Chapter 32
Using Snapshots for Organizing Work Environment With Virtual Machines

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ABSTRACT

The chapter reveals the issue of implementing snapshots for maintaining virtual machines used for students' lab stands. Hence, implementing that backup/restore method means significant reduction of the amount of effort required for lab stands maintenance. The actuality of this chapter is in the increasing appliance of virtualization methods in the educational process, as it currently is not very developed due to the lack of a systematic approach to the development and application of new technologies. The object of study is the practical part of the course "Network Software" of the Department IU5 in BMSTU. The subject of research is the process of preparing a virtual stand for lab works. The purpose of research is to prove the significance of applying virtualization technologies such as using snapshots in the educational process.

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ORGANIZATION BACKGROUND

The Bauman Moscow State Technical University (BMSTU) is a public technical university located in Moscow, Russia. The BMSTU is the oldest and largest Russian technical university offering B.S., M.S., and PhD degrees in various engineering fields and applied sciences.

The BMSTU has 19 departments providing full-time education. Currently, strategy of the University is to provide human resources for cutting-edge areas of Russian science and technology, foremost economic development directions of the country, such as: Information and communication systems; nano systems and materials industry; power supply and conservation; biosystems; security and counterterrorism; transportation and aerospace systems; promising military equipment ("Bauman Moscow State Technical University," n.d.).

The department *Information processing and control systems* was founded in 1938. The main directions of training are programming, information support, computer networks and telecommunications, and modeling and system design of automated control systems. Students' acquaintance with the basics of computer science and features of the future profession begins already in the first year of education. In the last decade, the department continued scientific and methodical research in the field of creating and developing modern methods of modeling and designing distributed automated control systems.

SETTING THE STAGE

Considering the changes in the educational process, it is recognized that educational programs in the field of computer science in particular require continuous updating, because, unlike engineering or, especially, mathematical or physical sciences, technologies and principles of computer science may become obsolete in 5-7 years (Pokrovsky, 2010). Considering this, special attention should be paid to the updating of study plans.

In the study of computer sciences, during practical activities, students need to work with software which is specifically needed for this discipline (e.g., programming, machine graphics, modeling, numerical calculations, and databases).

According to Patricia Dickinson and Judith Montgomery (2016), when it comes to mathematics, professional development and teaching strategies are essential to promote multiple representations and ways of knowing, especially in a time where reform practices are valued. However, for strategies to transfer into teachers' classroom practice, authentic activities must be embedded to provide an opportunity to experiment and explore new concepts, construct knowledge, engage in dialogue with peers, and develop the confidence to master new strategies.

Obviously, mistakes are a norm in the learning process, and not an exception. Virtual machines (VM) are convenient not only because in case of incorrect actions the student can easily restart his machine or take a new one. After all, a virtual machine is just a collection of files. They can significantly reduce the cost of organizing the educational process and make it more effective. The process of using VM began at the end of the last century, in many educational institutions. Nowadays, the trend is not only to use VM, but also to transfer them to so-called clouds. This is possible when the user is provided with the necessary computing and information resources through modern network technologies, and he/she interacts with the programs that he/she needs and that he/she can operate remotely. The user is often

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