

interconnects like Myrinet, Quadrics, Gigabit Ethernet and InfiniBand. MPI standards are widely used in distributed memory systems. We have carried out performance analysis of MVAPICH (MVAPICH2 and MVAPICH) and Open MPI to analyze suitability of different MPI standards over InfiniBand interconnect using Intel MP\_LINPACK open source software. The graph below shows the results obtained.

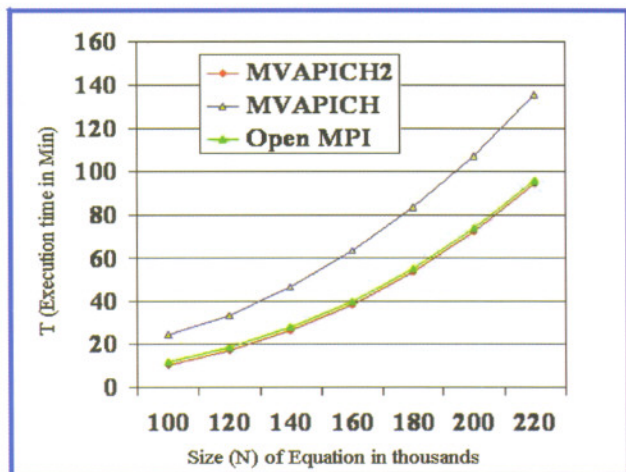


Fig. 1.1.4: Performance of MVAPICH2, MVAPICH and Open MPI with InfiniBand interconnect.

Results of tests carried out for different sizes of system equations revealed that MVAPICH2 delivers better performance as compared to Open MPI and MVAPICH. Thus applications should be based on MVAPICH2 variant of MPI if they are intended to run on high performance computing cluster with InfiniBand interconnect.

## D) Porting of user programs:

As per requirement of users, various software packages were successfully ported on computing servers and clusters. GUI based Biological Application software Autodesk version 4.0 has been successfully ported on Intel Itanium2 based Linux platform. This application has been configured with GUI MGLTools version 1.5.4, Python-2.5, tcl/tk-8.4 and Swig-1.3.31. The sequential applications successfully ported are: CST STUDIO SUITE 2008, Flair (Fluka Advanced Interface) version 0.7, MELD & PPP on Intel Xeon based Linux servers.

The parallel applications successfully ported on Kshitij-1 cluster are: ADF-2009 bundle with HPMPI (Amsterdam Density Functional, version 2009 - a FORTRAN program for calculations on atoms and molecules) and CPMD (Car-Parrinello Molecular Dynamics - Electronic Structure and Molecular Dynamics Program).

## E) Centralized access of ANSYS-12:

ANSYS-12 has been installed and configured on Intel Itanium2 based high-end server Ganak-1 with X11 and OpenGL (Open Graphics Library) for 2D & 3D graphics. All ANSYS users can access ANSYS-12 software by connecting Ganak-1 server through remote graphical display from their Windows and Linux desktops using X Display Manager Protocol (XDMCP).

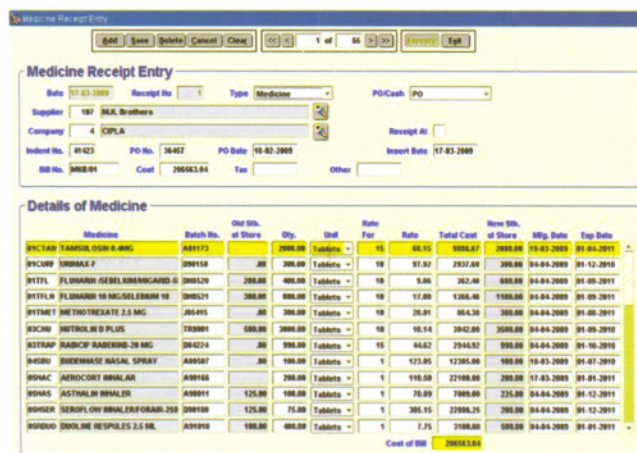
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## I.2: Development of Information Systems at RRCAT

### A) Migration of client/ server based Medical Centre Information Management Software (Chikitsa) to web based architecture:

Medical Centre Information Management Software (Chikitsa) has been migrated to web based platform using n-tier architecture, earlier it was running on two-tier client/server architecture. Xeon based Oracle 10g Database Server and Application Server were installed and configured for authentication from Oracle Internet Directory. Migration and re-engineering of data from Oracle 7.3 to Oracle 10g was carried out while maintaining data integrity and consistency. Migration of forms and reports using Oracle Developer Suite 10g, application deployment on Application Server 10g and unified login was completed with single sign-on functionality.

Re-structuring of the software and database was done to overcome shortcomings of earlier software. New features were added for annual stock taking and report generation from



Medicine	Batch No.	Old Stk.	Qty	Rate	Total Cost	New Stk.	Exp. Date
ASCLIP TABLETS 1000'S/BOX	1001179	0	200.00	Tablets	18	3600.00	01-05-2010
ASCLIP TABLETS 7	1001180	0	200.00	Tablets	18	3600.00	01-05-2010
BIFFIN FLUOXETINE 100MG/BOX/30 TABLETS	1001176	200.00	400.00	Tablets	18	7200.00	01-05-2010
BIFFIN FLUOXETINE 100MG/BOX/30 TABLETS	1001177	200.00	400.00	Tablets	18	7200.00	01-05-2010
BIFFIN METOPROLOLOL 2.5.MG	1001181	0	200.00	Tablets	18	3600.00	01-05-2010
BIFFIN METOPROLOLOL 2.5.MG	1000991	500.00	2000.00	Tablets	18	18000.00	01-05-2010
BIFFIN PABICIP PAROXETINE 20.MG	1001214	0	500.00	Tablets	18	9000.00	01-05-2010
BIFFIN SIBERWALD NARCAL SPRAY	1000187	0	100.00	Tablets	1	1200.00	01-07-2010
BIFFIN AEROCORET BRIBALAN	1000166	0	200.00	Tablets	1	2100.00	01-01-2011
BIFFIN ACTUALIN BRIBALAN	1000111	125.00	600.00	Tablets	1	7500.00	01-12-2011
BIFFIN SERIOLIN BRIBALAN 250	1000100	125.00	750.00	Tablets	1	22500.00	01-12-2011
BIFFIN DOXIN BRIBALAN 2.5.MG	1000100	100.00	400.00	Tablets	1	2100.00	01-04-2011

Fig. 1.2.1: Snap shot showing entry of received medicines.



archived data and current data. Many queries were provided to doctors, like - medicines issued to patients & patient referral details during specified period, report to provide current status of medicine stock etc. Using these reports it is possible to monitor consumption of medicines for raising indent. The software has also been enhanced for maintaining batch wise stock of medicines to facilitate listing of short expiry medicines.

Comprehensive training to all the users of Medical Centre was provided and now the software is successfully running on Oracle 10g platform.

### B) Enhancements to OASIS - Project Monitoring Software:

Project Monitoring Software OASIS has been enhanced by integrating Major Works data with various budget monitoring reports like list of all indents, list of payments made, procurement calendar and BE/ RE reports. Work order and other details of major works files can be viewed using the link on file no. Additional report has been added to provide list of closed files. Drill down option has been developed in Project Expenditure report for viewing payment details related to M&S, M&E, MW, OE, Temporary Advance, TA etc.

The software was enhanced further by adding another module as c-OASIS (consolidated On-line AccesS to project Information System) for monitoring procurement and expenditure related to all XI Plan projects. c-OASIS can be accessed on RRCATInfonet by Director, Regional Director (IRPSU), JCFA and members of Planning and Coordination Cell for viewing complete expenditure details of RRCAT. Budget monitoring information and payment details for XI Plan projects can either be viewed project-wise or for all projects. They can also view project wise procurement calendar, phasing of plan expenditure and BE/ RE reports for M&S/M&E/MW.

### C) Enhancements to Pay and Allowance Processing System:

Program was developed to generate Pay and Allowances report by extracting online information from Allowance Processing Software and Integrated Accounting Software to avoid duplicate data entry as well as to ensure consistency and correctness of data. Reports for Quarterly income tax return, PF schedule and PF broadsheet were also developed. Pay Bill Register (PBR) module was re-designed, developed and implemented for entry of PBR related details.

'Due statement' was re-generated for arrear calculation of employees affected by re-fixation in certain grades and implementation of Suri Committee recommendations. Consolidation of data from all arrear files was done to

facilitate disbursement of 60% arrears of 6 CPC.

A module was developed for Rebate 89 calculation to distribute Income tax over previous financial years. Arrears related to 6 CPC, Suri committee recommendations and PRIS (O) were consolidated and Form 10C was generated for all employees to verify calculated Rebate 89.

### D) Revamping of RRCATInfonet Portal:

RRCATInfonet is very popular portal for dissemination of information among the employees using two access schemes - open access and authenticated access. RRCATInfonet has been revamped with new look and feel to provide single point access to various web resources and Internet/ Intranet services like email, Information portals etc.

Latest version of Jakarta Tomcat web container was configured on Infonet server. This has features for better monitoring and management of JVM, container managed security for single sign-on, session replication and clustering, shared thread pools, web services support and connection pooling. Latest version of JDK has been configured on the server for supporting AES encryption feature. Secure Sockets Layer (SSL) support is also installed and configured to serve requests over secure channel for applications related to Digital Certificates using https protocol.

The existing static web pages, authenticated web applications and on-line Infonet services were re-designed, tested and deployed with new look and feel using cascading style sheets with Server Side Include feature of web server.



Fig. I.2.2: RRCATInfonet Portal.

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