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A Graph Library Development Based on the Service-Oriented Architecture: Used for Representation of the Biological Systems in the Computer Algorithms

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Abstract : Considering the usage of graph-based approaches in systems and synthetic biology, and the various types of the graphs employed by them, a comprehensive graph library based on the three-tier architecture (3TA) was previously introduced for full representation of the biological systems. Although proposing a 3TA-based graph library, three following reasons motivated us to redesign the graph library based on the service-oriented architecture (SOA): (1) Maintaining the accuracy of the data related to an input graph (including its edges, its vertices, its topology, etc.) without involving the end user: Since, in the case of using 3TA, the library files are available to the end users, they may be utilized incorrectly, and consequently, the invalid graph data will be provided to the computer algorithms. However, considering the usage of the SOA, the operation of the graph registration is specified as a service by encapsulation of the library files. In other words, overall control operations needed for registration of the valid data will be the responsibility of the services. (2) Partitioning of the library product into some different parts: Considering 3TA, a whole library product was provided in general. While here, the product can be divided into smaller ones, such as an AND/OR graph drawing service, and each one can be provided individually. As a result, the end user will be able to select any parts of the library product, instead of all features, to add it to a project. (3) Reduction of the complexities: While using 3TA, several other libraries must be needed to add for connecting to the database, responsibility of the provision of the needed library resources in the SOA-based graph library is entrusted with the services by themselves. Therefore, the end user who wants to use the graph library is not involved with its complexity. In the end, in order to make the library easier to control in the system, and to restrict the end user from accessing the files, it was preferred to use the service-oriented architecture (SOA) over the three-tier architecture (3TA) and to redevelop the previously proposed graph library based on it.

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