Visualization and Simulation for the Analysis of Business Intelligence Products

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ABSTRACT

This paper analyzes information technology products for improvement existing solutions and implementations. Selected products are Business Intelligence (BI) applications in comparison with Customer Relationship Management (CRM), database and operating systems. The subject of interest is the architecture. BI architecture is less sophisticated in regard to adopted arrangements for other products. The best resolution offers an Oracle database system. This arrangement helps provide extraordinary stability to the given system. Operating systems have minimalist architecture with necessary processes and configuration files; similarly as for CRM products. BI architecture is without order, with items as tools for end users, component analysis, database components, components for data transformation and integration, and system sources. The solution is to merge the system source with methods for their transformation, and tools for end users with component analysis. Presented analysis is based on Petri Nets.

Keywords: Analysis, Architecture, Business Intelligence, Petri Nets, Software Development

INTRODUCTION

Software development, structure design, analysis of actual needs, and application simulation are high-level current terms. The reasons are based on the dynamic changes of the needs of information technology users. These changes have close links to preference modifications and diversity in a global and information society. Users want extreme speed, but do not intend to give high quality or breadth of input (Kadlec, 2005). Analysis necessity follows on from requirements to description for the given situation. The aim is to get an optimal view of the solution for appropriate computer support via applications, and understand strategic advantages in information technologies (Zutshi & Creed, 2010). The selected method of software solution is not unique, and designers must realize many analyses. A good starting point is analysis with support simulation. Such created models dynamically display solutions, necessary objects, and defined methods. One benefit is the easy movement of existing objects in the designed solution with the idea to gain a new and attractive concept for information technology users.

Analysis better reflects challenges to information technology products with support
visualization and simulation for finding new answers to questions, developing new perspective, or solving problems (Erbe & Hills, 2010). Designers and analysts can immediately display the considered design. The issue of creating and testing software in automated systems is an integral part of their design and implementation, and can be considered a specific industry application of software engineering (Cendelin, 2002). Created models suitably describe:

- Application structure with configuration,
- Processes and files to support realized activities,
- Setting rights for users according to actual requirements,
- Method for further development,
- Architecture for adopted solutions.

This individual approach to practical implementation of information technology products is important with regards to a number of problems which are different from companies and institutions; therefore new information products are needed, which helps users to deal with these challenges (Kollmann & Krell, 2011). One of the important models for the measurement of architectures is quality model ISO/IEC 9126 (Komárová, Máčová, & Bednarčíková, 2008). This model distinguishes three indicator groups, such as internal and external quality, quality in use. Other good helpers are defined metrics for software as Availability (A), or Mean Time Between Failures (MTBF) that specify software quality in concrete numbers:

\[ A = \frac{MTTF}{MTBF}, \quad (1) \]
\[ MTBF = MTTR + MTTF, \quad (2) \]

where MTTF is Mean Time To Failure, MTTR is Mean Time To Recovery (Relex, 2009).

Very good analysis and simulations help to improve quality in all indicator groups and metrics. Simulations enable the definition of optimal software features for dynamic work of users, quick response on user requirements, or the achievement of user satisfaction. The above mentioned indicators and metrics are also useful for users of information technology products, such as operating and database systems, BI and CRM products. These products are significant for users because they provide work with information. Database systems have a fundamental influence on data processing, data management, and process to data search. BI and CRM products use stored data for further analysis and support of customer service. These products often co-operate with database systems. Operating systems are used on a basic level for administration available hardware sources. Operating system is default required by all applications to work optimally with memory, CPU (Central Processing Unit), disks, LAN (Local Area Network), and printers. The basic rule of implemented software is to deliver information in time, and of adequate quality for users in companies, organizations, and for individuals. The benefits of practical implementation in practice are individual. Users can select from commercial or open-source products to support data processing.

**Information Technology for Support Data Processing**

BI products provide a similar situation on the market as with the database systems. Companies and organizations can select from various products of this type. Traditional products are, for example, from Oracle, SAP, IBM, and open-source products such as JasperSoft, or Pentaho. Until recently it was thought that BI is only suitable for large enterprises with hundreds of employees to fully utilize its potential, but recent surveys show that BI is gradually promoted in middle and even small businesses (Open-source, n. d.). The reasons for the increase in the use of these products are existence procedures for visibility unexpected and surprising connections based on information.

In addition to the options of BI products, there is the area of advanced data analysis. This includes also data mining with useful links to swarm intelligence (Abraham, Grosan, & Ra-
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