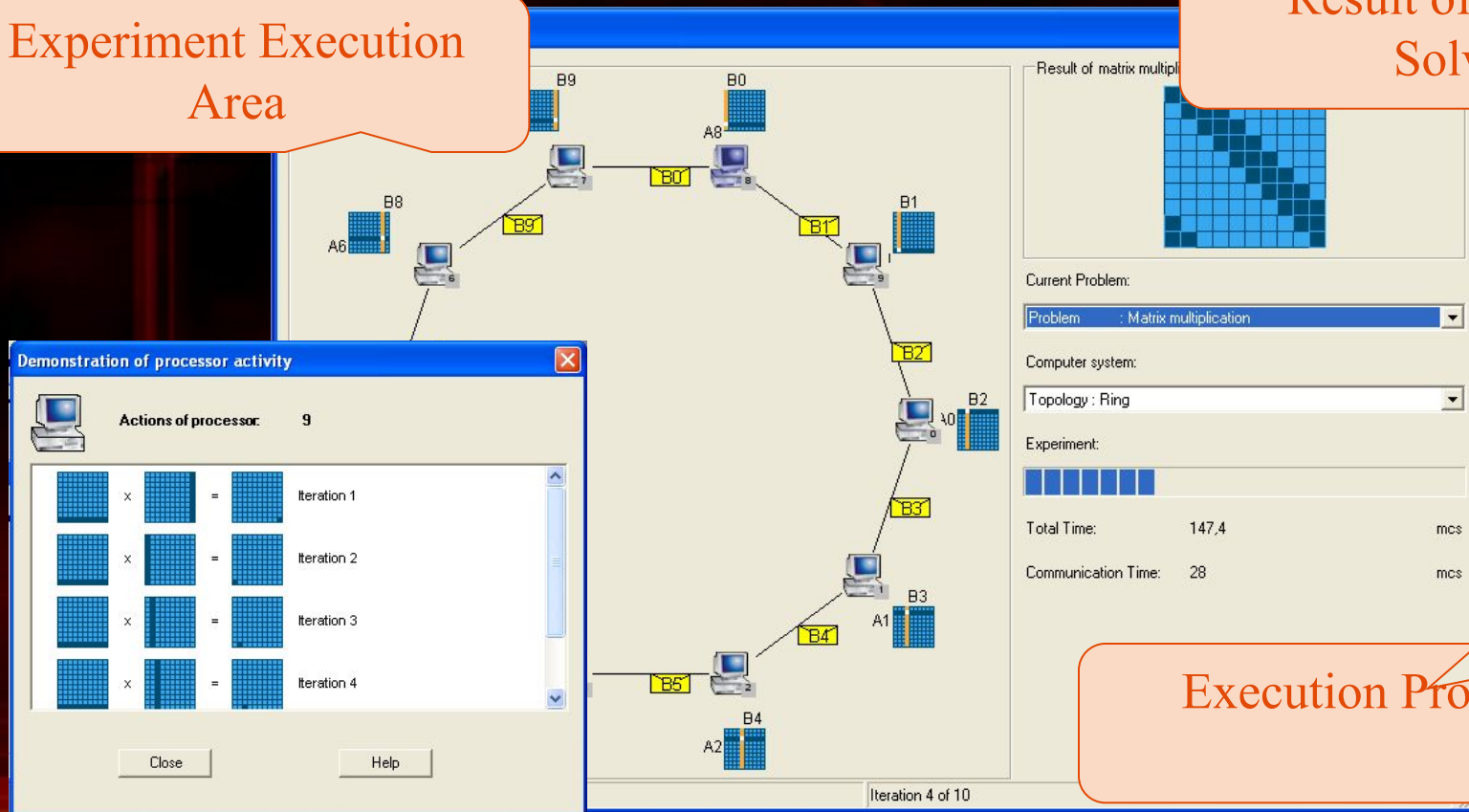


ParaLab Overview...

- Carrying out an experiment...

Experiment Execution
Area

Result of Problem
Solving



Execution Progress Bar

ParaLab Overview...

- Carrying out an experiment:
 - Simulation mode,
 - Remote access to a cluster

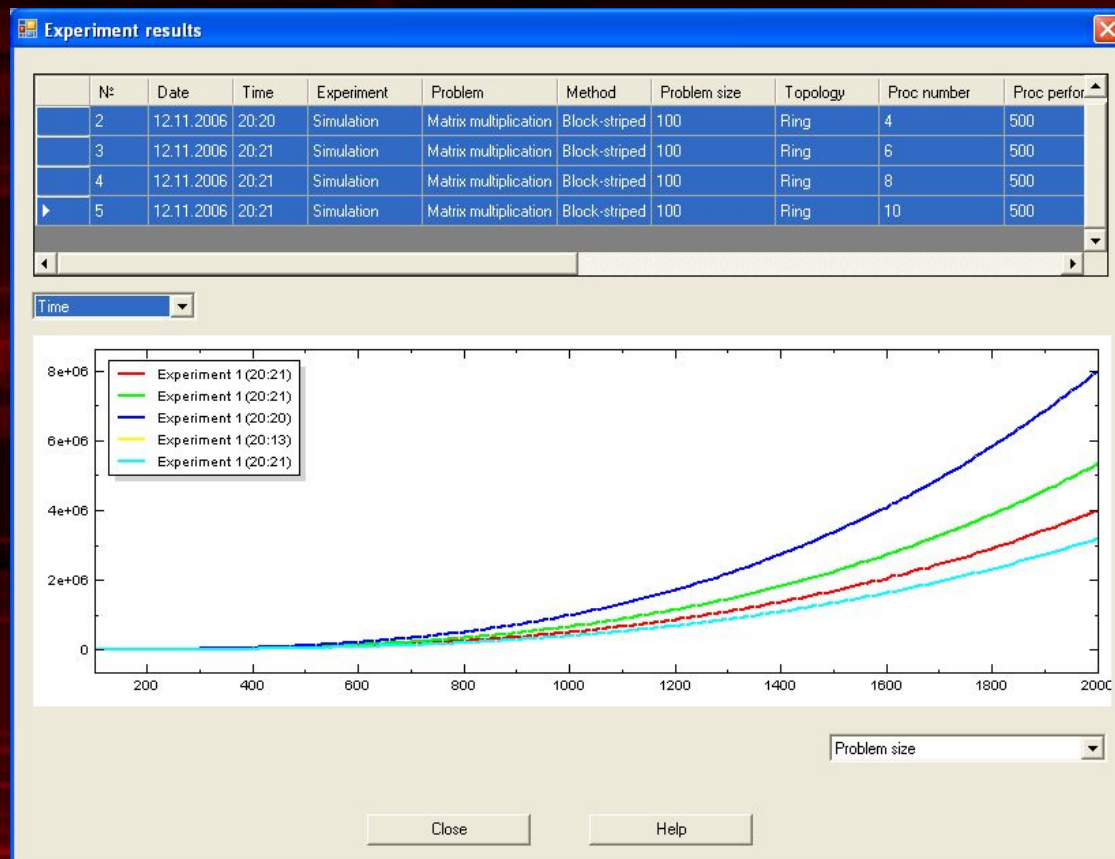


ParaLab Overview

- Information gathering and analyzing the results

“Experiment Log”

Graphs of
Performance Metrics
(Time, Speedup,...)

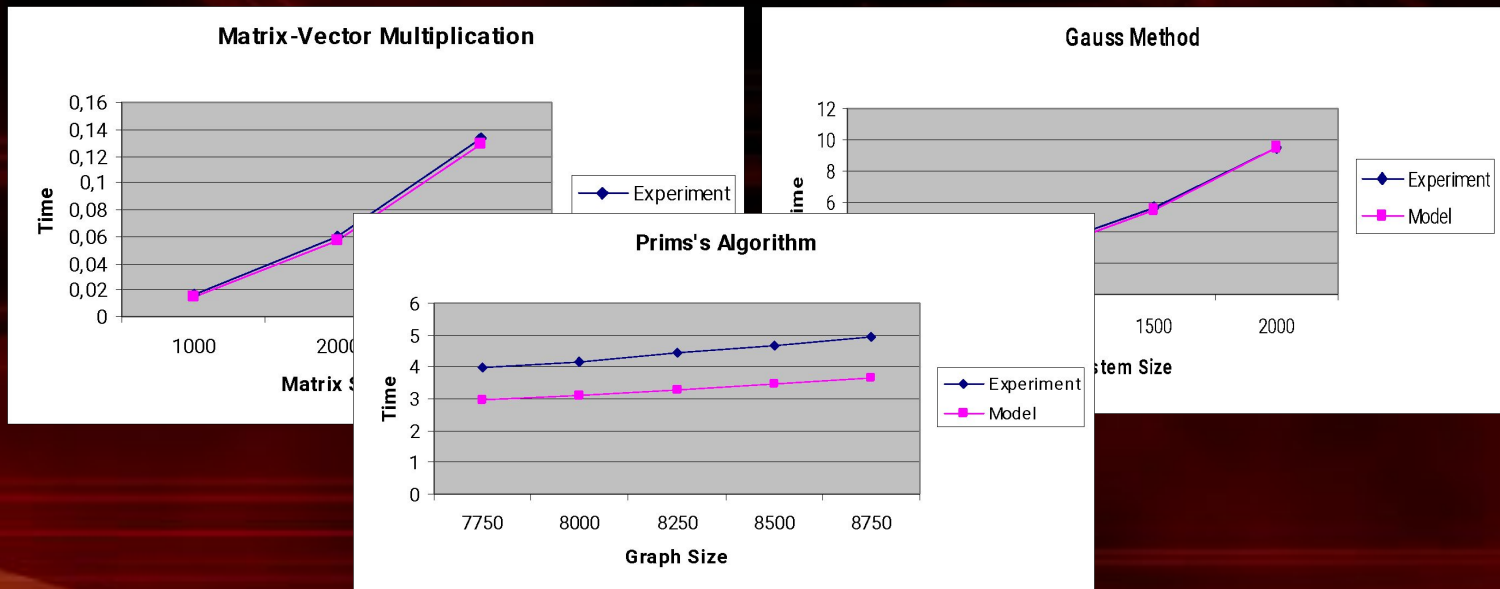


Estimation of Parallel Algorithm Execution Time:

- Hockney's model and its generalizations

$$T(comm) = l \cdot \left(\alpha + \frac{m}{\beta} \right)$$

- Results



ParaLab Requirements:

- Microsoft .NET, C#
- Microsoft Compute Cluster Server 2003



ParaLab may be useful for both novices, who are just starting to learn parallel computing, and experts in this perspective sphere of strategic computer technology



**Take advantage of ParaLab and
the world of parallel computing
will become more evident to you!**



Contacts:

Nizhni Novgorod State University
Faculty of Computational Mathematics and Cybernetics
Software Department

Victor P. Gergel

Phone: +7 (8312) 65-48-59

Fax: +7 (8312) 65-85-92

Email: gergel@unn.ac.ru

Internet: <http://www.software.unn.ac.ru>

