

## I.1 : Computing and information management development at RRCAT

### A) Virtual cluster based setup for OPERA software:

One virtual cluster based setup has been commissioned for OPERA software, which is a well known magnet designing and simulation software. OPERA version 11.02 has been procured by Indus Operations & Accelerator Physics Design Division of RRCAT, for which virtual cluster based solution has been implemented by the Computer Centre. The setup consists of three HP DL 380 G5 servers (Xeon 3.73 GHz Dual core, Dual processor servers with 8, 8, 4 GB RAM). One of the servers is configured as license and backup server (for high availability) and remaining two servers are configured as application servers with Red Hat Enterprise Linux 4.0.

GUI based 2D and 3D applications of OPERA need high performance industry standard OpenGL run-time libraries. All the three servers are optimized for OpenGL run-time libraries.

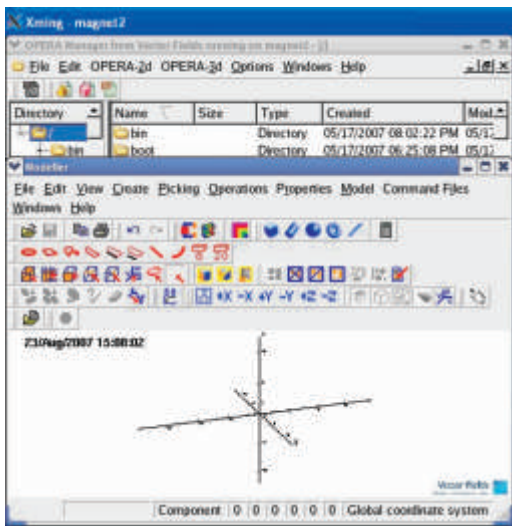


Fig. I.1.1: Remote execution of OPERA on application server from window desktop.

Users can run their GUI based applications remotely from their desktops on RRCATNet (see Fig. I.1.1). Open source software Xming is configured for running applications with OpenGL support from remote Window desktops.

### B) Porting of user programs:

As per requirement of many users, various software packages were successfully ported on Intel based computing servers. The software packages are - Tracy2 (routines for beam dynamics), V-bond (to calculate eigen values and

vectors of symmetric matrices), PICPSI-3D (plasma physics particle-in-cell code) and CNTech Toolset (software to model and simulate image formation and resist development in x-ray and EUV lithography).

### C) RRCATInfonet:

RRCAT Intranet is very popular portal for dissemination of information among the employees using two access schemes – open access and authenticated access. Due to the technological advancements and limited functionality of existing software platform, the need for upgradation was felt. The new Intranet server was configured using open source Jakarta Tomcat web container. Configurations were carried out for authentication from LDAP server for single sign-on. Administrative module of the web container was added for better monitoring and management of JVM, sessions, thread pools and database connections. The authentication mechanism has been redesigned and implemented using bean managed authentication and session tracking. The existing static web pages, authenticated web applications and Intranet services were ported, tested and deployed on the new server with new look and feel (Fig. I.1.2). The Intranet has been released to the users with all these new features as RRCATInfonet.

One authenticated module for complete purchase information cycle has been developed and released on RRCATInfonet. The authorized users can view information related to all the purchase files including details of indent, enquiry, purchase order (PO), goods receipt, requisition voucher, PO concurrence, consolidated foreign and local payments and cheque. The online information is extracted from the Integrated Purchase-Stores-Audit information management software and Integrated Accounting software. Another authenticated module for XI Plan projects has been provided, which can be used by project coordinators to maintain the status of XI plan project reports.



Fig. I.1.2: RRCAT Infonet portal.

## D) Enhancements to Integrated Accounting Software:

For better information management, new features have been incorporated in the Integrated Accounting Software. To avoid any misclassification, the head of account and budget master tables were updated according to generic coding scheme and provided in all modules like receipt, payment, cheque and budget compilation. Provision is made to maintain financial year wise details of Budget Estimate, Revised Estimate, Final Grant for complete five year project plans. To strictly monitor expenditure against sanctions, all payments are checked against these entries. Commitments with respect to purchase orders and works files are checked at pre-audit stage to stop over commitments. Provision to fulfill statutory requirement of Form-16, VAT statement and RRCAT financial statement required by Ministry of Finance has been made in the software. All these reports can be generated by the software. Now the expenditure statement (sent to the project coordinators) showing financial year-wise expenditure and progressive expenditure is generated through the software.

## E) CORAL database copy tools for LHC:

Under DAE-CERN collaboration, Computer Centre completed the project to develop a set of CORAL database copy tools for LHC users. The CoralTools package was designed and developed to provide a set of export tools for CORAL (Common Object Relational Access Layer) framework to simplify deployment of CORAL based applications. The package provides facility for copying either individual tables or complete schemas between existing databases and technologies. The tools support schema and data copy between Oracle, MySQL and SQLite relational databases.

The CoralTools package was developed in Python and it is an implementation of PyCoral interface developed using the Python C API. The set of CoralTools were tested and implemented on CERN servers. Programs were written for unit testing, integration testing and stress testing (performance analysis was carried out on databases containing upto 5,00,000 records). This module has been released to users in CERN.

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## I.2 : Developments in networking and communication at RRCAT

### A) RRCATNet planning, expansion and upgradation:

Under phase IV of OFC networking, Internal CAT5E based networking of two buildings namely LCW Extension and Beam Alignment Lab, along with their backbone connectivity to RRCATNet was completed. The Internal networking was also completed in Training School Building and DSL based RRCATNet connectivity was provided. Network in Purchase building was augmented by 24 nodes, making it 96 nodes network. In all, 100 nodes were added to RRCATNet during the period of Jan-June 2007.

### B) Email and Internet access setup enhancements:

A new, secondary email server with spam and virus filtering solutions has been commissioned. This works in tandem with the primary email server to distribute the load of incoming emails. In addition, it has been programmed to maintain one day old copy of the user areas thus providing a hot standby email server ready for use in case of the primary server failure. The SPAM control sub-system, was also reconfigured with latest updates to follow latest SPAM control procedures.

A hot standby proxy server setup was converted to an automatic failover and load balanced proxy server setup, thus enhancing the existing internet access setup. One monitoring software for graphical visualization of internet access logs on per user basis has also been installed (see Fig.I.2.1).

### Internet access by a user : Monday, Aug. 27, 2007

Time	Site	Minutes	Pages	Downloads	Size
09:28 - 17:22	www.cern.ch	0:17	5	5	3615 bytes
09:28 - 17:31	www.nasa.gov	1:56	5	7	9 kbytes
09:28 - 17:30	www.google.co.in	20:28	30	34	72 kbytes
09:31 - 09:31	www.wikipedia.com	0:02	2	3	5 kbytes
09:31 - 09:42	www.fnal.gov	37:34	1	15	129 kbytes
09:31 - 09:31	www.iitk.ac.in	0:20	1	24	68 kbytes
09:31 - 09:36	www.iitb.ac.in	5:48	1	31	106 kbytes
09:31 - 09:39	www.altavista.com	17:28		11	84 kbytes
09:32 - 17:19	www.barc.gov.in	1:41	9	9	226 kbytes
09:32 - 09:41	www.cdac.in	23:51		7	68 kbytes
09:36 - 09:44	www.iisc.ernet.in	9:23		18	607 kbytes
09:48 - 11:17	www.bsnl.co.in	1:31	4	47	747 kbytes
09:48 - 09:48	www.mit.edu	0:09	1	5	343 kbytes
09:49 - 09:49	www.dst.gov.in	0:05	2	2	3004 bytes
09:52 - 11:30	www.tifr.res.in	0:53	5	17	163 kbytes
09:52 - 10:17	www.iop.ernet.in	1:25	6	28	1471 kbytes
09:52 - 09:52	www.igcar.ernet.in	0:03	1	1	4 kbytes
10:00 - 10:02	www.yahoo.com	1:27	3	32	598 kbytes
10:32 - 17:30	www.gmail.com	0:02	2	2	1236 bytes
10:32 - 17:30	www.cat.ernet.in	392:35	208	370	215 kbytes
10:32 - 17:29	www.howstuffworks.com	0:05		7	28 kbytes

Fig. I.2.1: Snapshot of internet access details for a user.