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The interoperability problem during the implementation of the FOURTH PARADIGM

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As it is known, at the present time worldwide there is a transition to the so called FOURTH PARADIGM in the methods and means of scientific researches [1]. The essence of the FOURTH PARADIGM is the intensive use of information technologies for the simultaneous using of large amounts of experimental data, numerical simulation results and accumulated knowledge. It is obvious that this requires using of high-performance distributed environment, which includes individual supercomputers, clusters, GRID-systems, cloud computing systems and end-user personal computers. It is also quite obvious that in such a purely heterogeneous environment, which should be classified as a System of Systems (SoS), there is a problem of compatibility and interaction of heterogeneous software and hardware platforms, called "interoperability problem". The interoperability problem should be solved on the basis of the use of profiles - sets of ICT-standards, this problem is dealt with by many organizations and individual researchers around the world, but it is never solved until the end, due to the great complexity. In particular, therefore, the issue of interoperability and development of standards are included in the RAS Program of fundamental researches for 2013-2020 (clause 34). The authors investigate the problem of interoperability for more than 10 years and have developed several standards. The main result should be considered the proposed unified approach to ensuring interoperability for information systems (IS) of the widest class [2], which is subsequently issued in the form of GOST R 55062-2012. Further, the authors applied this approach to specific areas: e-science, e-education, e-health, e-libraries, e-military. Research was also conducted for GRID and cloud computing systems. The authors have regularly reported their results at previous JINR conferences since 2010 [3]. All of the above classes of IS are components of the SoS. Therefore, using these developments and foreign experience [4], we have now started to solve the problem of interoperability in SoS. The problem is very difficult and we have only preliminary results. This work is done with the support of the Program №. 27 of fundamental researches of the RAS Presidium.

Literature:

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Summary

The problem of interoperability in the implementation of the fourth paradigm of scientific research is considered. It is indicated that the information infrastructure in the implementation of the fourth paradigm belongs to the class System of Systems –SoS. This information infrastructure is a purely heterogeneous environment in which the problem of interoperability is both very relevant and very complex. Preliminary results on solving the problem of interoperability for SoS, obtained on the basis of the approach developed by the authors and using international experience, are presented.

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