

## Current status of the project

### “VEonPC — Virtual Environment on PC-Linux-cluster: Research & Development & Demonstration”

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### Abstract

In the judgment of Frederic Brooks, one of most prominent scientists in the computer science, virtual reality (virtual environment — VE) has been transferred from laboratories to practical applications, where it is in daily use by engineers, scientists, medics, the military — that is not only by computer graphics specialists.

**The general goal of this project<sup>6</sup>** is to make VE-technology closer to end user in Russia by creating cooperative center for computation and demonstration using available (commodity) in the country hardware and software.

As a result of implementation of the project it does possible to carry out fundamental researches and to solve complex and actual problems originating in daily life, using the up-to-date technology of human-computer interaction — virtual environment, which provides for not only immersion of a person to the artificial world of a model but also direct data manipulation in the scene.

VE allows to make data processing, modeling and planning of experiments, creation of complex machines and mechanisms, industrial objects and processes at a qualitatively new level and also to boost training efficiency of personnel driving complex machines, and processes.

**The new feature of the project** — the utilization of widely available high performance personal computers and inexpensive elements of VE. They allow to establish a software&hardware installation providing with solutions of tasks earlier available only for the big scale and expensive systems.

**Application areas** for this research include both traditional fundamental disciplines: physics, mathematics, astronomy, medicine; and special applied sciences: space exploration, computational fluid dynamics, computational oceanography, geosciences and geotechnics, probing and construction of shells (hulls of submarines and nuclear reactors), metal forming (car and aerospace industry), elasticity, casting, impact analysis (crash simulation), electromagnetics, and biomedical engineering (protheses and artificial teeth), and, at last, applications in defense area and at liquidation of extreme situations. Training for complex technical tasks, such as cosmonauts and pilots training, is one of the important applications of VEs.

An international consortium of researchers to focus on the underlying theoretical problems that must be solved for producing meaningful and high-level visualization in VE is proposed. The universities and research institutions to be included in this project have the responsibility to devise new ways for visualization in VE and provide prototype implementations that can easily be integrated into existing visualization systems. Each partner in this collaborative effort address different problems of the total effort.

New educational courses on computer graphics, scientific visualization and virtual reality will be established to migrate the research results into the classroom, possibly utilizing distance-learning technology among the various sites for remote teaching. This will allow direct communication among the various research groups as well as an immediate transfer of the new knowledge into science and engineering curricula.

The circle of primary users of the system includes physicists, mathematicians, doctors, designers and engineers, nuclear plant operators and also students and post-graduate students. Further it, undoubtedly, will be considerably enlarged.

During the conference we will demonstrate several applications, that have been implemented in the current time.

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## The examples of VE demonstrations



VE installation at the CeBIT'2002 (Hannover, Germany): Maxim Foursa, Minister of communication and informatic of Russia Leonid Reiman, Vladimir Kabanov, Stanislav Klimenko and Saturn



Space Station "Mir" and kids excursion to "Virtual Planetarium"



Cosmonaut Gennady Manakov with "Cubik Mouse" and VE demonstration at the Expo-Science-2003