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DESIGN OF DATABASES BY BACHELOR'S DEGREE APPLICANTS WHEN WRITING A QUALIFICATION PAPER
ПРОЕКТУВАННЯ БАЗ ДАНИХ ЗДОБУВАЧАМИ БАКАЛАВРСЬКОГО СТУПЕНЮ ПРИ НАПИСАННІ КВАЛІФІКАЦІЙНОЇ РОБОТИ

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Abstract. *For use by applicants for a bachelor's degree when writing qualification papers, the «BachelorDesignDB» methodology is proposed, which consists of the following stages: review of sources on existing databases; study of the subject area in order to form an initial attitude; database design using well-known methods («Normal Forms» and «Essence-Relation») and analysis of the design results obtained; creation of a designed database with the help of the selected software application and its protection; optimization and performance improvement of the created database; formulating conclusions and providing recommendations for the practical use of the created database.*

Key words: *subject area; relation; design; binary linking; normalization; protection; optimization; performance; research..*

Анотація. *Для використання здобувачами бакалаврського ступеня при написанні кваліфікаційних робіт запропонована методика «BachelorDesignDB», що складається із наступних етапів: огляд джерел щодо існуючих баз даних; вивчення предметної області з метою формування початкового відношення; проектування бази даних з використанням відомих методів («Нормальні форми» і «Сутність-зв'язок») та аналіз отриманих результатів проектування; створення за допомогою обраного програмного додатку спроектованої бази даних та її захист; оптимізація та підвищення продуктивності створеної бази даних; формулювання висновків та надання рекомендацій щодо практичного використання створеної бази даних.*

Ключові слова: *предметна область; відношення; проектування; бінарний зв'язок; нормалізація; захист; оптимізація; продуктивність; дослідження.*

Introduction

Formulation of the problem. At the present stage, people are constantly using databases without even knowing it. For example, the database turns out to be a phone book; the search for necessary medicine is based on the use of a database; receiving

wages for work performed also involves working with a database and there are an infinite number of such examples. Catalogs occupy a special place. A catalog is a list of information about objects, compiled in order to facilitate the search for these objects on some basis. For example, a library catalog, a catalog of postage stamps (scott), an astrological catalog, a catalog of resources on the Internet, a catalog of goods (services), a catalog of music albums and many others. The creation of any kind of catalog or some kind of reference book requires the design of a database and the solution of relevant problems, which confirms the relevance of the topic.

Analysis of the latest research. Earlier, the author proposed the «Foreign DistLearnDB» methodology for the formation of competencies in applicants for a bachelor's degree of foreign origin in distance learning in the discipline «Databases» [7-8], as well as the «SoftSkillsDatabase» methodology for the formation of competencies and social skills in the performance of a group task in the discipline «Databases» [9].

The purpose of the work this is the development of a methodology for the formation of competencies in applicants for a bachelor's degree when designing a database when writing a qualification work.

General characteristics of the methodology.

The «BachelorDesignDB» method is proposed, which consists of the following stages: review of sources for the creation of databases; study of the subject area in order to form an initial attitude; database design using known methods and analysis of the design results obtained; creation of a designed database with the help of the selected program and its protection; optimization and performance improvement of the created database; formulation of conclusions and provision of practical recommendations on the use of the created database, and was used by applicants for a bachelor's degree when writing relevant qualification papers [1-6, 10-11].

1. Database design using known methods.

To design a database, it is possible to use the following methods: the method of Normal Forms (the classical method based on the use of the mathematical concept of «relation») and the method of «Essence-Relation» (graphical method based on the use of ER-instance diagrams and ER-type diagrams).

The process of designing a database using the method of Normal Forms is iterative and is consecutive interpreting relation of the first normal form (1NF) in the normal form of high order according to certain rules. Each of the following normal form restricts certain type of functional dependencies, eliminating related anomalies

in the performance of operations on relations database and retains the properties of the previous Normal Forms.

When designing a database, the following stages of normalization take place:

• the first stage of normalization (transfer of the relation from 1NF to 2NF), which eliminates partial functional dependence, which generates a clear unprofitable duplication of data;

• the second stage of normalization (transfer of the relation from 2NF to 3NF), which eliminates the transitive functional dependence, which generates implicit unprofitable duplication of data;

• analysis of the resulting relations regarding the requirements of the Normal Form of Beuys-Codd (BCNF).

For example, the design of a database of SQL constructs was carried out in [11]. The initial relation includes 12 attributes, between which dependencies are identified and shown in Figure 1 [11]. The primary key of a relation is composite and consists of three attributes (Construction, Program, Question).
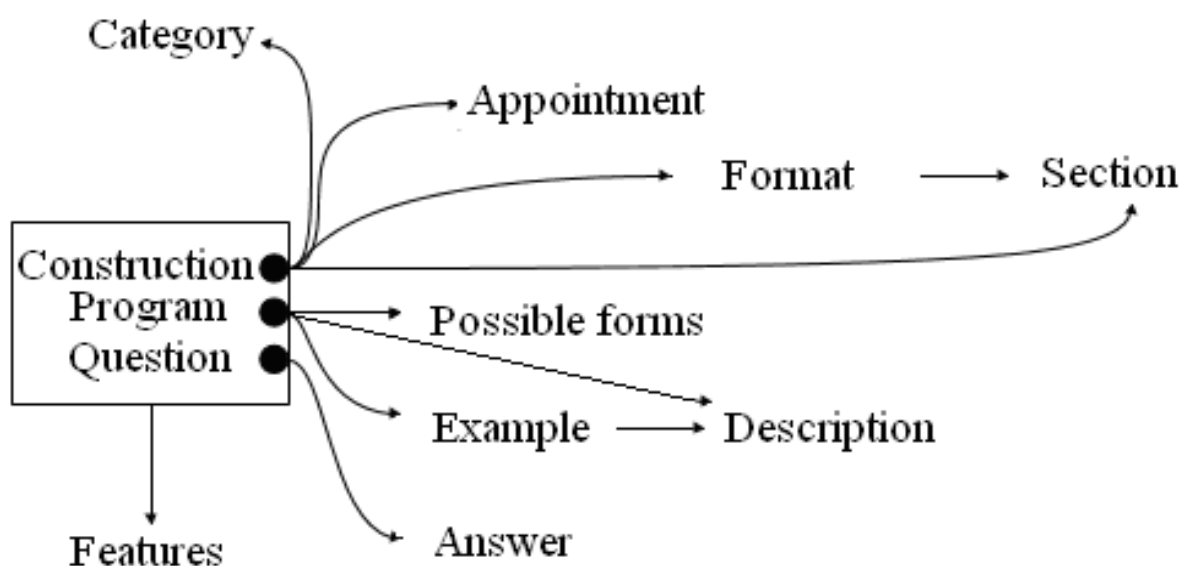

Figure 1 – Dependencies between attributes of the original relation
A source: [11]

The general structure of the designed database using the method of Normal Form is presented in Figure 2 [11].

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