Abstracts of Doctor Habilitatus Thesis

(doctor habilitatus thesis in computer science, Chisinau, 2012)

Title: Models, algorithms and tools for database design and analysis
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The thesis is comprised of an introduction, four chapters, conclusions and recommendations, bibliography (234 titles), 7 annexes and consists of 230 pages, from which 186 pages cover the main part, including 29 figures. Obtained results are published in 72 scientific papers.

Keywords: Schema database design, functional dependencies, covers, normal forms, nonessential attributes, recoverable attributes, equivalence classes of attributes, degree of acyclicity, polynomial algorithms.

The area of study refers to the design of information systems in general, and databases in particular.

The aim of this work is to develop models and methods, techniques and efficient algorithms that could be applied to automate the design process and evaluation of the database schema. Achieving this goal involves the following key objectives: to examine and analyze the characteristics of database structures used in information systems, to determine and describe the problems which occur in the design of the database schema, investigation of the research level and available solutions for the identified problems, analysis of existing algorithms, presentation of scientific arguments, models, techniques, algorithms, their implementation and application in testing.

The scientific novelty and originality of obtained results consists of the presented models, methods, techniques and algorithms which are essentially new or are improving existing tools necessary for the design and analysis of database schemas. All these results have a direct contribution to the shaping of a direction of research - elaboration of adaptable databases, adaptable to changing environment in which it activates.

The theoretical signification of research presented in this thesis consists of the proved theoretical foundations of modeling and design techniques and analysis of schemes.

Solved scientific problems include: tools of functional dependencies efficient inference; techniques and algorithms to design schemes that satisfy a number of desirable features; model of attributes that dictate the behavior of relational schemes; techniques and polynomial algorithms for testing of the

degree of database normalization; efficient heuristic detection methods of determinants in database schemes; techniques and models for analysis of acyclic schemes and their adjustment in order to obtain desired and more efficient characteristics.

The practical value of the work: proposed algorithms in this thesis can be used to automate the design process of databases, create feasible and adjustable to changes databases. The results are of practical importance because software products are extensible and allow their integration in various application fields.

The scientific results of the work are implemented in several projects developed by the IT company Estcomputer SRL and in computer assisted training of students of the Academy of Economic Studies of Moldova and of the Technical University of Moldova.

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