

Applied Informatics

State exam: Software technologies

Academic year 2023/2024

1. Logical programming structure, essential terminology, list of data structures, Prolog database. Comparison with structural or object-oriented programming, some possibilities of the use a non-procedural programming language.
2. Database architecture. Database systems (DBS). Main functionalities of DBS. History of evolution of DBS. Data models. Relational algebra: projection, selection, and join functions. SQL.
3. Conceptual modelling. The E-R model and its graphical representation. Relational model. Types of relationships among entities and their representation in the relational model. Characteristics of a relational table. Normal forms of relational scheme.
4. Ontologies and semantic web (metadata, RDF, RDFS, OWL, RDF vocabularies, querying, inferencing, linked data, semantic web applications, ontologies, ontology development tools, classification, ontological representation languages).
5. Object-oriented modelling and programming essential terminology, principles and applications. Software process. UML. Event-driven programming.
6. Processing of the sequences - data structures, usage, principle of implementation, algorithms (sorting, searching) in selected programming language.
7. Solution the issue of persistent data storage in selected programming language.
8. Web applications principles and tools. Mark-up languages, styling and scripting languaues. Application logic principles. Tools for design, implementation and testing. Multi-tier applications, MVC architecture. Security policy related to web applications.
9. Essential algorithms of computer graphics methods of visualization, visibility and illumination, methods of representation of graphical information, OPENGL.
10. Basic principles of image processing and image recognition methods of scanning, pre-processing, segmentation and classification of the image, raster image formats, compression, color and color models.
11. Algorithms on graphs. A depth-first and breadth-first search algorithms, and the use of the search on graphs in solution of other problems.

Literature:

Wirth, N. *Algorithms and Data Structures*. Prentice Hall, 1985. ISBN 978-0130220059.

The Java Tutorial (Oracle)

Goetz, Brian. *Java concurrency in practice*. Upper Saddle River, 2006. ISBN 0-321-34960-1 .

Skonnard, Aaron. *XML*. 1. vyd. Praha, 2006. ISBN 80-247-0972-4 .

Barker, Jacquie. *Beginning Java objects*. 2nd ed. Berkeley, 2005. ISBN 1-59059-457-6.

Salomon, David. *Computer graphics and geometric modeling*. New York, 1999. ISBN 0-387-98682-0.

Connolly, Thomas M. *Database systems*. 5th ed. Boston, 2010. ISBN 978-0-321-52306-8.

Awad, Elias M. *Knowledge management*. Upper Saddle River, 2004. ISBN 0-13-034820-1.

Barnes, David J. *Objects first with Java*. 5th ed. Boston, 2012. ISBN 978-0-13-283554-1.

Clocksin, W. F. *Programming in Prolog*. 5th ed. Berlin, 2003. ISBN 3-540-00678-8.

Bratko, Ivan. *Prolog programming for artificial intelligence*. 3rd ed. Harlow, 2001. ISBN 0-201-40375-7.

Daconta, Michael C. *The Semantic Web*. Indianapolis, 2003. ISBN 0-471-43257-1 .

Fowler, M. *UML Distilled*. Addison ? Wesley, 2007.

Roques, Pascal. *UML in practice*. Chichester, 2004. ISBN 0-470-84831-6.

Arlow, Jim. *UML 2 and the unified process*. 2nd ed. Upper Saddle River, 2005. ISBN 0-321-32127-8.

Watt, Alan H. *3D computer graphics*. 3th ed. Harlow, 2000. ISBN 0-201-39855-9.

Gustafson, J.M. *HTML5 Web Application Development By Example. Beginner's guide*. Packt Publishing, 2013. ISBN 978-1-84969-594-7

Powell, Thomas. *Web design*. McGraw-Hill Professional Publishing, 2002. ISBN 978-0072224429