CMS Computing Activities in Russia: Current Status and Plans

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A number of Russian leading nuclear physical institutes and tens of Russian manufactories and plants participate in the construction of all the detectors at the Large Hadron Collider (LHC, CERN): ATLAS, CMS, LHCb and ALICE. In a total Russian investments into the LHC project can be evaluated at the ≈5% level.

In order to provide a full-range participation of Russian scientists at the LHC projects at the running phase of the accelerator and the detectors, it ought to organize a computing support for these experiments in Russia at a proper level.

During last several years Russian institutes joined their activities and the Project on a creation of Russian Regional Centre for storage and analysis of LHC data (RRC-LHC) has been created [1]. At this moment the main task is to create and test a prototype of such a distributed center in Russia.

During last two years several institutes participating in CMS: the Institute of Theoretical and Experimental Physics (ITEP) and the Skobeltsyn Institute of Nuclear Physics (SINP MSU) in Moscow, the Joint Institute for Nuclear Research (JINR, Dubna) and the Institute of High Energy Physics (IHEP, Protvino), Lebedev Phisics Institute (LPI, Troitsk) worked in a close cooperation in a frame of the activities on a creation of a RCC-LHC prototype [2]. Several PC-Linux clusters with a proper software environment have been created (see Fig. 1; here RCC MSU - Regional Computing Center of Moscow State University, a part of its resources is used for a RCC-LHC prototype). As it can be seen from Fig. 1, there are about 60 CPU at the four Russian institutes with a disk space of several TB and DLT automatic tape library with a capicity of 10 TB. Since September this year the CPU and disk resources will be increased significantly: by more than 100 CPU and 5 TB of a disk space.

Nowdays these clusters of a prototype of RCC-LHC are being used in particular for testing of a current CMS software and for a participation in mass simulation runs on a generation of simulated physical data of different types to include them into a common CMS data base at CERN. For example, 285000 events were generated at RCC-LHC during CMS Monte-Carlo events production run in spring, 2001 (see Fig. 2). It constituted a 19% of a total amount of events generated during this run at all CMS institutes.

As the Grid technologies will be used for a realization of a distributed model of RRC-LHC and an integration into the global LHC computing infrastructure, we participate in the EU DataGrid project in WP6 (Testbed) and WP8 (HEP Application) Working Packages. By summer this year a project supported by INTAS on global tests of DataGrid technologies has began. One of the main problems are

Figure 1: Current status of common resources of a prototype of a Russian regional center for storage and analysis of LHC data.

a problem of fast internal links between Russian institutes and a problem of a fast link from Russian institutes to CERN. Current status of links is shown at Fig. 3.

In the future we consider a CMS regional center for LHC in Russia as a part of RRC-LHC. It assumed to be some kind of a distributed cluster of a Tier2 level centers with some functionalities of TIER1 (according to the classification given by the MONARC project [3]) which will be connected to some LHC/CMS regional center of a Tier1 level (see Fig. 4).

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References

[1] http://theory.npi.msu.su/ ilyin/RIVK-BAK

[2] O.Kodolova, E.Tikhonenko. – CMS Conf. talk 2000-030, CERN, Geneva, 2000.

[3] http://www.cern.ch/MONARC

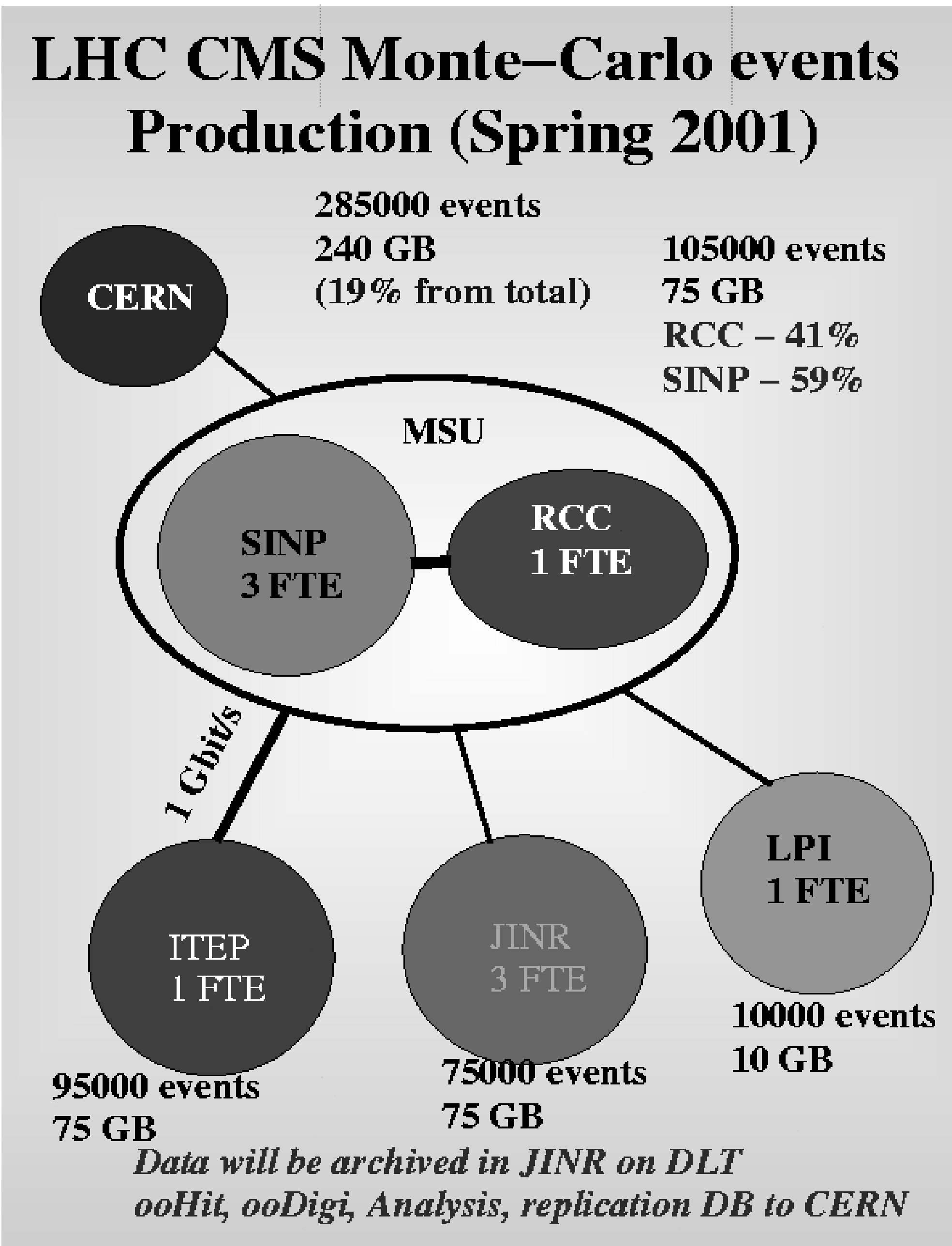

Figure 2: Russian participation in CMS Monte-Carlo production run in spring, 2001 (MSU - Moscow State University; LPI - Lebedev Physical Institute; FTE - full-time employee)

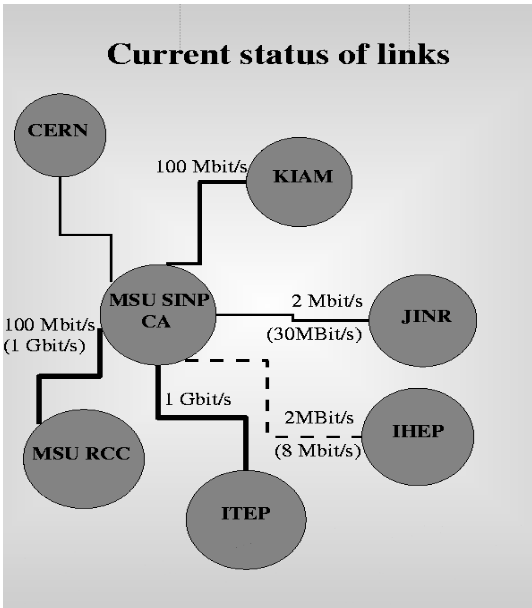

Figure 3: Current status of links at the constructing RRC-LHC prototype.

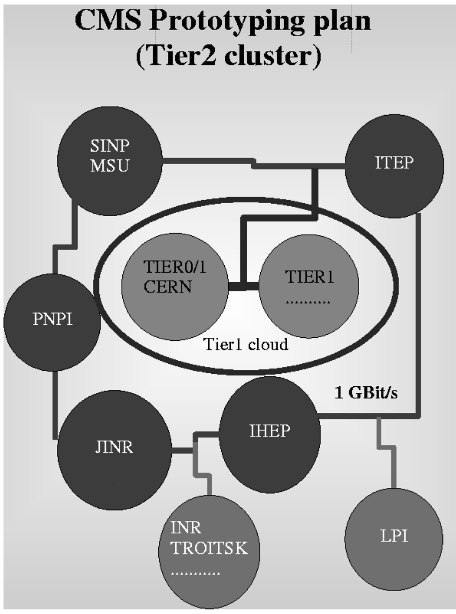

Figure 4: Outline of CMS regional center in Russia (here PNPI - Petersburg Nuclear Physics Institute; INR - Institute for Nuclear Research).