

Concept of versions of electronic documents in databases

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Abstract – *The use of computer technologies for work with documents leads to appearance of such notion as electronic document.*

There can be entered the notion “Electronic document version” because of time properties in database. Version is a depending from time value. Electronic document version notion is methods of saving and display the part of electronic document version data in database.

Key words – electronic document, version, database, metadata, informational society, version management system, time.

I. Introduction

One of the general trends of society and state development is transfer to informational society based on wide implementation of information-communication technologies (ICT) in all man activity ranges. Among plurals of modern ICT, that determines this progress, the particular place is taken by the “electronic document” technology [1].

It musty be noticed that electronic documentation appearance become the main feature of development of information society and electronic democracy in all countries of world. The considerable part of modern documentation more and more transfers in so-called “digital” form. Document essence understanding transfers from material component into informational. Effective so-called “electronic government” in many states becomes the main criteria of democracy development, successful interaction of government and society, that becomes contactless, communication “on-line” and, what is important, impossible without electronic document movement.

II. Meaning and definition of electronic document

Electronic document – is a document, information in which is input as electronic data, including compulsory document details.

Electronic document or complex of electronic documents, created by individual or entity, is proof of action or interaction and contains information about content of actions and interactions. Electronic document is characterized by the content, context and structure.

Electronic document content – is text or graphic parts, that forms document. Electronic document context – is information about connections of enclosed information with individuals or entity and other documents.

Electronic document determines by its metadata. Metadata – is data, that connected and belong to electronic document, contains information about its social

certainty and content understanding, context, structure. Electronic document metadata have elements of legal, business like, organizational, procedure proofs of electronic document entirety and its authenticity for authors, users and researchers. Metadata is required element of process of electronic document storage. As object of archive storage, electronic document is characterized by the next features:

- electronic document is programming-technically dependent product
- electronic document have wide range of informational display: text, graphical, electronic tables, databases, multimedia;
- electronic document content can be fragmented (databases), i.e. physically document can be stored in several different files;
- electronic document can have links, , which are not controlled by authors, for example, use of internet-files or files of corporate databases, that have a short lifecycle range;
- electronic document is stored at physical information carriers (magnetic, optical devices), that can't guarantee long-term information storage (demagnetization process, mechanical injury, change of programming-technical means).

III. Time and version data connection principle

Nowadays one of the tasks during database projecting is ability of data version modelling, history storage, as changes of data itself , as the ability of users actions change tracking.

Version (borrowed from Medieval Latin version – turn, change) – is one of the several, different from each other statements or explanations of any fact, event, content. Version is dependent from time value.

There exists several definitions of version use:

- in legal and investigatory activity – is suggestion of crime committing path;
- variant (number) of programming product or accessory;
- file or electronic document, that is a modification of another file;
- system of demands and rules from separate sports, developed by some organization;

Time – is the most widespread property of environment. It can be hardly imagined object (notion) or collection of objects (notions), that have no relation to time. Any process researches are performed in time context.

Mathematical definition of time – is infinite tight elements plural, on which are defined order ratio. This plural is isomorphic to plural of real numbers, that means that time axis is presented as real numbers axis. Such definition truly present all aspects of time from reality elements.

In database area time axis determines as counted discrete plural, on which is set the ratio \leq (“less or equal”). Elements of this plural are called time momenta.

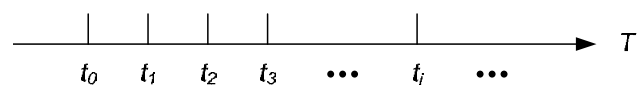


Fig. 1. Time axis

Time is extremely multidimensional. In fact, this is not only a notion, but also definition, that shows whole complex of our world properties. This is also an age of our informational society, and human daily schedule, and the most important parameter of all processes in nature, society, and technic. Especially it concerns computer informational systems and global Internet network. And in every of this processes time have its properties, definite rhythm, and scale.

Data, that are stored in database taking into account version and time actuality, are different from data, that are stored in traditional database. This difference is that the data connects with some moment or time period, that displays moment of data appearance in effect, time of its save in database (start version creation), version actuality period etc. Traditional databases consider saved data as such, that are real (actual) on real (last) moment of time. They save last or future states of databases. Assignment to the data (content) a version gives ability to remember data state at different moments of time.

The main aim of relational data version account is attach the data to the time. This makes possible to choose different states of database. There exist several approaches of data and time connection:

- on essences level;
- on attributes level;
- on nesting level (group of attributes).

For example, temporal extensions of relational model use time to data connections at cortege level (in fact on essence level), object-oriented models – on attributes or nesting levels [2].

Second step – time elements choose, that connects with version data. Usually researchers performs selection between time moment and time interval, connecting it to the actual data version.

Third step – determination of time measures, that semantically divides on two kinds: real time and version actuality time.

In database context researchers usually considers two time dimensions, with the help of which data version can be clearly identified. Real time indicates time of fact determination in reality. Real action time – is time, when the action happened in real world, independently from its writing into some database (creation of one of electronic documents versions). Transaction time – is the time of fact saving in the database. Transaction time have different semantics, than real time. For example, “yesterday” and “tomorrow” actions of real life can be written into database by “present” time transaction.

IV. Version of electronic documents in databases

Action, in which electronic document sustain a number of changes during its existance, is quite typical. During that often is important to have not only the last version, but alos several previous. In the simplest case several

document variants can be saved by its numeration correspondently. This way is not effective (it must be stored several almost identical copies) and requires increased attention, discipline, and oftel lead to mistakes. For more convenient document organization there were created version management systems of different variants.

Version management systems – programming mean for version management of electronic information unit: programs programming code, script, web-page, web-site, 3D model, electronic or text document etc.

Version management system is usually used in development of software for tracking, documentation, and control under gradual changes in electronic documents, that allows simultaneous use of electronic document by several users.

In databases electronic documents stores as parts of separate relevant subject area. Electronic document version – is the substitution or modification of data content of part of electronic document. Electronic document version in databases can be reached with the help of format and details of electronic document unification, and also choose of its storage mode.

Documents version may be characterized by time index;

- last edition time (modification, addition) of document;
- document actuality change time (actual or non-actual);
- assume some document version after performing any operations with documents (it may be both numbers or latin letters, or mixed variant);
- creation of main actual electronic document, to which is assumed version number, and after correspondent changes or additions input, add the change number after dot.

Conclusion

Thanks to time properties, in databases can be inputted such notion as electronic document version.

The main problem in electronic document version modelling in databases is not placed in the area of database management system creation, but in the area of electronic document unified form development, data storage method, their display and processing

It is described electronic document version notion in database with the help of time indexes.

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