

Final State Exams - Topics of the State Exam Subject

Academic year: 2021/2022
Supervising department:: Department of Computers and Informatics FEI TUKE
Field of study: Computer Science
Study programme: **Informatics**
Type of study: Engineering study
State exam subject: **Main Knowledge of Study Field of Informatics and its Use**

Topics and questions about them:

1. Parallel Computer Systems

- 1.1. Classification of Parallel Computer Systems and Trends in Parallel Computer Systems
- 1.2. The Characteristics of Parallelism and the Performance Evaluation of Parallel Computer Systems
- 1.3. Interconnection Networks for Parallel Computer Systems
- 1.4. Instruction Level Parallel Processors and Pipelining
- 1.5. Multithreaded Processors and Multiprocessors
- 1.6. POSIX Threads, Pthreads
- 1.7. Shared Memory Processors and OpenMP
- 1.8. Graphics Processing Units
- 1.9. CUDA and OpenCL
- 1.10. Multiple Instructions Stream Multiple Data Stream Based Computer Paradigms, Distributed Computer Systems and Specialized Architectures

2. Semantics of Programming Languages

- 2.1. Definition of the notions semantics, classification of semantic methods, components of syntax definition and programming language semantics
- 2.2. Simple programming language, semantics of arithmetic and Boolean expressions
- 2.3. Natural semantics as a big-step operational semantics
- 2.4. Structural operational semantics as small-step operational semantics
- 2.5. Simple programming language extensions and their operational semantics
- 2.6. Operational semantics of blocks, declarations and procedures
- 2.7. Abstract implementation of programming languages
- 2.8. Denotation semantics
- 2.9. Indirect denotation semantics
- 2.10. Axiomatic semantics

3. Parallel Programming

- 3.1. Relationship of parallel architectures and parallel problems
- 3.2. Characteristics of parallel algorithms and parallel problems
- 3.3. Relationship of parallel problems and the types of parallelism
- 3.4. Decomposition of parallel problems
- 3.5. Evaluation of efficiency of parallel computation

- 3.6. Message passing in MPI for communication between two processes and collective communication
- 3.7. Collective communication in MPI
- 3.8. The usage of communicators and topologies in MPI for decomposition of parallel problems
- 3.9. Farm and pipeline parallelism
- 3.10. Expansive and massive parallelism in the model of data parallelism

4. Security in Computer Systems

- 4.1 Introduction to Computer Security
- 4.2 Cryptography
- 4.3 Identification and authentication
- 4.4 Access control, models of ACL
- 4.5 Malicious code
- 4.6 Program security
- 4.7 OS Security
- 4.8 DB security
- 4.9 Security in computer networks
- 4.10 Web security
- 4.11 Forensic analysis

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