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Different ways of system integration

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Abstract

Digitizing of knowledge of mankind and his activities leads to a massive increase of the recorded data. Rapid technological development of storage media leads into inexpensive data storage. It is obvious that currently we are storing any information without the need for an analysis of its importance. In many areas of science and research is need to store every generated information; in advance it is not possible to determine the significance of potential information. With this amount of data it is increasing demand for their efficient processing. This paper deals with different ways of system integration, from data level to UI level. In the conclusion we propose a new way to data integration – ontology.

Keywords: database, integration, data

Introduction

Most current information systems are designed with precision to the user interface (UI), because UI sells the product. We can see it many times, that old but precise and good quality software is replaced by a worse quality software solution, that is easy to use and do not require special training. This trend has caused that the majority of the development of information and communication technologies is focused on improving communication between user and machine. Communication between machine and machine has been relegated to secondary status. Therefore it is bigger and bigger problem related to data integration of such information systems.

With the advent of huge database systems and data centers, however, it begins to turn attention to the data storage and data handling. Informatization of society also led to the linking of various government systems. These are the reasons why current corporate applications focus on the functionality, where one application covers a range of similar solutions.

The issues of integration

Almost in every large company we can find not one but dozens of software. In terms of development, this is the right step because the development company must specialize in certain areas in which they lead with quality of their product. In terms of mentioned large company it is complicated situation because although they can manage all their sub-processes (or applications), they can't see and even know how these systems influence each other. Also they can't see merged semantic result from these systems.

"These software products are mostly accounting systems, production management, storage management and other specialized software systems. Essential requirements related to integration of mentioned systems is usually a list of following tasks:

- The data will be entered only once
- Individual users will work with "their suitable" environment
- Using history
- Communication between environments
- Communication on line, in time" [1].

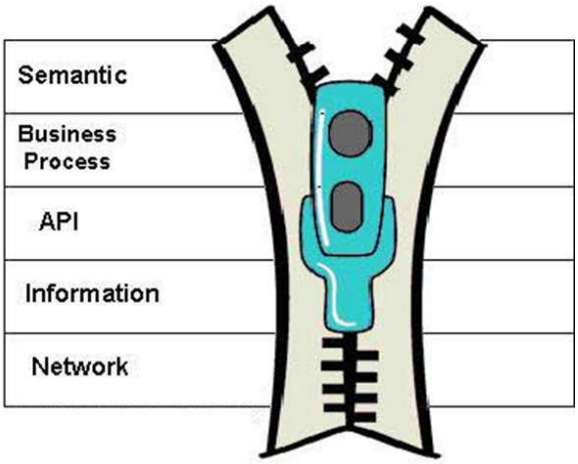

Figure 1 – Current level of integration [2]

Integration at the data level

Data integration is implemented by data sharing or data replication. Both methods has its positive and negative aspects.

The first method, data sharing, is realized through a large data repository that is accessible to all elements of the system. The major positives of this integration include:

- Relatively quickly realizable solution,
- Centralized access to storage,
- Data synchronization (every application is always working with current data).

The major negatives of this concept:

- Complexity of data design in terms of flexibility and versatility,
- Transactions over the same data in the same time,
- Model changes affects all applications (due to the extensive use of NHibernate, Entity Framework and so on.

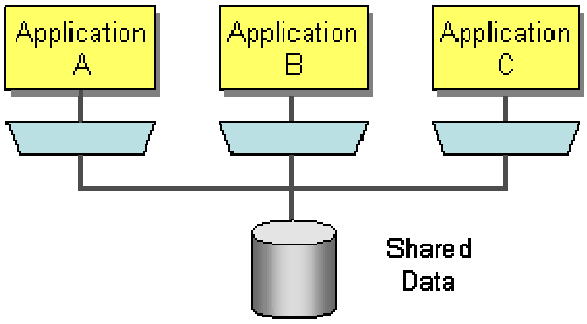

Figure 2 – Data integration with centralized storage [3]

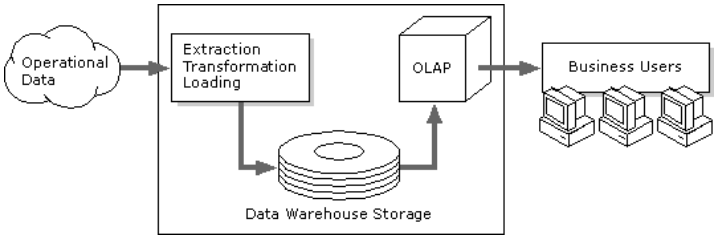

Figure 3 – DW with OnLine Analytical Processing

Data warehouse (DW)

DW is a subject oriented, nonvolatile, integrated, time variant collection of data in support of management's decisions [4]. We can say DW is multidimensional database structure which integrates historical data from various sources and effectively provides these data with multilevel combined view. The data is maintained within a certain period of time (each substructure contain implicit or explicit time element) and therefore provides management support for long-term decision making.

Integration at the application level

System integration is long-term and strategic decision that reconfigures all existing IT in the company. The most commonly used method of application integration is Point-To-Point (P2P), which is evolving over the development and modernization of the company. On the other hand, there is Enterprise Service Bus (ESB) solution. It centralizes the logic of integration on a single platform across the entire enterprise infrastructure.

Point-to-point

This system of integration is mostly used in large organizations, where the applications and systems can be technologically of various age and often the oldest ones cover the main business of the company.

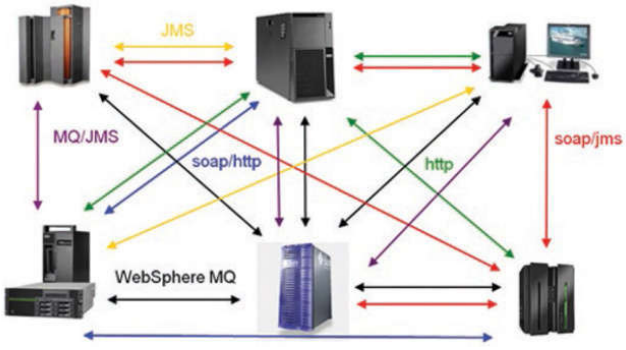

Figure 4 – Point-to-point integration

The biggest disadvantage of this type of integration is that the number of connections grows fast and each connection must be implemented and maintained separately. The number of connection - **|H|** of **n** - systems:

Formulae:

$$|H| \leq \binom{n}{2} = \frac{n(n-1)}{2}$$

Enterprise service bus

ESB is a new kind of middleware that supports service-oriented interactions between enterprise applications. The integration of this type is based on P2P technique, but P2P links are replaced by a network of links in one layer, which takes the entire integration logic of applications outside.

ESB advantages are

- Variety of standards (XML, WSDL, ...)
- Simple expandability
- Supports integration between others partners
- Possibility to change the seller because of standardization

Integration at the UI level

Last type of integration is the least important since there is no real interconnection between systems. UI integration covers business application under a single user interface, typically a web interface.

Figure 5 – Integration layer of ESB

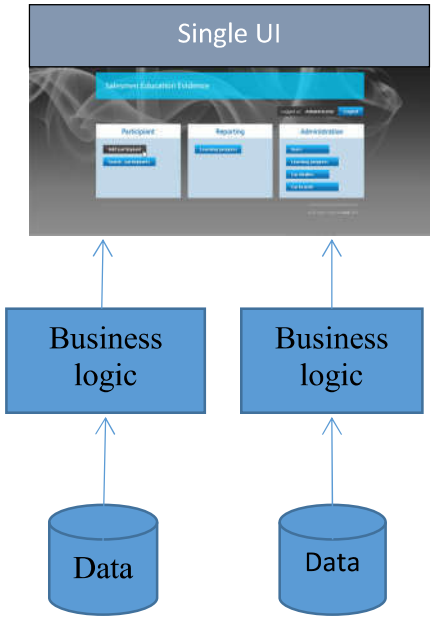

Figure 6 – UI integration

Conclusion

A new milestone in the history of information systems comes from a completely new and unexplored areas, but is mainly based on known technology – ontology. Its main purpose is to distribute information intelligently, without redundancy, processed and implemented in business logic. There is not available functional application of this kind of integration yet. However partial solutions are already known. While ontology stays back in field of integration, the often used data warehouse and ESB solutions are widely used for their support function and relatively easy deploy process.

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