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CMS COMPUTING SUPPORT AT JINR

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Introduction

Computing, software and networks are of paramount importance to the Compact Muon Solenoid (CMS) experiment. Solving of many tasks both in the construction and runnig phases of the CMS experiment requires a wide use of computer resources. All these requirements are stated in the CMS Computing Technical Proposal (CMS CTP) [1].

More than 1600 scientists from 151 scientific centres participate in the CMS Project. In 1994 Russian and Dubna Member States collaborating in CMS decided to organize themselves in a single collaboration, the Russia/ Dubna Member States CMS collaboration (RDMS CMS).

In the context of JINR activities in the CMS Project, we consider our task to provide hardware and software resources at JINR for full participation of JINR specialists in the CMS experiment and make the JINR computer infrastructure closer to the CERN one.

Common CMS requirements on computing

The main tasks at construction phase requiring computer resources (according to CMS CTP) are:

1. Detector and physics simulation:

    - to evaluate the detector performance and design;
    - to develop and verify the trigger, calibration, reconstruction and data analysis algorithms.

2. Test beam:

    - data storage and access;
    - data processing.

3. Engineering studies:

    - mechanical engineering;
    - electric/electronic engineering.

4. Information distribution and network communications:

  - WWW-access to information ;
  - fast network access ;
  - teleconferencing.

5. Computing infrastructure:

  - choise of operating system, programming language, text processing system and scripting language.

6. Regional computing centres:

  - half of the required CPU power and disk storage needed for the Monte-Carlo simulation is expected to be located in the institutes outside CERN.

Taking into account all these requirements, we can formulate that for all CMS institutes in the construction phase of the CMS project is needed:

- availability of actual versions of CMSIM simulation package at all institutes;

- computing infrastructure with UNIX operating system (Solaris), F77, F90, C, C++ compilers, HEPix environment, LaTex and Word text processors, perl scripting language;

- CAD/CAM support;

- WWW informational support on CMS activities;

- sufficient CPU and storage resources for simulation and data processing tasks;

- fast network access;

- hardware and software for teleconferencing.

Investigations on CMS at JINR requiring computer resources:

- mechanical and electronic design for the Endcap HCAL, the Muon Station ME1/1 and the Endcap Preshower;

- detector and physics simulation;

- beam test data proccessing;

- physics analysis.

Activities on CMS computing support at JINR

In 1997 the SUN CMS cluster has been created at JINR. The computational environment is the same as at the CERN CMS cluster (cms.cern.ch). The CMS cluster at JINR supports both the tasks of simulation and data processing. The cluster is also used as archive server for electronic and mechanical design. Site-licences for JINR on Fortran F77-4.0 and C++-4.1 provide all JINR specialists with complete conditions in Solaris OS environment for their work, including the use of current CERNLIB versions. The latest versions of many FSF/GNU products widely used in JINR are installed on the cluster.

JINR SUN CMS Cluster Resources:

Hardware:	3 SPARC-stations (140 Ultra SPARC station and two SPARC stations-20)
Disk Space:	24 GB
Software:	OS Solaris 2.5.1 C-4.0, C++-4.1, F77-4.0 compilers cernlib97a
Number of users:	38

RDMS CMS WWW-Server

The CMS informational system is heavily based on the world-wide web (WWW). The web-server (http://sunct2.jinr.dubna.su) has been designed
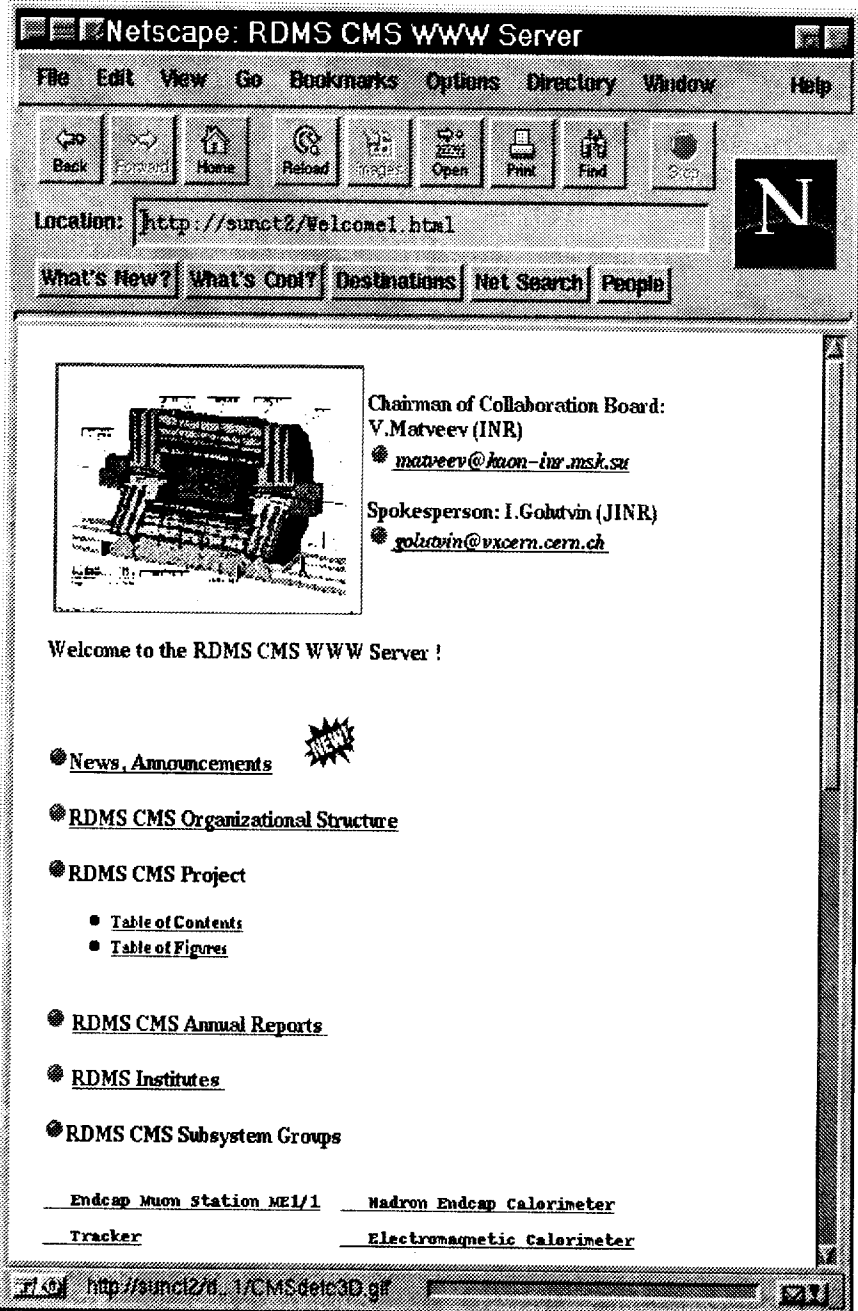
Figure 1: Welcome-page of RDMS CMS WWW-server.

at JINR and contains information on RDMS CMS collaboration activities in different forms (texts, tables, draughts, figures, pictures, etc.). The total number of documents on this server is about 500. This web-server has been adopted as an official web-server for the RDMS CMS collaboration by the RDMS CMS Collaboration Board in June, 1997. The quality of the server structure and its contents have been highly appreciated by CERN experts.

Now on the RDMS CMS web-server (http://sunct2.jinr.dubna.su) there are references from the CERN CMS web-servers CMSDOC and CMSINFO. JINR is responsible for further development and support of the RDMS CMS web-server. Now the server is accessed dozens of times a day from many sites (from CERN, Russia, USA, France, Italy, etc.). The RDMS CMS welcome-page on the WWW-server is presented in Fig.1.

Plans for further CMS computing support at JINR

- support and development of JINR Sun CMS cluster;

- technical support of RDMS CMS WWW-server;

- collective access to engineering tools;

- paricipation in teleconferencing.

Modernization of the current local network (ATM) and development of external network communications from JINR will promote more effective participation of JINR specialists in the CMS project.

Software evolution strategy requires use of object-oriented methods. In the context of this trend, it is neccessary for JINR to obtain the corresponding software and force specialists to be experienced in the object-oriented approach.

JINR activities on CMS computing at JINR have been reported at Annual RDMS CMS Meetings in 1996 and 1997 [2-5].

References

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Голутвин И.А. и др.
Поддержка компьютинга CMS в ОИЯИ

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Участие сотрудников ОИЯИ в эксперименте CMS на LHC предполагает активное привлечение компьютерных средств. К настоящему моменту созданы условия для проведения таких работ непосредственно в ОИЯИ: компьютерная инфраструктура соответствует основным требованиям по CMS-компьютингу, предоставлены необходимые вычислительные и дисковые ресурсы. Также оказывается информационная поддержка для эксперимента CMS (web-сервер http://sunct2.jinr.dubna.su). В работе очерчен круг дальнейших планов по поддержке компьютинга CMS в ОИЯИ.

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CMS Computing Support at JINR

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Participation of JINR specialists in the CMS experiment at LHC requires a wide use of computer resources. In the context of JINR activities in the CMS Project, hardware and software resources have been provided for full participation of JINR specialists in the CMS experiment; the JINR computer infrastructure was made closer to the CERN one. JINR also provides the informational support for the CMS experiment (web-server http://sunct2.jinr.dubna.su). Plans for further CMS computing support at JINR are stated.

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