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SCHEME MODEL OF A RELATIONAL DATABASE PRESENTS A MODIFIED ALGEBRA ALGORITHMS

There гіштп of the modified algorithms algebra for constructing mathematical models of patterns of relational databases is grounded. Mathematical models of abstract database schemes with one or many relations and abstract schema data warehouse are constructed.

Keywords: algebra, model, diagram, database.

Вступ і формулювання задачі

Modeling of the processes using the database is implemented by building a database schema, which defines the composition tables(relations) and the relations between them (constraints). The scheme of data on a technical level server algorithmically described in a script by means of the SQL query language as a task to create databases. At the present stage of database schemas clearer than the code on the SQL query language, served diagrams and diagrams of the graphic interface of the special software for developers - CASE means. Graphical diagrams are clear and understandable to the designers of databases, but the code on the SQL query language is practically the only method for describing data schemas for modern DBMS. Therefore, in the modern CASE tools developments based on UML diagrams, entity-relationship models, IDEF1X charts use the SQL language to transfer the design results in a working server environment DBMS. Having the advantages of clarity, to describe the large number of component systems, charts are not formal method for describing data model. Charts are static, describe only certain state of components of the schemes, the data cannot be run as an algorithm or to indicate the sequence of operations, but only a certain state as a result. Charts in CASE funds are not described transformation of data schemas, even such well-known as relational operations, requests, or decomposition of normalization. The SQL language was created as a language construct data structures with preset properties and manipulation. The script of SQL commands is not a formal tool that can fit conversion criteria (for example, normal forms (NF) and functional dependencies between variables ratio or the number of components). Formalized expression that takes the scheme formally introduces the ability to perform a transformation, has such clear advantages over the charts and the SQL language, as a single tool for presenting schema database and perform transformations on them. Therefore, the urgent task of creating a formal representation of the database schema on the basis of the algebra algorithms.

This implies the need to demonstrate the advantages of algebraic tools in the theory of algorithms and to emphasize the advantages of one over other methods.

Dignity algebra algorithms in the invention and implementation of a formal mechanism for the preservation of the precedence of the operators (unterm) component of algorithms using index operations, which play the role of ranks and act in accordance noncommutative Untere. This advantage has to be shown in the view of the operations in databases. Such possibility will be the embodiment OPN known physics Nobel laureate Rhenman that characterizes with his characteristic humor “good theory” such a sign that it possesses the ability to “pull the neck”, i.e it is ready and gives the benefit and in other fields beyond that for which it was invented, expressing the inherent processes in these areas is a General pattern that becomes the basis of using analogies for the interpretation of this law, taking into account the already acquired experience, as well as bringing new experiences to enrich the original theory.

When it comes to algebra and algorithms, you will recall that these terms and concepts associated with the name of Muhammad Ibn Musa al-Khwarizmi, who combined in his works algorithms (not Euclidean, and arithmetic), which through the use of Hindu positional system of representation of numbers avtomatizovani perform these actions. The translation of his labour Latin in the 12th century.. introduced Europeans on these achievements, and alebra became independent of formal logical discipline, as a generalization of arithmetic and simultaneously automation and a model for other subject areas, which have to fulfill the formal operations (actions). In his time Dgilbert their Problems posed a problem axomatic probability theory, mechanics and statistical physics as an example, physics, which is widely used methods of mathematics, just as in geometry, and as arithmetic and alibre, we talked about special issues.

Database related biosocial and physico-technical subject areas, so the concept alabri to be useful here, should "pull the neck", but how, and where. It would seem that there may be a subsidiary of the so-called epistemology (from the Greek γνοσίς of knowledge) and, according to the dictionaries, it is the doctrine of the nature and regularities of knowledge with the known thesis: from living contemplation of abstract thinking, and from him to practice - such is the dialectical way of knowing the truth. Vivid manifestation of it is touchmouse for decades in the former Soviet Union arrogant (all knowing) philosophy with its theory of reflection, which meant nothing, and only categorically rejected the creativity of the researcher. And in General epistemology is aprioristic, deductive methodology. Here is axiomatic method, limited neeffektivnost which showed K. Gödel. It is good to present systematized material, but not for search and formation and presentation of yet unknown regularities.

And the modern world science relies primarily on epistemology (from the Greek επιστημη knowledge, the essence and basis of knowledge)that is like the opposite of the epistemology: General knowledge there outcome of the achievement of the outcomes and methods of concrete Sciences (in Soviet science, this term is practically not used). So, the methodology, epistemology is a synthetic, inductive, therefore it is desirable, when the system of knowledge is formed only by generalizations, negotiate collectively accounted properties of researched object with the tasks that need to be solved on this object.

Because the language of physical-technical Sciences mathematics, then we are talking here about the system analysis as a means of justification for constructing a mathematical model of the investigated object, i.e. the mathematical object that implements in its structure characteristics of the investigated object with the subject area, essential for solvable with respect to his task. And here comes another factor: logically identical expressions in applications not equal, and it is in this sense algebraic transformations: they open the new possibilities for the preservation of invariants. This requires the development of the corresponding algebra.

Of course the researchers note that in the XVII century Redecard and G. Galilei if reformulate the very nature of scientific activity, proclaiming the indissoluble Union of theoretical physics and mathematics: mathematics and physical reality is indivisible than "built in" theoretical physics to mathematics. And more recently Bourbaki developed this way of thinking to the thesis that the mathematical patterns in a strange way reflect the structure of the physical world. And further: "science has become razanatsoa fiction - racontant with mathematics". As Aristotle argued that mathematics is entirely a product of human thought and a pupil of the philosopher Russell L. Wittgenstein thought that the mathematician is the inventor, not a discoverer. Our knowledge depend on the human mind, no less (if not more)than from the realities of the surrounding world. Scientific truth actually Express the mathematical relations. And this explains the increased role of the observer (as interpreted P. Dirac and V.Heisenberg) in physics and in accordance inventor (in the sense Jagamara) in mathematics (see [1], where it is given the overview of the historical events in the development of the methodology of scientific research and scientific concepts of truth).

As algebra algorithms in this case, experience shows the feasibility and usefulness of its [2, 3]therefore, it is appropriate and necessary modification for the analysis of databases in information systems and networks.

When processing the data should be algorithms based on adequate to the object and objectives of the models, on MAP - triad model - algorithm - software implementation, so the creative role of the researcher is extremely high.

In connection with this is to pay attention to the fact, that at least the first results in algebra algorithms have been published a couple of decades ago, it has not yet gained widespread recognition that she quite rightly has the right to claim. And here comes to mind of zaczarowany M Peschel [4] psychological fact that he expressed words of the famous German writer and art critic B.breht: "many of the creators proud of the shown courage, happy, that learned the truth ... He is looking forward to, the people that their interests he comes, will use this weapon. And if, as often happens, he will not consider it necessary to go even to the kind of tricks in order to bring the truth to these people, that all work can go awry". And then the Peschel emphasizes: "Mathematics is required to obtain quantitative practical to use the model; however, it also leads to the temptation to give special attention partial models, especially easy pddack mathematical treatment Specialist in the field of technical Sciences, has an absolute right, when attracts for his model the mathematical apparatus only to the extent essential for the achievement of their own goals, and further notes the wide spread abuse "mathematics", which has passed in "autocatalytic the process of the" accumulation of formulas, ignoring the fact that these systems are not in accordance with these expressions.

Because the algorithm is a computational procedure, it naturally be interpreted as a sequence of "steps", and the practical implementation of the algorithm is traditionally considered as a machine. The concept of a sequence of steps in application to the problems of logic has brought to life a different kind of so-called "machine", from Turing beginning, the ideology of which related practicount not so long ago programming in the address codes. They have grown from the Aristotelian syllogistics and their service is that they discovered the existence of an algorithmically unsolvable problems.

Famous American engineer and mathematician Cshenton - founder of the theory of communication (which for some reason were called information theory is a very unfortunate term that only confusing concepts in this important and challenging field) have shown [5]that enough machine and at least two States, to simulate a Turing machine (and one state not enough), that is, it is a variant of the machine, but as we see now that is adapted to the decision of the special task. In our time there is no need to build the theory of algorithms by means of Turing's machine, because there are other possibilities - up to the software packages inclusive, and different machines have the meaning as evidence of history.

In a particular subject area should be designated basic operators is independent and those who have exhausted all the needs for current tasks. Then setting out appropriate actions, we can generate a need in this area algorithms. Because algebrica system combines the basic set algebriche O operations and family relations (reports) R, so it is denoted S=<A, O, R>you can choose the right set of operations and expand it as needed, adaptation to new challenges, even in relation to the same objects. This shows the advantages alebrijes interpretation of the problem and the lack of representation of algorithms block diagram, which are essentially a hybrid variants of the graphs for expression POV asani component of the algorithm with the verbal description of these operators. It is clear that such representation algorithms are not available to denote action.

As for the subject area in this case, it should be borne in mind an extended notion of space data, as many Db - vectors [6] (from the English. diversify (to spread) distribution, main assets, investments, and the fact that the notion of the matrix are summarized in the so-called block matrices, so it is appropriate concept durbak-vector and abbreviated Db - vector). Depending on the structure of such a vector and nature blocks this will affect the operations in each block and between units as the basis for structuring, consolidation and integration both in databases and information networks.

Said considering the previously open Mpekele and natural phenomena contignaco protection confirms the importance and urgent need of promotion, protection and further development of the ideas and tools alabri algorithms, which is the aim of this article.

Justification of the choice of tools for building models

The database schema is defined structure. In programming, data structures, for example, describes object-oriented algorithmic languages. The theoretical basis of programming languages, methods of

algorithms. To represent algorithms used verbal and block schematic methods. In addition they can also apply nTune and algebriche methods. NTune have known methods of recursive functions [7], account lambda [8]virtual machines Turing [9] and Fasting [10], algorithms Markov [12]machines Kolmogorov [12], Chengue [13], ago - Ullman - Hopcroft [14], generic algorithms Krincha [15].

The use of algebraic methods provides the solution of the following problems: synthesis of mathematical models of information technologies and tools, conversion of models to optimize them, synthesis of models, data structures, building models for the functioning of the formalisation of the grammars of languages information technologies and systems, investigation of the models. And in General models are frameworks for conservation and transformation of data.

It is known [16, 17]that algebriche methods of representation of algorithms is the system of algorithmic algebras Glushkov, a modified system of algorithmic algebras (an algebra is Algorithmics Zeitlin), algebra algorithms [18] and modified algebra algorithms [19, 20, 21]. A modified system of algorithmic algebras generalizes the system of algorithmic algebras and modified algebra algorithms generalizes algebra algorithms.

Table 1 lists the known operations modified system of algorithmic alep [22] and modified algebra algorithms [21]. The sign "-" means no surgery.

Table 1.

Operations algebraic methods describing algorithms.

№	A modified system of algorithmic algebras		Modified algebra algorithms	
	The operation name	Designation	The operation name	Designation
1	*conjunction*	*x&y*	-	
2	*disjunction*	*X|Y*	-	
3	*objections*	$\overline{x}$	*reversal*	$\overline{x}$
4	*forecasting*	*X•u*	-	
5	*composition*	*X*Y*	*sequentually*	$\overset{\frown}{X;Y}$
6	*alternative*	*([u] X, Y)*	*elimination*	$\overline{\vdash X;Y;u\text{-}?\dashv}$
7	*cycle*	*{[u] X}*	*cycle sequentually*	*⊄uX*
8	-		*cycle elimination*	*⊅uX*
9	-		*cycle paralelna*	*ØuX*
10	*filter*	*F(u)*	-	
11	*asynchronous disjunction*	*X||Y*	*paralelna*	$\overline{X;Y}$
12	*control point*	*T(u)*	-	
13	*synchronizer*	*S(u)*	-	

In modified alep algorithms lack operations of conjunction and disjunction, forecasting, filter, milestones and synchronizer, which has modified the system of algorithmic alep. But in a modified system of algorithmic alep no cyclic operations of elimination and cyclic paralelna. But the application of these operations significantly simplifies analytical expressions, like the use of loop operations and cyclic sequentually.

In a modified system of algorithmic alep to describe sequences is being composition is associative [16]. However, algorithms, processes and structures are associative only in specific cases. So, a modified system of algorithmic alep can only be applied for construction of associative models.

For the description of sequences in a modified alep algorithms scheduled for surgery sequentually. It can be built as associative and Niacin model. In this regard, for the synthesis of models it is advisable to use the modified alebro algorithms.

The mathematical model of a relational database schemas

The relational database schema, which formed a single table is given on Fig.1.

а) б)

Fig.1. The symbol (a) the structure of the database tables (b).

The database model, presented in the form of modified formula algebra algorithms is as follows:

b; ⊄x dx; ⊄yxvx,y
;
t; ⊄z az; dz; vaz
;
⊄k ck

where b is the name of the database, x is a variable number of domains database, dx - variable domain names, yx - variable number of properties domains, vx,y is the variable names and values of properties of domains, t is the name of the relation, the z - variable number of attributes relations, az - the name and value of the z-th attribute relations, dz domain with z - s ' attitude, vaz property z-th attribute, k - variable number of keys, attitude, ck - the name and value of the k-th key relationships.

A database schema with many tables is given in Fig. Solid colored diamond and lines are the existing links between the tables.

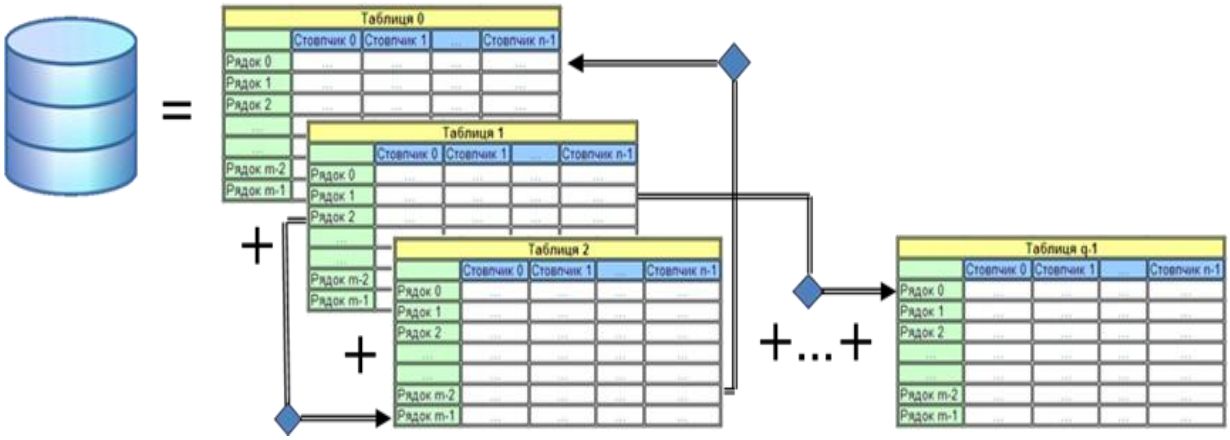

Fig.2. A database schema with many tables.

The model database with multiple tables, filed as formula modified alabri algorithms is as follows:

$$b;\overbrace{\left(\begin{array}{l}\varnothing x\ d_x;\ \varnothing y_x v_{x,y}\\ ;\\ \varnothing r\ \overbrace{\left(\begin{array}{l}t_r;\ \varnothing z_r\ a_{r,z};\ d_{r,z};\ vd_{r,z}\\ ;\\ \varnothing k_{r,}\ c_{r,k}\end{array}\right)}\end{array}\right)}$$

where r - variable number of database tables, $r \in \overbrace{0, 1, \ldots p\text{-}1.}$

On Fig. 3 shows the diagram of database storage, which formed q databases.

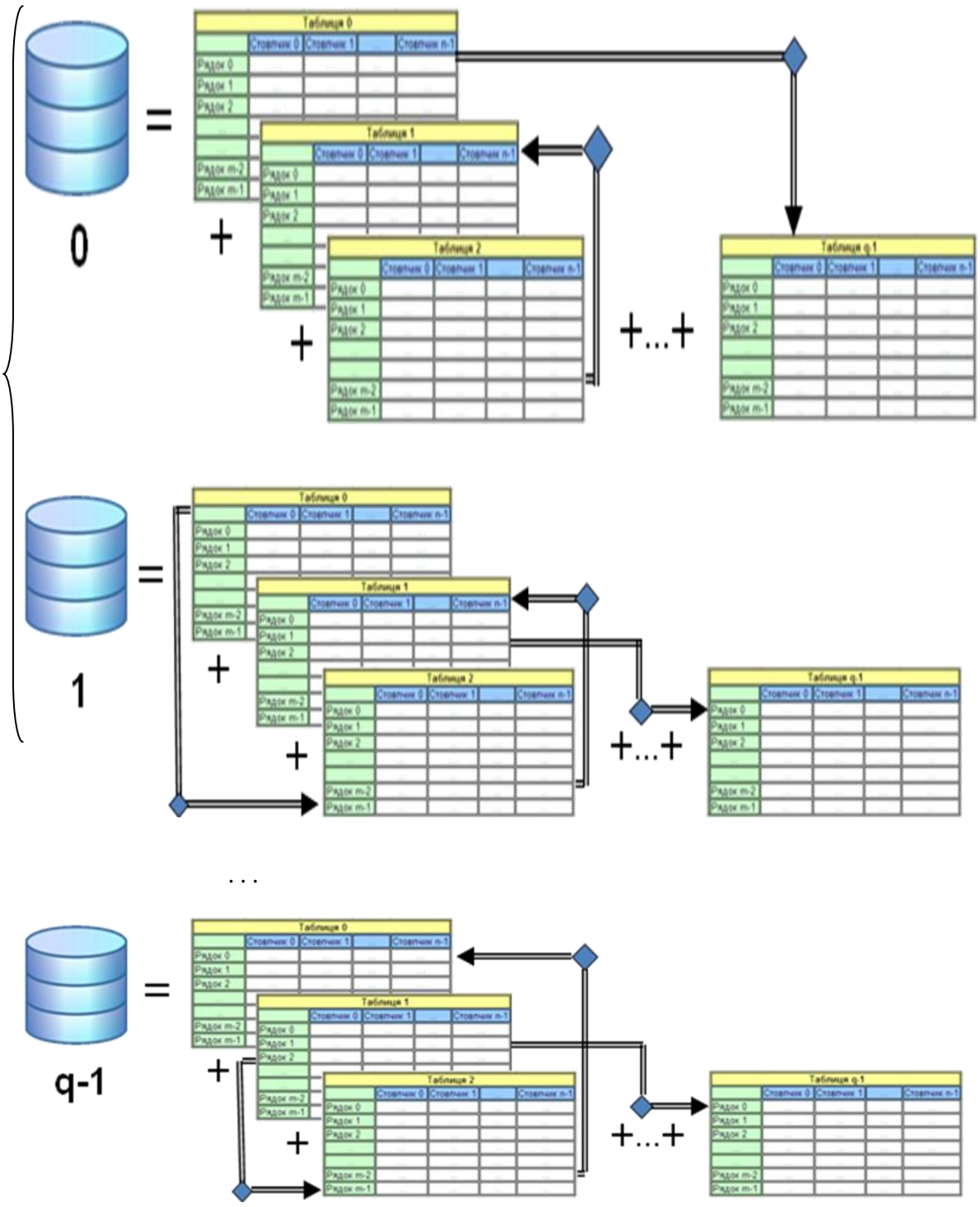

Fig. 3. Store databases.

The model warehouse schema database, are presented in the form of modified formula algebra algorithms is this:

$$\not\alpha s\ \overbrace{b_s;\left(\begin{array}{l}\not\alpha x_s\ \overbrace{d_{s,x}}; \not\alpha y_{s,x} v_{s,x,y}\\ ;\\ \not\alpha r_s\left(\begin{array}{l}\overbrace{t_{s,r}}; \not\alpha z_{s,r}\ \overbrace{a_{s,r,z}}; \overbrace{d_{s,r,z}}; \overbrace{va_{s,r,z}}\\ ;\\ \not\alpha k_{s,r,}\ c_{s,r,k}\end{array}\right.\end{array}\right.}$$

where s is a variable number of databases, $\overbrace{s \in 0, 1, \ldots}\ q\text{-}1$.

Conclusions

Application for construction of mathematical models of operation of cyclic elimination and cyclic paralelna modified algebra algorithms are means more compact analytical expressions.

Modified algebra algorithms and provides creation as associative and neaiaa models.

Mathematical models database schemas comparison with traditional database schemas is significantly smaller, less expensive storage and transmission through the communication channels.

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