

# Research, monitoring and diagnosis of continuous control systems IT capacity of information flows in of metallurgical enterprises

E N Bulakina, O N Nedzelskaya, V V Moiseev and A N Bikineeva

Siberian Federal University, 79 Svobodniy prospekt, Krasnoyarsk, 660041, Russia

E-mail: elenagb09@mail.ru

**Abstract.** The article analyzes the effectiveness of the development, implementation and operation of information systems, IT infrastructures the system of metallurgical enterprises and government agencies. Identifying existing problems of the life cycle of IT systems. Some aspects of the development of information technology and the prospects for their use. Prospects of virtualization technologies with the existing development pattern element base processors. Developed IT strategy, which is the link between the strategy of development of the enterprise and the IT department. A comparative analysis of international experience in the application of foreign methodologies, ITIL, COBIT, offering tools to build systems that can provide solutions to highly targeted IT issues. Defined the scope of application of these methodologies in the development of information systems of national importance. A model of the efficiency of public services through information technology. We consider methodologies to gather in a single system the various methodologies, guidance, and legal aspects. The methods for evaluating the effectiveness of information systems. The analysis of simulation systems of information technologies in which they are applied.

## 1. Introduction

The main purpose is: the study of technological virtualization solutions to improve the efficiency of information systems their interpenetration; Development of methodological approaches to the management of complex, centralized IT infrastructure; consideration of the use of adaptive management of IT facilities. To develop a plan for the development of IT infrastructure, you can use modeling to predict the trends of development. In the case of a simple analysis of the carrying capacity of the hardware and software system there is a representation only possible acceptable operating parameters. Mathematical modeling allows to obtain data on the system in a wide range of possible parameters [1]. During the simulation we can get accurate data about the performance of hardware and software system and use it to select the required technical platform [2]. You should also consider testing any available hardware to create a complex environment with real operating conditions in the data center. This environment allows you to experience the power limit values, work in emergency situations, and other options. Recommendations for technological solutions should contain information about the expected level of performance and the necessary software and hardware and the costs of implementation and support. When designing the technical platform for large enterprises with complex IT infrastructures requires in-depth analysis, taking into account all aspects of the integration into a single system. Technological solution should provide guaranteed performance in such clear

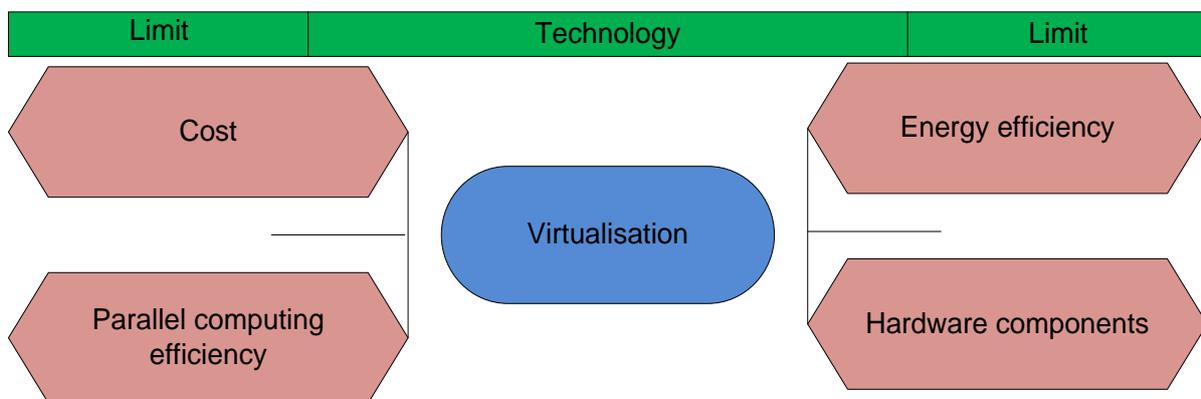


terms, such as performance computing subsystem, the number of IOPS per unit time, the number of transactions per unit of time, and others.

## 2. Trends in the development of IT infrastructures, taking into account the performance of computer systems

Determine the performance of hardware and software system helps to calculate workload indicators, such as growth in the number of transactions by 50% at peak load. These data are used to predict the state of the system when the load increases, as well as for determining the parameters of the expansion system. There is an important smooth interaction with the hardware vendor in terms of harmonized test methods for correct comparison of performance information systems. Also worth noting is that the introduction of a complex distributed IT environments requires a comprehensive approach, as a large number of technological interfaces creates many interdependencies performance parameters [3].

By itself, the development of IT infrastructure is a tool for effective development of the company. In the development of IT, there are various empirical observations, in particular, of Moore's Law and its derivatives in various fields, Koomey, Amdahl, Grosch, Nelsen, Kreider and technologies shaping the development of IT, such as Web 2.0, BYOD (Bring Your Own Device), Tablet PC virtualization and others. Of course, between the laws and technologies have relationships to help you determine the horizons of development of a technology. For example, to implement virtualization technologies on the existing hardware components can be attributed Moore's law in respect of the element base, Amdahl's law regarding the effectiveness of parallelism computation Koomey's law with respect to energy efficiency, Grosch's law in respect of the cost, the Bekenstein limit in respect of the limited computing systems [4]. Thus, modeling the trend of development of information technology, or perhaps taking into account existing laws, figure 1.



**Figure 1.** The limits of virtualization technologies.

## 3. Simulation and testing of the hardware complex to create an environment with real operating conditions.

Thus, Amdahl's Law shows growth restriction of the computing system computing increase parallelism "In the case when the task is divided into several parts, the total time of execution on a parallel system cannot be less than the execution time of the longest fragment":

$$S_p = \frac{1}{\alpha + \frac{1-\alpha}{\rho}} \quad (1)$$

Where  $\alpha$  - the proportion of the total volume of calculations that can only be obtained by successive calculations, the share  $(\alpha-1)$  - can be parallelized ideally,  $\rho$  - the number of computing nodes.

From this we see that the algorithm contains only parallel computing provides a linear increase in performance with increasing number of calculators. If the proportion of the algorithm in parallel computing is 90%, the increase in the number of times processor 10 provides the acceleration to 5.26 times, 100 times – a 9.17 fold increase to 1,000 and gives 9.91 times acceleration. Thus, the increase of efficiency of parallel computing depends on the algorithm and limited at  $\alpha > 0$ . In turn, this shows the limitations of concurrency computing for virtualization

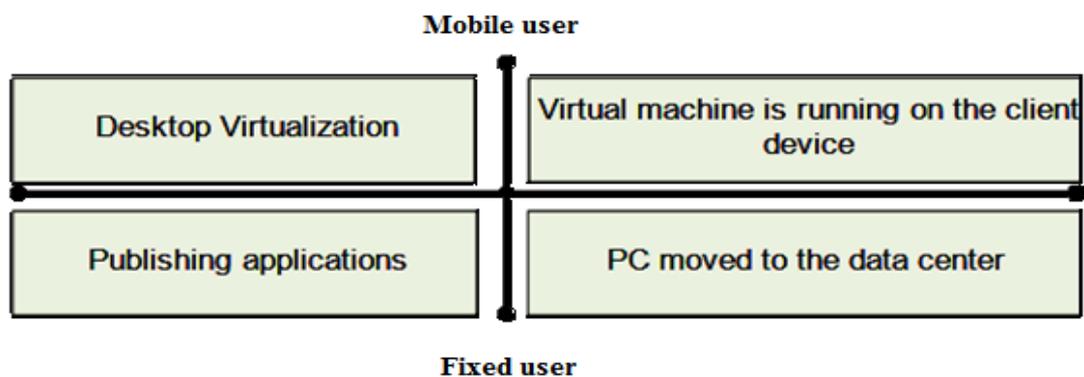
Koomey law describes a multi-year trend in the development of hardware computing systems since 1946. Koomey observations show that the number of calculations relating to the joule energy dissipation increases approximately every 1.57 years.

Grosch's law states that the more expensive computer, the better balance of performance and price for it. In practice, this law corresponds to that of a large scalability and high performance easier to achieve using centralized data centers than on small computer systems [5].

Restriction Bekenstein an upper limit quantity of information which may be contained within a given volume using a predetermined amount of energy. That gives us an idea of the physical limitations of productivity computing systems.

Virtualization technologies allow you to create alternative solutions in the construction of information structure. Traditional solutions, in this case, include desktops. According to surveys, the main aspects of the classic PC environment, stimulating interest in alternative solutions are price, security, manageability, flexible remote access, reducing energy costs [6]. The most interesting for us is a flexible remote access.

For an employee working environment should be varied, accessible from anywhere, to support different loads and devices for flexible access. From the point of view of the person responsible for the management of the working environment, it should provide control over all user data, operating system images, settings and so on, and at the same time be accessible remotely, figure 2.



**Figure 2.** Approaches that provide flexibility in the production environment.

#### **4. Implementation of virtualization technologies on the existing element base of the enterprise, providing flexibility in the work environment**

In this regard, we can turn our attention to the fleet management devices, whose number is constantly growing to control the working environment. This will solve the problem of constant upgrades, updates, hardware and software parts. In fact the differences in remote access technologies consist in what part of the client environment, we move into the data center [7]. Consider the basic approaches (Figure 3).

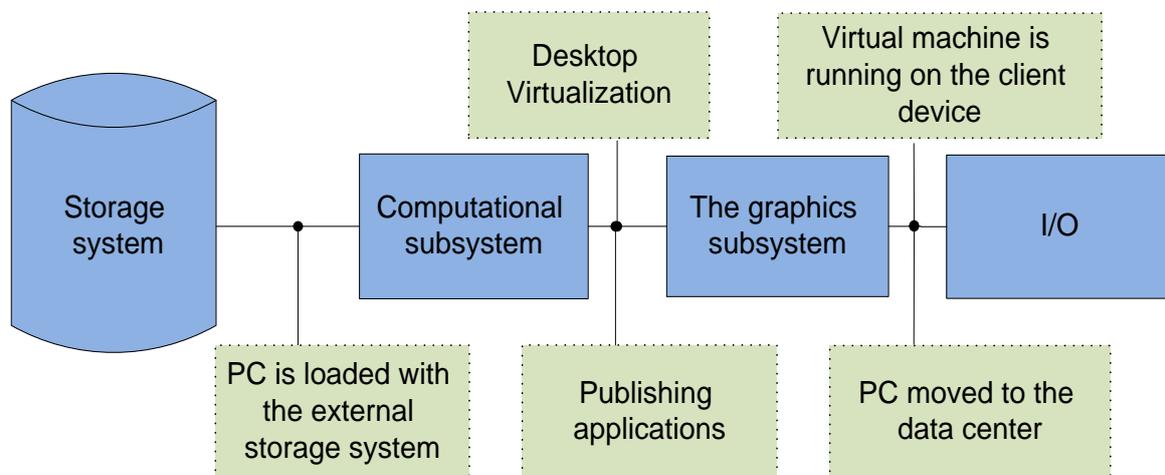
The PC is loaded with the external storage system. In this case, the delivery will take an image of the operating system of the data center. Thus, in the data center, we move everything about the storage infrastructure. That is, in personal computers completely or partially missing hard drives, but all that relates to computational processes - is on the side of the client device.

1. Virtualization jobs. Using this approach, the data center shall be made not only all that relates to the storage and computing resources. In this case, all that relates to the processing of image data remains on the side of the client device.

2. Publication of the application is the most common approach. In this case, all applications run in the data center. The client device carried postage image, i.e. the device acts as a client terminal device.

3. PC is moved to the data center. In this case, the employee of the display remains and input-output device that is not a computer.

4. The virtual machine running on the client device. This approach allows us to empower approach desktop virtualization, providing the ability to perform tasks without the employee's connection to the data center on his personal computer in an isolated virtual environment.



**Figure 3.** Different approaches centralized management

It should be noted that it is difficult to name some of these universal solutions [8]. Depending on the requirements of the infrastructure operating environment may use one or the other approach, or combinations thereof. It should be noted that it may remain a task that will remain outside of these approaches. Consider approaches that provide flexibility in the organization of the working environment.

For users who need to provide mobility, using the classical set of applications most appropriate solution is desktop virtualization. If you want more processing power, centralized data protection approach is used in which the PC is loaded with the external storage system. In those cases where it takes a lot of computing resources, such as graphic workstations, PCs displacement method is applicable to a data center. This will optimize the management of power and cooling, as well as improve the ergonomics of the workspace. In the case of performing specialized applications on mobile computers may be the best approach is the implementation of the virtual machine on a PC.

Thus, the conclusion that before using any technology necessary to analyze the needs of the enterprise. This will create an integrated system that links a variety of technologies, methodologies, and processes occurring in the enterprise. Currently developed a database that allows to evaluate IT infrastructure, based on the results to develop an action plan for the modernization and further development of the IT infrastructure to meet the requirements necessary enterprise methodologies.

## 5. Conclusions

It should be noted that it is difficult to name any of the above solutions universal [8]. Depending on the requirements for the infrastructure of the work environment, it is possible to apply this or that

approach, or their combinations. Here it should be noted that there can be a task that will remain outside the considered.

For a user who needs to provide mobility, when using the classic set of applications, the most appropriate solution is the virtualization of the PC. In the event that it is necessary to provide more computing power, centralized data protection applies the approach in which the PC is booted from an external storage system. In those cases where a lot of computing resource is required, for example, graphic stations, we apply the way of moving the PC to the data center. This will optimize the management of power and cooling systems, as well as improve the ergonomics of the workspace. In the case of performing specialized applications on mobile computers, the best approach may be to run a virtual machine on a PC.

Thus, the conclusion suggests that before the application, this or that, the technology requires an analysis of the needs of the enterprise. This allows you to create an integrated system that connects various technologies, methodologies, and processes occurring in the enterprise. Currently, a database has been developed that allows to assess the IT infrastructure of the enterprise, based on the results obtained, an action plan is being developed to modernize and further develop the IT infrastructure in accordance with the requirements of the necessary enterprise.

When choosing technologies for the development of the company's IT infrastructure, one should pay attention to the prospects of using the chosen technology. So, according to the principles of building computing systems, virtualization technologies have a limited development limit, at the end of which it is possible to replace innovative technologies. But for today this technology is one of the most effective in application.

In the organization of flexible management of the working environment, a comprehensive assessment of the tasks facing us should be carried out. It is necessary to conduct a detailed collection of data on the interaction of the collective of the enterprise to create an optimal information structure. Only taking into account all requirements, it is possible to achieve results that meet the requirements of the enterprise and increase the efficiency of the work.

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