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Software & Systems Received 18.09.17
DOI: 10.15827/0236-235X.120.609-618 2017, vol. 30, no. 4, pp. 609–618

FUZZY DATA STORING AND EFFICIENT PROCESSING IN PostgreSQL DBMS

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Abstract. In just half a century the theory of fuzzy sets has developed from theoretical foundations to practical use in artificial intelligence systems in such areas as industrial equipment and vehicles control, medical diagnosis and expert systems, including risk assessment, from economic to environmental. Many of them need efficient and reliable storage and processing of large volumes of information. For this purpose, there are DBMS, the most advanced of them are the object-relational DBMS. However, fuzzy data are difficult to reconcile with both object and relational data models. Moreover, the majority of industrial DBMS do not contain built-in fuzzy data types and mechanisms to work with them. These DBMS include cross-platform and freely distributed in source object-relational DBMS called PostgreSQL. Import substitution in infrastructure software is largely associated with application of PostgreSQL.

Opportunities of fuzzy data relational modeling and a developed mechanism for extending types through the creation of the required user-defined types along with powerful procedural languages in PostgreSQL allow implementing various alternative approaches to fuzzy data storage and handling.

The article shows a comparative analysis of these approaches from the point of view of maintaining data integrity and processing efficiency. There are the experimental results at various fuzzy data models depending on approaches. The paper proposes design solutions that increase the efficiency of fuzzy data search, and formulates recommendations on choosing an approach to modeling fuzzy data.

Keywords: linguistic variable, fuzzy set, database management system, PostgreSQL, triangular norms, fuzzy logic operations, data integrity, SQL query efficiency.

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