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Solving Enterprise Management Problem with Cluster Technologies and ERP – Systems (in the Context of Capital CSE System)

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Abstract:

The article is dedicated to a problem of mass data management in large corporations. The introduction describes the aim and objectives of this article, defines the object and subject of the research, as well as research methodology. The main part of the article considers core operating principles of 'Capital CSE' applications along with functional elements of one of the most important contours of Capital CSE complex. The article provides an analysis of the relevance and effectiveness of cluster technology and ERP-systems on the example of a large enterprise of the Perm region – Permenergo OJSC. This work also presents the analysis of a change to a new technology on the example of the enterprise abovementioned. The paper reviews functionality of Capital CSE system applications and the principles of implementation and use of cluster systems in the context of Permenergo OJSC. The article formulates the application features of cluster system technology in solving modern problems within enterprise. Following the analysis results, the reasons for the relevance of the proposed tool, namely cluster technology, for solving applied problems by large corporations, were defined.

Key Words: *Clusters, Cluster Technology, Mass Data Management, Power Economy, Mass Data, Capital CSE, GOAL, ERP-systems*

JEL Classification :

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1. Introduction

The urgency of the problem considered is that many large corporations today face the challenge of managing large amounts of data within a single enterprise. Various corporations resolve the issue depending on the level of information support with application solutions designed for specific functional tasks. Use of cluster technologies is the one of the abovementioned applied solutions. The trend towards the introduction of cluster systems in all sectors of economy, science and technology is becoming more and more popular among large businesses.

The purpose of this article is to make proposals for improving array management within a single corporation.

The objectives of this article are:

- to analyze activity of a large enterprise and its existing management system;
- to analyze transition to a new technology on example of the enterprise considered, and also to specify the reasons for the use of current tools for application tasks by large corporations.

The object of the research is Permenergo OJSC.
As a subject of the research we consider the enterprise management process when solving problems of information processes integration, as well as large data processing in real time operation.

2. Materials and Methods

When studying and searching for solution of the stated issue we used theoretical research methods, such as analysis, comparison, generalization; empirical research methods: conversation, observation, investigation; scientific methods: comparative method and system analysis.

Clusters are currently created in a variety of industrial sectors, and power industry is one of them. A mutually beneficial consolidation of enterprises in the industry within one region can serve as an example. In St. Petersburg, this issue is already being resolved in a positive way.

Since 1999, the executive office of Permenergo OJSC and all of its branches decided to transfer as full as possible a software package to a single management Capital CSE system (Capital CSE. Online). Capital CSE involves more than 50 business applications, grouped into 16 application circuits.

The structure of the system components may include additional elements, e.g. OleReport table editor.

Basic principles of the system applications are listed below:

- configuration of the main application elements;
- specific dialog boxes;
- connection configuration;
- application launcher.

The software complex Capital CSE (developed by GELICON PRO) is a system of enterprise management designed to provide management processes with material, financial and human resources (Enterprise management system Capital CSE. Online).

One of the most important circuits of the complex is a circuit "Capital CSE Configuration Tool", designated for execution on tasks related to adaptation of a product basic functionality to specific business processes of a particular enterprise. Functional elements of the circuit are (Kolchanova A. G., Kolchanova P. S. 2014):

1. object-oriented language GOAL, supporting SQL language, transaction management and execution of stored procedures, structural exceptions handling, working with OLE-servers, etc.
2. dialog editor, intended for visual design and programming user interface.
3. problem-oriented library of GBO facilities (GELICON BUSINESS OBJECT).

Implementation and operation of Capital CSE on enterprise is intended to ensure (Kolchanova A. G., 2014):

- transition to a new management model within the single information space;
- effective solution of operational, managerial and accounting tasks;
- financial reporting adjustment in accordance with Russian and international standards;
- continuous registration and control of enterprise resources and relationships with contractors;
- efficient preparation of analytical documents, reports and certificates, outlooks and operating plans of enterprise;
- improvement of efficiency and decision-making time;
- organization of end-to-end accounting and timely monitoring of key areas of financial and economic activity in real time operation;

- qualitative improvement of the efficiency of the whole process of contract activity by systematization of accounting of contracts, addendums and other acts;
- access rights differentiation and appointment of responsible employees for specific commitments;
- filing;
- economic effect by monitoring compliance with the maturity dates;
- budget implementation control;
- reduction of financial costs in the form of penalties;
- increase in operational activities through the creation of a unified database of contracts;
- providing relevant information on the contracts status;
- electronic means of information search and analysis.

Each of Permenergo OJSC companies had its own database deployed, audit and database administration.

In 2008-2010, all branches and administrative office were transferred to a new version Capital CSE 4.1, and information from their separate databases was consolidated in one database on a company server. It necessitated the use of system tools to distribute resources among all users, thus, it required additional administrative tools to work with a common base combining information on all of aforementioned tasks through the whole system (Klyuev, 2010).

This transition became possible only due to proper decisions made on the access to a common database information, system resources, and distribution of access rights to resources amongst individual users and user groups.

Remote work (of Berezniki electric network, Ocher electric networks, Northern electric network, Kungur electric network, Tchaikovsky electric network, Chusovoy electric network, Central electric network, Perm electric network) is performed in real-time mode through specific terminal.
A cluster of computers for memory resources allocation (with Microsoft Windows) was used as the terminal. The base itself was deployed on a high-capacity server with LINUX.

It allowed solving the problem of information centralization and resource allocation. As far as a cluster, by definition, combines two or more servers working together to ensure trouble-free operation of set of applications or services and perceived by a customer as a single unit, then this technology could not be better used to solve the problem of remote access to a single database of 'Permenergo'. The cluster nodes

are combined though the hardware network resources, sharable resources and server software.

1. Microsoft Windows 2000/2003 supports two clustering technologies: clusters with load balancing (Network Load Balancing) and server clusters (Clustering based on Windows 2000/2003. Online. Network Load Balancing: the description of technology. Online).

Server cluster distributes its load among servers within the cluster, each server carries its own load. If a failure occurs in a cluster node, applications and services, configured to work in a cluster, are transparently restarted in any free node. Server clusters use a shared disk to exchange data within cluster and to provide transparent access to its applications and services. They require special equipment, but this technology provides a high level of reliability, as the cluster itself does not have any single point of failure. This mode of cluster configuration is also called active-passive mode. Application in cluster works on one node with the common data located in an external storage. (Clustering based on Windows 2000/2003. Online)

Since personnel management and accounting must be carried out in real time, any failure of the system can result in serious consequences, cluster fault-tolerance helps to solve effectively any system problem arising in operation. This technology is exactly the one used in Permenergo OJSC.

A cluster approach to internal network provides the following benefits (Kireev, 2008):

1. A high level of efficiency.

When services or applications fail on some node in the cluster configured to joint operation, cluster software allows restarting the application on another node. Users either observe a momentary delay in sustaining an operation or do not notice any server failure at all.

2. Scalability.

For applications in cluster, adding a sever to a cluster means an increase in capacity: fault-tolerance, load balancing and etc.

3. Manageability.

Administrators with a single common interface can manage applications and services, establish a reaction to failure in cluster node, distribute the load among its units or remove their load to perform preventive maintenance.

We propose to examine the work of cluster on a real example of enterprise management system – ('Permenergo' case study).

Principal Activity

Currently, Permenergo OJSC operates in a branch status of OAO 'Mezhregionalnaya raspredelitelnaya setevaya kompaniya Urala' ('Interregional Distribution Company of Urals'). 'Permenergo', as a branch, transmits electricity through distribution networks and connects consumers to the electric infrastructure.
The following business processes are involved in automation of enterprise management system using 'Capital CSE Software':

1. accounting;
2. fixed assets accounting;
3. material assets accounting;
4. payroll accounting;
5. personnel management;
6. management of contract activity;
7. supply management;
8. financial management.

Terminal management enables allocation of user access rights not only to a single database information but also to resources in the terminal (Boyarkin, 2008). Only part of users has the ability to forward mail from own computers to the terminal; this limitation was caused by the need to protect the terminal from computer viruses, but some users have an ability to transfer generated tables to their computers but this access is given only in case of industrial necessity.

4. Results

The use of economic, technological clusters is a new and most correct approach to solving modern problems requiring integration of information processes, processing of large volumes of information in real time operation given technical resources of enterprises and institutions of higher education.

5. Conclusion

According to the results of this article, we suggest the following conclusions. When writing the article, cluster technology and ERP-systems use were analyzed in context of one of the largest companies in the Perm region. The principles of system applications operation and functionality of the Capital CSE management system were considered, a tool for improving the array management within a single corporation was offered, the principles for the implementation and use of cluster

systems in large enterprises were observed. The purpose of this article might be considered as achieved.

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