# Annual Report
## 2013-14

**CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING**

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# Governing Council

(As on 31st March 2014)

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**Shri. P.H. Khurian**
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Principal Secy, (IT), Vellayambalam, Kerala

**Prof. Rajat Moona**
Member, Governing Council C-DAC and
Director General, C-DAC

**Shri. R. Y. Deshpande**
Secretary, Governing Council, C-DAC and
Registrar and Director (Legal & Contracts), C-DAC

# Contents

# Overview

The Year 2013-14 is marked with several technological achievements, events and recognitions for C-DAC. The growth of C-DAC was marked by the establishment of its eleventh centre in the North East at Silchar, Assam during the year. C-DAC's PARAM Yuva-II was ranked the 1st supercomputer in India, 9th in Asia Pacific and 44th in the world for its energy efficiency in the Green500 list. Public release of Urdu language resources on Android was done by Hon'ble MC&IT on December 16, 2013. The Mobile Seva application for mobile based governance developed by C-DAC was dedicated to the nation on December 23, 2013 by Shri J. Satyanarayana, Secretary, Department of Electronics and Information Technology (DeitY). C-DAC also bagged several awards during the year for its technologies and solutions.

After its launch last year, C-DAC's PARAM Yuva-II system has helped process 87136 jobs from various science and engineering domains till March 2014. These jobs were executed by 596 HPC users from 41 different institutions spread across the country. PARAM Bio Blaze, yet another supercomputing system was launched at C-DAC on February 18, 2014 to address the computational needs of bioinformatics user community in the country. C-DAC initiated the design of PARAM Shavak, a ready-to-use HPC system pre-loaded with all the required system software and applications from selected scientific domains. Such a system is expected to help adopt HPC culture in academic institutions. Various HPC applications were ported on PARAM Yuva-II whose architecture is based on Intel Xeon Phi. C-DAC developed an application of grid computing, Bio-Gateway, an easy-to-use interface for Bioinformatics community users to submit jobs on grid GARUDA. C-DAC developed Sumegha Cloud Lab Kit, a cloud installation package that enables an organization to build its own private scientific cloud.

A scalable, multi-lingual search platform for Government of India websites was setup by C-DAC this year. To enable multiple users to communicate in different languages in real time, C-DAC developed a speech translation application as a part of Universal Speech Translation Advanced Research (U-STAR) consortium. For converting documents from image format into Unicode text, an Online Character Recognition (OCR) system was developed and deployed for 12 Indian scripts. For mobiles, "mTranslator", an interactive cross platform application was developed that can translate English to nine Indian languages. JATAN, a virtual museum builder, was deployed this year in ten national museums across the country in addition to four earlier installations.

C-DAC carried out Transfer of Technology (ToT) of integrated E-Nose and E-Vision systems. Wireless Traffic Control system (WiTRAC) was deployed in Indore and Surat. C-DAC Open Process Solution (COPS), an indigenous generic SCADA engine along with a security hardener for data link layer, was developed. A Detailed Project Report (DPR) was prepared towards the design and development of India Microprocessor. C-DAC evolved the technical specifications of Aakash-IV tablets in association with IIT Bombay and IIT Madras and created an eco-structure for testing and certification of Aakash-IV tablets.

BOSS (Bharat Operating System Solutions) Linux Urdu version was released on December 16, 2013 by Hon'ble MC&IT. Vikaspedia, the multilingual, multi-sectoral knowledge portal was launched by Shri J. Satyanarayana, Secretary, DeitY on February 18, 2014. As on end of March 2014, Mobile Seva platform has integrated 1015 government departments/agencies and 318 government services are made available to the citizens through this facility. Various other software solutions were also developed and deployed for e-Learning, e-Governance and specially challenged citizens of India.

C-DAC developed cyber forensic solutions for analyzing SIM cards and call data records. End-system security solutions for application and device control as well as for comprehensive vulnerability assessment were developed. A dynamic network firewall solution was developed for protecting networks against cyber-attacks. Various training and awareness programmes were conducted across the country in information security and cyber forensics.

Various mobile-based health-care solutions were developed including mSymptomChecker (for multiple symptom analysis and associated disease), mSwasthya (Android Appstore with about 15 different applications) and MoSQuIT (disease surveillance system for malaria). C-DAC initiated deployment of Megh Sushrut, a hospital management information system, in the state of Maharashtra across several of its government hospitals. e-Aushadhi, a supply chain management system for drugs, is being implemented in the states of Maharashtra, Punjab, Rajasthan and Odisha.

Automation tools for managing GATE 2014 examination were developed using which about 10 lakh candidates applied for the examination and received the online status updates and results. Authoring tools which help in creating question repository were developed. The same were used for authoring question papers for the C-DAC's Common Admission Test (C-CAT). C-CAT examination was also conducted using computer-based examination mechanism developed completely in-house by C-DAC. C-DAC also initiated development of solutions for certificate verification, training centre management, university management and e-courses. C-DAC continued to offer its M.Tech, PG Diploma courses, and other training and skill development programmes during the year.

In addition to the activities carried out in various thematic areas, C-DAC initiated some new technology development activities. These include electronic Personal Safety System (ePSS), India Microprocessor (IMP) and National Supercomputing Mission (NSM).

The above mentioned activities have resulted in several research publications, patents, many awards and several new collaborations with academic and research institutions both in India and abroad.

This annual report covers the accomplishments and major activities of C-DAC during the year 2013-14.

# Technical Areas

## High Performance Computing (HPC), Grid Computing and Cloud Computing

C-DAC continued working on its HPC program through its various new initiatives comprising of HPC systems and facilities, HPC applications, HPC solutions and services, as well as grid and cloud computing. During the year, C-DAC also collaborated with the Department of Science and Technology (DST) and various other Departments and Ministries to prepare the National Supercomputing Mission proposal, which defines the future roadmap of India's HPC program. The activities carried out by C-DAC during the year 2013-14 in this area are briefly covered below.

## High Performance Computing

### National Supercomputing Mission (NSM)

A proposal titled "National Supercomputing Mission: Building Capacity and Capability" has been evolved by the two departments of the Government of India, namely Department of Science and Technology (DST) and Department of Electronics and Information Technology (DeitY), following all due procedures and after building the national consensus for advancing supercomputing technology, applications, research and related activities in the country. The proposal aims to consolidate the ongoing initiatives by various agencies in supercomputing in the country into a collaborative program along with effective governance and monitoring mechanisms. The main objectives of the proposal are:

● Make India a world leader in HPC and to enhance the national capability in solving grand challenge problems of national and global relevance
● Empower scientists and researchers with state-of-the-art computing facilities for their cutting-edge research in their respective domains
● Reduce redundancies and avoiding duplication of efforts and investments in HPC
● Attain global competitiveness and self-reliance in HPC

During the year, a joint EFC proposal was evolved for the said National Supercomputing Mission. After obtaining requisite approvals from both the ministries, i.e., approval of Hon'ble Minister of C&IT as well as Hon'ble Minister of S&T, the joint EFC proposal was circulated by DeitY, inviting comments and views of all concerned Departments/ Ministries. Positive and favourable comments have been received from all the stakeholders, namely Department of Agricultural Research and Education (DARE), Department of Atomic Energy (DAE), Department of Biotechnology (DBT), Defence Research and Development Organisation (DRDO), Ministry of Earth Sciences (MoES), Department of Economic Affairs (DEA), Department of Expenditure (DoE), Department of Higher Education, Ministry of Human Resource Development (MHRD), Council for Scientific and Industrial Research (CSIR)/Department of Scientific & Industrial Research (DSIR), and Department of Space (DoS).

The joint EFC proposal has been revised based on the comments received and also includes para-wise response to the comments of various stakeholders. The EFC is expected to meet shortly and consider the proposal.

## HPC Systems and Facilities

**PARAM Yuva II**

In the last year's annual report, it was reported that C-DAC launched its PARAM Yuva II system on February 8, 2013 and dedicated this new and powerful supercomputing system to the HPC user community of the country. This was the first system in the country to cross the half petaflop milestone by having computing power of 529 TF/s. During the current year, C-DAC benchmarked this system by operating and running the standard LINPACK benchmark and registered the benchmark and obtained a sustained performance of 386.71 TF/s. By doing so, the system secured the coveted rank of 69th best performing system among the world's Top500 supercomputers announced in June 2013 at the International Supercomputing Conference (ISC'13) in Leipzig, Germany. Subsequently, C-DAC also worked towards benchmarking the system's energy efficiency. PARAM Yuva II with the performance of 1,760.20 MFlops per Watt was ranked 44th in the Green500 list released in November 2013 at the Supercomputing Conference (SC'13) at Denver, Colorado, USA. The same list indicated that its rank was 9th in Asia Pacific and No. 1 in India.



From the day the PARAM Yuva II system was launched and dedicated to the HPC user community of the country, it has been extensively used by the users from various academic and research institutes for carrying out their research. During this year, system has helped process 87136 jobs from various science and engineering domains till March 2014. These jobs were executed by 596 HPC users from 41 different institutions spread across the country. The graphs below provide institute-wise CPU utilization and application domain-wise CPU utilization of the system during the year 2013-14.
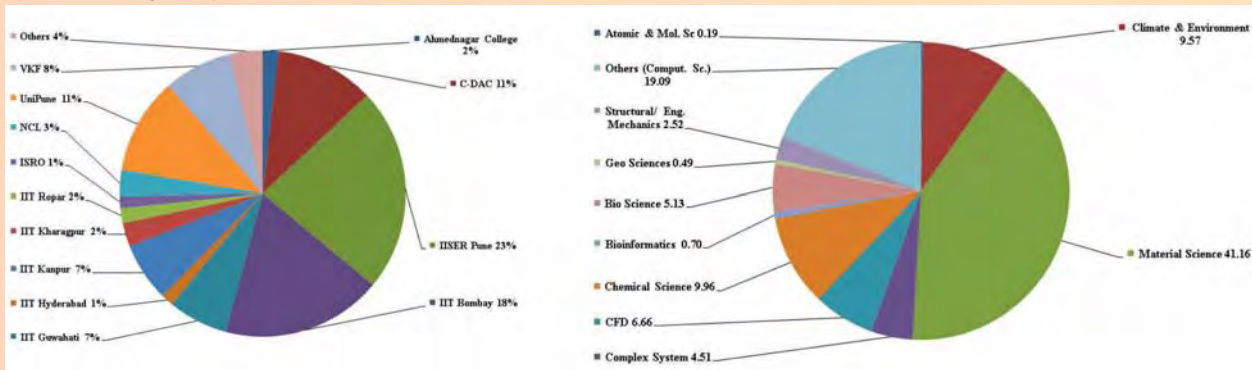


*Institution-wise CPU utilization (in%)
of PARAM Yuva II*

*Application domain-wise CPU utilization (in%)
of PARAM Yuva II*

**PARAM Bio-Blaze**

PARAM Bio Blaze, yet another supercomputing system, was launched at C-DAC on February 18, 2014 for enhancing various research capabilities in bioinformatics, enabling research projects with scientific, academic and industrial collaboration. It is a blade based system with peak compute performance of 10.65 TF. It has 32 compute nodes with 16 cores of Intel Xeon processor running at optimum 2.6 GHz. Compute nodes communicate with each other over 56 Gbps high speed FDR Infiniband interconnect. 20 TB of scratch storage is mounted on nodes using the same 56 Gbps link so that the disk input/output is fast. Among other applications in Bioinformatics, Param Bio Blaze will also help capture the movement of molecules and interaction between two molecules.



*PARAM Bio-Blaze*

**PARAM Shavak**

C-DAC initiated the design of PARAM Shavak, a ready-to-use HPC system pre-loaded with all the required system software and applications from selected scientific domains. Such a system is expected to help adopt HPC culture in academic institutions.

## HPC Applications

**AcoMod on Xeon Phi Platform**

AcoMod is a C based Acoustic Modelling code using MPI and OpenMP. Various optimization techniques were applied to the code and profiling was done using Intel Vtune XE tool. Improvement in performance was achieved using the following levels of optimizations (on Sandybridge):

- Compiler directives like O3 and xAVX
- Pragma directives like SIMD and vector alignment
- Memory alignment according to the cache lines
- Code level optimizations like dynamic scheduling of OpenMP threads and cache blocking at cache level
- Runtime level with KMP Affinity

Performance of 4.65X was achieved w.r.t. the base line MPI code (which is 1092 seconds) and 1.55X w.r.t. OpenMP code (which is 364.63 seconds) using 15 threads on single node. Removing MPI from the code and using only OpenMP improved the performance further. Memory allocation issues were addressed to get memory bandwidth on both sockets resulting in speedup of 6.6X (w.r.t. only MPI baseline performance).

Optimized AcoMod was successfully ported on Xeon Phi (in native execution mode). This reduced the execution time of the code from almost 11 hours to approximately 10 minutes. The code was executed using 60 cores on one Xeon Phi card.
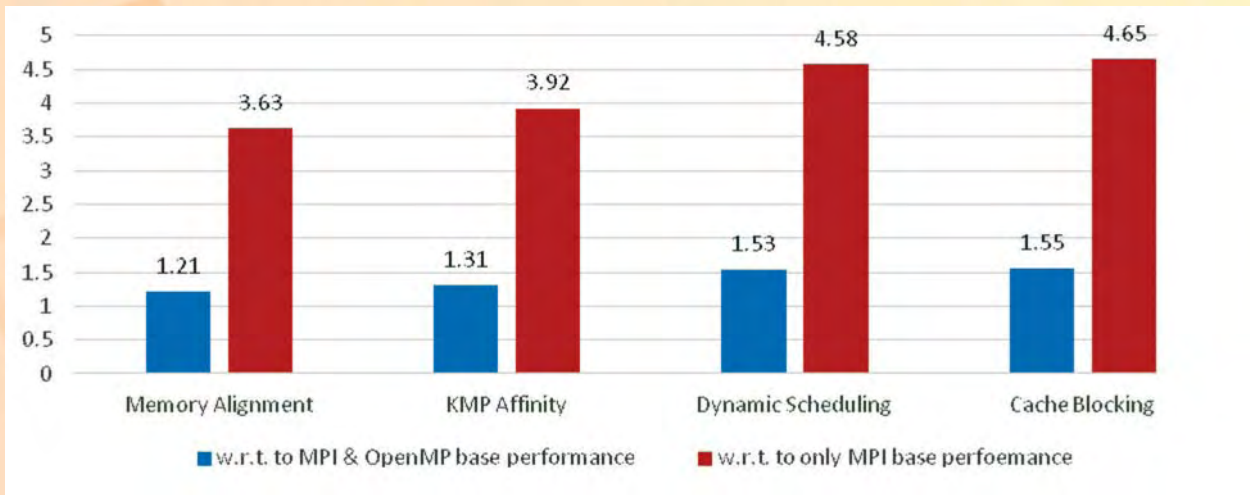
*Speedup of AcoMod on Sandybridge with different optimizing techniques*

Baseline performance: with MPI and OpenMP → 364.63 seconds
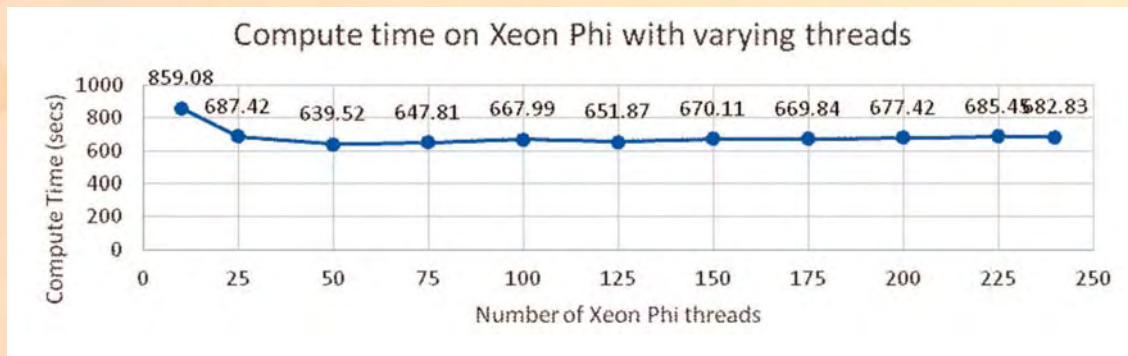
Baseline performance: with only MPI → 1092 seconds



*Execution of AcoMod in native execution mode on single Xeon Phi card*

### OpenFOAM on Xeon Phi Platform

OpenFOAM is an open-source, general purpose software suite for Computational Fluid Dynamics (CFD) computation. It has different flow solvers for different kinds of flow, and it consists of several pre-processing and post-processing tools. It is fully parallelized using MPI.

OpenFOAM was ported in native execution mode on Intel Xeon Phi platform (PARAM Yuva II). It involved porting of essential computational parts of OpenFOAM. The code scaled in the native execution mode up to 150 cores. The scaling flattens up beyond 128 cores and shows minimum execution time when 150 cores are used.

OpenFOAM was also run on Intel Xeon Phi platform (PARAM Yuva II) in symmetric execution mode. In symmetric execution mode, Xeon Phi cores and Xeon-host cores are treated in the same way and MPI processes are spawned on Xeon Phi cores as if they are part of a node. Maximum of 2 nodes each with 2 Xeon Phi cards were used for this purpose. Using maximum of 24 cores on each Xeon Phi card and 16 cores on each host, the maximum number of cores used was 128. Also, different amount of workload was assigned to Xeon Phi cores compared with host-cores. However, the overall performance has been limited by the performance of the Xeon Phi cards.

### Gromacs on Xeon Phi Platform

Gromacs is a molecular dynamics code used for simulation of biochemical molecules like proteins, lipids and nucleic acids that have a lot of complicated bonded interactions. It simulates the Newtonian equations of motion for systems with hundreds to millions of particles. This code is an open source code primarily written in C and parallelized using hybrid OpenMP and MPI models, with the compute intensive parts written in Intel intrinsic instructions.

As Intel intrinsic instructions are architecture specific, the performance drop in the code was observed while running the code on Xeon Phi platform (PARAM Yuva II). A version of Gromacs in which the hotspot was coded using 512 bit Intel intrinsic instructions for Xeon Phi was obtained and integrated into existing version of Gromacs. The code was then entirely recompiled as the input data generation steps contained Gromacs tools, which are version specific. Benchmarking of the compiled version of code was done both for host and Xeon Phi in native execution mode using Gromacs standard benchmarking input.
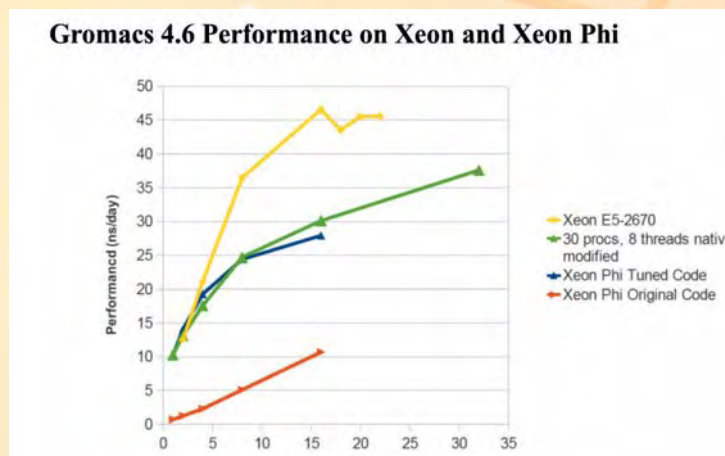


**Number of Xeon Phi Cards/Node**
*(60 Procs, 4 Threads per card on Xeon/16 Procs, 1 Thread per node on host)*

**WRF on Xeon Phi Platform**

The Weather Research and Forecasting Model (WRF) is an atmospheric model, which is widely used for numerical weather prediction. The model employs advanced physical parameterizations, which facilitate modeling the atmospheric processes from global to mesoscale with spacing down up to 100 metres. Better and faster weather forecasting requires huge amount of computational resources. Recent computational accelerators like Intel Xeon Phi and Nvidia GPGPU, which have higher power efficiency, provide a better platform for weather forecasting applications.

As part of short-range weather forecasting research, the complexities involved in porting and execution of high resolution WRF model on Intel Xeon Phi platform (PARAM Yuva II) was studied. Studies were done to evaluate the performance of high resolution Nested (12 km and 4 km) and Single (3 km) domain WRF model configurations in host, native and symmetric execution modes. Scalability studies using varying nodes and KNC threads were carried out. The execution environment has been optimized for host and symmetric mode execution and the performance bottlenecks were identified. It has been observed that single domain configurations were better suitable for many core based Xeon Phi accelerators. This was the first of a kind operational full WRF implementation on Xeon Phi.

**ROMS on Xeon Phi Platform**

Ocean modelling is an inherently complex phenomenon within the earth system framework, which poses a challenge to the computational scientists. The computational requirements for ocean state forecasting are high due to the spectra of the scales of motion. Regional Ocean Modelling System (ROMS) is a terrain following ocean model which solves the Reynolds averaged Navier-stokes equation.

Early experiments to evaluate the performance of ROMS on Intel Xeon Phi platform (PARAM Yuva II) have been performed. Model simulations were conducted in native and symmetric execution modes on Xeon Phi. Performance profiling of the code has been done to determine the bottlenecks, and possible improvements to achieve higher performance has been identified.

**VASP on Xeon Phi Platform**

The Vienna Ab initio Simulation Package (VASP) is a code for atomic scale materials modelling, e.g. electronic structure calculations and quantum-mechanical molecular dynamics, from first principles.

Native compilation and benchmarking of VASP 5.3 code on Xeon Phi platform (PARAM Yuva II) with gamma and All K points input files was done followed by explicit threading with OpenMP for routines taking most time. The code was run in native execution mode and best results were obtained with total of 240 MPI processes on 8 Xeon Phi cards.

**OpenSees on Xeon Phi Platform**

OpenSees open source software is for earthquake engineering applications. It is used for earthquake simulation studies for different kinds of structures. It was ported on Intel Xeon Phi platform (PARAM Yuva II) in native and symmetric execution modes on 32 nodes. The porting effort indicated the use of TCL TK, PetSc and Mumps for better performance of OpenSees. This effort has resulted in the availability of optimized and scalable version of OpenSees software for Xeon-Phi platform. The code has been used for static analysis of 3-noded beam element and 9-noded shell elements on PARAM Yuva II.

**HPC Solutions and Services**

With the expertise developed over the years in the area of HPC, C-DAC also extends its services to other organizations/ institutes to enable them to meet their in-house HPC requirements. Some of the activities carried out during the year towards this include:

- Establishment of an HPC centre at NIT, Sikkim for capacity building and high-end computational research in open science and engineering. This activity is currently in progress.

- Establishment of a supercomputing centre at NIT, Silchar for capacity building and research. This activity is currently in progress.

- Development of gene regulatory network analysis algorithms/tools using parallel computing under HPC environment in collaboration with Indian Agricultural and Statistical Research Institute (IASRI), Delhi. The activity aims to identify the genes and gene systems responsible for abiotic stresses in rice, which are the major causes for lower productivity in rice.

- Application support and web interface development for large scale genome annotation for the HPC facility at NABI, Mohali.

- Providing consultancy services for setup of an HPC facility at NTPC, Noida. The offered services include deciding the architecture of the HPC system, techno-commercial evaluation of bids, monitoring the installation and commissioning of the system, training the users by conducting workshops on the concepts of HPC systems and parallel programming, and on-site support for system administration.

- Providing consultancy services for implementation of Bio-clustering and portal for National Agricultural Bio-Grid (NABG). The facility consists of HPC clusters geographically distributed in five locations. C-DAC has developed web based portal for integrating the above said facility to NABG. System design, monitoring of installations, and workshops on HPC and parallel programming were part of the consultancy provided to this World Bank funded project through Indian Agricultural Statistics Research Institute (IASRI), New Delhi.

- Providing on-site system administration support to the HPC facility and associated eco-system at the Indian National Centre for Ocean Information Services (INCOIS), Hyderabad.

# Grid Computing

The Indian grid GARUDA continued to offer technology services to the grid user community from more than 77 partnering institutes spanning R&D organizations and academic institutes. GARUDA affiliates crossed 1500 users from various domains such as Bioinformatics, Computer Aided Engineering (CAE), Open Source Drug Discovery (OSDD), etc. To serve the users better, the following features were added to GARUDA during the year.

### Garuda Access Portal (GAP)

GAP provides a web interface for submission of jobs to GARUDA. It was enhanced with the following features:

- Advanced reservation functions such as querying for availability of resources for immediate or advance timestamp; CPU based reservation; modification of reserved resources; and cancellation of reserved resources.
- Quality of Service (QoS) features such as monitoring of QoS parameters (availability, response time, security, speedup factor, success rate) and automatic/manual selection of clusters for job submission based on user's choice.

### Bio-Gateway

Bio-Gateway is an easy-to-use interface for Bioinformatics community users to submit jobs on to GARUDA grid. It is based on Galaxy, an open source framework for creating Bioinformatics workflows. Its key features include the following:

- Widely used bioinformatics tools for Next Generation Sequencing (NGS) data analysis, Genome analysis, Molecular modeling, and Metagenomic data analysis
- Creation of workflows with pre-processing, processing and post-processing
- Visualization support through Jmol and Phyloviz

### Collaborative Class Room (CCR)

CCR is an online education grid, which facilitates interconnection of LMS (Learning Management System) instances to access core features of LMS as well as online course repositories being managed administratively by different institutions. It was enhanced to support audio/video conferencing between participants in the following two modes:

- **Online class** – In this case, only the instructor of a class can act as moderator of the session with all privileges.
- **Discussion room** – In this case, all the participants get moderator privileges, and can act as moderator of the session.

Its enhanced features include the following:
- SCORM runtime environment
- Question and test interoperability assessment engine
- Learning and tools interoperability (provider and consumer)
- Shibboleth based single sign on facility
- NMEICT based course curriculum format
- Adaptable to multi-screen resolution (tablets, desktop, etc.)

# Cloud Computing

### Sumegha Cloud Lab Kit

Sumegha Cloud Lab Kit developed by C-DAC is a cloud installation package that enables an organization to build its own private scientific cloud. It has the following features:

- Web based tools that support easy and quick access to the virtual machines and virtual HPC clusters
- Simple and quick installation of all the cloud components
- Pre-built OS images with complex parallel environments like MPI and Map Reduce to cater to the HPC needs
- Golden images with pre-loaded HPC applications like seasonal forecast model, next generation pipeline with the required visualization tools, and job submission portal for easy parallel job submission
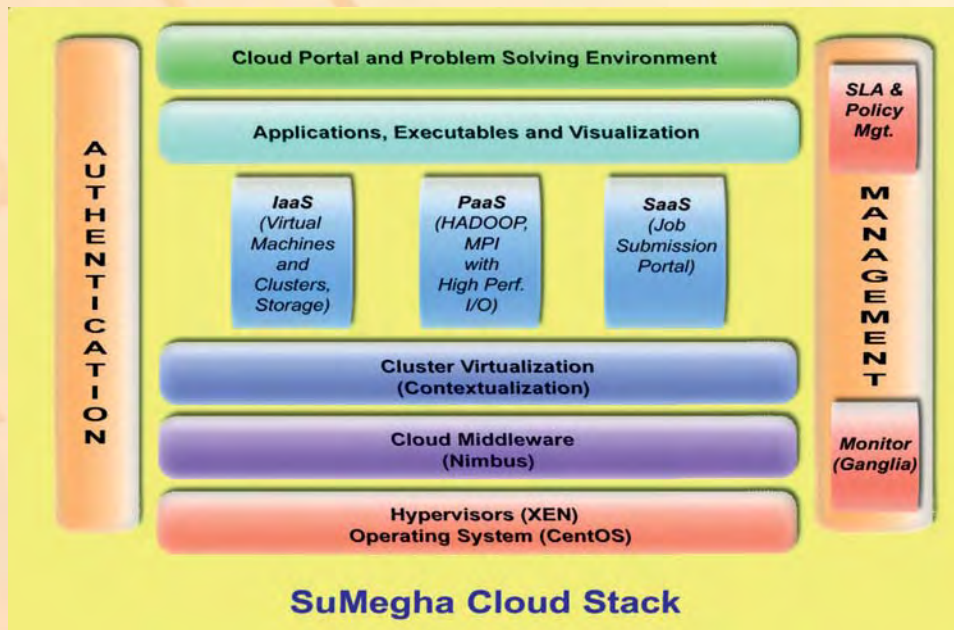


*Sumegha Cloud Lab Kit*

**Online NGS Tool for Scientific Cloud**

Next Generation Sequencing (NGS) is used to analyze and process the data produced as a result of genome sequencing. Generally, the datasets produced are huge and require huge computation power and other resources. Analysis and processing of NGS data requires a work-flow where the results of one step need to be pipelined to the next step for further processing. Online NGS tool is a web-based pipeline for genome sequence analysis. It is hosted on C-DAC's scientific cloud and is provided to the users via the Internet.

Online NGS tool works on MPI-enabled virtual clusters to provide maximum computation using parallel approaches and provides storage for huge sequenced files. It comes integrated with tools for pre-processing, mapping/aligning, and manipulating sequenced datasets. Its key features are:

- Run-time logs for better debugging
- Directory trees to navigate easily among the projects or different output files/directories
- Huge datasets uploading via the Internet
- Common view window for visualizations and other textual outputs
- Notification centre for the user to know which step is going on at any given time and other information like which project is active and which is pending
- Download facility for files which can't be opened in View Window

**Indian Banking Community Cloud (IBCC)**

Banking, Financial Services and Insurance (BFSI) sector benefits from cloud computing as it:
- Provides flexibility and agility to meet growing business needs in a dynamic and competitive landscape
- Cuts Infrastructure cost
- Transforms business processes and enhances ability to grow in new sectors or regions without the time and cost burdens involved with establishing a physical presence

- Enables small banks with difficulty of procuring high-end infrastructure to leverage cloud computational power to drive efficiencies

In order to leverage these benefits, Indian Banking Community Cloud (IBCC) was inaugurated by Dr. D. Subbarao on August 2nd 2013. Allahabad Bank, Andhra Bank, Bank of India, Canara Bank, Corporation Bank and Syndicate Bank were the first movers of this initiative.

IBCC at the Institute of Development and Research in Banking Technology (IDRBT), Hyderabad is built on C-DAC's cloud stack, Meghdoot. Meghdoot is an open source cloud stack developed by C-DAC, which enables implementation of state-of-art cloud environment using open standards.

**Advanced Tools for Cloud Security Transaction**

To minimize the security risk associated in using cloud based computing and storage services, C-DAC has developed the following data encryption modules (AES standard) and integrated them on to its Meghdoot cloud stack:

- Client side encryption  toolkit and  GUI based VM image bundling and uploading toolkit for storage and computing services
- Server side encryption for secure storage service with two factor authentication
- EBS  Volume encryption
- Digital certificate based user authentication

The above features have been integrated with Meghdoot cloud stack and deployed at IDRBT, Hyderabad.

**Disaster Recovery as a Service on Cloud**

C-DAC is working on developing a proof-of-concept testbed for offering Disaster Recovery as a Service (DRaaS) on cloud. It is named "Optimal-DRaaS" solution. It combines the benefits of disaster recovery solution and a cloud environment to the user for providing complete cost effective disaster recovery solution. C-DAC Optimal-DRaaS solution can provide disaster recovery for various postgres based applications, deployment of services to run mission-critical activities. These are mainly served for small and medium industries, which do not wish to spend on hardware and other related additional costs. Optimal DRaaS can easily be managed remotely, cutting down more than 60% of the cost compared to a physical infrastructure setup. Services offered by Optimal DRaaS are easily scalable without interrupting the infrastructure setup and do not use much space compared to physical deployment in a data centre. Customization is yet another feature of Optimal-DRaaS, which allows users to make changes without any issues.

C-DAC plans to use Optimal-DRaaS to provide proof-of-concept for multi-site Disaster Recovery as a Service (DRaaS) solution over cloud for e-governance applications.

# Multilingual Computing and Heritage Computing

C-DAC continued its contribution towards overcoming the language barrier in computing. Spectrum of activities include development and enhancement of several multilingual tools, technologies and products for search, translation, data entry, mobile based applications, etc. C-DAC actively contributed towards the standardisation activities related to language enablement and heritage computing.

## Multilingual Search Engines

### Setting up Search Infrastructure for Web and Enterprise Search for GoI Directory

This is a scalable search platform for Government of India websites. The objective behind the directory is to provide a single point source to know all about Indian Government websites at all levels and from all sectors. C-DAC is maintaining this directory in association with NIC and it lists about 10,000 websites.

### ParaMoneyMantra

ParaMoneyMantra (PMM) is a suite of analytical tools addressing a variety of problems in financial markets. It can perform fundamental/technical/quantitative analysis based on a variety of mathematical/statistical/artificial-intelligence models, and the analysis of mixed markets incorporating time zone alignment and exchange rate data. It is a cloud-based solution with an High Performance Computing (HPC)-based parallel processing compute-tier.
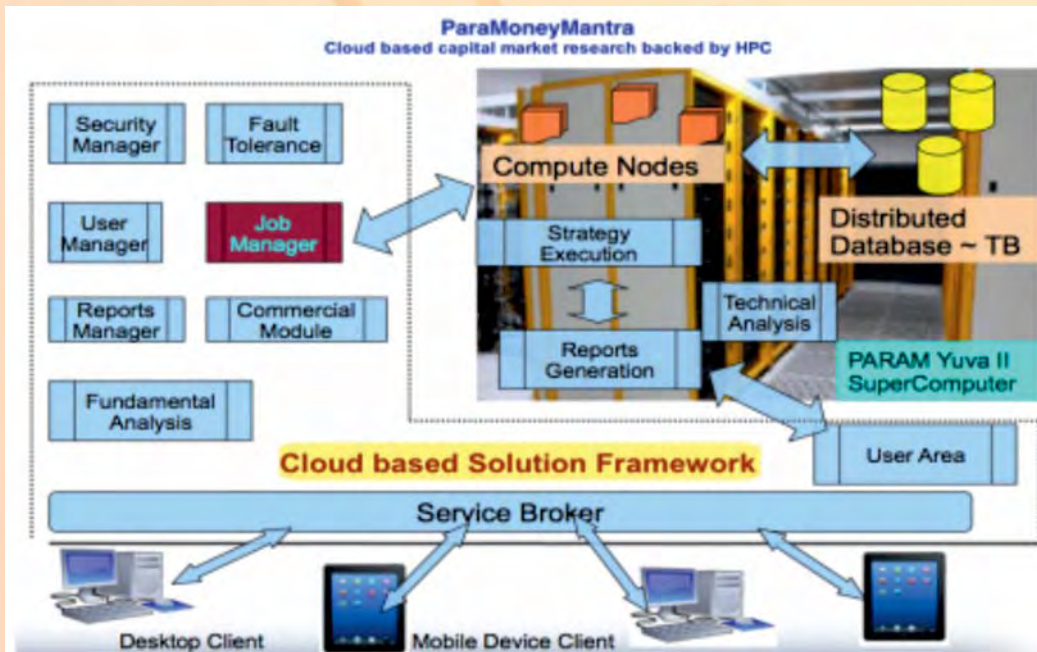


*ParaMoneyMantra*

### Textual Information Extraction and Retrieval System from Mass Media Data on Web for Assembly Election 2013 of Madhya Pradesh

C-DAC developed a textual information extraction and retrieval system for checking violations of Model Code of Conduct in assembly election 2013 in Madhya Pradesh. The system searches for keywords and extracts the Internet data from mass media sources such as websites of newspapers, political parties and leaders as well as twitter so that it can identify and report violation of the Model Code of Conduct.

## Machine Translation and Transliteration Systems

### AnglaBangla Machine Aided Translation System

AnglaBangla is a pseudo-interlingua based English-to-Bangla Machine-Aided Translation (MAT) system based on

Anglabharati technology. Accuracy of the system is 87% as reported by the testing agency of C-DAC. The system supports Unicode format, different file types such as .doc, .txt and .pdf files, and provides integrated Bangla keyboard for editing.
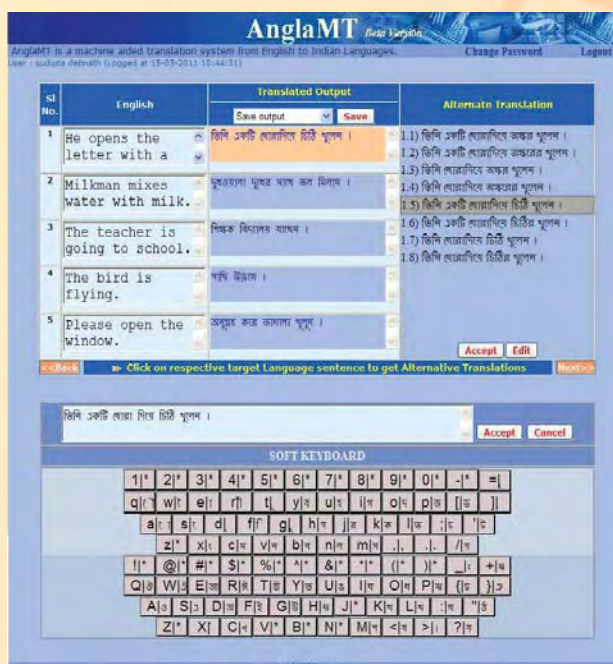


*AnglaBangla MAT System*

### Bangla Analyzer

It is a pseudo lingua based prototype Bangla shallow parser which can be used for the development of Machine Translation System for Bangla to other language(s) translation (mainly for Bangla-to-English MT). The system has workbench for generation of linguistic resources and POS Tagger, morphological analyzer and parser for Bangla.

### ANUVADAKSH (English-to-Indian Language Machine Translation System for Tourism and Healthcare Domains (EILMT Phase-II)

Anuvadaksh is a multi-lingual, multi-platform and multi-engine hybrid translation system, developed by C-DAC along with 13 institutes in India. The system is designed to use four-translation engines working in parallel, namely EBMT (Example Based Machine Translation), SMT (Statistical based Machine Translation), TAG (Tree-Adjoining-Grammar based Machine Translation) and AnalGen (Rules-based Machine Translation), which would facilitate the translation for the six language pairs i.e. English to Hindi, Bengali, Marathi, Urdu, Tamil and Oriya. The collation and ranking module collates translated output of all the engines and ranks them on the basis of translation accuracy. The system is W3C compliant and supports cross browser compatibility for Internet Explorer, Mozilla Firefox, Google Chrome, Apple Safari and Opera.

### Paribhashika – English-Malayalam Machine Aided Translation System

Paribhashika is a pattern directed English-Malayalam Machine Aided Translation (MAT) system, based on AnglaBharati technology. Paribhashika is the first attempt to customize AnglaBharati MAT engine for a Dravidian language. The system provides a practical aid for translation from English to Malayalam. The major portion of the task is done by machine and the balance is left to human editing.

### Malyalam Parser (MParse)

A parser has a wide range of applications starting from simple phrase finding (e.g. for proper name recognition) to full semantic analysis of text (e.g. for information extraction or machine translation). The main beneficiaries of the syntactic parser for Malayalam are the linguists, students and the people working in the Natural Language Processing domain.

# OCR (Optical Character Recognition) and OHR (Optical Handwriting Recognition) Systems for Indian Languages

### WebOCR for Indian Scripts

An online OCR system has been developed and deployed for 12 Indian scripts for converting documents images into Unicode text. Key features of the system include Unicode to Braille conversion for visually impaired persons, dictionary based correction, text-to-speech conversion and Captcha based crowd sourcing.

### Nayana

Nayana enables users to convert printed Malayalam documents to editable computer files. It has applications like library digitization, newspaper archiving, etc. Optical Character Recognition combined with text-to-speech technology can be used for Text Reading System, which is of great help to the visually challenged people. Shri Oommen Chandy, Chief Minister of Kerala, released Nayana 3.2 on Shreshta Bhasha Dinam on November 1, 2013 as part of the function 'Shreshta Bhasha Shastra Bhasha'.

### Bangla OHR System Based Telemedicine Application Using Web Platform

It is a local language solution through Online Handwritten Prescription system, integrated with multimedia conferencing to enable the process, to be executed in a better and effective way. It supports two-way video conferencing with audio input from digital peripherals along with handwritten Bengali prescription with doctor's signature. Bangla OHR based telemedicine application was demonstrated in INFOCOM Industrial Meet and W3C India workshop to several global and local industries/experts at Kolkata.

## Multilingual Data Entry Tools and Technologies

### Urdu Nastaliq Font Development for Rendering over Adobe Products

Adobe systems use a peculiar methodology of rendering of complex scripts. Windows specific fonts do not always work over the Adobe products such as Adobe Photoshop. This particular effort involved understanding the requirements of the Adobe way of rendering and redesigning and structuring the existing fonts. The fonts so designed as per these specifications are very much close to the most standard way of designing a font and thus have a potential of being seamlessly integrated over a variety of platforms/products.
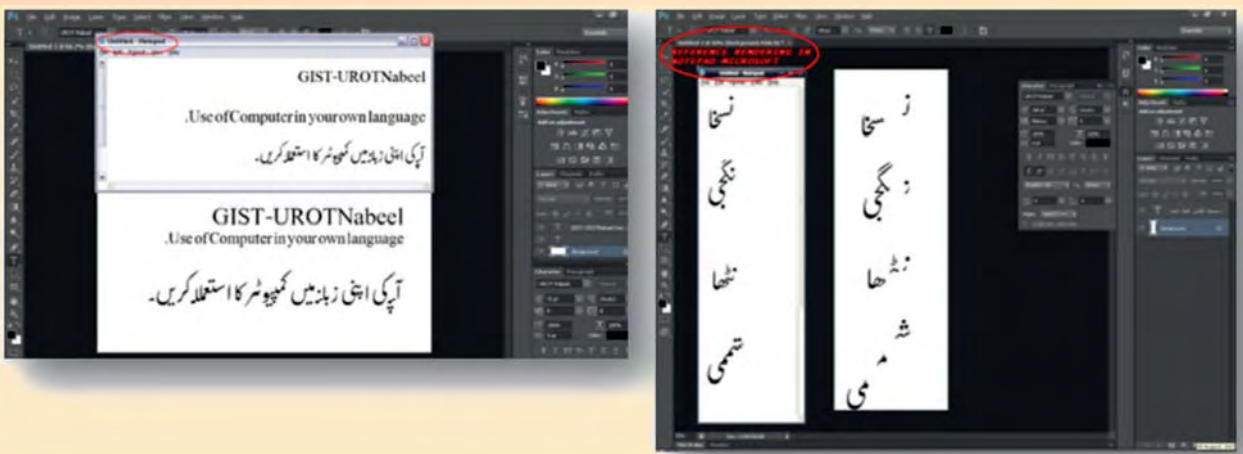


*Snapshot of the Urdu font rendering on Adobe Photoshop CS 6*

### Common Set of Words Extraction from the Corpus

A tool has been developed that can extract a set of consecutive words that are commonly occurring in the corpus. It supports extraction of sequential words from corpus, text word prediction APIs for English and Indian languages, has generic syllable driven rule and dictionary based prediction engine, and has facility of word based predictions generally synched with the user inputting habits for a better user experience.

**Standardization of Perso-Arabic Keyboards Layouts**

Standardization of enhanced Inscript keyboards layout for Brahmi based languages as per latest version of unicode has already been submitted to BIS. A similar exercise is being carried out for the three languages Kashmiri, Sindhi and Urdu, which use the Arabic code block. The keyboard design is such that it is based on frequency, is Unicode compliant and above all ensures that the same keyboard can be deployed for hand-held devices, tablets and smart phones.

**Akshara - Spell Checker for Malayalam**

Akshara is a spell checker for Malayalam language that can process file input or typed text. It performs standardization of input text before spell check using rules proposed by Kerala Bhasha Institute. It has facility to load, process and save documents in various formats (.txt, .doc, .docx, .rtf, .odt), built-in code converter for ASCII, ISCII, Unicode and vice versa, automatic spell checking and editing facility.

**Varthamozhy - Interactive News Reading System for Malayalam**

Varthamozhy is a news reading software in Malayalam language. At present, it includes news of leading Malayalam dailies such as Mathrubhumi, Malayala Manorama, Kerala Kaumudi, Madhyamam, Kerala Online News, Deshabhimani, etc. Varthamozhy downloads the news from the respective news website according to the user's choice. It then reads it out using Text-To-Speech (TTS) technology.

## Mobile Based Tools and Solutions

**Mobile Based Solution for English-to-Indian Language Translation**

"mTranslator" is an interactive cross platform application developed in HTML5 based on AnglaMT and Anuvadaksh Machine Translation System, which can currently translate English to nine Indian languages.

**SMS Reader**

Sandesh Pathak is an Indian language SMS reader that takes incoming SMS as input and reads it aloud. Currently, it supports five Indian languages: Hindi, Marathi, Tamil, Telugu and Gujarati. It was launched on February 18, 2014, by Shri J. Satyanarayana, Secretary, Department of Electronics and Information Technology (DeitY).

**Sandesham**

Sandesham is an application that listens to incoming SMS and reads it aloud for the user. This mobile application comes handy while driving as one can listen to incoming SMS and keep one's hands on steering wheel and eyes on the road. Preferences can be set to select what to be read.

**Indian Language Keyboards on Android Platform**

C-DAC has developed Indian language keyboards for Android platform and are available for free download. It provides uniform user experience for smartphone and desktop users and quick learning. It is based on standard INSCRIPT keyboard principles and is compatible with latest Unicode version. Onscreen keyboards are made available for Hindi, Marathi, Gujarati, Kannada, Telugu, Malayalam, Oriya, Punjabi, Bengali, Assamese, Tamil and Urdu.

**Mozhy Android Application to View, Edit, Save and Read Unicode Text Documents**

Mozhy is an easy-to-use Android application with a text editor for Malayalam, which enables users to view, edit, save and read Unicode text documents. It reads aloud the Malayalam Unicode text in a natural sounding male voice. Users can pause the reading and continue from any point of the text that is touched by the user. Mozhy provides a Malayalam keyboard having all Malayalam keystrokes along with numerals and punctuations, which helps editing of text file with ease.

*Mozhy Android application*

## Localization Initiatives

### Centre of Excellence in Marathi Language Computing

Directorate of Information Technology (DIT), Government of Maharashtra and C-DAC have signed an MoU for creating a centre of excellence in Marathi language computing. As a part of this, C-DAC has carried out the following:

● *Floating Keyboard:* This is an enhanced INSCRIPT keyboard in action. Once integrated in a website, the user can direct input data in Unicode without downloading any component.

● *GIST Transliteration Control*: This control once integrated in website helps the users to input data phonetically. For ease of inputting, suggestions pop up once letters are typed.

● *Five Days Courseware*: The "Five day course on Localization – Web Accessibility – GIGW" has been jointly developed by C-DAC and DIT, Maharashtra.

● *ParibhashaKosh*: This consists of a series of publications of English-Marathi dictionary to promote education. Each publication is dedicated to a specific domain like Pharmacy, Agriculture, Mathematics, Chemistry, Education, Commerce, Finance, Social Science, Geography, Biology, Business Management, Electrical Engineering, Law and Judiciary, etc.

● *CoE GCDR*: This is a glossary updation tool to create glossary of terms in Marathi language.

● *Centre of Excellence Portal*: CoE portal (**http://coe.maharashtra.gov.in**) aims to provide Marathi language computing to end users and developers who want to make their site in Marathi language. This site has tools and resources which are useful for desktop users and application developers. This site also contains 'Paribhasha Kosh' (a word glossary categorized to different koshas). Download section has various tools, fonts, documents, guidelines for developers, FUEL standards, E-books, ISM (documents and macros). A developer section has five-day course on "Localization – Web Accessibility – GIGW".



*Centre of excellence in Marathi language computing*

## Other Applications

### TTS Browser Plug-in for Firefox and Google Chrome

This is a new application built using Indian language Text-to-Speech (TTS) system and made available freely in open source. Indian language Mozilla and Chrome browser plug-in, give the power of speech to browser. During net surfing, when the user selects some text on the browser and presses a particular command, the system starts speaking the selected text. It supports five Indian languages: Hindi, Marathi, Tamil, Telugu and Gujarati.

### Universal Speech Translation Advanced Research (U-STAR)

Universal Speech Translation Advanced Research Consortium (**http://www.ustar-consortium.com**) is an international research consortium conducting research and development on a network-based Speech-to-Speech Translation (S2ST) system, with the aim of breaking the language barriers of the world. U-STAR has developed a speech translation app using this network-based S2ST system, which help multiple users (up to five) to communicate in different languages, in real time, either face to face or remotely. U-STAR, currently comprised of 28 institutes from 23 countries, has been conducting various workshops around the world and ongoing research on speech translation. U-STAR and its members have collaboratively developed a multilingual speech translation system to provide translation services via a publicly-released client application.

### Translator Contributor Plug-in

This plug-in tool is developed for translators/post editors for various central and state Mission Mode Projects (MMP). Using this plug-in, various portals of MMPs can be translated dynamically/on the fly to Indian languages. A user version of the plug-in is also available, which can be used for translation purpose only. Its features are:

- Supports six Indian languages viz. Bengali, Gujarati, Hindi, Malayalam, Marathi, and Punjabi.
- Provides option to contribute/rectify the translation.
- Provides floating keyboard for inputting.
- Provides option to revert back to original page.
- Automatic translation of subsequent pages from same domain to selected language.
- Option to view the information of page translation done in percentage.

### Localisation Project Management Framework Portal

The **www.localisation.gov.in** portal is a one stop shop for relevant standards, best practices, tools and technologies for realizing the dream of localizing all the citizen services in regional languages. Apart from standards, best practices and guidelines, the portal is currently equipped with dashboard, which will reveal the usage of various standards, tools and technologies and help understand additional requirements, if any.

### Transliteration Based Typing Service for Web

This is an intelligent and suggestion based typing mechanism for typing on any website. It works on transliteration based approach, that is, text typed in English gets transliterated to Indian languages along with the suggestions. So the user has the option to choose from the suggestions. It also provides virtual keyboard for directly typing in Indian language in INSCRIPT layout for any correction. The integration is JavaScript based, which can be easily integrated with any web based application.

### Open Type Fonts for MAC OS X for Indian Languages

Open type fonts for MAC OS X differ from Windows Open type fonts in terms of underlying technology they use for rendering as well as technology to program them. While MAC fonts are based upon Apple advanced typography and state tables, Windows fonts are based upon open type layout tables. Fonts were designed for MAC OS X for Oriya, Tamil, Bengali, Telugu and Malyalam.

# Heritage Computing

### JATAN: Virtual Museum Builder

JATAN is a digital collection management system specially designed and developed for the Indian museums. It is a client-server application with features such as image cropping, watermarking, unique numbering, management of digital objects with multimedia representations, Dublin core metadata compliance, and collaborative framework for museum curators and historians. It is adopted by Ministry of Culture for standardized implementation across national museums. It was deployed this year in ten national museums across the country in addition to four earlier installations.



*JATAN-Virtual museam builder*

### e-Records Capturing Tool

An e-Records capturing tool (called DatantarTM) has been developed for automatic extraction of preservation metadata in compliance with e-Governance standard for Preservation Information Documentation (PID) and for capturing the electronic records e.g. birth certificates, domicile certificates, property documents, which are stored in the databases of e-governance systems.

### Notification of Digital Preservation Standard for e-Governance

Digital preservation standard and best practices developed as per of the deliverables of Centre of Excellence for Digital Preservation are notified by Ministry of Communications and Information Technology, Government of India vide Notification No. 1(2)/2010-EG-II dated December 13, 2013 for all e-Governance applications in India.

### e-Governance Standard for Preservation Information Documentation (eGOV-PID) of Electronic Records

The eGOV-PID provides the standard metadata dictionary and schema for automatically capturing the preservation metadata in terms of cataloguing information, enclosure information, provenance information, fixity information, representation information, digital signature information and access rights information immediately after an electronic record is produced by an e-Governance system.

### Best Practices and Guidelines for Production of Preservable e-Record

The best practices and guidelines introduce five distinct steps of e-record management, namely e-record creation, e-record capturing, e-record keeping, e-record transfer to trusted digital repository and e-record preservation, which need to be adopted in all e-governance projects. It also specifies the open source and standard based file formats for the production of e-records.

### Center of Excellence for Digital Preservation under National Digital Preservation Program

C-DAC is entrusted with the responsibility of creating a digital preservation system as a pilot project under the guidance of High Court of Delhi and e-Committee Supreme Court of India. The main aim of this project is to create a trustworthy digital repository (TDR ISO 16363) for the disposed case records through adaptation of Open Archival Information System [OAIS (ISO14721)] developed by Consultative Committee for Space Data Systems (CCSDS) and to establish Trusted Digital Repository (TDR ISO 16363 standards) for the records. The software tool called "Disposed Case Portfolio Manager" has been deployed at e-Committee Supreme Court.

# Professional Electronics

C-DAC has conceived, designed, implemented and managed several major Professional Electronic products for industrial development and social empowerment. The primary areas of Professional Electronics include: Control Systems for Industrial Automation; Systems for Security; Electronic Devices and Smart Products; Sensors and Network Systems; Medical Electronics; and Agri-Electronics. The activities carried out during the year in these areas are described below.

## India Microprocessor

C-DAC is actively involved in this initiative and study was carried out on various commercial and open source microprocessor architectures and requirements of various strategic and R&D microprocessor users of the country. As a part of this activity, C-DAC carried out the following:

- Critical analysis and comparison of popular ISAs

- Detailed evaluation of ANURAG Processor family designed by DRDO

- Evaluation of available Open Source Microprocessor architectures

- Detailed elicitation of user requirements

Based on the above activities, C-DAC has prepared a detailed project report and submitted to DeitY.

## Aakash Tablets

Aakash tablet has gone through multiple phases, the first phase was of a pilot implementation, which was under Ministry of Human Resource Development (MHRD) for educational purposes and the second phase is that of deployment of Aakash tablets. C-DAC evolved the technical specifications of Aakash-IV tablets in association with IIT Bombay and IIT Madras and created an eco-structure for testing and certification of Aakash-IV tablets.

## Control Systems for Industrial Automation

### Modelling and Control of Processes : iSTec and iCoMS

Many of the industrial processes are complex systems characterized by non linearity, uncertainty, large process lag and random disturbances. It is difficult to control these processes with the desired level of accuracy, using conventional control systems. Advanced Control Systems employing plant modelling, state estimation, filtering, prediction and adaptive control show enormous improvement in plant operations and energy efficiencies. Industrial Steam Temperature Control (iSTeC) and Industrial Coal Mill Soft Sensor (iCoMS) are two such modelling endeavours developed by C-DAC.

iSTeC offers a comprehensive integrated mathematical model for a steam boiler and Kalman Filter-based Steam Temperature Prediction Control System. It can improve the efficiency of the plant with better control accuracy of around $\pm 4\ ^0C$ from the current level of $\pm 10\ ^0C$, in the main steam temperature control.

iCoMS is an innovative on-line soft sensor using a coal mill mathematical model and evolutionary computation algorithm to accurately measure/estimate the pulverised coal flow of a bowl mill coal pulveriser system of thermal power plant. The mill/master pressure control system is made more efficient by using iCoMS.

### Advanced Process Control using Data Fusion

Generic multi-sensor data fusion system is applicable to any power plant or process industry which can be described by mathematical models of linear/non-linear differential, partial differential equations. The system has a generic state estimation (Kalman/Extended Kalman Filter) and parameter estimation (Genetic Algorithm) tool to deal with

the processes which are highly random and non-linear in nature.

Two industry applications viz., sintering bed in steel making process and coal mill pulveriser system have been taken as data fusion application case studies. As a joint project with IIT Kharagpur, the software for the tolerant and optimal operation for improved product quality and productivity was developed by C-DAC.

**Automation System for Water Treatment Plant**

In drinking water treatment plants, automation can increase plant efficiency, enhance safety, improve reliability, and contribute to regulatory compliance. It can improve productivity, minimize staff requirement, and optimize treatment processes to improve drinking water quality while minimizing energy and chemical use.

The automation system for water treatment plant is configured with C-DAC's state-of-the-art iCon and iSMART (embedded controllers) and the iROSE (SCADA/HMI software), iWiSe and iWase (Wireless sensor network products), iGate (Communication interface), and iCOSS (Colour sensor). The filter bed parameters such as filter bed level, differential pressure across the filter bed, filter bed delivery, clean water sump tank level, wash water overhead tank level, etc. are measured with transmitters. There is automatic control for delivery flow, chemical addition, raw water pumps and pure water pumps. Sub-station monitoring enables overall energy management for the operation. The automation system gives advice and guidance to the operating personnel to carry out the backwash at the appropriate times. Automation in chemical addition ensures the correct level of turbidity and pH in the drinking water.

**Automation System for Steam Temperature Control**

The system is implemented in Tuticorin Thermal Power Station (TTPS) for steam temperature control and related areas. It is configured using C-DAC products viz., iCon, iRoSE, iWiSe, iWase, iRESS, iSTeC, iCoMS. The iCon embedded controllers are networked through two layer-2 managed switches for redundancy.

One server and two operator stations handle the data acquisition and monitoring functions. Another machine handles the modelling, simulation and prediction system operations. A separate machine is provided to run a real time expert system which provides intelligent operator guidance. Yet another machine is provided to run the evolutionary computation model and the soft sensor lgorithm for pulverized coal flow measurement.
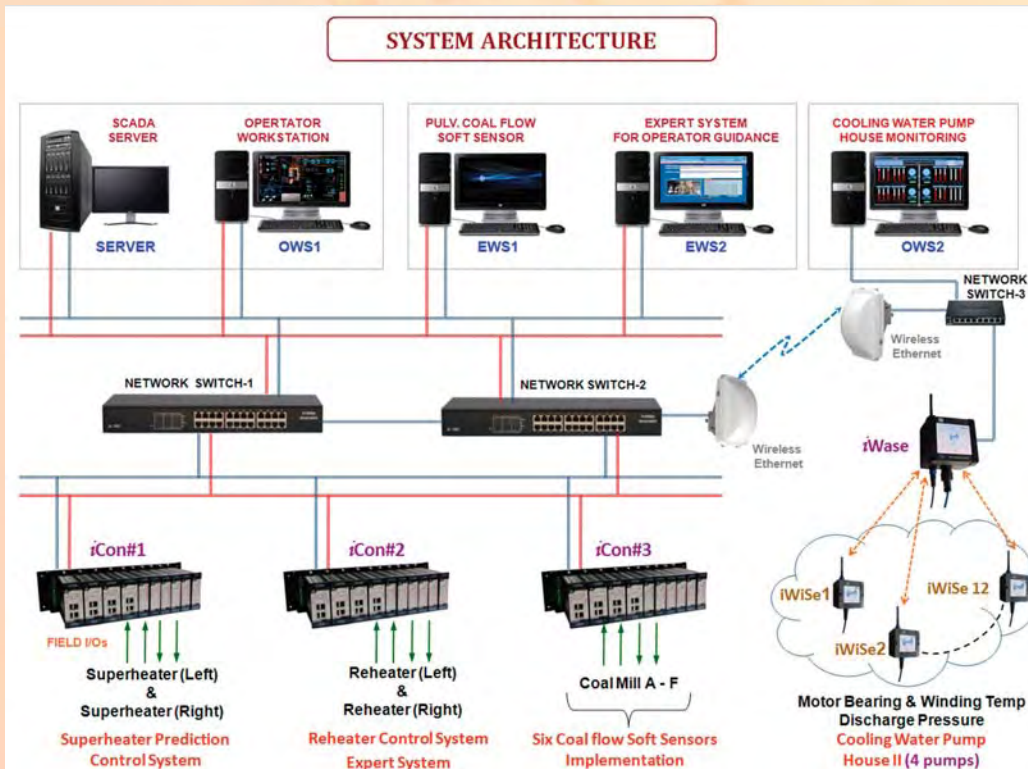


*Automation System for Steam Temperature Control at TTPS*

**Smart ProGate**

In interconnecting two devices or two networks, interoperability is a main concern in SCADA (Supervisory Control And Data Acquisition) systems. To overcome this concern, a gateway is required to convert from one type of protocol to the other. Smart ProGate is a software framework which acts as a multiprotocol gateway. It includes an agent based monitoring and diagnostic tool to continuously monitor the communication port of the devices and performs self-healing in case of port failures.

Its protocol convertor converts proprietary protocol to IEC 60870-5 101 (Serial Port) or to IEC 60870-5 104 (Ethernet) or converts IEC 60870-5 101 to IEC 60870-5 104. Inter Control Center Protocol (ICCP) stack of SMART ProGate can be used as network interface with SCADA control centers at different levels. It supports all blocks from 1 to 9 of IEC 60870-6 TASE.2 for both clients and servers and can also act as an ICCP (IEC 60870-6-503 TASE.2) client. It operates over TCP/IP Ethernet networks for local and wide area networks. XML technology is used for data exchange between local application and ICCP system.
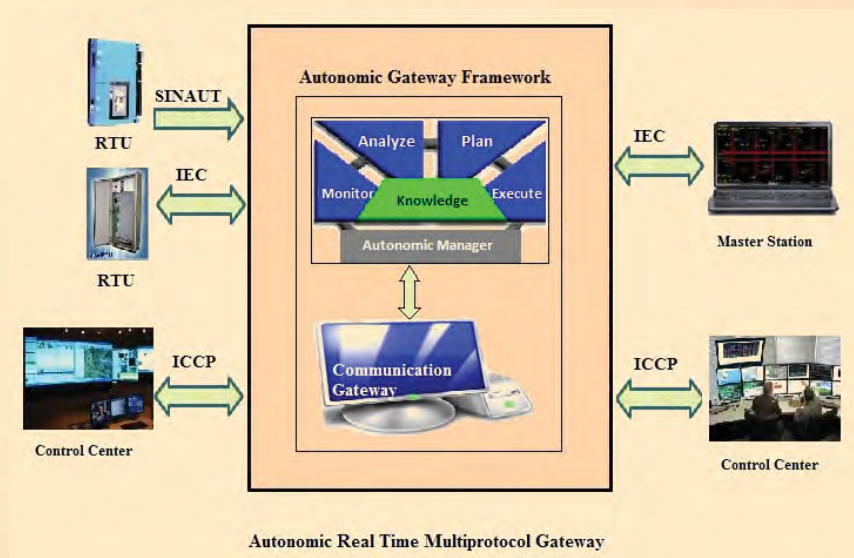


*Components of Smart ProGate*

**C-DAC's Open Process Solution (COPS)**

C-DAC Open Process Solution (COPS) is an indigenously developed generic SCADA engine. COPS – Defender is a security hardener for IEC 870-5-101 and IEC 870-5-104 protocols. It provides application layer security by adhering to IEC 62351 for security authentication mechanism, thereby preventing any unauthorized usage. Further, data encryption provides security at the data link layer, which eliminates communication channel threats. Other key features allow effective mitigation solution with minimal latency between existing RTUs and MTUs. ARM based Single board computer is used as security hardener in this indigenously developed solution. The system has been successfully tested at Central Power Research Institute (CPRI) Lab.

**COPS SCADA Lab Suite**

COPS supports a true hierarchical distributed architecture, which provides the most cost-effective solution to the customer. The system is fully scalable and uses the industry standards in all the sub-system. For training and educational purposes, the COPS is made available as SCADA Lab Suite with scalable features. It provides a real-time flexible information management system improved with next generation rich graphical user interface for Human Machine Interface (HMI).

SCADA lab kit includes various modules like IEC 60870-5-104 compliance Remote Terminal Unit (RTU) simulator and RTU master, user friendly GUI based on Flex, historical database management, flexible reporting system and trending, tag database configurator, and alarm/event handling.

### Industrial Process Automation Software (IPAS)

IPAS is a user friendly software for easy ladder logic programming of control logic using IEC 61131-3 ladder logic and conversion tool for converting the ladder logic to IEC 61331-3 function blocks. This technology can be used as an import substitution for SCADA systems for process control industries, power generation, distribution, water treatment plants, etc.

## Systems for Security

### Tamper Evident Recorder and Player (TERP)

TERP is a software application that captures multiple forms of information i.e. audio, video, date, time, location, documents, biometrics [like fingerprints] and metadata [MAC address, disk ID, device specific information]. Captured information is digitally signed using smart card or hardware token and a receipt containing metadata and GPS information. Hash of the recorded file is printed that may be preserved for future reference. Digital content captured by this application can be presented as evidence in the court. Recorded information can be played on easily available player. The digital content can be verified for integrity using TERP Verifier Application.

### TETRA System for North East

A TETRA communication network was installed in Sikkim for Indian Army with indigenously developed hardware and software required for the system. The system provides voice and data communication on a secured network and also monitoring and management of the vehicles on-line. This fast deployable mobile communication network system also finds application in disaster management and in other emergency situations of the hill bound state.

### Smart Tracking and Distress Alert System for Automobiles (SmartDASA)

SmartDASA is a vehicle mounted device which senses the impact of the vehicle during an accident or hit and automatically calls the nearest emergency service and passes on the location information of the affected vehicle. A voice communication channel to the emergency service is automatically established even if the occupants are incapacitated to make the call by themselves. The camera provided inside the vehicle captures and transmits the images of the occupants so that appropriate plan of action can be adopted by the emergency service centre to carry out necessary relief and rescue operations. Special sensors and algorithms have been developed for sensing the crash of the vehicle reliably and automatically.



*Distress Alert System for Automobiles*

### Software Defined Radio (SDR)

Software Defined Radio (SDR) is a radio which can receive and transmit widely different radio protocols (referred to as waveforms), decided solely by the software. SDRs have significant utility for the military communication services as they use radios of different communication standards. The SDR uses a core set of modular and configurable hardware and software components. The basic hardware architecture of SDR provides for sufficient resources to define the waveform characteristics like carrier frequency, bandwidth, modulation scheme, source/channel coding, encryption, network protocol processing etc., in software. C-DAC is developing three different models of SDR products:

1. Man-pack model, which has form-factor of "ManPack" for military or strategic applications. The unit is lightweight and ergonomically designed for comfort to carry for long periods of time.

2.  Hand-held model, which is capable of operating both in VHF and UHF band. Third party standard SDR waveforms can also be ported to its hardware.

3.  HF and L Band model, which is capable of working in both bands with capabilities for network centric warfare on land, at sea and in the air. HF (3MHz to 30MHz) is the most suitable spectrum for over-the-horizon radio communication. Robust HF communication systems can cater to narrow band voice and data communication needs. But, ad-hoc as well as back bone communication requires larger bandwidth for higher data rates necessitating L-Band (960MHz to 1250MHz) operation.



*Man-pack model of SDR*

**Early Fire Detection and Safe Exit Guidance System**

This system provides information about fire occurrence and guides individuals to safely exit the building. Furthermore, by accurately locating the source of fire and its general spreading direction, this information is made available to fire fighting and other security agencies for effectively combating and bringing the situation under control. The system senses the abnormal rise in current drawing and also LPG leakage detection and sends the information through Wi-Fi. The system continuously monitors the environmental details like temperature fluctuations, smoke, etc. and reports it to the fire safety officer.

**Real-time Monitoring System for Detection of Harmful Gases**

Real time monitoring system for detection of harmful gases, like LPG/PNG, consists of distributed gas sensing nodes that monitor the safety levels of targeted gas leakage in the deployed environment and transmits the safety status over an RF network to a control station. Each of the individual node is equipped with a gas sensor to detect leakage of targeted gas. Each of the sensing node is calibrated to raise alarm much before leakage concentration of targeted gas reaches unsafe levels. The gas concentration levels are analyzed and an RF transceiver transmits packetized data to the control station that monitors the safety status sent by each node. If any leakage is detected, control station raises an audio-visual alarm to alert the operator informing about the leakage node location.

**Electronic Personal Safety System (ePSS)**

Electronic Personal Safety System (ePSS) aims to assist women, children, aged persons and others in distress, by enabling them to send an emergency message to the police control room with a single click of a button on the device with them having GPS and GSM capability. The geographical location of the person in distress will be displayed on the map of the city in the control room and it will be automatically forwarded to multiple mobile rescue police vans located nearest to the spot. The shortest route for the police van to reach the distress location will also be displayed. The system will also log all events including voice and text data related to the distress alert.

**Early Warning of Approaching Trains (EWATS)**

Unmanned level crossings are potential sources of accidents to the road users and railways. The early warning is generated by analyzing the acoustic/ultrasonic signals resulting from the interaction of the locomotive wheels and the rail, propagated through the rails. The signals are picked up from the rail itself, about 1.5 Km away from the level crossing point. The system will listen passively to the signals present in the rails, generated by the moving locomotive. From this signal parameters pertaining to the train, like speed, number of compartments, type of locomotive, approximate distance, etc., can be extracted. The system can be used in unmanned/manned level crossings and also during rail track maintenance as an early warning system.

### Ship Wake Measurement System (SWAMS)

The system can measure, record and analyze the physical properties of wake generated by Indian naval ships. The wake measurement data will be useful for improving the "stealth characteristics" of naval ships. The wake measurement procedure involves transmitting high frequency ultrasonic signals through a seabed array of transducer elements onto the wake of a cruising ship and receiving the reflected echoes through another seabed array of transducer elements. The underwater transducer arrays and the sensor unit are mounted on an underwater pile driven on the sea bed. The received signals are digitized, stored in the local memory of the underwater sensor in real time, and sent to the shore based SWAMS data handling system for data storage and data analysis. The system will be installed at the Naval Under Water Ranges (NUWR), Goa.

### Acoustic Path Checker (APACHE)

Autonomous vehicles (AV) find applications in various strategic areas. By employing an obstacle detector, the AV can move on its own. The system will detect the presence of an obstacle which may possibly obstruct the movement of the AV and give a warning signal so that the AV can change the direction of movement or stop to avoid a collision. The technology can be used as an obstacle detection system, where cameras will not work due to poor visibility conditions. The technology developed can be adapted and used in underwater applications as well as in navigational aids for the visually challenged. C-DAC has successfully developed an acoustic and ultrasonics based path checking system, which can be mounted on an autonomous vehicle. The system has parabolic reflectors having a 3 dB beam width of 3° and a sensitivity enhancement of 34.73 dB.

# Electronic Devices and Smart Products

### Smart Kitchen Cabinet

Smart Kitchen Cabinet is an appliance that incorporates automatic grocery items management, enabling nutrition aware cooking. It facilitates user in nutrition aware cooking and improving quality of kitchen activities by automatic shopping list preparation. It consists of a touch screen Liquid Crystal Display (LCD), load sensors, Radio-Frequency Identification (RFID) reader and tags to provide complete awareness about ingredients and availability information for better kitchen management. The sensor information is collected and transferred to kitchen database. Application analyses the sensor data and takes necessary actions to intimate the user about shopping list by SMS and e-mail. Calorie information of an item is also calculated using nutrition database and it will be shown on display in front of the user.

### Interactive Mirror

Interactive Mirror is an artifact augmented with intelligence to demonstrate personalized services for enhanced comfort. The mirror aims at recognizing the user based on image processing techniques and provides personalized services like emotion recognition, health progress representation, event reminding and mirror usage time. The mirror can find potential applications in smart homes, textile industries, hotels and beauty parlors.

### Wireless Traffic Control System (WiTraC)

Usage of wireless technology for road traffic signaling helps implementation of traffic signal controllers without digging/ducting across carriageway. The introduction of stage skipping for approaches where there are no vehicles reduces the cycle time and minimizes the number of red jumping. Non-intrusive camera based vehicle detectors are used to operate WiTraC in vehicle actuated mode. WiTrac has been implemented in the AB Road BRT Corridor of Indore City. The average stoppage delay of iBUS at the intersection dropped from 80 sec to less than 5 sec due to the introduction of Transit Signal Priority (TSP) resulting in an overall improvement in journey time. This has increased the ridership in the BRT buses. WiTraC was also deployed at junctions in Surat city by C-DAC's ToT partner M/s Delhi Integrated Multi-Model Transit System Ltd. (DIMTS), New Delhi.

**Omni-Directional Mobile**

This is a remotely operated mobile which can move in two mutually perpendicular directions without turning, besides the capability to turn around on a spot without moving forward/backward. The system uses special algorithms to determine the right combination of speeds of the four wheels and closed loop control principles for controlling the movements of the vehicle. This indigenously developed technology will help replace costly units imported from abroad. Such appliances have many uses in industrial environment as well as defense and para-military forces.



*Omni-directional Mobile*

**Phase Locked Loop IP block**

Phase locked loop (PLL) technology allows one to eliminate expensive oscillator modules. Using integrated PLL and common low-frequency crystals, one can achieve low jitter and excellent power-supply noise rejection. PLL can reduce cost, improve system reliability, and save board space. PLLs find great importance in physical layer integrated circuits (PHY) for recovering clock from data in high performance data transfer protocols, and also for generating multiple high frequency clocks inside a SoC from a reference clock. PLL takes a reference clock between 20MHz and 25MHz and outputs a clock in 400 MHz to 500 MHz. C-DAC has fabricated a PLL chip in 350nm CMOS process.

# Sensors and Network Systems

**WINGZ-Energy**

WINGZ-Energy is a multiprotocol, zigbee to Internet gateway hardware which is used to interface a low power wireless sensor network to infrastructure networks such as LAN, WAN, or mobile networks. This system enables easy monitoring and controlling of wireless sensor networks over the Internet. The board supports multiple IP protocols such as Wi-Fi, 3G, or Ethernet to establish a connection to internet using one among many IP protocols present. Support for internal web server and database along with data logging for wireless sensor networks is provided. The board is powered with ARM processor with rich operating system support such as embedded Linux, Android, Wince, Ubuntu, etc.

**C-DAC ZigBee Stack**

The C-DAC ZigBee stack is implemented using TinyOS-2.x for CC2430 and CC2530 microcontrollers. The stack can be compiled by Keil and IAR compiler. It allows the network to be formed in Star, Cluster Tree, and Mesh topology. The CSMA-CA and TDMA channel access mechanism coordinates the data transmission in the network. The base station (ZC) of the coordinator is responsible for the network formation. The router (ZR) and end device (ZED) join the network through MAC association procedure. Network uses adhoc on-demand distance routing (AODV) for mesh topology and hierarchical routing for cluster-tree topology. The stack allows message encryption and authentication for providing security to the packet transmitted. In order to update the firmware of the nodes, stack supports over the air programming. Network time synchronization allows every node's clock to be synchronized with base station clock.

### Power over Ethernet (PoE) based PAN Coordinator

PoE technology describes a system to pass electrical power safely, along with data, on Ethernet cabling. PoE based Personal Area Network (PAN) coordinator aims at the extra ability to provide power through widely used existing Ethernet infrastructure. The power injected into the system through power source equipment is controlled and coordinated through the PoE interface and DC-DC control circuitry based on IEEE 802.3at standard.

### MEMS Level Sensing System

A Micro-Electro-Mechanical System (MEMS) based ultrasound level sensing system capable of sensing fluid levels in a tank with the possibility of non-horizontal levels has been developed jointly with IISc, Bangalore. C-DAC developed the necessary Electronics for MEMS sensor chip integration, as well as modules for Signal Processing and Data Communication. The product can be used in hybrid level measurement (like solids and liquids mixed or solid surfaces containing conical and pyramid shapes) in process industries and submarine systems.

## Medical Electronics

### Smart Bed

Smart bed is a preventive healthcare application developed under ubiquitous computing project to study and detect the sleeping pattern and sleep disorders like sleep apnea, restless leg syndrome, and insomnia in an unobtrusive manner. It features respiration and heart beat signal extraction using a sensor and then assessing sleep quality and disorders.

### Wireless Pulse Oximeter

Pulse Oximeter is a non-invasive, easy to use, diagnostic test device used for detecting the percentage of hemoglobin that is saturated with oxygen (SpO2). The Intelligent finger tip probe calculates the percentage of oxygen, heart rate, blood flow and transmits the data via Bluetooth onto a mobile phone. It features a transmission range of 10 meters and draws a low current of 120mA from a +5 volt power supply.
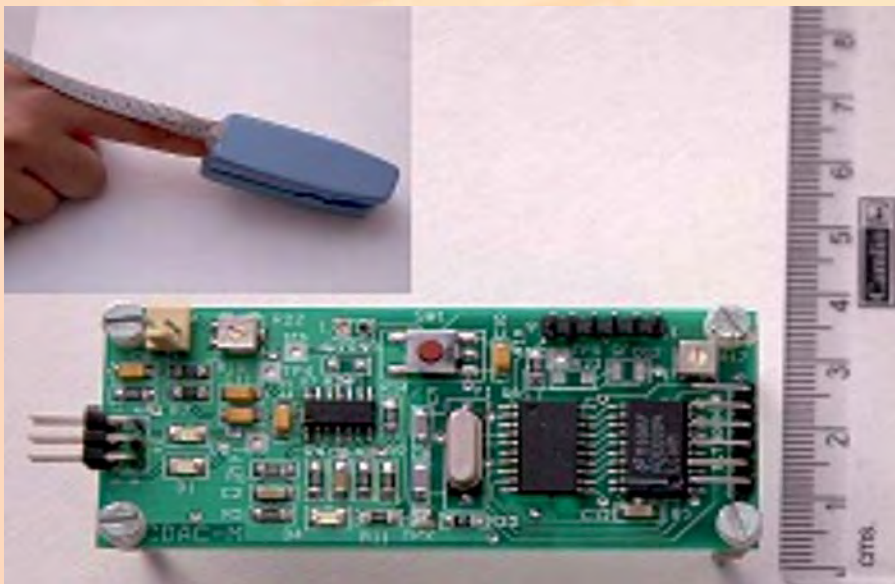


*Pulse Oximeter*

### Wireless Digital Stethoscope

A stethoscope is a diagnostic instrument used by various health care professionals to listen to the sounds of patient's heart, lungs, abdomen, etc. Careful listening of the sounds is imperative for detecting subtle manifestations of abnormalities. Wireless digital stethoscope acquires acoustic signals from the chest and processes signals after digitization to facilitate medical examination. It is an ergonomically designed handheld portable device for

picking up sounds directly from the body and outputs sound on wired or bluetooth headset. It is useful in monitoring sub-audible sounds of heart through the use of advance filtering technique and wireless transmission over bluetooth for remote diagnosis. It is supported by mobile applications in Symbian/Android to capture the wireless data.

*Digital Stethoscope*

### Urine Analyzer

An urine analyzer is an electro-optical instrument based on Beer's and Lambert's law of photochemistry. The presence of certain substances in the urine reflects the metabolic state of the body. Since urine can be easily collected, its examination is important in diagnosis of various pathological conditions. The urine analyzer mainly comprises of an auto-sampler for sampling, an optical assembly for measurement of urine parameters, a CPU for computation and instrumentation, and a Peristaltic pump assembly.

### Early Detection of Breast Cancer using Thermal Sensors

Negative Temperature Coefficient (NTC) chip thermistors can be used as thermal sensors for the measurement of temperature of cancer cells. Thermography is a non-invasive, skin surface temperature screening measurement method that is economical, fast and non painful. The advantage is that it can detect breast cancer at a very early stage, even up to 10 years earlier than the conventional mammography. C-DAC is developing such a thermal sensor.

## Agri-Electronics

### Integrated E-Nose and E-Vision System

E-Nose or Electronic Nose senses complex odours using an array of sensors. The sensor output is statistically classified and resolved with suitable pattern recognition engine as a measurement of odour of the sample. Similarly, E-Vision or Electronic Vision makes use of digital camera based image capturing, conditioning and processing. Image features are detected by soft-computing algorithms. The integrated system permits reliable, repeatable, physical, non-invasive, affordable, real-time techniques for various measurements in applications like food quality assessment, environmental pollution detection, medical applications, explosive detection, etc.

The system is employed in Tantea Complex of Coonoor (Tamil Nadu) for quality monitoring of black tea. ToT for the product has been done to Nagarjuna Fertilizers & Chemicals Ltd. (NFCL), Hyderabad and Electronics Research & Development Enterprise (ERDE), Kolkata.

### Hand held Electronic Nose (HEN)

The device is intended for assessment of finished tea quality and determination of optimum fermentation time for tea during manufacturing. The device can also be used for quality determination of spice and floriculture produces as well as for diagnosis of diseases like diabetes. It is a small portable device with graphical user interface with touch screen with data storage in FAT file system in SD Card memory. Its MOS sensors were developed indigenously by Sensor Hub, Kolkata. This product was deployed at PES Institute of Technology (PESIT), Bangalore; UPASI Tea Estates Valparai, Tamil Nadu; DTDRC Kurseong, Darjeeling and Tea Research Association, Jorhat.

*Hand held E-Nose*

**Obnoxious Odour Measurement System (OOMENS)**

The system measures concentration of odorant such as Dimethyl Sulphide, Dimethyl Disulphide, Methyl Mercaptant, and Hydrogen Sulphide generated from pulp and paper industries. The system is installed at Tamil Nadu Newsprint and Papers Limited (TNPL) at Karur and Mysore Paper Mill (MPM) at Bhadravati.

**Electronic Tongue**

Electronic Tongue or E-Tongue is used for taste characterization and is based on the voltammetry technique. It comprises of electrochemical cell, sensor array and appropriate pattern recognition software capable of recognizing simple or complex soluble non-volatile molecules which forms taste of a sample.

E-Tongue is also used for monitoring of ageing of tea. It distinguishes tea samples having different astringency values with an accuracy of more than 85% and mimics tea tasting scores by electronic means through an user-friendly software. The system was deployed at M/s National Collateral Management Services Limited (NCMSL), Hyderabad for quality determination of chilly and turmeric.

**Resham Darshan**

It is an image processing based solution for colour characterization of reeled as well as spun yarns of silk. It is PC based online image capturing and instant analysing of the rice sample. It provides graphical user interface for easy operability. It presents colour templates, colour comparison, and on-line weighing. It presents bar plot on distribution of different silk grades. The system has been deployed at silk sorting centers in Deoghar (Jharkhand) and in Bhagalpur (Bihar).

**Smart Farm**

Smart Farm system is a low-power, user-friendly device, which helps the farmers to plan their irrigation and fertigation schedules based on the environmental and soil conditions of the agriculture land. The system monitors parameters such as soil moisture, pH, atmospheric temperature, humidity, etc. in real-time, to intelligently operate the pumps/valves, based on the field conditions as well as informs the farmer about the field parameter value changes through a graphical display unit. Data acquisition is done through wireless motes. The device can be configured to send SMS to the farmer's mobile on detecting critical alarm conditions of the critical field parameters. There is provision for alerting through LED flashers/hooters as well. The agricultural field devices can be controlled from a remote location by special commands given through mobile phones. Smart Farm system can be configured for providing the logging of parameters such as water quantity used for irrigation, fertilizer quantity applied to the soil, pump on/off, valve open/close, etc. on a daily/monthly basis. The logged data can be retrieved for further analysis using external memory interface. A system has been commissioned at College of Agriculture, Vellayani (Kerala).

# Software Technologies

In the software technology area, C-DAC designs, develops and deploys various types of software for e-Governance applications, e-learning applications and other applications of social impact. It also hosts the National Resource Centre for Free and Open Source Software (NRCFOSS), which contributes to the growth of FOSS in India through R&D, Human Resource Development, Networking and Entrepreneurship development, and also serves as the reference point for all FOSS related activities in the country. The activities carried out by C-DAC in this thematic area during the last one year are described below.

## Mobile Computing

### MTRANS – Mobile Transaction Framework

Mobile applications run in an environment characterized by frequent network disconnections, low bandwidth, mobility related issues, low computing power and limited set of APIs for application development. Mobile transactions can face frequent aborts due to frequent disconnections from the server and result in low transaction throughput. MTRANS framework has been developed to provide JAVA based API libraries on Android and J2ME platforms for developing transactional network based applications with less effort and help achieve better transaction throughput. First version of MTRANS framework has been released for internal pilot trial. Its key features are:

- It supports disconnected operation of applications and helps achieve better transaction throughput
- It adapts the MVC (Model View Controller) design approach innovatively to suit mobile applications processing
- It provides a unique Message Exchange Protocol over HTTP and API for handling business data
- It works independent of any mobile database and provides its own data access APIs

### Mobile Seva

Mobile Seva application for mobile based governance was developed by C-DAC. It provides an integrated, centralized platform which can be used by all Government departments and agencies across the country for delivery of public services to citizens and businesses over mobile devices using SMS, USSD, IVRS, CBS, LBS, and mobile applications installed on mobile phones. The diagram below depicts the various components of Mobile Seva.
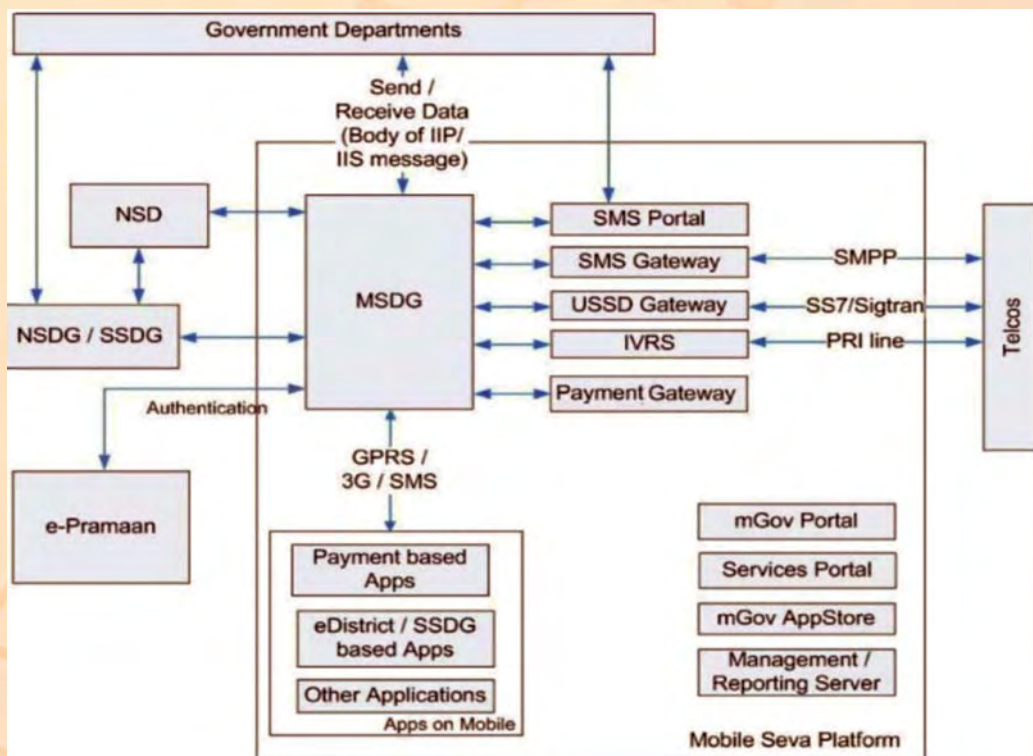


*The various components of Mobile Seva*

It uses a single number, 166, for all the different channels (SMS, IVRS, USSD) for accessing services available on Mobile Seva platform. Once integrated to any one channel, it provides automatic integration to other available channels. It has been integrated with National e-Governance Service Delivery Gateway (NSDG) and State e-Governance Service Delivery Gateway (SSDG), which means it is connected to all the departments which are on NSDG/SSDG.

A user friendly services portal enables users to mange their account and sub account, create new user, create new group, and view various kinds of reports. Mobile Seva Appstore has been made available to all Government departments to host and/or manage mobile applications.

The system has unicode support for Indian Languages, and audit trail maintenance for each message.

Mobile Seva was dedicated to the nation on December 23, 2013 by Shri J. Satyanarayana, Secretary, Department of Electronics and Information Technology (DeitY). As on end of March 2014, Mobile Seva platform has integrated 1015 government departments/ agencies and 318 government services are made available to the citizens through this facility. Approximately 94,22,52,440 SMSes have been pushed so far by the integrated departments. 318 services are available on: 166/51969 / 9223166166. Approximately 27,17,677 SMSes have been pulled so far by the integrated departments. 300 live and 62 demo mobile applications (m-Apps) with over 1,86,613 downloads are hosted currently on the m-App store. 25 lakh transactions have been carried out on NSDG and 904 state services have been registered in National Service Discovery (NSD) till date.

## Free/Open Source Software

**BOSS Linux 5.0 (Urdu version)**
BOSS (Bharat Operating System Solutions) GNU/Linux distribution has been developed by C-DAC derived from Debian for enhancing the use of Free/ Open Source Software throughout India. BOSS Linux 5.0 was fully customized in Urdu language. The entire desktop and applications are translated in Urdu. BOSS Urdu features complete GNOME 3.4 Desktop Environment including all the menus and sub-menus in Urdu. The Smart Common Input Method (SCIM) Input keyboard layout support for Urdu Inscript layout is bundled by default in BOSS with Unicode 6.3 support. BOSS is bundled with C-DAC-UrotGhalib and Nafees Urdu fonts for input support in Libreoffice and all text editors. BOSS Linux urdu version was officially released in Delhi on December 16, 2013 by the Hon'ble Union Minister for Communications & IT.

**National Resource Centre for Free/Open Source Software (NRCFOSS) Phase-II**
NRCFOSS Phase-II is a consortium based project involving research and academic institutes including C-DAC Centres/IITs/AU-KBC (Anna University–KB Chandrasekhar) Research Centre. Major outcomes during the year include following:

- Around 1000+ manpower trained on BOSS through different workshops, training programmes, and seminars

- Government of Punjab has placed an order for implementation of BOSS Linux/EduBOSS across schools in the state of Punjab under the Sarva Shiksha Abhiyan programme. It has been implemented in more than 7000 schools

- Government of Haryana has placed an order for implementation of BOSS Linux/EduBOSS across schools in the state of Haryana under the Sarva Shiksha Abhiyan programme. It has been implemented in more than 5000 schools

- Government of Maharsahtra has placed an order for implementation of EduBOSS across 5000 schools

- C-DAC signed MoU with M/s HCL for BOSS Linux/EduBOSS preload in systems

- Analysis study was done for complete migration from Windows to BOSS Linux for Tamil Nadu Agricultural

Department and Ship Building Centre, Indian Navy, Vishakhapatnam.

● Deployment of EduBOSS Linux was carried out in all the Government schools of Chandigarh

# ICT for Social Development

**Vikaspedia**

Vikaspedia, the multilingual, multi-sectoral knowledge portal, seeks to empower poor and under-served communities through provision of information, products and services in regional languages. Built as a crowd-sourcing platform using an open source content management system Plone, the portal offers information related to six livelihood sectors in five languages. Online services, e-learning courses, and multimedia content are also offered as part of the portal. It has an inbuilt workflow model that supports a "hub-hub-spokes model" approach [Vikaspedia team– State Nodal Agencies/expert organizations – volunteers/service providers – community] in content creation, management and utility.

Vikaspedia portal was formally launched by Shri J. Satyanarayana, Secretary, Department of Electronics and Information Technology (DeitY), on February 18, 2014.  The portal has user interactive features such as global search of the portal content in regional languages, opinion polls, page rating, page sharing on social networking sites, feedback mechanisms, etc. The portal is also mobile compliant.



*Vikaspedia portal*

Dynamic market information tool, a part of Vikaspedia, addresses the complete process of handling market information – entry, display, archival and sending personalized information to registered users. It consists of commodity, markets, market price and user management modules. The user interface is in English and Tamil.  The technology transfer of DMI to Tamil Nadu Agricultural University, Coimbatore was done during September 2013.

**Enhanced Orca**

The open source Orca screen reader has been significantly enhanced to address some of the common difficulties encountered by Orca users. Major enhancements are listing of shortcut facility, skim reading, navigation by sentence, structural navigation for OpenOffice.org documents, etc. Deb package of enhanced Orca was released on April 30, 2013.

**Balsahara**

The 'Balsahara' is a mobile and web-based children's homes automation software developed by C-DAC. These homes provide rehabilitation of the disadvantaged children for their overall growth. Balsahara software monitors the activities of these homes.

# E-learning

**Simple Collaborative Online Platform for Education (SCOPE)**

SCOPE is an open source Learning Mmanagement System (LMS) released under GPLv3 licensing terms. Key features include audio/video communication between instructor and students, Question and Test Interoperability (QTI) specification based assessment engine, course management, synchronized presentation through whiteboard, support for multiple screen resolutions (desktop PC, tablets, etc.), file sharing, and e-mail.

**e-learning Quality Research Laboratory**

A web based platform has been developed to test LMS as well as e-contents according to a pre-defined quality model. Key features include computation of course effectiveness index based on NMEICT's four quadrant model. Evaluation of LMS can be done with respect to performance, usability, accessibility and security parameters.

**Mobile VidEo ConteNt ManagemenT and Online DeliveRy System (MENTOR)**

MENTOR is an m-learning product that supports various activities like course creation, assignment of video lectures to different topics in a course, assignment of courses to students, assessment of student performance, and doing configuration settings including video adaptation and rendering based on learner's mobile phone audio/video capabilities. Client side m-learning applications developed for Android & J2ME platforms can be used for accessing video lectures and quiz material for self-assessment. The contents developed for m-learning are short duration video lectures suitable for just-in-time, concept based learning. Client support is available for both Android and Java-enabled mobile phones, and supports video adaptation and rendering according to mobile device video/audio capabilities. M-Learning video lectures for four courses namely C-Programming, Data Structures, Soft Skills and Entrepreneurship were also developed as part of the project. The system has been implemented in PR Government College, Kakinada, Andhra Pradesh.

**Adaptable and Accessible e-Learning Framework (e-Saadhya)**

e-Saadhya (Saral Anukulaney Adhyayan) is an adaptable and accessible e-Learning framework for children with mild mental retardation and autism. This framework is a unique product with a combination of standard diagnostic and special educational assessment checklists, special educational teaching methodologies namely Applied Behaviour Analysis (ABA), Discrete Trial Training (DTT), use of audio visual prompts and reinforcements, and curriculum based measurement support provided by enabling the special educator/parent in creating associated assessments/quizzes for each lesson. Personalization of each lesson and performance tracking with visual reports are supported.

The environment is user friendly with cognitive accessibility features embedded with audio video navigational guidance and voice support. A mobile based augmented reality solution is also developed to interactively teach the children with real world pictures. This supports dynamic creation of audio visual schedules, speaking albums by a parent or a special educator after which these can be accessed and used by the child over a mobile device. Scope of the tool covers two sets of profiles of children within the spectrum of autism with ASD alone and with mild mental retardation in primary schools or within the age group of 16 years. Age group is in line with Sarva Shiksha Abhiyan (SSA) policy.

e-Saadhya is being implemented at National Institute for Mentally Handicaped (NIMH) Secunderabad and 15 special schools in Hyderabad, Bangalore and New Delhi.

**Computer-enabled Continuous and Comprehensive Evaluation (CCE)**

C-DAC, in collaboration with Amrita Vishwa Vidyapeetham, has developed an ICT enabled CCE framework to help teachers manage the complex assessment activities in CBSE schools. The framework incorporates formative and summative assessments, and helps calculate and store students data like marks, grades and percentage for scholastic and co-scholastic areas. CCE framework also helps analyze the performance data of students and provides easy to understand visualizations giving students and teachers a complete picture of performance of a single student or a class of students, abrupt changes in performance of a particular student, alerts for continuous degradation in performance, etc. These are helpful for the students since they get timely feedback and can work accordingly to improve the performance, as well as for teachers and school management in monitoring the student performance and need for improvement.

**Online Labs (OLabs) for Schools – Phase II**

OLabs Phase-I achieved significant acceptance from schools, as it offered high quality simulations and animations, and conformed to the curriculum. Feedback from principals and other stakeholders at schools was positive and many requested for OLabs for other subjects (all Science subjects, Mathematics and English). OLabs Phase II includes enhancements to the OLabs framework to support m-learning on devices like Aakash tablet, translation of courseware to Indian languages, additional classes and subjects. Phase II extends the concept of labs to Mathematical activities and English language learning.

Over 50 additional experiments (beyond those done in Phase I) covering Physics, Chemistry, Biology, Mathematics and English have been completed, and are available online. Most of the experiments run on Android based mobile devices. Translation to Hindi, Marathi and Malayalam is in progress.

# E-governance

**eRA: e-Governance Application Integration with Reconfigurable Architecture**

Middleware is a key ingredient of distributed computing. As e-Governance systems evolve, they need to provide advanced features to support dynamic and flexible processes that adapt as business situations change as well as integrate with other systems which have functional/data overlaps and they need to provide complete control and visibility into the entire e-Governance scenario. These features ultimately require a flexible, distributed architecture that enable secure collaboration, advanced data management, dynamic system updates, and custom rule-based processes. Identifying these needs of the modern e-Governance systems, C-DAC developed eRA (e-Governance Application Integration with Reconfigurable Architecture). eRA defines a reconfigurable middleware with support for workflow and rule-based service configurations.
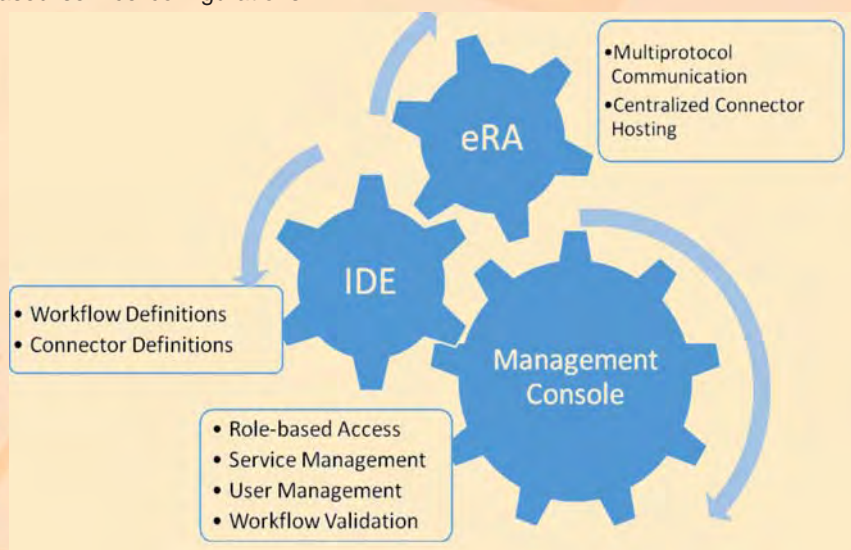


*Architecture of eRA*

Current e-Governance infrastructure identifies National e-Governance Service Delivery Gateway (NSDG) and State e-Governance Service Delivery Gateways (SSDGs) forming a messaging middleware based infrastructure. eRA extends the e-Service delivery framework by facilitating multiple protocols support for service integrations as well as delivery of integrated services with workflow rules defined for the constituent services. The asynchronous and/or synchronous services based on different protocols and offered by multiple government departments can be integrated and delivered as a single service to the government departments (G2G)/businesses(G2B)/citizens (G2C).

**Electronic Standards for India Portals for DeitY and Bureau of Indian Standards**

Compulsory registration scheme of Department of Consumer Affairs (DOCA)/BIS mandates compliance to Indian safety standards for 15 electronic items. In Clause II of DeitY's Electronics & Information Technology Goods (Requirements for Compulsory Registration) Order, 2012, a commitment has been made to handle the whole process of registration, surveillance, etc. in a transparent and time bound fashion. This portal is an outcome of this effort. The portal offers:

- Manufacturer registration
- Initial product registration
- Evaluation of application
- Grant of registration
- Random sampling
- Surveillance
- Renewal/Cancellation/Suspension/Inclusion of registration

**e-Mulazim: HR Management System**

e-Mulazim is a user-friendly open source software that helps the HR department to manage its employees effectively. This system automates the complete employee scheduling process and allows the user to maintain attendance records, leaves, payroll, inventory, CPF/EPF and claims details electronically. It provides for matching of physical and logical movement of electronic information. E-mulazim has been deployed in National Agri-Food Biotechnology Institute (NABI), Ministry of Science & Technology; Center of Innovative and Applied Bioprocessing (CIAB), Ministry of Science & Technology; and Punjab Biotechnology Incubator (PBTI), Mohali.

**National Rollout of e-Services of ECI**

Election Commission of India (ECI) has decided to roll out the National e-Services as an ambitious project funded under National e-Governance Action Plan. This project envisages e-delivery of services of ECI to the citizens of India through effective use of ICT. The services offered through e-Services will help smoothen the interface between citizens and ECI, as well as increase transparency and ease of access of information to the citizens. A National Electoral Search application was developed under the project to provide improved search facility to citizens. The project enables voters to search for electoral and polling station information.

**e-MSIPS (Modified Special Incentive Package Scheme)**

The electronic MSIPS (e-MSIPS) application system enables online submissions and scrutiny of applications submitted to the Department of Electronics and Information Technology (DeitY) under the Modified Special Incentive Package Scheme (MSIPS) and Electronics Manufacturing Cluster (EMC) schemes.

# Others

### Customs Valuation System (CVS)

Customs Valuation System (CVS) is a decision making and analysis tool to assist customs officers in valuing price of a commodity. The system has been developed by C-DAC in consultation with Directorate General of Valuation (DGOV), India. It has been implemented in Kenya, Ethiopia and India.

### Warehouse Management System (eSAMBHARANI)

This software package covers the activities of a warehouse such as deposit, extension, reservation, and release of items and finance at warehouses, consolidation of the warehouse level activities and office management at container freight station and regional offices, MIS, payroll, superannuation, etc. The solution was developed for Kerala State Warehousing Corporation integrating its activities at 60 warehouses, 9 regional offices, three zonal offices, one container freight station and the head office.

### e-PPMS (Electronic Project Proposal Management System)

e-PPMS is an electronic project proposal management system developed with the objective of building a transparent system incorporating global benchmarks and practices to enable researchers to make online submission of proposals, technical evaluation, financial approvals, real-time tracking of status of proposals and to ensure service delivery in time bound manner.



*Electronic Project Proposal Management System (e-PPMS)*

The system was customized and deployed for Science and Engineering Research Board (SERB) and Indo-French Centre for the Promotion of Advanced Research (CEFIPRA).

# Cyber Security and Cyber Forensics

In cyber security and cyber forensics, C-DAC is involved in development of various technologies and solutions in a number of sub-areas such as Network security, Web security, Mobile security, End-system security, Security analysis, Authentication and Identity management and Cyber forensics. C-DAC also conducts nation-wide training and awareness programmes in this area. The activities carried out in these sub-areas during the year are described below.

## Network Security

### GYN (Guard Your Network) - Network Intrusion Prevention System

GYN is a network intrusion detection/prevention system developed by C-DAC that analyzes network packets to detect and prevent critical attacks using SNORT compatible signatures and anomaly detection mechanism. GYN analyzer capabilities include analysis of packets, sessions and network flow records with user friendly web-based management facility. GYN detects various kinds of attacks such as Denial of Service (DoS), worms, web attacks, email attacks, attack against database (SQL) servers, scans, floods, protocol and application anomalies. GYN is deployed at Government agencies, C-DOT Bangalore and at various C-DAC centres.

### CHAKRA

CHAKRA is a dynamic network based firewall solution developed by C-DAC that is capable of learning new firewall rules automatically based on analysis carried out on various input sources such as SNMP data, flow traffic and intrusion detection system alerts. It has built-in capabilities to verify and validate consistency in firewall rules. In addition to the firewall functionality, CHAKRA also provides the traffic monitoring functionalities which include bandwidth usage, existing connection details, top communication, traffic trend analysis, etc. The solution is deployed at C-DAC and Tezpur University, Assam.

## End-System Security

### Application and Device Control (ADC)

ADC is an end system security solution developed by C-DAC for whitelisting applications and to control USB mass storage devices with centralized management. This provides support such as protection against unknown malware, whitelisting of executables and java files, provides user authentication, encryption of data, etc. It logs details such as applications allowed or denied at end systems, device authentication attempts and file operations on devices, at server for further analysis. ADC solution is deployed at ISRO Trivandrum, DRDL Hyderabad and NAVY Vishakhapatnam.

### Browser JSGuard

Browser JSGuard is a security add-on to web browser, which detects and defends from malicious HTML and JS based attacks made through the web browser. It blocks access to the harmful, inappropriate and dangerous websites that may contain malicious content by applying heuristic rules. It alerts the user on visiting any malicious web pages and provides the detailed threat analysis report of the web page.

## Web and Mobile Security

### Web Security

### WebSAFE – Web Application Security Assessment Framework

WebSAFE is a comprehensive OWASP compliant and open-source based Vulnerability Assessment (VA) solution

developed by C-DAC. It integrates various open-source tools and the framework is user friendly, which provides generic results and reports bringing out the security flaws and provides the work-arounds. WebSAFE has been deployed at STQC Hyderabad, DRDL Hyderabad and IDRBT Hyderabad.

**PHP Application Vulnerability Scanner (PAVS)**
C-DAC has developed PAVS (PHP Application Vulnerability Scanner), a source code scanner for finding the code vulnerabilities in PHP based applications. PAVS addresses security issues such as cross-site scripting, SQL injection, file manipulation, file inclusion, command execution, code evaluation attacks and also finds the loop holes in PHP configuration settings.

## Mobile Security

**Mobile Device Security Solution**
C-DAC has developed M-Kavach, a mobile device security solution that provides protection against most of the common threats on Android platforms. It provides secure storage, application monitoring, remote erase/lock, and call and SMS whitelisting/blacklisting.

**Lightweight Data Security Framework for Mobile Platforms (M-Safe)**
C-DAC has developed a Software Development Kit (SDK) for mobile platforms that provides methods for secure communication and secure storage.

## Security Analysis

**Password Recovery Tool**
Human memorable passwords are an integral part of most computer security systems, which are used to protect our electronic documents, online accounts and online financial transactions. Many a times, there is a legitimate need to crack a password either because a very important password is forgotten or the person who encrypted the file refuses to divulge the password. The Password Recovery Tool being developed is the first step towards developing an indigenous tool for password recovery. It supports password recovery for the files with the formats viz. PDF, MS-OFFICE, WINRAR, WINZIP with GPUs/CPUs/FPGAs.

## Attack Analysis

**Confirming Malicious URLs based on Dynamic Analysis**
C-DAC has developed a high interaction active honeypot which actively browses the URLs using real environment and determines the suspicions URLs based on state changes. Security issues addressed are suspicious URLs, detection and collection of malware propagating using Drive-By-Download.

**Client-Server Architecture based Dynamically Configurable Honeynet**
C-DAC has developed a dynamically configurable honeynet framework that has capabilities to collect large-scale attack data and determine attack trends. It has built-in mechanisms for malware collection and deploying real and emulated OS services.

## Authentication and Identity Management

**Biometrics R&D Lab**
C-DAC in collaboration with Unique Identification Authority of India (UIDAI) has established a Biometric R&D Lab for carrying out cutting-edge research in biometrics and to serve as a national resource center for building capabilities

and governing the biometrics technology. The center addresses various issues related to field challenges, biometric samples quality analysis, interoperability and standards compliance, performance (speed and accuracy) and security threats.

### Test-bed for Performance Evaluation and Benchmarking

C-DAC has setup a test-bed for evaluating abilities of biometric SDKs from various vendors. The test-bed is used for evaluating abilities of the biometric SDKs obtained by UIDAI through an EOI/RFP from various vendors for Aadhaar Authentication Services. The evaluation is carried out based on multiple runs on varied data sets, of different volumes, and for different duration for measuring, comparing and reporting their performances.
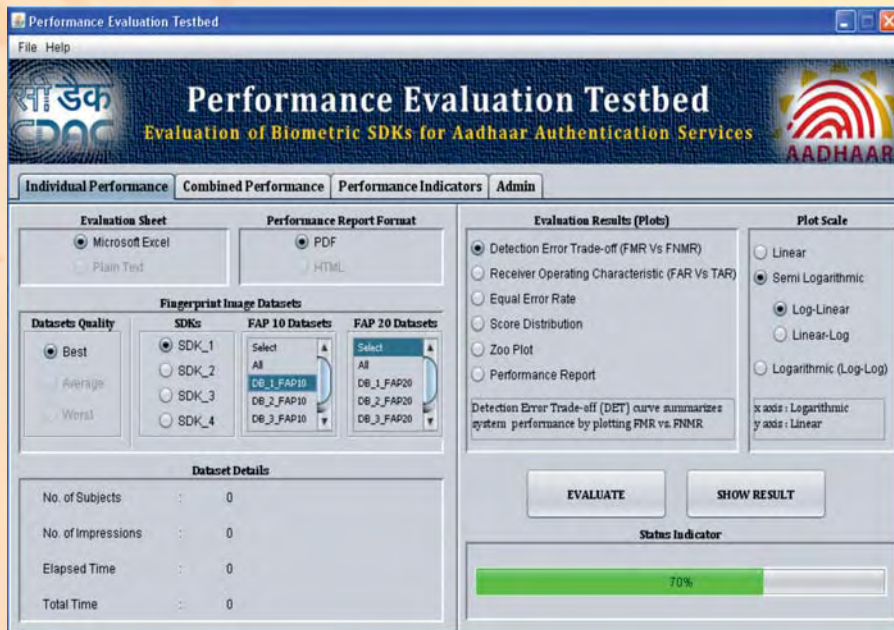


*Test-bed for Performance Evaluation and Benchmarking*

### Light Weight Fingerprint SDK and Aadhaar Authentication Client Application

C-DAC has developed Aadhaar authentication client that uses Bharatiya-Biometric SDK in its core for performing both IRIS and fingerprint-based biometric operations. It sends the standardized fingerprint template along with the Aadhaar number in the form of XML packet to UIDAI's Central Identities Data Repository (CIDR) for verification; the CIDR verifies whether the data submitted matches the data available in CIDR and responds with a "yes/no". No personal identity information is returned as part of the response. The client captures the fingerprint, extracts the features, generates the standardized template (FMR: ISO/IEC 19794-2:2005) and transmits it to the Aadhaar authentication server for authentication.

## Cyber Forensics

### SIMXtractor - SIM Card Imaging and Analysis Tool Suite

SIMXtractor is a forensic solution for imaging and analyzing SIM cards. The tool suite contains a SIM Card Reader, SIM Imager (Imaging of SIM cards) and SIM Analyzer (Analysis of SIM cards). The tool works with both GSM and CDMA SIM cards.

*SIM Card Reader:* SIM Card Reader is a hardware based reader with USB support that is USB 2.0 compliant, supports 5V, 3.3V and 1.8 V SIM cards, ISO-7816 compatible, PC/SC compliant, works with all versions of Windows (32 bit and 64 bit) and Forensically Write Blocked Device.

*SIM Imager:* SIM Imager is a software utility to image the contents of the SIM card using SIM card reader. It generates an image file of the SIM card contents, supports MD5, SHA-1 and SHA-2 hashing methods, generates hash values

for all files individually and SIM card media hash, provides seizure report generation facility and supports any PC/SC compliant SIM readers.

*SIM Analyzer:* SIM Analyzer is a software utility to analyze a SIM card image. It has capabilities to analyze call logs, contacts, messages, and network related information. It supports analysis of multiple SIM card images simultaneously, provides searching facility, can recover deleted SMS, and can generate custom PDF reports.



*SIMXtractor - SIM Card Imaging and Analysis Tool Suite*

SIMXtractor is deployed at various law enforcement agencies in Kerala, Madhya Pradesh, Punjab, Noorul Islam University, Tamil Nadu and Central Forensic Science Laboratory, Madhya Pradesh.

### Advik – Call Data Record Analyzer

Advik is a Call Data Record (CDR) analyzer which can import and analyze CDR/Tower CDR logs of any service provider in India and generate a comprehensive report of frequency statistics including service provider details and subscriber details (SDR) of CDR numbers. Key features include support for CDR/Tower CDR logs of .xls (x) and .csv file formats, support to import SDR of .xls (x) and .mdb file formats, search SDR, call flow visualize, customizable smart filters, timeline of calls, geo-analyzer, add/remove CDR, import cell-id information from .xls (x) file formats, identify error records and highlight and generate comprehensive reports.

Advik is deployed at various law and enforcement agencies of Kerala and Madhya Pradesh; Central Forensic Science Laboratories at Punjab and Assam; Central Forensic Institute at Madhya Pradesh; Sistechnologies, Hightech Systems and Noorul Islam University in Tamil Nadu.

## Training and Awareness

### Cyber Forensics Training Lab

ICT based cyber forensics training lab was designed, implemented and inaugurated at four North Eastern States - Assam, Tripura, Meghalaya and Sikkim for police department. Also, C-DAC upgraded the capabilities of the State Bureau of Investigation (Economic Offenses), Govt. of Madhya Pradesh.

### Information Security Education and Awareness

As a part of this initiative, C-DAC conducted various events to generate information security awareness among Indian citizens to enable them to participate safely in information society. As a part of this initiative, 623 workshops were organized across the country covering about 21566 Teachers/Parents/CSC/NGOs etc., and about 60154 school children/engineering/degree college students. During these workshops, around 75,450 awareness kits (with promotional material, booklets and handbooks) were distributed. About 55 posters on various topics of information security awareness were designed and around 1,10,000 posters were distributed to target users in schools, colleges, etc., for indirect reach to masses. Around 55 cartoon/animation – 2D/3D videos have been developed and made available through websites for downloads. A dedicated website for information security awareness (**http://infosecawareness.in**) has been developed and content is available in English, Hindi, Kannada and Malayam. A two day national level conference on Information Security was also conducted.

# Health Informatics

C-DAC has been at the forefront of development and propagation of ICT in Healthcare domain. With its core competence in the area, it continues to provide required tools, technologies, and healthcare solutions to the citizens of India. The activities carried out by C-DAC during the year in this thematic area are described below.

## Mobile as Health Delivery Platform (mHealth)

Mobile or hand-held devices are fast becoming a platform of choice for masses. Its availability and reach is steadily increasing in the country. This makes mobile/handheld devices a mode of delivery of tools and technologies in healthcare domain as well. C-DAC has developed and propagated few tools targeting individual health and monitoring over mobile platform already, and this year few more were made available:

### mSymptomChecker/eSymptomChecker
A self-help application that can be used for multiple symptom analysis, associated disease, and information regarding possible prevention through knowledge graph has been developed and released for both web-browser and mobile/handheld clients. The eSymptomChecker tool can be accessed over a web-browser. It is developed using HTML/XML and JavaScript. It can be accessed from even a thin client. The mSymptomChecker on the other hand is designed on Android platform 3.0 and API level 11 for use in any Android based mobile/handheld device. The developed technology tool is ready for deployment and soon will be rolled out in districts of Mizoram and Tripura under a project.

### mSwasthya
An Android App Store with about 15 different applications is developed under the mSwasthya suite. The available apps are in the area of health, wellness and fitness. All the applications are available to the citizens of India to enable self-care. Over 6000 downloads across various apps have already taken place since May 2013.

### MoSQuIT (Mobile-based Surveillance Quest using IT)
MoSQuIT is a disease surveillance system for Malaria using mobile platform. MoSQuIT enables effective data-collection/updation/collation for a centralized repository thereby reducing time required for information proliferation and initiation of appropriate action by State Health department. MoSQuIT enables systematic and continuous watch/vigil over the status of malaria in the community.

Under a funded project, Mobile based integrated surveillance system for malaria along international borders of North East Region, India, the developed solution is being extended as malaria surveillance system along Indo-Bhutan, Indo- Myanmar and Indo-Bangladesh international borders with new features like geo-tagging of patients location, spatial epidemiology, vector surveillance, drug inventory, continuous medical education.

### Integrated Healthcare Applications Platform [iHeal]
iHEAL is a mobile point-of-care solution comprising of a specially designed computer to meet the needs of a clinician's workflow while addressing all the environmental limitations of a conventional laptop computer. Along with helping hospitals reduce medication administration and dispensing errors and enhance quality of care, iHEAL can also enhance collaboration among staff, ease of clinician workloads, improve workflow, reduce paperwork and make more of their professional time available for patient care.

## Research for New Technologies

C-DAC continues to undertake new challenges for creating technologies targeting different needs and requirements in healthcare domain. Continuous innovation and focus to deliver usable solutions remains the hallmark of C-DAC's contribution and effort in the healthcare domain.

### Non-Invasive Brain Computer Interface (BCI) for Physically Challenged Persons
A desktop control application has been developed that enables users to control the mouse using eye-blinks detected from the EEG signals. It uses the Emotiv EPOC Neuroheadset to capture EEG signals, which is a 14-channel mobile EEG acquisition device. It has electrodes that are placed over the frontal, temporal and occipital regions of the brain. Work is in progress to enable the user to control the desktop using imagined movements. Currently offline analysis of motor imagery datasets, and development of signal processing and machine learning pipeline to be used is being developed. Initial experiments on the recorded motor imagery datasets indicate accuracies of up to 75%. The application to control mouse movement using eyeblinks has been deployed at the Neurology Department of Nizam's Institute of Medical Science (NIMS), Hyderabad for trials by patients.

### Computer Aided Detection System for Mammograms [CAD for Mammograms]
C-DAC is developing an efficient, reliable and cost effective "Computer Aided Detection Software" for analyzing mammogram images for diagnosis of breast cancer. The technology is being developed in collaboration with Regional Cancer Centre (RCC), Thiruvananthapuram.

## Product Development and Deployments

C-DAC has built several noteworthy products in healthcare IT domain. Some of these products have continued to evolve over time and have seen newer deployments year on year. C-DAC also invests a considerable amount of resources in building newer version of existing solutions as well as new solutions to meet newer demands and challenges.

### Megh Sushrut Hospital Management and Information System (HMIS)
Megh Sushrut continues to be C-DAC's flagship solution for end-to-end hospital enterprise management system that covers all areas from administration, planning, to clinical services. Megh Sushrut is developed and deployed following SaaS (Software as a Service) model over the cloud infrastructure. This year, apart from continuing to operate the service for existing locations, C-DAC signed the deal to initiate deployment in State of Maharashtra across several of its government run hospitals.
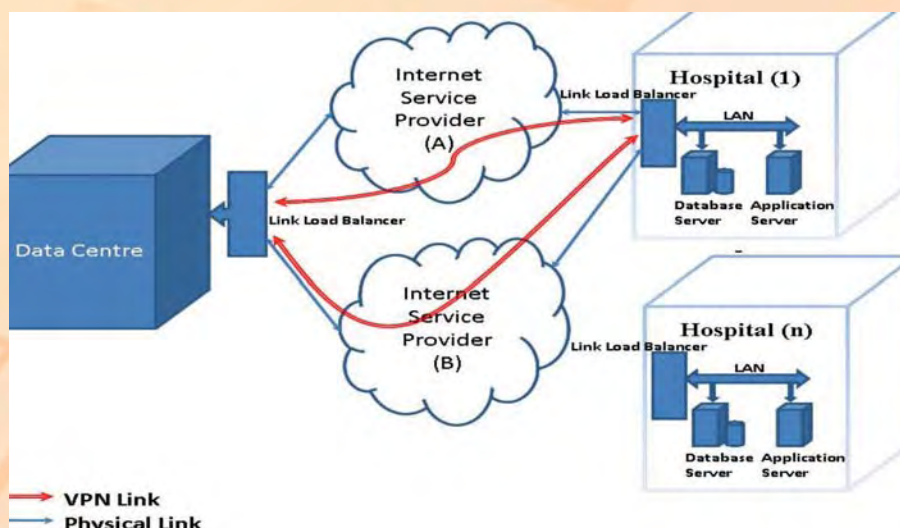


*Megh Sushrut Hospital Management and Information System*

### e-Aushadhi Drugs Supply Chain Management System

e-Aushadhi solution deals with the purchase, inventory management and distribution of various drugs, sutures and surgical items to various District Drug Warehouses (DDWs), Medical Colleges, District Hospitals, Community Health Centres (CHCs), Primary Health Centres (PHCs) and Drug Distribution Centres (DDCs) in an entire state. The system ensures that the drug reaches the ultimate beneficiary with uncompromised quality and well before its expiry date while facilitating the top management with greater transparency, better monitoring and complete control over the drug distribution. This year C-DAC received orders from various states to deploy the system at various levels. Notable among these locations are: PHD Maharashtra, PHSC Mohali at Punjab, and states of Rajasthan and Odisha.
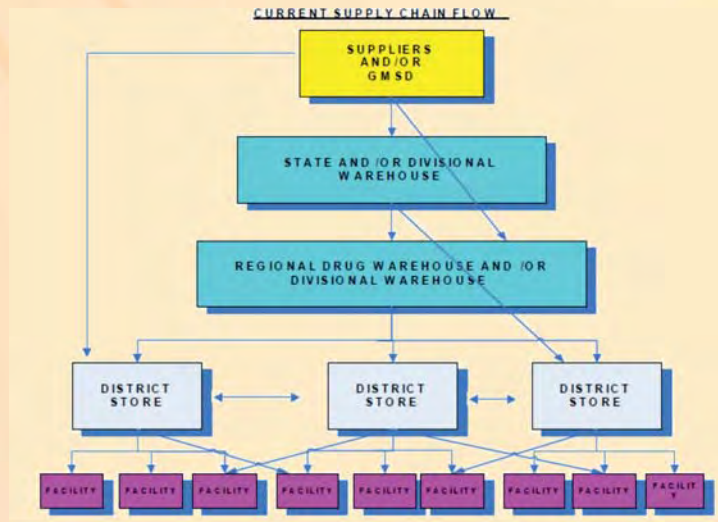


*e-Aushadhi Drugs Supply Chain Management System*

### Blood Bank Management System (BBMS)

The BBMS system is designed and developed as per NACO and NABH guidelines for management of blood banks. It is a comprehensive online Inventory Management System that gives detailed information about blood components from collection to its consumption by end user. BBMS system is both a standalone solution as well as it can be integrated with Megh Sushrut solution for integrated management. The solution is being deployed this year in Rajasthan over a one year period.
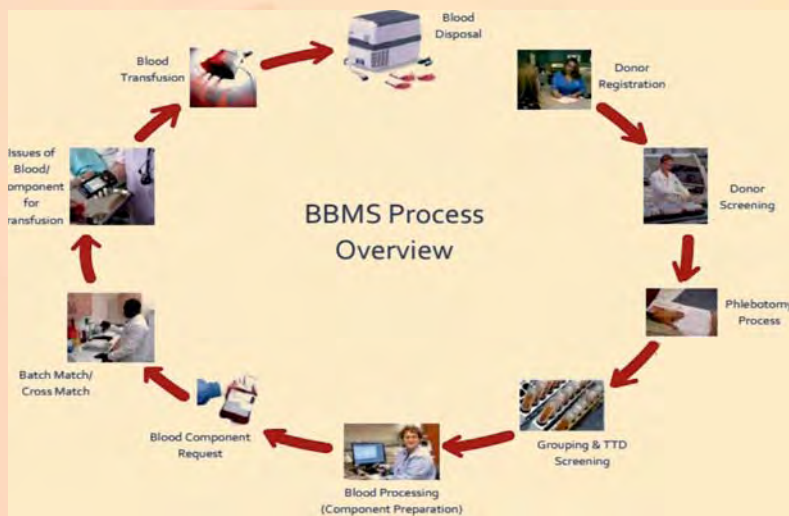


*Blood Bank Management System*

### Mercury Nimbus

Mercury™ Nimbus suite is a cloud-enabled comprehensive EMR/EHR and Telemedicine solution from C-DAC. It includes three tools: Mercury™ on Cloud, Cloud Repository and Mercury™ for Android, specially tailored to cloud /

clustered infrastructure. Suite supports multiple deployment models spanning IaaS/PaaS/SaaS models and is immediately available on Windows® Azure cloud with other cloud services on-demand. With Mercury Nimbus, cost of ICT infrastructure will reduce significantly for all users due to virtualization infrastructure in cloud, resulting in reduced overall cost of building and operating a telemedicine network. C-DAC unveiled the Mercury™ Nimbus suite on September 01, 2013 at the 1st Conference of Maharashtra Chapter of Telemedicine Society of India (TSI) in collaboration with Indian Medical Association (IMA) Pune branch.

## Tele-Health Services

Under Odisha Telemedicine Project (Phase-III), C-DAC has already deployed Mercury Web Telemedicine Solution in twenty-four district hospitals and four state specialty hospitals of Odisha in a NRHM, Govt. of Odisha funded project. The Government of Odisha has decided to extend the project by one year to include remaining six districts in the project as well as continue the operations and maintenance activity. C-DAC continues to operate the deployed sites through its service agency and provide support and upgrade as required. With this extension, all districts in Odisha will be covered under the project, linking them with state specialty hospitals.

In Annual Maintenance Contract of Telemedicine Centers of Punjab State Telemedicine network project funded by Punjab Health Systems Corporation (PHSC), C-DAC continues to provide support and maintenance activities. Recently all nodes were upgraded from Sanjeevani to eSanjeevani, the latest version of the solution deployed.

In National Informatics Centre Services Inc. (NICSI) funded Telemedicine over NOFN project, C-DAC has completed the project objectives and migrated the telemedicine services over the National Optical Fibre Network (NOFN) of India.

The implementation of a blood bank solution at IMA Blood Bank, Dehradun has been completed under Blood Bank Management System for IMA Blood Bank Dehradun project. The project was funded by IMA Blood Bank.

The project Computerization of SAT Hospital [SATH Computerization] at SAT Hospital, Thiruvananthapuram has been completed. The project was funded by Medical College Hospital (MCH), Govt. of Kerala. The project required implementation of HIS solution and operationalizing it across various units. The solution is integrated with the Doctors Desk software, which can be managed either independently from multiple points or together from a single point.

Ministry of External Affairs, Government of India has approved a project Telemedicine network in Armenia to C-DAC to deploy telemedicine network at 11 locations in the country of Armenia to provide specialized Health Care facility there.

Directorate of Health Services, Govt. of Kerala has approved a project Directorate of Health Services OP-IP Computerisation [DHS OP IP] to C-DAC. The project includes District Model Hospital, Peroorkada and the Taluk Hospital, North Paravur in Keral. The project aims at computerising the activities of OP and IP departments of the Hospitals using Medical Records Library software of C-DAC.

The Animal Husbandry Department (AHD), Govt. of Kerala has approved a project Mobile Tele-Veterinary Units [MTV] to C-DAC. Two fully equipped Mobile Tele-Veterinary Units with Digital Unit, Ultrasound Scanner, Surgical equipment and Animal Lifting and Standing Support device, Backup Generator, Workstation Computer, Refrigerator, and 3G Connectivity as well as Web Camera will be built and provided to AHD for operation.

# Education and Training

C-DAC's education and training division is involved in the following activities:

- High-end education programmes
- Industry-specific training programmes
- Corporate training
- Faculty development
- IT skill development
- Development of technologies for education and training

The major activities carried out during the year under these categories are given below.

## High-end Education Programmes

C-DAC conducts following PG degree awarding programmes in collaboration with leading universities:

- ME in Wireless & Mobile Computing
- ME in IT System & Network Security
- ME in VLSI & Embedded Systems Design
- ME in High Performance Computing

About 300 students were enrolled during the year in these programmes.

## Industry-specific Training Programmes

C-DAC offers the following PG Diploma programmes.

- PG Diploma in Advanced Computing (PG-DAC)
- PG Diploma in Wireless and Mobile Computing (PG-WiMC)
- PG Diploma in VLSI Design (PG-DVLSI)
- PG Diploma in IT Infrastructure, Systems and Security (PG-DITISS)
- PG Diploma in Integrated Embedded System and VLSI Design(PG-DIVESD)
- PG Diploma in Geoinformatics (PG-DGi)
- PG Diploma in Healthcare Informatics (PG-DHI)
- PG Diploma in Embedded System Design (PG-DESD)
- PG Diploma in System Software Development (PG-DSSD)
- Post Graduate Diploma in Automation SCADA Systems (PG-DASS)

More than 5000 students were trained during the year under these programmes.

## Corporate Training

As a part of corporate training activity, C-DAC conducted IT training for South Western Command, Jaipur for their personnel in Diploma in Computer and Network Security (DCNS) and Diploma in System Administration (DSA). The training was conducted at command locations in Hissar, Bhatinda, Ranchi, Mathura, Bikaner, Alwar, and Jaipur. 180 officers attended this training.

## Faculty Development

As part of its Faculty Development Programme, 249 engineering college faculty members across the country were trained in 10 two weeks training programs in the area of Hardware, Embedded Systems, System Software and Application Software.

# IT Skill Development

To aid development of IT skills in workforce, C-DAC trained about 600 students in various IT skills like Embedded Systems, Java and .Net programming.

# Technologies for Education and Training

Various software that can aid in management and delivery of education and training in effective manner, were developed. They are briefly described below.

### GATE-2014 Automation
Automation tools for managing GATE 2014 examination were developed using which about 10 lakh candidates applied for the examination and received the online status updates and results.

### Portal for Online Courses
A comprehensive portal having online course content for enhancing teaching and learning experience of school education has been developed. The target users are CBSE schools, teachers and students. At present course content is available for Mathematics, Science and Social Science for CBSE class IX and X. Its key features include
- Web based access to all resources
- Content, evaluation and formative assessment component is aligned to CBSE class IX and X curriculum
- Repository of high-quality educational resources, organized for ease of use

### Question Paper authoring tool
Authoring tools help in creating question repository in an encrypted image format. It is a desktop based application and has following features – loading, marking and tagging of question paper; reviewing and modifying of questions; preview of question paper; exporting of question paper package; data clean up and exit confirmation; multiple package exporting, each one with a different set of decryption keys. The algorithm used for encryption is AES-128. It is used for authoring question papers for the nation-wide C-CAT examinations of C-DAC.

### C-CAT Registration System
C-DAC developed the Common Admission Test (C-CAT) Registration System to provide web based solution to handle registration process of candidates applying for C-DAC's PG Diploma courses. The C-CAT registration system consists of 8 major modules, the major ones among them include
- Fill C-CAT application form
- View/print application form
- Make payment
- Status check
- Select exam city and date
- Print admit card

This system allows candidates to register and update their information while applying for PG-Diploma Courses. C-CAT examination was also conducted using computer-based examination mechanism developed completely in-house by C-DAC.

### Challan Processing System
Challan processing system enables candidates of PG Diploma courses to pay second Installment of course fee through challan facility. The challan processing software provides an interface as web services to bank as well as counseling software for sending and receiving candidates data for verification and validation of candidate and collecting their payment status.

# New Initiatives

**e-course development for medical sciences**

C-DAC is developing six e-learning courses in collaboration with AIIMS in health and medical sciences domain for virtual teaching in the North-East region, due to the lack of expert faculty in that region. In this project, AIIMS is the knowledge partner, C-DAC is the technology partner and the beneficiaries are the two North-Eastern medical colleges and hospitals of RIMS, Imphal and NEIGRIHMS, Shillong. The benefits of the project include:

- Filling gaps in teaching resources in the client medical colleges
- Standardizing teaching standards and practice of medical education
- Standardizing assessment standards and practice
- Establishing templates for eventual country-wide rollout

**e-Learning content design for ECI**

e-Learning content design for election management was developed to assist Election Commission of India for training their personnel. The development includes e-learning modules comprising of auto played e-learning content, activities, quizzes, FAQ's, audio explanations and video recordings of ECI experts as per requirement of the respective modules.

**University Management System**

University Management System (UMS) through its planned various modules and features will remove the complexity of paper work, save time of university staff and students so that much of their focus will be on delivering and gaining knowledge. Students will get several facilities through proper management of Universities services and therefore more learning, knowledge, carrier opportunities, economic growth and development will be achieved.

**Training Centre Management System**

Training Centre Management System (TCMS) is envisaged to provide a web based interface to keep track of all activities governed by training centers. It will help managing and tracking all types of training activities conducted by a training centre like managing pre-planned schedules, different training plans, courses catalog, students, faculties, employees, exam and training with different reports to manage training center's operations, efficiency and performance, etc.

**Certificate Verification System**

Online PG-Diploma certificate verification system is designed to verify the authenticity of C-DAC's PG Diploma certificates, through web portal.

**C-CAT Registration Dashboard System**

C-CAT registration dashboard system would be developed to accommodate frequent changes in registration software and to display dashboard for various modules like registration details, application details, payment details, course details, center details, candidate details. Dashboard would also include the facility to change exam details such as exam date, exam center, and exam city.

# Resources, Facilitation Services and Initiatives

## Collaborations/Cooperations

1.  C-DAC signed an MOU with Hanoi University of Science and Technology, Vietnam for scientific cooperation between India and Vietnam through scientific exchange program in the field of HPC, Grid Computing, Modeling and Sumilation.



*Signing of MoU with Hanoi University*

2.  C-DAC signed an MOU with Internet Corporation for Assigned Names and Numbers (ICANN) to setup a joint Centre of Excellence in DNS Security.
3.  MEA and C-DAC have signed an agreement on May 31, 2013 for strengthening of India-Myanmar Centre for Enhancement of IT Skills.
4.  C-DAC signed an agreement with "Caelis International" for implementing SASEC Information Highway Project of Asian Development Bank in which C-DAC is one of the Research & Training centres responsible for building technical and business skills in ICT, particularly in developing local content and e-applications for the poor.
5.  C-DAC signed an MOU with with Space Application Centre, Ahmedabad to carryout weather forecasting using PARAM YUVA-II Supercomputing facility for all India short range weather forecast.

# Patents

## Patents Awarded

1. "A System and a Method for the Survivability of Intrusion Detection Entities", Inventor(s): Subramanian N, Nihar Satish Khedekar, Pramod Sakharam Pawar, Srinivas Guntupalli and Mayank Bhatnagar, Indian Patent Number: 257867.

## Patents Filed

1. "A Method and System for Storing Data in Cloud Storage", Inventor(s): Payal Saluja, Prahlada Rao, and Sarat Chandra Babu

2. "Education Framework For Individuals With Cognitive Disabilities", Inventor(s): Sarat Chandra Babu Nelaturu, Annie Joyce Vullamparthi, Karthika Venkatesan, Sharadhi Manjeshwara, and Sivaranjani Duraisam

3. "System and Method for Performing Science Experiments", Inventor(s): N S Sreekanth, Nobby Varghese, and Supriya N. Pal

4. "System and Method For Planning Origin Destination Flow by Optimally Using GPS", Inventor(s): Tapas, Amritanshu Sinha and S. V. Srikanth

5. "System and Method for Storing, Retreiving, and Managing Course Structures in Relational Database", Inventor(s): Sandesh Jain and Uday Kumar M

6. "Electronic Voting Apparatus and System Thereof", Inventor(s): P R Lakshmi Eswari, Mahesh Patil, and Himanshu Pareek

7. "Image Identifying and Comparing System for Identifying and/or Comparing Facial Images", Inventor(s): Debasis Mazumdar, Kunal Chanda, Munmun Chakraborty, and Soma Mitra

8. "Apparatus for Grading Silk Yarn Based on Color Characterization and Methodology Thereof", Inventor(s): Amitava Akuli, Abhra Pal, Tamal Dey, Rabindranath Kanjilal, and Nabarun Bhattacharyya

9. "Apparatus for Flavour Detection and Gradation of Tea", Inventor(s): Alokesh Ghosh, Hena Ray, Tarun Kanti Ghosh, Amritasu Das, Rabindranath Kanjilal, and Nabarun Bhattacharyya

10. "Apparatus for Detection of Sporozoal Infection in Silk Moth and Methodology Thereof", Inventor(s): Amitava Akuli, Abhra Pal, Tamal Dey, Nabarun Bhattacharyya, Rabindranath Kanjilal, Ravi Aankar, and Suryakant

11. "A System and Method for Segmenting Slap Fingerprints", Inventor(s): Zia Saquib, Santosh Kumar Soni, Sweta Suhasaria, Varunkrishnan T. K., Pratibha Mokal, and Anamika Singh

12. "Method and System for Non-interactive, Dynamic and Secure Group Communication", Inventor(s): Om Pal and Vinod Kumar

13. "Low Power Heterodyne Receiver for Radio Frequency Signal", Inventor(s) : Chandan Maity, Ashutosh Gupta, and Sanjat Kumar Panigrahi

14. "Twelve Transistor Static RAM (SRAM) Cell", Inventor(s): Arti Noor and Sampath Kumar

15. "System and Method for Finding Duplicate and Near-Duplicate Documents", Inventor(s): Om Pal, Rishi Prakash, and Praveen Kumar Srivastava

16. "Method for Effective Management of Helicoverpa Armigera", Inventor(s): In collaboration with NCL, Pune: Ashok Prabhakar Giri, Vidya Shrikant Gupta, Vaijayanti Abhijit Tamhane, Rakesh Shamsunder Joshi, Manasi Mishra, Rajendra Ramchandra Joshi, Uddhavesh Bhaskar Sonavane, and Anirban Ghosh

17. "Method and System for Surface Vibration Measurement, Monitoring and Analysis, Using Ultrasonic Non Contact Measurement Technique, Employing Frequency Down Conversion", Inventor(s): R. Mohanachandran, R. Haneesh Sankar, and Subodh P S

18. "Device and Method for Detecting Double Talk Condition and Canceling the Returned Echo from received Speech Signal in a 2-way Communication System", Inventor(s ): Simon Zachariah, Satheesh Prabhu, Soumya Murali, and Annu Liza Jose

19. "A Modified Non-Linear Processor with Adaptively Programmable Transfer Characteristics for Echo Canceling in 2-way Communication Systems", Inventor(s): Simon Zachariah, Satheesh Prabhu, Soumya Murali, and Annu Liza

20. "A Modified Method of Echo Canceling in 2-way communication systems by Companding of signals in the Adaptive Filter Path", Inventor(s): Simon Zachariah, Satheesh Prabhu, Soumya Murali, and Annu Liza Jose

## Awards/Recognition

1. Received two eNorth East Awards for the year 2013 for the Projects:

   - Deployment of Healthcare Knowledge System in NE States for Promoting Public Health Awareness & Education

   - Intelligent Advisory System for Farmers

   The Award was presented in presence of Honorable Chief Minister of Arunachal Pradesh, Shri Nabam Tuki and Dr. H K Paliwal, Chief Secretary, Govt. of Arunachal Pradesh on December 13, 2013 at the Golden Jubilee Banquet Hall, Itanagar.

2. Received Most Innovative Product Award under IESA (Indian Electronics and Semiconductor Association) - Technovation Awards 2013 for Wireless ECG Sensor developed by C-DAC. It was awarded at Bangalore during February 3-4, 2014.



*Jaspal singh and Mandeep Singh of C-DAC, Mohali received the award from Dr. Walden C. Rhines, CEO and Chairman of the Board of Directors, Mentor Graphics Corporation alongwith Sanjeev Keskar, IESA Chairman and Shri T.J. Mathew, Secretary, Information Public Relations Department, Govt. of Kerala*

3. Received Best Stall Award for the stall at National Science Expo 2014 - The 26th Kerala Science Congress held during January 28-31, 2014.

4. Received mBillionth South Asia Award for the year 2013 for the "Mobile Seva" to provide government services to citizens on their mobile phones under mGovernance category.

5. Recived IMC-IT (Indian Merchants' Chamber - Information Technology) Award for Speech to Speech Translation System – USTAR under the IT Products – Small & Medium Enterprises category. Award Ceremony was held at Wallchand Hirachand Hall, IMC Chamber, Mumbai on January 30, 2014.

6. Received Manthan Award for the year 2013 in 3 different categories:

   - E-Inclusion and Localisation: For "Multilingual Multimedia tool for mitigating code of conduct cases at Election Commission"

   - e-Science and Technology: For "e-safeT" and "Onama Solution"

   - e-Health: For "Mobile Tele-Ophthalmology Units"

7. "e-safeT" developed by C-DAC which is a compact, ultra-low power data logger consisting of a high resolution temperature sensor, memory, visual indicators and wireless link also received 5th eGov SecureIT 2014 Award as for Most Innovative Security Product of the Year.

8.  Received 33rd Skoch Summit award for e-PPMS (Electronic Project Proposal Management System) for Indian Council of Medical Research under Smart Governance category.

9.  Received CSI Nihilent e-Governance Awards 2013 for Implementing Megh Sushrut, a Cloud Based Health Management Information System in the State of Rajasthan, under e-Governance (G2C) category. It was awarded on December 14, 2013 at Visakhapatnam by Shri J. Satyanarayana, Secretary, DeitY, and Professor S. V. Raghavan, National President, CSI & Scientific Secretary to Principal Scientific Advisor, Government of India.



*Receiving CSI Nihilent e-Governace Award*

10. Mobile based Surveillance Quest using Information Technology (MoSQuIT) developed by C-DAC received awards for the year 2013 in 2 different categories:

    ● mHealth: mBillionth South Asia Award

    ● Digital inclusion: SKOCH Digital inclusion Award

11. Received EFY Readers Choice Award 2013 as the most preferred 'Electronics Training Institute'.

# Events/Conferences

1. Conducted INDO-TAIWAN Workshop on Cloud Computing and its Applications (ITCCA-2013) at Bangalore during November 7-8, 2013 in collaboration with NAR Labs, NCHC, Taiwan



*Indo-Taiwan Workshop on Cloud Computing and Applications*

2. Conducted GARUDA-NKN Partners Meet 2013 at SAIACS CEO Center Auditorium, Bangalore during July 25-26, 2013.



*GARUDA-NKN Partners Meet 2013*

3. Condcuted workshop on "Data Deluge in Biology: Use of High-Performance Grid and Cloud Computing" at Jorhat Medical College Hospital campus, Jorhat during December 19-20, 2013.

4. Conducted W3C Workshops at New Delhi on September 17, 2013; Bangalore on September 19, 2013 and Kolkata on September 23, 2013 in collaboration with W3C India.

5. Conducted Hands-on Training on "Adaptable and Accessible e-Learning (A2EL) Framework" at Bubbles Centre for Autism, Bangalore during June 5-6, 2013.

6. Condcuted workshop cum Hands on Training on "e-Saadhya" at C-DAC Hyderabad for Special Educators, Principals of Special Schools, Parents on March 14, 2014 in collaboration with C-DAC Bangalore, NIMH Secunderabad and Special Schools.

7. Conducted training for Special Educators of NGO "Action for Autism" at Delhi during March 7-8, 2014.

8. Condcuted training program for Faculty Members on "ICT based Teaching-Learning for Higher Education" at P. R. Government College, Kakinada, Andhra Pradesh during October 28-29, 2013.

9. Orgnaized a workshop on "Ubicomp 2013: Internet of Things: Connecting A's" at JNTU Hyderabad on September 13, 2013 in collaboration with CSI, JNTU Hyderabad

10. Conducted training on "Information Security in Virtual Training Environment" at DeitY, New Delhi during December 23 – 24, 2013.

11. Organized National Conference on "Information Security (Infosec 2014)" at JNTU Auditorium, Hyderabad during January 31 – February 1, 2014 in collaboration with JNT University Hyderabad and Computer Society of India, Hyderabad Chapter.

12. Conducted workshop on "Cybercrime and Cyber Forensics –Techno-Legal Challenges" at High Court of Manipur, Imphal during February 15-16, 2014

13. Conducted workshop on "Information Security Awareness" at Central Detective Training School, Kolkata, on February 3, 2014 for Police Staffs of different cadre.

14. Conducted Training Programme on "Mobile Forensics" at C-DAC, Kolkata during February 3-5, 2014 for Police officials from various states of the cadre of Sub Inspector, Inspector, DGP and other officials followed by hands-on sessions.

15. Conducted National Workshop on "Application of Wireless Sensors Network for Decision Support in Tea Plantations" at Meleng Tea Estate, Jorhat, Assam on May 27, 2013 in collaboration with Tea Research Association (TRA), Jorhat, Assam.

16. Conducted National Workshop on "Climate Controlled Greenhouses for Agricultural Research" at C-DAC Mohali on July 11, 2013 for agricultural researchers, scientists, academicians and students.

17. Conducted IEEE workshop on "SCADA Security" at C-DAC Mumbai on October 19, 2013 in collaboration with IEEE Bombay Section

18. Conducted a workshop for "eSangam integrations (NSDG + SSDGs + eRA)" for the NIC officials at DeitY, New Delhi on July 4, 2013.

19. Conducted a workshop for "Multi-department scenarios and the impact on the same if integrated with eSangam" for the NIC officials at DeitY, New Delhi on November 8, 2013.

20. Conducted workshop for participating suppliers on Iris Devices in respect of "FRR Field Testing and Biometric Device Certification for Aadhaar Authentication" at STQC, New Delhi on October 4, 2013.

21. Organized an International Conference on "Natural Language Processing (ICON – 2013)" at Noida during December 18-20, 2013 in collaboration with IIIT Hyderabad, NLPAI and CIIL Mysore.

22. Organized a conference on "Popularizing Indian Cultural Heritage through characters and narrations of Indian Folklore" at C-DAC Noida on November 19, 2013 in collaboration with Media Lab Asia.

23. Organized an International Conference on "Digital Preservation and Development of Trusted Digital Repositories" at India Habitat Centre, New Delhi, India during February 4-6, 2014 in collaboration with European
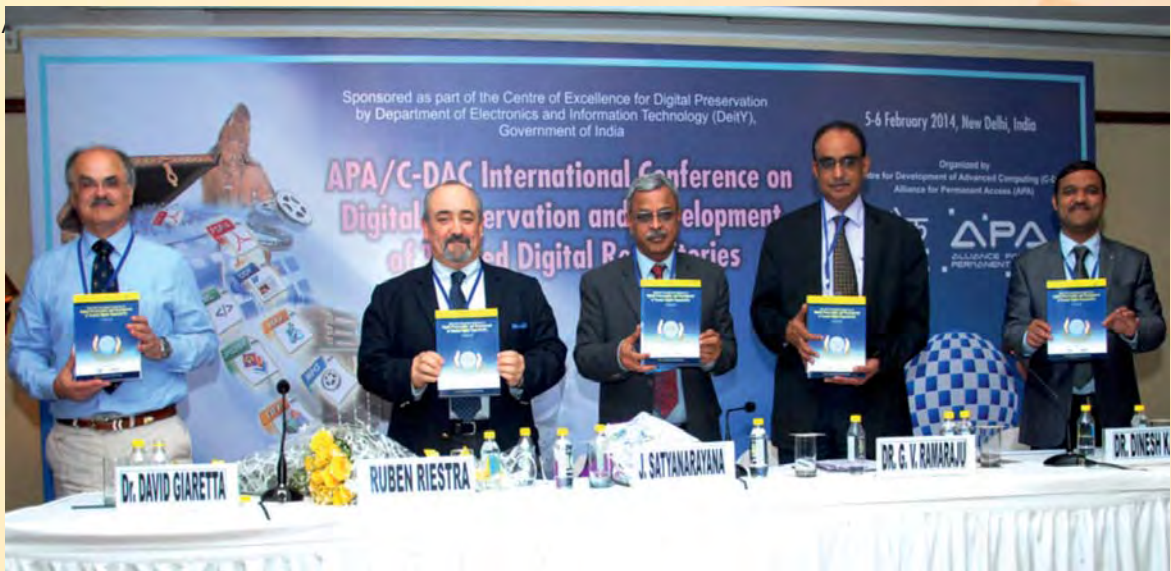
*Dr. David Giaretta, Director Alliance for Permanent Access, Ruben Riestra, Director, Inmark, J. Satyanarayana, Secretary, DeitY, Dr. G. V. Ramaraju, Group Coordinator, R &D in IT, DeitY, Dr. Dinesh Katre, Associate Director & HoD, C-DAC during the inaugural session of International Conference on Digital Preservation and Development of Trusted Digital Repositories*

24. Released updated and advanced Urdu language software tools CD and Urdu children's stories for Android-based Aakash tablets through tdil-dc portal at DeitY, New Delhi on December 16, 2013.

25. Launched the Urdu Pedia (Urdu Content Creation Framework based on MediaWiki) and Urdu Tools at Conference Hall of Zakir Hussain Delhi College at Jawahar Lal Nehru Marg, New Delhi on August 03, 2013.



26. Organized a Symposium on "Accelerating Biology 2014: Computing Life" at Yashwantrao Chavan Academy of Development Administration (YASHADA), Pune during February 18-20, 2014.

27. Orgnaized Fourth National Symposium on "HPC in Academia and Beyond" at Assam Engineering College, Guwahati on October 5, 2013 in collaboration with Assam Engineering College, Guwahati.

28. Conducted workshop on "Open Stack and Network Security Embedded System SOC Based Approch Application and Case Study of PSOC" at Gujarat Technological University, Ahemedabad on January 25, 2014.

29. Conducted a workshop on "Intellectual Property Rights (IPR)" at C-DAC on June 26-27, 2013 in collaboration with Kerala State Centre for Science, Technology and Environment (KSCSTE).

30. Orgnized a National Workshop on "Power Electronics (NWPE) 2013" at Bangalore on September 19, 2013.

# Reaserch Papers/Publications

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3. Ankit Kumar and  B S Bindhumadhava, "Agent based: QoS Resource Management for Grids" IRACST - International Journal of Computer Science and Information Technology & Security,  IJCSITS Vol.2, No.1.

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12. Vijayalakshmi B, "Cost Effective Delivery of Modern Energy Services to Rural Communities – An Indian Case Study", International Journal for Service Learning in Engineering, Vol. 8, No. 1, pp. 78-87, 2013.

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15. Kalyani P Sambhoo, Sanjay S Kadam, Ashok W Deshpande, "Rule Based Fuzzy Indexing for Grading of proposed Industrial Sites for Power Plant Installation", International Journal of Computers & Technology (IJCT), Vol.10, No.7, pp 1836-1847, 2013.

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20. Kaur, Jaskirat, and Mandeep Singh, "Multiprotocol Gateway for Wireless Communication in Embedded Systems", International Journal of Computer Applications Vol. 72, Issue 1, pp. 27-31, 2013.

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22. Kala, Rahul, and Mandeep Singh, "ECG Signal Acquisition with on Chip Compression Algorithm", International Journal of Computer Applications, Vol. 74, Issue 1, pp. 38-42, 2013.

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129. Kamran Morovati and Sanjay Kadam, "Data Leak Prevention Using a New Hybrid Security Model", International Conference on Advances in Computing, Electronics and Communication (ACEC-2013), October 2013.

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131. Gaur Sunder, "Long-term Preservation, Management and Utility of Electronic Health Records," APA International Conference on Digital Preservation and Development of Trusted Digital Repositories, Alliance for Permanent Access (APA), EU.

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151. Asok Bandyopadhyay, "Handwritten Text and Signature Recognition System using pattern Classification Method", In International Conference on Control, Instrumentation, Energy & Communication, February 2014.

152. Shahid H Haradwala, Devdulal Ghosh and Dr Nabarun Bhattacharyya,"Discrimination of level of rancidity for French fries by Electronic nose", CSIR-IICT Hyderabad, November 2013.

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161. Navdeep S. Chahal, Preeti Abrol and Karan Sidana, "CloudBase: A practical approach on Cloud Computing" 3rd International Conference on Biomedical Engineering & Assistive Technologies (BEATS-2014), February 2014.

162. Saurav Gupta, J.S. Bhatia and D.K. Jain, 'Deployment of a mobile based child vaccination system in an Indian setting', Medetel 2014.

163. J.S. Bhatia, Saurav Gupta and Chanpreet Singh, 'Factors Enhancing Adoption of Rural Telemedicine Network', American Telemedicine Association (ATA), 2014.

164. Saurav Gupta and JS Bhatia, "Design Considerations for a mHealth Application", Telemedicon 2013.

165. Saurav Gupta, Rajesh Kumar and JS Bhatia,"Patient centric mobile applications for homecare", Telemedicon 2013.

166. Rajnish Kaur, Saurav Gupta and J.S. Bhatia,"A web based integrated telecardiology system for low resource settings", Telemedicon 2013.

167. Saurav Gupta, 'Context aware real time consultation for continuouscare', Chandigarh Science Congress - CHASCON 2014, February 2014.

168. Navpreet Kaur and Saurav Gupta, "uSwasthya: an ubiquitous approach for patient care", Chandigarh Science Congress- CHASCON 2014, February 2014.

169. Rajwant Kaur, Mandeep Singh and J.S. Bhatia, "An Approach for Acquiring EEG/EMG Data Using AFE", Proceedings of Ist IEEE International Conference on Machine Intelligence Research and Advancement, 2013.

170. Sushant Sharma and Mandeep Singh, "On Board EMG Signal Compression for Portable Devices - A Study", Proceedings of Ist IEEE International Conference on Machine Intelligence Research and Advancement, 2013.

171. Gagandeep Singh, Gurmohan Singh and V. Sulochana, "High Performance Low Power Dual Edge – Triggered Static D Flip-Flop", 4th IEEE Conference on Computing, Communication & Networking Technologies (ICCCNT-2013), July 2013.

172. Akshay Goel and Gurmohan Singh, "Novel High Gain Low Noise CMOS Instrumentation Amplifier for Biomedical Application", IEEE sponsored International Conference on Machine Intelligence Research and Advancement (ICMIRA)-2013,December 2013.

173. Ekta Jolly,Dilip Kumar and Balwinder Singh, "Performance Analysis and Implementation of Scalable Encryption Algorithm on FPGA", IEEE International Conference on Machine Intelligence Research and Advancement, 2013.

174. Balwinder Singh and Robin Khosla, "Implementation of Efficient Image Processing Algorithm on FPGA International Conference on Machine Intelligence Research and Advancement ", 2013.

175. Raj Nath Patel and Rohit Gupta, "Reordering rules for English-Hindi SMT.", Proceedings of the Second Workshop on Hybrid Approaches to Translation, ACL 2013, 2013.

176. Pranaw Kumar, "Seamless Integration of Common Framework Indian Language TTSes in Various Applications", Oriental COCOSDA held jointly with 2013 Conference on Asian Spoken Language Research and Evaluation (O-COCOSDA/CASLRE) International Conference, IEEE Xplore, 2013.

177. Hemant A Patil, "A syllable-based framework for unit selection synthesis in 13 Indian languages", Oriental COCOSDA held jointly with 2013 Conference on Asian Spoken Language Research and Evaluation (O-COCOSDA/CASLRE) International Conference, IEEE Xplore, 2013.

178. Zia Saquib, Veena Tyagi, Shreya Bokare, Shivraj Dongawe, Monika Dwivedi and Jayati Dwivedi, "A New Approach to Disaster Recovery as a Service over Cloud for Database system", 15th Conference on Advanced Computing (ICACT-2013), September, 2013.

179. Zia Saquib, Veena Tyagi, Shreya Bokare, Shivraj Dongawe and Monika Dwivedi,"iSCSI based DraaS over Eucalyptus Cloud", IEEE CLOUD2013 , May, 2013.

180. AllwynD'souza, Golden Bhengra, Vijay Jain, Rajeev Srivastava and PadmajaJoshi,"Web Application Design for Performance", Proceedings of 7th International Conference on Software Engineering (CONSEG-2013), November 2013.

181. Peeyush Jain and Paritosh Tripathi, "SCADA Security: A review and enhancement of DNP3 based systems", CSI transactions on ICT, August 2013.

182. Peeyush Jain, Paritosh Tripathi, Vinod Kumar, Ashwin Nivangune and Zia Saquib, "Security Solution to protect SCADA System from Cyber Attacks", International Conference on Recent Trends in Communication Engineering and Network Technologies, Proceedings by the Elsevier Science and Technology, December 2013.

183. Peeyush Jain, Paritosh Tripathi and Zia Saquib, "Threat Profiling with Security Solution Approaches for SCADA Systems," 4th International Conference on Recent Trends in Information, Telecommunication and Computing (ITC-2013), Springer LNEE, August, 2013.

184. Urjaswala Vora, Peeyush Chomal, Avani Vakharwala, Mohsin Sutar, Ankit Gupta, and Hemant Kirar, "eRA: eGovernance Reference Architecture", Proceedings of the 23rd Australasian Software Engineering Conference (ASWEC), April 2014.

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186. Renu Balyan, "Dealing with Hinglish Named Entities in English Corpora", Proceedings of 10th : International Conference on Natural Language Processing (ICON – 2013), 2013.

187. Vijay Singh and Bhupendra Kumar, "Document layout analysis for Indian newspapers using contour based symbiotic approach", 4th International Conference on Computer Communication and Informatics, January 2014.

188. Payal Abichandani and Rishi Prakash, "Digital Preservation of Court's Disposed Case Records"; APA/C-DAC Digital preservation and development of Trusted Digital Repositories,excel India, 2014.

189. Vikash Kumar, Anshu Jain and P N Barwal, "Wireless Sensor Networks: Security Issues, Challenges and Solutions"; ACSITEET-2014, 2014.

190. Paras Jain, Devendra Rao, Vikas Bansal, "Equity of Access : Using E-Learning utility for disabled", ELELTECH India 2013, June 2013.

191. Srivastava Praveen, Garg Chinmay, Gupta Ajay and Goel Himani, "Cost Estimation Tool Based On Modified Step Down Approach", IEEE, IACC 2014, 2014.

192. Srivastava Praveen, Gupta Ajay and Goel Himani, "A Standalone Utility-eAushadhi Desktop", IEEE, IACC 2014, 2014.

193. Priyanka Dutta, Vasudha Gupta and Sunit Rana, "Performance Comparison on Java Technologies – A Practical Approach", Third International Conference on Computer Science, Engineering &Applications (ICCSEA-2013), 2013.

194. Sumit Soman, Soumya Sen Gupta and P Govind Raj, "Feasibility of Using Low-Cost EEG Acquisition for Motor Imagery BCIs", 2013 ICEIT Conference on Advances in Mobile Communications, Networking and Computing, pp167-171, Sep 27-28, 2013.

195. Jain A, Srivastava S and Soman S, "Transfer learning using adaptive SVM for image classification," Proceedings of the 2013 IEEE Second International Conference on Image Information Processing (ICIIP), pp.580,585, 9-11 December 2013.

196. Paras Jain, Devendra Rao, Siddharth Dixit and Vikas Bansal, "Renovating e-learning using Mob-Learning Utility", National Conference on e-Learning & e-Learning Technologies, 2013.

197. Lakshmi Kalyani, V K Sharma and B K Murthy, "Enhanced learning through virtual classrooms", National seminar on e-Learning & e-Learning Technologies (ELELTECH), June 2013.

198. Dinesh Katre, Torkil Clemmensen, Jose Abdelnour Nocera, Arminda Lopes, Rikke Orngreen and Pedro Campos, "Work Analysis and HCI, Human Work Interaction Design", Springer Verlag, September 2013.

199. Sourabh Koriya, Jayshree Pawar, Suman Behara, Srinu Naik and Dinesh Katre, "Software for Capturing e-Government Records as per the Digital Preservation Standard", Proceedings of International Conference on Digital Preservation and Development of Trusted Digital Repositories, February 2014.

200. Yogendra Tank, Nikhil Padhiyar, Bhavesh Gabani and Dinesh Katre, "Role of Digital Forensics in Digital Preservation as per the Indian Legal Requirements", Proceedings of International Conference on Digital Preservation and Development of Trusted Digital Repositories, February 2014.

201. Dinesh Katre, Shashank Puntamkar, T. Hussain and Ankit Sharma, "Development of Digital Preservation and Repository Infrastructure for National Archives of India", Proceedings of International Conference on Digital Preservation and Development of Trusted Digital Repositories, February 2014.

202. Anuradha Tomar, Jahnavi Bodhankar, Pavan Kurariya, Pramod Anarase, Priyanka Jain, Anuradha Lele, Hemant Darbari and Virendrakumar C Bhavsar, "High Performance Natural Language Processing Services on the Garuda Grid", IEEE Proceedings of Parallel Computing Technologies (PARCOMPTECH 2013), February, 2013.

203. Anuradha Tomar, Jahnavi Bodhankar, Pavan Kurariya, Pramod Anarase, Priyanka Jain, Anuradha Lele, Hemant Darbari and Virendrakumar C Bhavsar, "Parallel Implementation of Machine Translation using MPJ Express", IEEE Xplore and Proceedings of "Parallel Computing Technologies (PARCOMPTECH 2013), February, 2013.

204. Priyanka Jain, Hemant Darbari and Virendrakumar C Bhavsar, "Text Visualization: A pioneering solution in Language Learning Disability", Proceedings of National Conference on e-Learning & e-Learning Technologies (Eleltech 2013), June, 2013.

205. Priyanka Jain and Hemant Darbari, "Potential Ambient Energy-Harvesting Source : Noise Energy", Proceedings of 1st National Conference on Energy & Environment (NC2E 2014) ", Energy and Environment Security Through Cutting Edge Technology", February, 2014.

206. Ajai Kumar, Swati Mehta, Santosh Kumar, Kumar Sanjeev, Shiva Kartik S, Vivek Koul and Anupam Tiwari, "SemOnto: A Generic Ontology Based Semantic Search Engine", International Seminar on Indian Language Technology State and Prospects, March 2014.

207. Ajai Kumar, Swati Mehta, Kumar Sanjeev, Shiva Kartik S., Vivek Koul and Anupam Tiwari, "A Social Media Sentiment Analytics Tool", International Seminar on Indian Language Technology State and Prospects, March, 2014.

208. Sarita Narwal, Shashi Pal Singh, Lenali Singh and Ajai Kumar; National Conference on "e-Learning & e-Learning Technologies (ELETECH – 2013)", June 2013.

209. Mahesh Kulkarni, Swapnil Belhe, Sudesh M and Mathew Martin, "An Indian Sign Language Corpus for Domain Disaster", "International Symposium on Sign Language Translation and Avatar Technology (SLTAT'13), 2013.

210. Saumya Jetley, Swapnil Belhe and Atish Vaze, "Automatic Flag recognition Using Texture Based Color Analysis and Gradient Features", International Conference on Image Information Processing (ICIIP'13), 2013.

211. Swapnil Belhe, Kapil Mehrotra, Saumya Jetley and Akash Deshmukh, "Unconstrained Handwritten Devanagari Character Recognition using Convolutional Neural Networks (CNN)", International Workshop on Multilingual OCR (MOCR'13), 2013.

212. Kapil Mehrotra, Swapnil Belhe, S R M Prassana and Bandita Sarma, "Handwritten Assamese Numeral Recognizer Using HMM & SVM Classifiers", 19th National Conference on Communications (NCC'13), 2013.

213. Shubhanshu Gupta, Sayali Godbole, Yogesh Angadi and Hemant Desai, "T-Learning: Empowering India through Interactive Digital Television", 4th National Conference on E-Learning and E-Learning Technologies (ELELTECH INDIA-2013), 2013.

214. Rajat Gupta and Sundeep Anand, "Towards generation of translation memories with varied file formats from distributed/unorganized data", FUEL GILT Conference, 2013.

215. Rajat Gupta, N S Nikolov and M O'Haodha, "Crowdsourcing and pedagogy: some reflections on the museum as collaborative learning space", 5th International Conference on Qualitative and Quantitative Methods in Libraries, June, 2013.

216. Kakade A, Kharat P, Gupta A and Batra T, "Survey of Spam Filtering Techniques and Tools, and MapReduce with SVM", IJCSMC, 2013.

217. Anmulwar S, Mahajan S, Srivastava S, Gupta A and Markapuram V., "Survey of Rogue Access Point Detection Methods", Elsevier 3rd International Conference on Recent Trends in Engineering & Technology, 2013.

218. Kakade A, Kharat P, Gupta A, and Bathra T, "Spam Filtering Techniques and MapReduce with SVM", IEEE's Asia-Pacific Conference on Computer Aided System Engineering (APCASE), 2014.

219. Kakade A, Kharat P, Gupta A, and Tarun B, "Spam Filtering Techniques and MapReduce with SVM", IEEE's International Conference on Convergence of Technology (I2CT), 2014.

220. Srivastava S, Anmulwar S, Batra T, Gupta A, Markapuram V, and Sapkal A. M., "Comparative Study of Various Traffic Generator Tools", RAECS, 2014.

221. Srivastava S, Anmulwar S, Batra T, Gupta A, Markapuram V, and Sapkal A M, "Evaluation of Traffic Generators Over 40 Gbps Link", APCASE, 2014.

222. Srivastava S, Anmulwar S, Batra T, Gupta A, Markapuram V, and Sapkal A M, "Performance Analysis of Traffic Generators Over a 10 Gbps Link", ICRTET, 2014.

223. Gupta A, Wable G, and Batra T, "Collision Detection System for Vehicles in Hilly and Dense Fog Affected Area to Generate Collision Alerts", ICICT, 2014.

224. Bhadran V K, Jose Stephen, Anjali M and Jose Stephen, "Voice Enabled Multilingual Newspaper Reading System", Global Humanitarian Technology Conference- South Asia Satellite Conference (GHTC-SAS), August , 2013 .

225. Reshma R S, Jayan V and Bhadran V K, "Cross Lingual Information Retrieval using Statistical Natural Language Processing for English/Malayalam Text", proceedings of "National Conference on Innovations in Engineering Technology (NCIET-13)", May, 2013.

226. Sajini T, S L Binil Kumar, Arun Gopi and Neethu E A, "Seamless Integration of common framework Indian language TTSes in various application-a consortia effort", 16th International Oriental cocosda 2013 conference, November, 2013.

227. Sajini T, Binil Kumar S L and Bhadran V K, "Unit selection based Malayalam text to speech system integrated with disability aids", 3rd national conference on Indian language computing (NCILC-2013), 2013.

228. Sajini T, "Implementation of Malayalam Text to Speech Using Concatenative based TTS for Android Platform", 4th international conference on control, communication and computing [IEEE-ICCC 2013] proceedings, December, 2013.

229. Vinod P M, "Transliteration from English to Indian Languages", 1st  Workshop on Techniques on Basic Tool Creation and Its Applications (TBTCIA 2013), December, 2013.

230. Dinesh T, "Statistical POS Tagger for Malayalam", 1st Workshop on Techniques on Basic Tool Creation and Its Applications (TBTCIA 2013), December 2013.

231. Dija S, "Extraction of Memory Forensic artifacts from Windows 7 RAM Image", Proceedings of "The IEEE International Conference on Information and Communication Technologies (ICT 2013]", April, 2013.

232. Dija S, "Incident Responding, Live & Memory Forensics , Email Forensics and Window 7 Forensics", Summer School on Network and Information Security (NIS'13)", May 2013.

233. C Balan, "C-DAC Cyber Forensics Solutions", International Conference on Cyber security and Policing- CoCon-2013, September, 2013.

234. C. Balan, "Forensic Decryption of FAT BitLocker Volume", 5th International Conference on Digital Forensics & Cyber Crime [ICDF2C 2013], September, 2013.

235. Dija S, "Multilingual Search in Cyber Forensic Tools', IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), December, 2013.

## Invited Talks

1.  Prahlada Rao BB, Peta/ExaScale System Software for Scientific Applications on Hybrid Architectures, Indo-US International Workshop on High Performance Computing, Applications and Big Data Analytics, SERC, Indian Institute of Science, Bangalore, December 15-18, 2013

2.  Divya M G, e-Science activities in India: Role of C-DAC, ISGC 2014, Academia Sinica, Taipei, Taiwan, March 25, 2014

3.  Subrata Chattopadhyay, Garuda: the National Grid Computing Initiative - the Unique Platform for Collaboration, 2nd Annual NKN Workshop, IISc, Bangalore, October 19, 2013

4.  Prahlada Rao & Payal Saluja, Tutorial on "Cloud Computing & Cloud Security in Defense", Workshop on Cloud Computing, Software Validation & Cyber Security, Organized by Society for Defence Technologies (SODET), Hotel Capitol Bangalore, December 7, 2013

5.  Prahlada Rao, Payal Saluja and Vineeth Simon Arackal, Tutorial on Cloud Computing- Trends & Opportunities, Scientific clouds to Sensing Clouds, Indo-Taiwan Workshop on Cloud Computing & Its Applications (ITCCA 2013), Atria Hotel, Bangalore, November 7-8, 2013

6.  Payal Saluja, Cloud Standards, Indo-Taiwan workshop on Cloud computing and its applications –Indo Taiwan Workshop on Cloud Computing & its Applications (ITCCA -2013), Atria Hotel, Bangalore, November 7-8, 2013

7.  Prahlada Rao B B, C-DAC Grid & Cloud Computing Initiatives: Overview, SEAIP2013 South-East Asia International Joint-Research and Training Program, National Applied Research Laboratories (NARL) - Taiwan, Taichung & Tainen, Taiwan, December 2-6, 2013.

8.  Payal Saluja, Cloud Interoperability & Intercloud Testbed, IEEE- Cloud innovation Council of India Workshop (CCEM 2013), Bangalore, October 16, 2013

9.  Prahlada Rao, Trends in Scientific Cloud Computing (Tutorial), IEEE International Conference on Advances in Computing, Communications and Informatics (ICACCI-2013), Mysore, August 23, 2013

10. Prahlada Rao B B, Current Trends in Research in India on: Cloud, Virtualization, Multicores, EU-INDIA Collaboration Grounds, International Workshop on Next Generation Computing System EURO-INDIA collaboration in Joint Research Activities, Indian Institute of Science, Bangalore, India, April 4-5, 2013

11. Prahlada Rao B B, E-Infractructures in IT- A Case Study on GARUDA, National Conference on IT for Defence (CSI Annual Conference), NIMHANS Convention Centre, Bangalore, January 23-24, 2013

12. Arunachalam, Advanced MPI, Academy of Scientific & Innovative Research (AcSIR) course on HPSC, CSIR-4th PI C-MMACS Lab, Bangalore, April 10, 15 and 17, 2013

13. Supriya N. Pal, Introduction to Web Accessibility using HTML5 and WAI ARIA, W3C India HTML5 Workshop, Bangalore, September 19, 2013

14. Balaji Rajendran, Digital Signatures and PKI, National Conference on Cyber Space Security (NCCSS) 2013, Bangalore, December 7, 2013

15. B S Bindhumadhava, Next generation Power Grid computational needs, GARUDA NKN PARTNEERS MEET, Bangalore, July 25, 2013

16. BS Bindhumadhava, Inaugural Talk, Second International Conference on Advances in Cloud Computing (ACC 2013), Bangalore, September 19, 2013

17. Sridevi S, Context Aware Framework, International Conference on Recent Trends in Information Technology (ICRTIT 2013) organized by Department of Information Technology, Madras Institute of Technology (MIT), Anna University, Chennai, Madras Institute of Technology (MIT), Anna University, Chennai, July 25, 2013

18. Arun R, C-DAC Protocol Stack for Wireless Mesh Network, One day Workshop on 'ICT for smart buildings

with low carbon emissions', Software Technology Parks of India (STPI), Chennai,  March 29, 2014

19. Dhivya G, ZLED - Design & Deployment, One day Workshop on 'ICT for smart buildings with low carbon emissions' , Software Technology Parks of India (STPI), Chennai, March 29, 2014

20. Subaashini, Optimal Control of HVAC Systems for Buildings, One day Workshop on 'ICT for smart buildings with low carbon emissions' , Software Technology Parks of India (STPI), Chennai, March 29, 2014

21. Sayantani, Indoor Air Quality Monitoring using WSN, One day Workshop on 'ICT for smart buildings with low carbon emissions', Software Technology Parks of India (STPI), Chennai, March 29, 2014

22. C. Kathiresan, India Development Gateway  and Model e-villages, International programme on Information Communication Technology Applications for Rural Development organized by NIRD, Hyderabad, March 31  – April 9, 2013

23. Vijayalakshmi, India Development Gateway, Digital knowledge workshop organized by Wikimedia Foundation, Hyderabad, April 12, 2013

24. M. Jagadish Babu, Universalisation of Primary Education – Bridge the gap through ICTs National workshop titled"ICTs to achieve the MDGs" organized by NIRD, Hyderabad, December 12-13, 2013

25. C. Kathiresan, ICT based Knowledge Management in Indian Agriculture: Status & Analysis of cases National workshop titled"ICTs to achieve the MDGs" organized by NIRD, Hyderabad, December 12-13, 2013

26. Sandesh Jain, Key Standards and Technologies, Case study on SOA, Workshop on web Services – Concepts, Applications and Future Directions (WWS 2013), SRM University, Chennai, September 17-18, 2013

27. Sandesh Jain,  Network & Internet Technologies, SERP Technical Workshop, JNTU, Hyderabad, May 15, 2013

28. M.Kumar, Mobile learning, Workshop organized by IDRBT, Hyderabad, IDRBT Hyderabad, February 5, 2014

29. M.Kumar, Mobile Application Development Guidelines, Two day software engineering best practices workshop conducted at C-DAC Hyderabad, IDRBT, Hyderabad, February 5, 2014

30. Mahesh U. Patil, Internals of a Mobile Phone & Mobile OS : Developments & Security Issues, Programme on Mobile Banking, Security and Testing ( MBSAT ), IDRBT, Hyderabad, 4th Apr 2013

31. Biswajit Saha, "Mobile Forensics", a lecture at Sikkim Police HQ, Gangtok, June 28, 2013

32. Biswajit Saha, "Mobile Cloud Computing", the INDO-TAIWAN Workshop on Cloud Computing and its Applications (ITCCA-2013, Bangalore, November 7-8, 2013

33. Biswajit Saha, "Mobile Forensics" Invited talk at Central Detective Training School, Kolkata, November, 2013

34. Asok Bandyopadhyay, "Handwritten Text and Signature Recognition System using Pattern Classification Methods", international conference on Control Instrumentation, Energy and Communication (CIEC14), Dept.of Applied Physics, University of Calcutta, Technically Sponsored by IEEE, Kolkata Section, January 31-February 2, 2014

35. Alokesh Ghosh, "Perception Engineering", Electronic System Design and Manufacturing  workshop organized by CSI, Kolkata chapter, Techno Group of Colleges, Salt Lake, December 3, 2013

36. Alokesh Ghosh, "Handheld Electronic Nose in Agri-Applications", National Seminar-cum-Workshop on "Sensor and Sensing System for Taste Characterization of Food and Agro Produces", "Kalidas Auditorium", Vikramshila Complex, IIT, Kharagpur, May 9-10, 2013

37. Rajesh Kumar, Innovation through Communication Network Technologies, Destination IT @ North, CII Headquarters, Chandigarh, November 19-20, 2013

38. Saurav Gupta, Mobile Cloud: the next-gen computing, Destination IT @ North, CII Headquarters, Chandigarh, November 19-20, 2013

39. Bira Chandra Singh, Indian language TTS for the empowerment of visually challenged, ICEVI Eastern Regional International Conference on Educational Equity of the Visual Impaired, Revenshaw University, Cuttack,

Odisha, December 9, 2013.

40. Abhishek Gangwar, Elements of Programming and Graph theory, Tata Institute of Social Science, Mumbai, February 15, 2014

41. Dr. M. Sasikumar, Accessible solutions for differently-abled people, Netrodaya Foundation, Chennai, June 08, 2013.

42. Sagun Baijal, On use of Orca and ALViC (Accessible Linux for Visually Challenged), Netrodaya Foundation, Chennai, June 08, 2013.

43. Dr. Urjaswala Vora, "eRA: eGovernance Reference Architecture", In the 23rd Australasian Software Engineering Conference (ASWEC), Sydney, Australia, April 2014.

44. Santosh Kumar Soni, "IRIS Recognition Technology and Applicable ISO Standard", STQC HQ, New Delhi, March 14, 2014

45. Santosh Kumar Soni, "Biometrics Technologies", One Day National Seminar on "Advances in Bio-Imaging", Department of Biophysics, Information Technology and Biotechnology, University of Mumbai, February 26, 2014

46. Santosh Kumar Soni, A Presentation on "Biometrics Solution", e-Security Summit, C-DAC Hyderabad, October 26, 2013

47. Santosh Kumar Soni, "An Overview of Aadhaar Authentication and Biometrics Technology", STQC HQ, New Delhi, Govt. of India, April 02, 2013

48. Lakshmi Kalyani, E-learning, Training of officers of Common wealth countries at the India International Institute of Democracy & Election Management (IIIDEM), ECI, New Delhi, October 25, 2013

49. Dr. Dinesh Katre, Explorations with Human Work Analysis and HCI, Workshop on Human Aspects of Software Engineering organized by ACM India, Pune, October 11, 2013

50. Dr. Dinesh Katre, Transforming Indian Museums Using Digital Technologies, International Conference on Strategic Transformations, National Museum, New Delhi, February 11, 2014

51. Akshat Joshi & Neha Gupta, The introduction of IDN variants in the root zone serves to enhance the Internet's multilingualism and cultural diversity at the level of Top Level Domains (TLDs), Internet Governance Forum IGF -2013, Bali, Indonesia, October 23, 2013

52. Akshat Joshi, Generation panel for Neo-brahmi scripts, 49th ICANN Public conference, Singapore, March 25, 2014

53. Rajat Gupta, Machine Translation and Crowdsourcing Translation, The 2nd Workshop on Future Directions in Translation Research, Osaka, Japan, Tuesday, October 8, 2013

54. Rajat Gupta, Towards generation of translation memories with varied file formats from distributed/unorganized data, FUEL GILT Conference 2013, Pune, September 6, 2013

55. Dr. Rajendra Joshi, BRAF – A cyber infrastructure for Next Generation Biology, Internet 2, Arlington, VA, USA (Through Video conferencing), April 23, 2013

56. Dr. Rajendra Joshi, Understanding the self-assembly mechanism of human ß2 adrenergic receptor using multiscale modeling, International meeting on Chemical Biology, IISER, Pune, May 28, 2013

57. Amit Singh and Harshal Inamdar, RNA-seq anlysis, Transcriptomics workshop, North East Hill University, Shillong, June 17-21, 2013

58. Amit Singh and Harshal Inamdar, Bioinformatics Resources and Applications Facility (BRAF), Pharmabiotika 2013, Hitex Exhibition Center, Hyderabad, November 21-23, 2013

59. Dr. Rajendra Joshi, Probing the wild-type Ras activation mechanism using steered molecular dynamics and understanding the energy barrier in the activation, BioWorld 2013, IIT, Delhi , December 9 –11, 2013

60. Dr.Rajendra Joshi, BRAF – A cyber infrastructure for Next Generation Biology, STAT 2013, CR Rao Advanced

Institute of Mathematics, Statistics and Computer Science, Hyderabad, December 29, 2013

61.  Sunitha Manjari K, Comparative genomics of Mycobacteria, National Symposium on Innovation in TB Diagnostics, Drug Targets and Biomarkers, JBTDRC, Sevagram (Wardha), January 27 –28, 2014

62.  Sunitha Manjari K and Rashmi Mahajan, Anvaya Workflows Environment, Computational and Statistical Advances in Bioinformatics for 'omics' Data, Indian Agricultural and Statistical Research Institute, Delhi, February 4, 2014

63.  Gaur Sunder and Praphul Kolte, "Features of Telemedicine Software: Mercury Nimbus", CME for Telemedicine, Indian Medical Association, Pune Branch, Pune, India, September 1, 2013

64.  Gaur Sunder, "Interconnecting Healthcare Systems and Data" , NKN Partners Meet 2013, Bangalore, India, July 25-26, 2013

65.  Praphul Kolte and Gaur Sunder, Extending Horizons of Telemedicine, 2nd Annual Conference of The Telemedicine Society of India, Odisha Chapter (Oditelecon 2013), Cuttack, Odisha, India, June 7-8, 2013

66.  Dr. Sandeep K. Joshi, Power and Energy Consumption Optimization in HPC Facilities: An Overview,  National Conference on Energy and Environment, University of Pune, March 21, 2014

67.  Mr. Sanjay Wandhekar, HPC in India, International Supercomputing Conference 2013 (ISC'13),  Leipzig, Germany, June 17, 2013

68.  Mr. Abhishek Das, C-DAC initiatives in HPC for Scientific & Engineering Research, HPC Advisory Council European Workshop 2013, Leipzig, Germany, June 16, 2013

69.  Vikas Kumar, High Performance Computing in Compressible Flow Simulation for Aerospace Applications, 2nd International Conference on Supercomputer Technologies of Mathematical Modeling, Yakutsk, Russia, July 11, 2013

70.  Nabeel Koya A, "Cyber Crime", at Police and Forensic Science Lab, Thiruvananthapuram, July 25, 2013

71.  C Balan,  "Cyber Crime and Forensics", at Forensic Science Lab, Thiruvananthapuram, July 25, 2013

72.  Satheesh Kumar S, "C-DAC Cyber Forensics tools", DSCI Workshop at Lucknow, July 26-27, 2013

73.  Nabeel Koya A,  "Cyber Security", to the staff of Govt. Secretariat, in the programme organized by IMG, Thiruvananthapuram, August 21, 2013

74.  Satheesh Kumar S, "Cyber Forensics-an overview and demo of CDAC tools and Case Study", to the Police Officers in the training programme conducted by Forensic Science Laboratory, Thiruvananthapuram, August 29, 2013.

75.  Nabeel Koya A,  "Cybercrimes against women", to Kerala Police Officers, in the workshop conducted by Police Training College (PTC), Thiruvananthapuram, October 8, 2013

76.  Satheesh Kumar S,  "Cyber Forensics", to Kerala Police Officers in the workshop conducted by PTC, Thiruvananthapuram, October 9, 2013

77.  Satheesh Kumar S,  "Cyber Forensics" to Kerala Police Officers in the workshop conducted by Forensics Science Laboratories, Thiruvananthapuram, October 24, 2013

78.  Nabeel Koya A,   "Cybercrimes", to Kerala Police Officers, in the programme conducted by PTC, Thiruvananthapuram,  October 28, 2013

79.  Satheesh Kumar S,  "Investigation of Cyber Crime and Cyber Forensics", to Kerala Police Officers, in the programme conducted by Kerala Police Academy, Thrissur,  November  7, 2013

80.  Nabeel Koya A,  "Cybercrimes against women", to Kerala Police Officers in the programme conducted by Police Training College (PTC), Thiruvananthapuram,  November 11, 2013

81.  Nabeel Koya A,  "Cybercrimes emphasis on the crimes through Computers, Mobile Phones, etc.", to Kerala Police Officers in the programme conducted by Police Training College (PTC), Thiruvananthapuram, November 20, 2013

82. Nabeel Koya A, "Cybercrimes", to Kerala Police Officers conducted by PTC Thiruvananthapuram, December 10, 2013

83. Rajesh Kumar R, "Medical Image Analysis for Early Detection of Diseases", at in a workshop on "Next Generation healthcare Systems", IIT-Hyderabad, December 16,2013

84. Bhadran V K and Shri. Jayan V, "Machine Translation and Paribhashika – English to Malayalam Translation Tool", at the 3-day workshop at CIiL to impart training on MT Systems, December 18- 21, 2013

85. Sajini T, "Latest trends in speech synthesis", at International Seminar On Indian Language Technology: State And Prospects, March 18-21, 2014

86. Indhu T. R, "Classification of Handwritten Document Image into Text and Non-Text Regions", at International Seminar On Indian Language Technology: State And Prospects, March 18-21, 2014

87. Jose Stephen, "Speech Recognition for Human Computer Interaction", at International Seminar On Indian Language Technology: State And Prospects, March 18-21, 2014

88. Bhadran V.K, "Malayalam Computing Initiatives of C-DAC", "at International Seminar On Indian Language Technology: State And Prospects, March 18-21, 2014

89. C. Balan, "New Challenges in Digital Forensics", at Forensics State Laboratory, Chennai, March 8, 2014.

90. Nabeel Koya A, "Cyber Crimes", at Police Training College, Thiruvananthapuram, March 4, 2014.

91. Nabeel Koya A, "Cyber Crimes against women and investigation procedures", at Police Training College, Thiruvananthapuram, March 6, 2014.

92. Satheesh Kumar, "Seizure and Acquisition of Digital Evidence", in a workshop conducted by Data Security Council of India (DSCI) at Patna, March 25, 2014

# Human Resource Development

The year 2013–2014 had been a fruitful one for C-DAC, having achieved various landmarks in technological advancements. The HRD initiatives across the organization had fuelled various strategic and developmental interventions in the organization. Team, HRD understands the fact that, it is the quality of human capital that makes an organization successful.

The endeavour of Corporate HRD in carving out synergy between the HR departments of all C-DAC centres had brought out various HR initiatives, which were enthusiastically welcomed by the organization. Establishing uniformity in HR practises had been a major thrust area. Re-engineering of HR processes across C-DAC by deploying centralised/decentralised processes appropriately had helped the organization in enhancing its human resource management capability. Efforts to facilitate knowledge acquisition and dissemination has been well appreciated. The HR function could establish increased quality and consistency with respect to employment administration and employee engagement during the year.

**Indicative initiatives during the year:**

A) **C-DAC sponsored higher education scheme:** - Recognizing knowledge as the capital for any R&D organization, in order to bring in the most up-dated knowledge into the organization, "Higher Education Scheme" was introduced, which is expected to bear fruits, though slowly. The scheme supports the employees in gaining higher education from the premier institutes in the country.

B) **New Performance Appraisal System:** - All new annual performance appraisal mechanism was introduced, incorporating the specific performance parameters and key indicators, which drive an R&D organization to greater heights. The system is expected to induce newer initiatives and direction in individual and group performance front, which in turn will contribute to overall growth of the organization.

C) **C-DAC's Accelerated Knowledge Enhancement Programme (CAKE):-** Training modules covering higher level knowledge, designed and developed by eminent academicians and practitioners, are being introduced into the organization. Employees will get opportunity to undergo these specific training modules, across various thematic areas and certify themselves as knowledge champions in the respective technological area. The programme is expected to bring in quantum of new knowledge into the organization supporting its efforts to remain as premier scientific and technical organization, in the R&D domain.

D) **HR Enablers (HRE):-** To expand the reach of HR department to all employees and thereby by bridge the gap, by way of increased communication and ownership, HR enablers are identified from all corners of the organization. HREs will act as an extended arm of the HR management function and will thereby ensure 'right communication' to all the employees. The endeavour is expected to enhance the philosophical connect of the management with the employees by increased two-way communication and exchange of ideas.

## Spread of HR

C-DAC is 2970 strong as on March 2014, which is spread across seven technical thematic areas in addition to administration. The distribution of the employees is represented below:

## Total



- ■ High Performance Computing, Grid & Cloud Computing
- ■ Multilingual Computing
- ■ Professional Electronics
- ■ Software Technologies
- ■ Cyber Security and Cyber Forensics
- ■ Health Informatics
- ■ Education & training
- ■ Administration
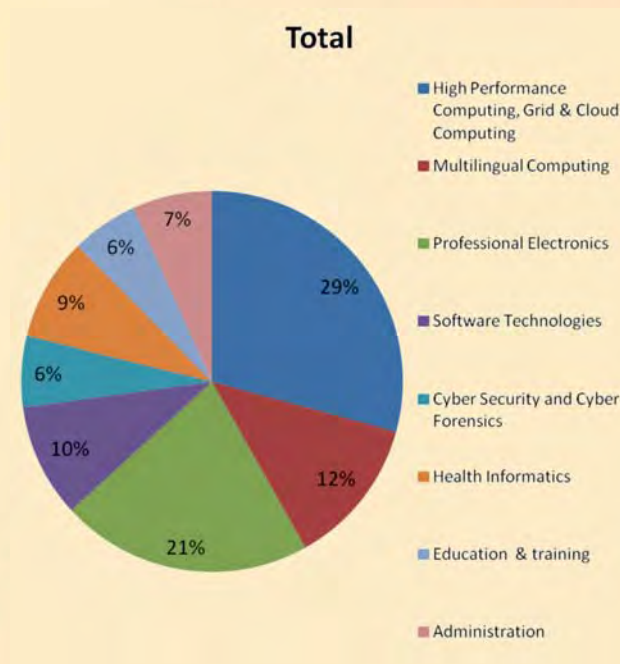
C-DAC has four categories of employees; namely 'Regular' and 'Continuing Contract', which are as per the sanctioned strength approved by the Governing Council and 'Grade Based Contract' and 'Contract on Consolidated Pay', which are fixed term project based engagements against specific project needs, for which the posts are created on need basis by the Director General and the Executive Directors respectively.

## Representation of Scheduled Caste, Scheduled Tribe and Other Backward Communities

C-DAC, being a model employer, has always ensured that Scheduled Caste, Scheduled Tribe and Other backward communities are adequately represented in the organization. All efforts including 'Special Recruitment Drive' had been done for complying the statutory requirements in this regard. The distribution of employees with respect to the various categories is represented below:-

## Total



- ■ General
- ■ Other Backward Class
- ■ Scheduled Caste
- ■ Scheduled Tribe
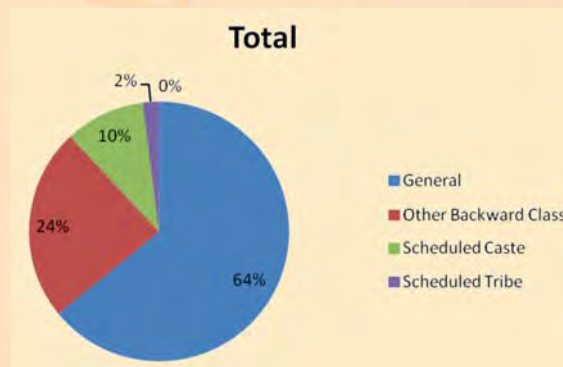
## Way Forward

The HR function of C-DAC, which is blended well with the other functions, is committed to facilitate the organization, to grow and deliver sustained benefits to the stake holders and to the nation at large. The following are some of the initiatives on card:

i)   Technical Leadership Summit for manifesting technological road maps of the organization.

ii)  Improved knowledge acquisition and dissemination models.

iii) Mechanism to achieve better reach and accessibility for employees across the organization.

iv)  Mechanism to attain synergy with other premier academic and industry houses by means of strategic interaction, partnership and knowledge sharing.

# LEGAL and IPR

The main functions of Legal and IPR department are:
- Drafting/vetting of MOUs, contracts, tenders, etc.
- Providing legal advice/opinion on legal action by/against C-DAC
- Providing IPR related advice and services

The activities carried out during the year by the Legal department are listed below:

1. Legal department continued to render  following services:
   - Patent Prior Art Search
   - Invention analysis
   - Reply to queries related to Intellectual Property Rights
   - Patent alerts

2. These services have been well received by both internal and external users, including those from IISc, CoEP, etc. The number of registered users crossed more than 1000 from 650 in last year, on the portal **(http://ict-ipr.cdac.in)**.

3. A new project titled "Establishment of Centre of Excellence in Intellectual Property (particularly Patents, Designs and Copyright)" sanctioned by DeitY is being implemented by  C-DAC.

4. Apart from drafting/vetting several contracts/MOUs, the legal and IPR department also organized IPR awareness programmes at Pune, Bangalore, Mohali and Chennai centres of C-DAC.  Such awareness programmes help and encourage our employees to file patent/copyright/trademark applications for their work.

# RTI

C-DAC is a pubic body as provided in Section 2(h) of the RTI Act. Request for information under RTI Act can either be filed at any of the locations of C-DAC or can be submitted online through the RTI module. Mandatory disclosures as per the guidelines of Sec 4(1) (b) have been published in the RTI module on C-DAC's website. The same is updated periodically.

All RTI applications received during the fincancial year 2013-14, were duly processed.

## ISO Implementation

Corporate office of C-DAC received ISO 9001:2008 certification from STQC on October 4, 2013 for providing services to all C-DAC centres for Financial, Administrative and Human Resource Management and support for Research & Development and Education & Training activities.

# Financials

**Prof. Rajat Moona, Director General, C-DAC
finalising the Annual Accounts with the Auditors**

# INDEPENDENT AUDITOR'S REPORT

To
The Members,
Governing Council,
Centre for Development of Advanced Computing,
Pune University Campus,
Pune - 411 007.

## Report on the Financial Statements

We have audited the accompanying consolidated financial statements of Centre for Development of Advanced Computing (C-DAC), which comprise the consolidated Balance Sheet as at March 31, 2014, and the consolidated Income & Expenditure Account and the consolidated Receipts & Payment Account for the year then ended, and a summary of significant accounting policies and other explanatory information.

## Management's Responsibility for the Consolidated Financial Statements

Management is responsible for the preparation of these consolidated financial statements that give a true and fair view of the consolidated financial position, consolidated financial performance and consolidated cash flows of the Company in accordance with accounting principles generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the consolidated financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

## Auditor's Responsibility

Our responsibility is to express an opinion on these consolidated financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free from material misstatement. An audit involves

[ … contd ]

performing procedures to obtain audit evidence about the amounts and disclosures in the consolidated financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the consolidated financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Company's preparation and presentation of the consolidated financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

## Opinion

(a)     We further report that:

    i.     We have not audited the financial statements of Bangalore, Delhi, Hyderabad, Kolkata, Mohali, Noida, Thiruvananthapuram and Chennai Centre's whose financial statements reflect total assets of ` 43,952.72 lacs as at 31.03.2014 and total revenues of 9,405.48 lacs for the year then ended. These financial statements have been audited by other auditor's, whose reports have been furnished to us, and our opinion, in so far as it relates to the amounts included in respect of these Centre's, is based on the reports of such other auditor's and is subject to the note No. 18 of Schedule 19, wherein Centre specific notes are disclosed.

    ii.     The Institute has made provision of Rs.1,471.96 lacs up to 31$^{st}$ March, 2014 for bad & doubtful debts outstanding for the period more than three year. The Provision as made is adequate as per the opinion of the Management. Appropriate steps should be initiated for the recovery, since substantial funds are blocked.

    iii.     Balances of Debtors, Creditors, Current Assets, Loans & Advances and Current Liabilities are subject to confirmation and further reconciliation, if any. The extent of adjustment that may arise and their effect on accounts is not ascertainable as this stage.

[ … contd ]

(b)    In our opinion and to the best of our information and according to the explanations given to us, the said accounts read with the notes to accounts and subject to note nos. 1, 4, 5, 8, 9, 10, 11, 12, 13 and note no.18 regarding Centre specific notes of Schedule 19.

In our opinion and to the best of our information and according to the explanations given to us, the consolidated financial statements give a true and fair view in conformity with the accounting principles generally accepted in India:

(a) in the case of the consolidated Balance Sheet, of the state of affairs of the Center as at March 31, 2014;

(b) in the case of the consolidated Income and Expenditure, of the Surplus for the year ended on that date; and

(c) in the case of the consolidated Receipts & Payments Account, of the Receipts & Payment for the year ended on that date

**For M/S Patil Ranadive & Associates**
**Chartered Accountants**
**FR no. 107816W**

**CA J. J. RANADIVE**
**Partner**
**M.No. 032953**

**Date: 17th September , 2014**
**Pune:  Pune.**

## Consolidated Balance Sheet As At 31st March 2014

Amount in ₹

| Particulars | Schedule | 2013-2014 | 2012-2013 |
|---|---|---|---|
| **CORPUS/CAPITAL FUND AND LIABILITIES** | | | |
| Corpus/Capital Fund | 1 | 3,10,83,12,339 | 2,67,55,43,823 |
| Reserves and Surplus | 2 | 1,50,39,25,473 | 1,49,61,45,494 |
| Earmarked and Endowment Funds | 3 | 68,36,44,286 | 1,64,38,08,847 |
| Secured / Unsecured Loan from Bank | | 9,50,00,000 | 13,50,00,000 |
| Current Liabilities and Provisions | 4 | 95,09,75,430 | 1,05,07,45,811 |
| Branch & Divisions | | - | - |
| **Total** | | **6,34,18,57,528** | **7,00,12,43,975** |
| **ASSETS** | | | |
| **Fixed Assets** | | | |
| Acquired out of Own Funds | 5 | 37,17,73,115 | 34,66,05,662 |
| Acquired out of Grant in Aid | 6 | 1,25,89,11,242 | 1,26,96,58,226 |
| Acquired out of Project Grants | 7 | 24,50,14,231 | 22,64,87,268 |
| Investments-from Earmarked/Endowment Funds | | - | - |
| Investments-Others | | - | - |
| Current Assets, Loans, Advances etc. | 8 | 4,46,61,58,940 | 5,15,84,92,819 |
| Miscellaneous Expenditure | | - | - |
| **Total** | | **6,34,18,57,528** | **7,00,12,43,975** |

Significant Accounting Policies, Notes to Accounts and Schedules form an integral part of the Balance Sheet.

**CA Raghu Bhargava**　　　　**R.Y. Deshpande**　　　　**Prof. Rajat Moona**
**Director (Finance)**　　　　　**Registrar**　　　　　　　**Director General**

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
**FOR PATIL RANADIVE & ASSOCIATES (FR NO. 107816W)**
**CHARTERED ACCOUNTANTS**

**CA Janardan Ranadive**
**Partner (Membership Number 032953)**
**Pune**　　　　　　　　　　　　**Date :**　　　**17-Sep-2014**

## Income and Expenditure Account for the year ending 31st March 2014

*Amount in ₹*

| Particulars | Schedule | 2013-2014 | 2012-2013 |
|---|---|---|---|
| **INCOME** | | | |
| Income from Sales/Services | 9 | 61,77,21,668 | 41,46,48,333 |
| Grants/Subsidies | 10 | 99,66,16,942 | 91,68,85,506 |
| Fees/Subscription | 11 | 58,45,60,595 | 56,35,79,006 |
| Income from Investments (Income on Investments from earmarked/endowment funds transferred to funds) | 12 | - | - |
| Interest Earned | 13 | 21,82,25,124 | 20,81,89,813 |
| Other Income | 14 | 1,88,56,215 | 2,13,61,075 |
| Prior Period Income | | 96,46,067 | 2,27,21,542 |
| Increase/(decrease) in stock of Finished Goods and Work-in-progress | 15 | (17,70,047) | (10,58,863) |
| **TOTAL (A)** | | **2,44,38,56,564** | **2,14,63,26,412** |
| | | | |
| **EXPENDITURE** | | | |
| Establishment Expenses | 16 | 1,25,12,98,601 | 96,16,89,246 |
| Other Administrative Expenses | 17 | 74,25,82,055 | 62,03,71,885 |
| Prior Period Expenses | | 5,40,58,847 | 1,63,59,875 |
| Depreciation (corresponding to Schedule 5) | | 3,85,20,487 | 3,63,51,938 |
| **TOTAL (B)** | | **2,08,64,59,990** | **1,63,47,72,944** |
| | | | |
| Transferred to / (from) Balance of Core Grants | | (8,93,60,517) | 10,50,60,933 |
| | | | |
| **BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO CORPUS/CAPITAL FUND** | | **44,67,57,091** | **40,64,92,535** |
| | | | |
| **SIGNIFICANT ACCOUNTING POLICIES** | 18 | | |
| **CONTINGENT LIABILITIES AND NOTES TO ACCOUNTS** | 19 | | |

Significant Accounting Policies, Notes to Accounts and Schedules form an integral part of the Balance Sheet.


**CA Raghu Bhargava**          **R.Y. Deshpande**          **Prof. Rajat Moona**
 **Director (Finance)**           **Registrar**            **Director General**

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
**FOR PATIL RANADIVE & ASSOCIATES (FR NO. 107816W)**
**CHARTERED ACCOUNTANTS**


**CA Janardan Ranadive**
**Partner (Membership Number 032953)**
**Pune**                          Date :          **17-Sep-2014**

Amount in ₹

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|

## Schedule 1 - Corpus/Capital Fund

| | | |
|---|---|---|
| Balance as at the beginning of the year | 2,67,55,43,823 | 2,32,70,50,797 |
| Add: Surplus as per Income & Expenditure Account | 44,67,57,091 | 40,64,92,535 |
| Less : Own contribution to Core / Projects and Other Adjustments / Transfers | 1,39,88,575 | 5,79,99,509 |
| **Balance as at the year - end** | **3,10,83,12,339** | **2,67,55,43,823** |

## Schedule 2 - Reserves and Surplus

| | | |
|---|---|---|
| **1. Capital Reserve :** | | |
| As per last Account | 1,49,61,45,494 | 1,33,87,56,405 |
| Addition during the year | 28,31,53,738 | 46,53,12,485 |
| Less : Deductions during the year | 27,53,73,759 | 30,79,23,396 |
| **Total** | **1,50,39,25,473** | **1,49,61,45,494** |

## Schedule 3 - Earmarked/Endowment Funds

| | | |
|---|---|---|
| **1. Balance of Core Grants** | | |
| **a) Opening balance of the funds** | 30,42,74,144 | 15,37,94,472 |
| **b) Additions to the Funds** | | |
| I) Donations/Grants | 1,04,00,00,000 | 97,91,00,000 |
| II) Income from Investments made on account of funds | (4,86,33,530) | 4,54,18,739 |
| III) Other additions (C-DAC Contribution and Other Income) | 71,14,634 | 87,64,333 |
| **Total (b)** | **99,84,81,104** | **1,03,32,83,072** |
| **Total (a)+(b)** | **1,30,27,55,248** | **1,18,70,77,544** |
| **c) Utilization/Expenditure towards objectives of funds** | | |
| I) Capital Expenditure | | |
| Fixed Assets | 4,66,27,712 | 6,22,14,494 |
| Others | - | - |
| **Total I** | **4,66,27,712** | **6,22,14,494** |
| II) Revenue Expenditure | | |
| Salaries, Wages and Allowances etc. | 82,90,56,014 | 62,35,86,508 |
| Companats, Consumables and Other Direct Expenses | 2,02,68,785 | 94,61,720 |
| Travel | 1,51,99,627 | 1,28,25,676 |
| Contingencies, Overheads and Other Administrative Expenditure | 22,53,23,014 | 17,47,15,002 |
| **Total II** | **1,08,98,47,440** | **82,05,88,906** |
| **Total ( c )** | **1,13,64,75,152** | **88,28,03,400** |
| **Net Balance as at Year - End (a+b-c) Total 1** | **16,62,80,096** | **30,42,74,144** |
| **Projects wise Allocated Core Grant (Annexure 1)** | | |
| **d) Opening balance** | 45,30,83,083 | 1,24,15,73,078 |
| **e) Additions to the Funds** | | |
| I) Donations/Grants | 22,35,39,000 | 16,19,65,000 |
| II) Income from Investments made on account of funds | (53,56,891) | 6,13,70,062 |
| III) Other additions (C-DAC Contribution and Other Income) | 1,39,88,575 | 6,25,51,072 |
| **Total (e)** | **23,21,70,684** | **28,58,86,134** |
| **Total (d)+(e)** | **68,52,53,767** | **1,52,74,59,212** |

Amount in ₹

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|
| **f) Utilization/Expenditure towards objectives of funds** | | |
| I) Capital Expenditure | | |
| Fixed Assets | 7,36,02,686 | 23,72,09,688 |
| Others | - | - |
| **Total I** | 7,36,02,686 | 23,72,09,688 |
| II) Revenue Expenditure | | |
| Salaries, Wages and Allowances etc. | 27,67,81,825 | 34,47,37,048 |
| Componants, Consumables and Other Direct Expenses | 4,82,85,181 | 6,93,39,998 |
| Travel | 2,14,23,364 | 2,76,01,000 |
| Contingencies, Overheads and Other Administrative Expenditure | 13,18,79,472 | 16,05,34,384 |
| **Total II** | 47,83,69,842 | 60,22,12,430 |
| **Total Expenditure ( f )** | 55,19,72,528 | 83,94,22,118 |
| | | |
| **g) Refund / Transfer and Other Adjustments** | 25,27,06,848 | 23,49,54,011 |
| | | |
| **Net Balance as at Year - End (d+e-f-g) Total 2** | (11,94,25,609) | 45,30,83,083 |
| | | |
| **Core Grant Balance as at Year - End (Total 1 + Total 2) Total 3** | 4,68,54,487 | 75,73,57,227 |
| | | |
| **2. Balance of Unutilized Funded Project Grants (Annexure 2)** | | |
| | | |
| **a) Opening balance of the funds** | 88,25,81,212 | 1,14,88,76,365 |
| **b) Additions to the Funds** | | |
| I) Donations/Grants | 1,12,96,05,558 | 1,05,74,49,409 |
| II) Income from Investments made on account of funds | 4,42,12,758 | 6,29,22,183 |
| III) Other additions (C-DAC Contribution and Other Income) | 98,42,557 | 9,28,41,183 |
| **Total (b)** | 1,18,36,60,873 | 1,21,32,12,775 |
| **Total (a)+(b)** | 2,06,62,42,085 | 2,36,20,89,140 |
| | | |
| **c) Utilization/Expenditure towards objectives of funds** | | |
| I) Capital Expenditure | | |
| Fixed Assets | 16,52,10,119 | 16,60,04,302 |
| Others | - | - |
| **Total I** | 16,52,10,119 | 16,60,04,302 |
| II) Revenue Expenditure | | |
| Salaries, Wages and Allowances etc. | 51,47,98,010 | 52,70,43,211 |
| Componants, Consumables and Other Direct Expenses | 20,82,12,744 | 20,14,44,313 |
| Travel | 5,73,52,467 | 6,02,43,656 |
| Contingencies, Overheads and Other Administrative Expenditure | 36,59,95,429 | 44,55,42,659 |
| **Total II** | 1,14,63,58,650 | 1,23,42,73,839 |
| **Total ( c )** | 1,31,15,68,769 | 1,40,02,78,141 |
| | | |
| **d) Refund / Transfer and Other Adjustments** | 12,20,77,027 | 7,92,29,787 |
| | | |
| **Net Balance as at Year - End (a+b-c-d) Total 4** | 63,25,96,289 | 88,25,81,212 |
| | | |
| **3. Employee and Other Funds:** | | |
| As per last Account | 38,70,408 | 35,43,501 |
| Addition during the year | 6,20,372 | 3,26,907 |
| Less : Deductions during the year | 2,97,270 | - |
| **Total (5)** | 41,93,510 | 38,70,408 |
| | | |
| **Grand Total (Total 3+ Total 4+Total 5)** | 68,36,44,286 | 1,64,38,08,847 |

**Annexure 1 of Schedule 3    Projects wise Allocated Core Grant**
*(Attached to and forming an integral part of Balance Sheet)*

Amount in ₹

| Sr.No. | Name of the Project | Opening Balance | Grants Received During the year | Interest Earned | Other Income & CDAC's Contribution During the year | Capital Expenditure | Salary, Wages Allowances etc. | Componants, Consumables and Other Direct Expenses | Travel | Contingencies, Overheads and Other Administrative Expenditure | Total Expenses | Refund / Transfer & Other Adjustments | Closing Balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Acoustic Mine Detection System - MK2 | (34,45,845) | 1,70,06,000 | - | - | - | 1,49,35,000 | 46,82,429 | 5,22,748 | 71,60,974 | 2,73,02,151 | (1,37,41,996) | - |
| 2 | Autonomic Real Time Multiprotocol Gateway | 8,73,842 | - | - | - | - | - | - | - | - | - | 8,73,842 | - |
| 3 | Building a Pan-C-DAC Cloud Computing Framework | (57,85,374) | 58,50,000 | - | - | 13,33,349 | 92,86,883 | 4,03,298 | 10,82,800 | 22,82,724 | 1,43,89,054 | (5,76,116) | (1,37,48,312) |
| 4 | Building Fund | 1 | - | - | 1,39,88,575 | 1,39,86,030 | - | - | 1,765 | 780 | 1,39,88,575 | - | 1 |
| 5 | Development of E-Agrin Projects | - | - | - | - | - | - | - | - | - | - | - | - |
| 6 | E-Learning Solutions in Areas of Automated Grading & Analysis of Software Programs | (8,79,745) | 21,32,000 | - | - | 18,80,280 | - | - | 21,894 | 84,907 | 19,87,081 | (6,03,400) | (1,31,426) |
| 7 | E-Securities Initives Related to Security for USB Date Drives Automated Web Application Security Assessment Framework | (28,61,093) | 1,61,04,000 | 3,59,791 | - | 43,32,556 | 44,01,272 | 3,41,258 | 5,35,199 | 18,35,539 | 1,14,45,824 | 70 | 21,56,804 |
| 8 | HTDG 40 TF Project | - | - | - | - | - | - | - | - | - | - | - | - |
| 9 | IP Awarness in E&IT Sector | (60,05,619) | 1,35,39,000 | - | - | - | 23,55,793 | 4,77,911 | 8,54,112 | 27,25,572 | 64,13,388 | - | 11,19,993 |
| 10 | Mobile Computing and Applications | (80,29,452) | 2,59,40,000 | 1,62,549 | - | 30,44,242 | 1,86,42,508 | 33,16,448 | 5,52,489 | 48,55,688 | 3,04,11,375 | 1,11,745 | (1,24,50,023) |
| 11 | National Grid Computing Initiative - GARUDA - Foundation Phase | - | - | - | - | - | - | - | - | - | - | - | - |
| 12 | National Grid Computing Initiative - GARUDA - Grid Technology Services for operational Phase of Garuda | 11,61,77,565 | - | 5,21,624 | - | 1,87,00,623 | 1,51,44,604 | 57,99,017 | 36,18,816 | 65,53,285 | 4,98,16,345 | 6,68,82,844 | |
| 13 | North East Projects | 6,86,08,819 | 21,00,00,000 | (77,34,746) | - | - | 1,61,07,252 | 1,03,52,350 | 51,13,341 | 82,00,557 | 3,97,73,500 | 4,45,61,378 | 18,65,39,195 |
| 14 | Pan C-DAC Knowledge & Resource Management Lab (PCKRML) | (426) | (9,000) | - | - | - | - | - | - | - | - | 241 | (9,667) |
| 15 | Pan C-DAC Research Initive in Perception Engineering | 25,09,679 | 1,40,37,000 | 7,69,199 | - | 18,85,275 | 42,81,738 | 1,17,555 | 2,36,676 | 13,97,222 | 79,18,466 | - | 93,97,412 |
| 16 | Power Optimization of HPC Sys & Facilities | 25,05,422 | 1,99,91,000 | 3,04,386 | - | 17,32,978 | 1,20,87,693 | 72,89,695 | 2,79,711 | 58,88,381 | 2,72,78,458 | (51,24,926) | 6,47,276 |
| 17 | Sixth Pay Commission Arrears | - | - | - | - | - | - | - | - | - | - | - | - |
| 18 | Speed Post Bags Tracking RFID Barcode Tags | - | - | - | - | - | - | - | - | - | - | - | - |
| 19 | Trainers Training and Students Talent Transfor | (14,98,769) | - | 2,04,000 | - | 6,170 | 70,20,896 | 1,67,972 | 6,32,009 | (15,52,000) | 62,75,047 | - | (75,69,816) |
| 20 | Speech to Speech MAT Based Dialogue Sys.From Hindi To Indian Language | 3,08,33,742 | - | - | - | 9,70,267 | 3,18,99,299 | 9,43,581 | 13,21,443 | 41,84,579 | 3,93,19,169 | 2,97,09,000 | (3,81,94,427) |
| 21 | Dev. & Adaption of applications, System S/W & H/W Tech. for Hybrid Archi.Based HPC System | 2,26,72,389 | - | - | - | 1,41,30,551 | 4,01,84,967 | 52,81,391 | 19,41,364 | 1,58,13,816 | 7,73,52,089 | 1,93,79,000 | (7,40,58,700) |
| 22 | Provisioning of Hybrid Tech. in NPSF and CTSF - A Step towards Next Generation HPC | (4,15,25,187) | - | - | - | - | 1,13,23,838 | 5,55,867 | 1,16,890 | 3,83,45,741 | 5,03,42,336 | - | (9,18,67,523) |
| 23 | Advance Research in Ubiquitous Computing through C-DAC's Ubiquitous Computing Res. Centers | 3,25,08,242 | - | - | - | 66,74,430 | 1,85,01,097 | 39,23,965 | 11,19,679 | 65,32,039 | 3,67,51,210 | 2,21,42,000 | (2,63,84,968) |
| 24 | Design & Dev. Of a Unified Threat Management Solution (UTM) | 4,87,32,596 | - | (10,000) | - | 24,72,472 | 1,76,70,795 | 2,05,501 | 10,12,607 | 24,02,573 | 2,37,63,948 | 4,42,07,233 | (1,92,48,585) |
| 25 | BOSS Support Centres and Business Dev. (Ph II) | 4,79,04,969 | - | 66,306 | - | 3,90,615 | 2,75,59,567 | 15,66,457 | 17,18,938 | 88,77,380 | 4,01,12,957 | 3,52,95,000 | (2,74,36,682) |
| 26 | Development of Advanced tools for Cloud Security Transactions | 77,69,937 | - | - | - | - | 43,97,623 | 82,624 | 3,74,294 | 12,75,821 | 61,30,362 | 72,28,000 | (55,88,425) |
| 27 | Centre of Excellence in Smart Card Technology | 1,96,67,918 | - | - | - | 1,64,823 | 72,30,000 | 10,66,076 | 1,47,801 | 1,20,56,337 | 2,06,65,037 | (61,37,872) | 51,40,753 |
| 28 | Design & Development of a Rapid Product Dev. Platform | 1,12,06,700 | - | - | - | - | 27,05,000 | 9,30,657 | 38,132 | 8,06,274 | 44,80,063 | 55,61,447 | 11,65,190 |

**Annexure 1 of Schedule 3      Projects wise Allocated Core Grant**
*(Attached to and forming an integral part of Balance Sheet)*

Amount in ₹

| Sr.No. | Name of the Project | Opening Balance | Grants Received During the year | Interest Earned | Other Income & CDAC's Contribution During the year | Capital Expenditure | Salary, Wages Allowances etc. | Componants, Consumables and Other Direct Expenses | Travel | Contingencies, Overheads and Other Administrative Exxenditure | Total Expenses | Refund / Transfer & Other Adjustments | Closing Balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | OCR Sys. On Android based Handheld Devices using Multi Framework for Malayam, Bangla, Punjabi, Hindi, Urdu, Tamil & Telugu | 14,57,023 | - | - | - | 9,49,367 | 43,54,000 | 3,19,341 | 59,674 | 9,18,283 | 66,00,665 | (51,43,642) | - |
| 30 | Ubiquitous Speech Collection & Analysis System for Surveillance Application (USCAS) | 86,34,749 | - | - | - | 9,48,658 | 66,91,000 | 4,61,788 | 1,20,982 | 12,33,000 | 94,55,428 | 80,83,000 | (89,03,679) |
| 31 | Core Grant Project - Corporate | 10,10,51,000 | (10,10,51,000) | | | | | | | | | - | |
| | **Total** | 45,30,83,083 | 22,35,39,000 | (53,56,891) | 1,39,88,575 | 7,36,02,686 | 27,67,81,825 | 4,82,85,181 | 2,14,23,364 | 13,18,79,472 | 55,19,72,528 | 25,27,06,848 | (11,94,25,609) |

**Annexure 2 of Schedule 3    Funded Projects**
(Attached to and forming an integral part of Balance Sheet)

Amount in ₹

| Sr.No. | Name of the Project | Opening Balance | Grants Received During the year | Interest Earned | Other Income & CDAC's Contribution During the year | Capital Expenditure | Salary, Wages Allowances etc. | Componants, Consumables and Other Direct Exnenses | Travel | Contingencies, Overheads and Other Administrative Expenditure | Total Expenses | Refund / Transfer & Other Adjustments | Closing Balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **Bangalore Centre** | | | | | | | | | | | | |
| | DIT Projects | 2,09,78,101 | 10,10,13,070 | 37,09,116 | - | 3,06,63,504 | 3,49,34,339 | 97,00,896 | 53,04,893 | 1,64,36,702 | 9,70,40,334 | 34,95,657 | 2,51,64,296 |
| | Other Agency Projects | 42,57,219 | 65,01,601 | 47,647 | - | 3,99,669 | 40,70,712 | 17,61,237 | 6,95,920 | 8,11,927 | 77,39,465 | 4,413 | 30,62,589 |
| | Total Bangalore Centre | 2,52,35,320 | 10,75,14,671 | 37,56,763 | - | 3,10,63,173 | 3,90,05,051 | 1,14,62,133 | 60,00,813 | 1,72,48,629 | 10,47,79,799 | 35,00,070 | 2,82,26,885 |
| 2 | **Chennai Centre** | | | | | | | | | | | | |
| | DIT Projects | 6,94,53,270 | 2,76,72,000 | 25,02,754 | 33,97,000 | 1,84,40,135 | 4,14,67,656 | 74,70,104 | 72,28,335 | 3,65,713 | 7,49,71,943 | 1,73,22,134 | 1,07,30,947 |
| | Other Agency Projects | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total Chennai Centre | 6,94,53,270 | 2,76,72,000 | 25,02,754 | 33,97,000 | 1,84,40,135 | 4,14,67,656 | 74,70,104 | 72,28,335 | 3,65,713 | 7,49,71,943 | 1,73,22,134 | 1,07,30,947 |
| 3 | **Corporate Office** | | | | | | | | | | | | |
| | DIT Projects | - | - | - | - | | | | - | - | | | - |
| | Other Agency Projects | - | - | - | - | | | | - | - | | | - |
| | Total Corporate Office | - | - | - | - | | | | - | - | | | - |
| 4 | **Delhi Centre** | | | | | | | | | | | | |
| | DIT Projects | (7,40,704) | 1,92,89,859 | 5,000 | - | | 33,78,728 | - | - | 65,85,301 | 99,64,029 | - | 85,90,126 |
| | Other Agency Projects | 9,31,06,990 | 3,70,12,137 | | - | | 14,85,943 | 6,52,87,988 | 19,28,451 | 2,21,84,704 | 9,08,87,086 | 1,08,50,136 | 2,83,81,905 |
| | Total Delhi Centre | 9,23,66,286 | 5,63,01,996 | 5,000 | - | | 48,64,671 | 6,52,87,988 | 19,28,451 | 2,87,70,005 | 10,08,51,115 | 1,08,50,136 | 3,69,72,031 |
| 5 | **Hyderabad Centre** | | | | | | | | | | | | |
| | DIT Projects | 7,38,15,337 | 11,48,60,000 | 36,12,136 | 24,32,481 | 3,26,20,709 | 4,14,52,694 | 57,17,727 | 65,94,934 | 3,51,07,402 | 12,14,93,466 | 1,14,08,132 | 6,18,18,356 |
| | Other Agency Projects | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total Hyderabad Centre | 7,38,15,337 | 11,48,60,000 | 36,12,136 | 24,32,481 | 3,26,20,709 | 4,14,52,694 | 57,17,727 | 65,94,934 | 3,51,07,402 | 12,14,93,466 | 1,14,08,132 | 6,18,18,356 |
| 6 | **Kolkata Centre** | | | | | | | | | | | | |
| | DIT Projects | 9,74,45,048 | 2,80,95,000 | 47,52,184 | - | - | 2,41,32,714 | 85,38,623 | 49,84,294 | 1,02,62,962 | 4,79,18,593 | 2,96,29,168 | 5,27,44,471 |
| | Other Agency Projects | 1,13,79,016 | 19,91,300 | 1,01,187 | - | - | 26,03,108 | 12,87,544 | 5,66,792 | 5,47,743 | 50,05,187 | 12,61,200 | 72,05,116 |
| | Total Kolkata Centre | 10,88,24,064 | 3,00,86,300 | 48,53,371 | - | - | 2,67,35,822 | 98,26,167 | 55,51,086 | 1,08,10,705 | 5,29,23,780 | 3,08,90,368 | 5,99,49,587 |
| 7 | **Mohali Centre** | | | | | | | | | | | | |
| | DIT Projects | 24,01,630 | 1,34,57,650 | 3,43,643 | 9,50,000 | 16,64,005 | 53,04,419 | 8,49,794 | 4,19,444 | 20,93,697 | 1,03,31,359 | 9,04,222 | 59,17,342 |
| | Other Agency Projects | 3,88,59,750 | | 29,26,023 | | | 47,46,719 | 17,49,375 | 21,327 | 1,36,800 | 66,54,221 | | 3,51,31,552 |
| | Total Mohali Centre | 4,12,61,380 | 1,34,57,650 | 32,69,666 | 9,50,000 | 16,64,005 | 1,00,51,138 | 25,99,169 | 4,40,771 | 22,30,497 | 1,69,85,580 | 9,04,222 | 4,10,48,894 |
| 8 | **Mumbai Centre** | | | | | | | | | | | | |
| | DIT Projects | 5,87,00,757 | 16,71,29,000 | 30,76,526 | | 1,21,20,932 | 2,56,32,471 | 1,40,25,447 | 56,19,583 | 6,45,53,838 | 12,19,52,271 | 68,03,746 | 10,01,50,266 |
| | Other Agency Projects | - | - | - | | - | - | - | - | - | - | - | - |
| | Total Mumbai Centre | 5,87,00,757 | 16,71,29,000 | 30,76,526 | | 1,21,20,932 | 2,56,32,471 | 1,40,25,447 | 56,19,583 | 6,45,53,838 | 12,19,52,271 | 68,03,746 | 10,01,50,266 |
| 9 | **Noida Centre** | | | | | | | | | | | | |
| | DIT Projects | 32,53,685 | 11,95,72,650 | 2,03,233 | - | 50,09,277 | 5,12,88,258 | 22,39,541 | 21,84,417 | 1,48,84,423 | 7,56,05,916 | 1,08,69,649 | 3,65,54,003 |
| | Other Agency Projects | 72,26,115 | 17,55,656 | - | - | - | - | 5,87,091 | 19,709 | 1,96,599 | 8,03,399 | - | 81,78,372 |
| | Total Noida Centre | 1,04,79,800 | 12,13,28,306 | 2,03,233 | - | 50,09,277 | 5,12,88,258 | 28,26,632 | 22,04,126 | 1,50,81,022 | 7,64,09,315 | 1,08,69,649 | 4,47,32,375 |

**Annexure 2 of Schedule 3    Funded Projects**
*(Attached to and forming an integral part of Balance Sheet)*

Amount in ₹

| Sr.No. | Name of the Project | Opening Balance | Grants Received During the year | Interest Earned | Other Income & CDAC's Contribution During the year | Capital Expenditure | Salary, Wages Allowances etc. | Componants, Consumables and Other Direct Expenses | Travel | Contingencies, Overheads and Other Administrative Expenditure | Total Expenses | Refund / Transfer & Other Adjustments | Closing Balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | Pune Centre | | | | | | | | | | | | |
| | DIT Projects | 7,59,43,650 | 12,76,86,721 | 21,10,264 | 30,63,076 | 2,95,08,066 | 10,64,94,208 | 44,82,104 | 1,07,06,200 | 4,72,60,921 | 19,84,51,499 | 1,37,05,132 | (33,52,920) |
| | Other Agency Projects | (23,26,591) | 1,78,25,722 | 4,78,995 | - | 8,75,866 | 96,13,454 | 2,48,00,437 | 11,03,985 | 1,00,29,007 | 4,64,22,749 | (2,36,52,501) | (67,92,122) |
| | Total Pune Centre | 7,36,17,059 | 14,55,12,443 | 25,89,259 | 30,63,076 | 3,03,83,932 | 11,61,07,662 | 2,92,82,541 | 1,18,10,185 | 5,72,89,928 | 24,48,74,248 | (99,47,369) | (1,01,45,042) |
| 11 | Thiruvananthapuram Centre | | | | | | | | | | | | |
| | DIT Projects | 20,18,60,471 | 26,01,17,726 | 1,39,85,548 | - | 2,96,75,735 | 9,17,94,551 | 5,46,92,385 | 83,93,330 | 10,15,08,308 | 28,60,64,309 | (33,62,366) | 19,32,61,802 |
| | Other Agency Projects | 12,69,67,468 | 8,56,25,466 | 63,58,502 | - | 42,32,221 | 6,63,98,036 | 50,22,461 | 15,80,853 | 3,30,29,382 | 11,02,62,943 | 4,28,38,305 | 6,58,50,188 |
| | Total Thiruvananthapuram Centre | 32,88,27,939 | 34,57,43,192 | 2,03,44,050 | - | 3,39,07,956 | 15,81,92,587 | 5,97,14,836 | 99,74,183 | 13,45,37,690 | 39,63,27,252 | 3,94,75,939 | 25,91,11,990 |
| | Total DIT Projects | 60,31,11,245 | 97,88,93,676 | 3,43,00,404 | 98,42,557 | 15,97,02,363 | 42,58,80,038 | 10,77,16,621 | 5,14,35,430 | 29,90,59,267 | 1,04,37,93,719 | 9,07,75,474 | 49,15,78,689 |
| | Total Other Agency Projects | 27,94,69,967 | 15,07,11,882 | 99,12,354 | - | 55,07,756 | 8,89,17,972 | 10,04,96,123 | 59,17,037 | 6,69,36,162 | 26,77,75,050 | 3,13,01,553 | 14,10,17,600 |
| | **Grand Total** | 88,25,81,212 | 1,12,96,05,558 | 4,42,12,758 | 98,42,557 | 16,52,10,119 | 51,47,98,010 | 20,82,12,744 | 5,73,52,467 | 36,59,95,429 | 1,31,15,68,769 | 12,20,77,027 | 63,25,96,289 |

Amount in ₹

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|
| **Schedule 4 - Current Liabilities and Provisions** | | |
| **A. Current Liabilities** | | |
| 1. Acceptances | - | - |
| 2. Trade Payables (For Goods and Others) | 29,33,74,015 | 26,17,96,966 |
| 3. Advances Received | | |
| a) Advances Received from Parties | 13,28,28,658 | 22,75,11,283 |
| b) Fees Received in Advance | 20,75,829 | 61,00,905 |
| c) AMC Charges Received in Advance | - | |
| d) Rent/Other Income Received in Advance | 8,26,166 | 10,82,081 |
| 4. Statutory Liabilities | | |
| a) Overdue | - | - |
| b) Others | | |
| I) Members CPF Recovery Payable | 78,48,135 | 68,03,853 |
| ii) Members VPF Payable | 10,65,785 | 7,57,714 |
| iii) Members CPF Loan Recovery Payable | 2,98,555 | 3,23,065 |
| iv) Members Benevolent Fund Payable | 8,65,815 | 2,55,745 |
| v) Members CGEIS/Group Insurance Payable | 13,449 | 2,90,496 |
| vi) Members Other Recoveries Payable | 9,71,519 | 41,37,560 |
| vii) C-DAC's Contribution to Benevolent Fund Payable | 150 | 49,824 |
| viii) C-DAC's Contribution to CPF Payable | 1,07,34,223 | 83,04,812 |
| ix) Leave Salary and Pension Contribution Payable | 6,51,14,275 | 7,65,84,683 |
| x) Gratuity Payable | 1,81,12,902 | 4,77,04,707 |
| xi) Members Income Tax Payable | 1,25,50,577 | 67,08,147 |
| xii) Tax Deducted at Source Payable | 44,73,525 | 72,43,362 |
| xiii) Profession Tax Payable | 2,77,380 | 2,55,350 |
| xiv) General Sales Tax Payable | 2,09,269 | 60,257 |
| xv) Central Sales Tax Payable | 7,48,794 | 2,48,351 |
| xvi) Works Contract Tax Payable | 1,239 | - |
| xvii) Service Tax Payable | 2,72,79,068 | 47,41,834 |
| 5. Other Current Liabilities | | |
| a) Unpaid Salaries | 56,43,970 | 3,28,01,498 |
| b) Library/ Other Security Deposits Payable | 70,48,850 | 1,83,84,602 |
| c) Earnest Money Deposit Contractors Payable | 75,68,137 | 1,25,52,735 |
| d) Retention Deposit Contractors | 94,81,133 | 1,60,78,876 |
| e) Refund of Course Fees Due | 16,20,823 | 18,70,368 |
| f) Excess Lease Deposit Payable | - | 16,550 |
| g) ATC's & Others Share in Fees Payable/Other Current Liabilities | 31,10,47,664 | 26,51,01,128 |
| h) GIST/PACE Dealer's Deposit Payable | 20,23,315 | 12,71,045 |
| **Total (A)** | 92,41,03,220 | 1,00,90,37,797 |
| **B. Provisions** | | |
| 1. Others (Specify) | | |
| a) Provisions / Accrued Liabilities for Expenses | 2,68,72,210 | 4,17,08,014 |
| **Total (B)** | 2,68,72,210 | 4,17,08,014 |
| **Total (A)+(B)** | 95,09,75,430 | 1,05,07,45,811 |

**Schedule-5   FIXED ASSETS Acquired out of own funds**
*(Attached to and forming an integral part of Balance Sheet)*

Amount in ₹

| Sr.No. | Particulars | Cost/Valuation as on beginning of the year | Additions During the Year — On or Before 30th September | Additions During the Year — After 30th September | Total Additions during the year | Deletion/Adjustments During the Year | Cost/Valuation as on end of the year | Depreciation as at beginning of the year | Depreciation Written Back | Depreciation Rate | Depreciation Current Year | Total Depreciation up to the year end | WDV (Closing) | WDV (Opening) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 1 | Land | | | | | | | | | | | | | |
| | a) Freehold | 3,21,46,675 | - | - | - | - | 3,21,46,675 | - | - | 0% | - | - | 3,21,46,675 | 3,21,46,675 |
| | b) Leasehold | 15,46,55,971 | 28,66,500 | 4,69,17,742 | 4,97,84,242 | 1,29,42,935 | 19,14,97,278 | 1,21,90,360 | - | 0% | 3,76,569 | 1,25,66,929 | 17,89,30,349 | 14,24,65,611 |
| 2 | Building | | | | | | | | | | | | | |
| | a) On Freehold Land | 65,65,566 | - | - | - | - | 65,65,566 | 27,31,676 | - | 10% | 3,83,389 | 31,15,065 | 34,50,501 | 38,33,890 |
| | b) On Leasehold Land | 12,94,37,024 | - | - | - | - | 12,94,37,024 | 6,91,61,796 | - | 10% | 60,27,523 | 7,51,89,319 | 5,42,47,705 | 6,02,76,228 |
| | c) Ownership Flats/Premises | 3,84,72,032 | - | 7,64,263 | 7,64,263 | - | 3,92,36,295 | 2,62,31,174 | - | 10% | 13,00,512 | 2,75,31,686 | 1,17,04,609 | 1,22,40,858 |
| | d) Superstructures on Land not belonging to the entity | 1,47,34,869 | - | - | - | - | 1,47,34,869 | 1,20,12,162 | - | 10% | 2,72,271 | 1,22,84,433 | 24,50,436 | 27,22,707 |
| 3 | Plant, Machinery and Equipments | 6,11,59,130 | 4,00,775 | 1,17,764 | 5,18,539 | 16,16,859 | 6,00,60,810 | 4,94,71,023 | 12,86,425 | 15% | 17,81,433 | 4,99,66,031 | 1,00,94,779 | 1,16,88,107 |
| 4 | Vehicles | 1,26,15,268 | - | - | - | - | 1,26,15,268 | 59,71,727 | - | 15% | 9,96,531 | 69,68,258 | 56,47,010 | 66,43,541 |
| 5 | Furniture & Fixtures | 8,59,47,982 | 3,11,262 | 8,05,000 | 11,16,262 | - | 8,70,64,244 | 5,47,17,453 | - | 10% | 32,34,680 | 5,79,52,133 | 2,91,12,111 | 3,12,30,529 |
| 6 | Office Equipments | 2,76,53,173 | 2,46,114 | 13,57,807 | 16,03,921 | - | 2,92,57,094 | 1,86,83,683 | - | 15% | 15,86,013 | 2,02,69,696 | 89,87,398 | 89,69,490 |
| 7 | Air Conditioning Equipments | 3,21,41,938 | 83,890 | - | 83,890 | - | 3,22,25,828 | 2,44,78,489 | - | 15% | 11,62,099 | 2,56,40,588 | 65,85,240 | 76,63,449 |
| 8 | Computer Peripherals | 27,71,55,241 | 1,25,92,518 | 90,44,477 | 2,16,36,995 | - | 29,87,92,236 | 26,71,40,838 | - | 60% | 1,89,90,839 | 28,61,31,677 | 1,26,60,559 | 1,00,14,403 |
| 9 | Electrical Installations | 5,00,15,849 | 96,554 | 15,65,614 | 16,62,168 | - | 5,16,78,017 | 3,92,65,796 | - | 10% | 12,41,223 | 4,05,07,019 | 1,11,70,998 | 1,07,50,053 |
| 10 | Electronic Tools & Lab Equipments | 70,35,174 | 1,79,491 | 44,989 | 2,24,480 | - | 72,59,654 | 40,25,456 | - | 15% | 4,85,131 | 45,10,587 | 27,49,067 | 30,09,718 |
| 11 | Library Books | 1,37,35,396 | 2,92,873 | 1,27,972 | 4,20,845 | 649 | 1,41,55,592 | 1,33,58,743 | 437 | 60% | 4,78,372 | 1,38,36,678 | 3,18,914 | 3,76,653 |
| 12 | Copyright Know-how | 66,950 | - | - | - | - | 66,950 | 58,099 | - | 25% | 2,213 | 60,312 | 6,638 | 8,851 |
| 13 | Other Fixed Assets | 51,48,745 | - | 17,961 | 17,961 | 377 | 51,66,329 | 38,22,062 | 332 | 15% | 2,01,689 | 40,23,419 | 11,42,910 | 13,26,683 |
| | **Total** | 94,86,86,983 | 1,70,69,977 | 6,07,63,589 | 7,78,33,566 | 1,45,60,820 | 1,01,19,59,729 | 60,33,20,537 | 12,87,194 | | 3,85,20,487 | 64,05,63,830 | 37,14,05,899 | 34,53,66,446 |
| | Capital Work-in-progress | 12,39,216 | 1,79,200 | 14,500 | 1,93,700 | 10,65,700 | 3,67,216 | - | - | | - | - | 3,67,216 | 12,39,216 |
| | **Grand Total** | 94,99,26,199 | 1,72,49,177 | 6,07,78,089 | 7,80,27,266 | 1,56,26,520 | 1,01,23,26,945 | 60,33,20,537 | 12,87,194 | | 3,85,20,487 | 64,05,63,830 | 37,17,73,115 | 34,66,05,662 |
| | Previous Year | 93,22,46,720 | 1,11,74,098 | 1,27,33,459 | 2,39,07,557 | 62,28,078 | 94,99,26,199 | 56,91,21,544 | 21,52,945 | | 3,63,51,938 | 60,33,20,537 | 34,66,05,662 | 36,31,25,176 |

**Schedule-6     FIXED ASSETS Acquired out of Grant-In-Aid**
(Attached to and forming an integral part of Balance Sheet)

Amount in ₹

| A | B | C | Gross Block | | | | | | Depreciation | | | | | Net Block | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Additions During the Year | | | | | | | | | | | | |
| Sr.No. | Particulars | Cost/Valuation as on beginning of the year | On or Before 30th September | After 30th September | Total Additions during the year | Deletion/Adjustments During the Year | Cost/Valuation as on end of the year | Depreciation as at beginning of the year | Depreciation Written Back | Depreciation Rate | Depreciation Current Year | Total Depreciation up to the year end | WDV (Closing) | WDV (Opening) |
| | | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 1 | Land | | | | | | | | | | | | | |
| | a) Freehold | 49,04,850 | - | - | - | - | 49,04,850 | - | - | 0% | - | - | 49,04,850 | 49,04,850 |
| | b) Leasehold | 1,67,45,711 | - | - | - | - | 1,67,45,711 | 16,64,112 | - | 0% | 1,71,770 | 18,35,882 | 1,49,09,829 | 1,50,81,599 |
| 2 | Building | | | | | | | | | | | | | |
| | a) On Freehold Land | 6,58,09,591 | - | - | - | - | 6,58,09,591 | 5,20,74,827 | - | 10% | 13,73,477 | 5,34,48,304 | 1,23,61,287 | 1,37,34,764 |
| | b) On Leasehold Land | 11,56,21,720 | 24,51,422 | 14,62,278 | 39,13,700 | - | 11,95,35,420 | 8,26,55,830 | - | 10% | 38,87,959 | 8,63,43,789 | 3,31,91,631 | 3,29,65,890 |
| | c) Ownership Flats/Premises | 33,41,269 | - | - | - | - | 33,41,269 | 26,49,157 | - | 10% | 69,211 | 27,18,368 | 6,22,901 | 6,92,112 |
| | d) Superstructures on Land not belonging to the entity | - | - | - | - | - | - | - | - | 10% | - | - | - | - |
| 3 | Plant, Machinery and Equipments | 7,61,46,547 | 54,67,296 | 26,76,394 | 81,43,690 | 76,708 | 8,42,13,529 | 6,23,29,148 | 1,81,918 | 15% | 33,09,945 | 6,54,57,175 | 1,87,56,354 | 1,38,17,399 |
| 4 | Vehicles | 1,45,33,321 | - | - | - | 7,57,714 | 1,37,75,607 | 1,11,94,708 | 6,45,948 | 15% | 4,84,028 | 1,10,32,788 | 27,42,819 | 33,38,613 |
| 5 | Furniture & Fixtures | 10,20,01,006 | 10,13,916 | 22,81,759 | 32,95,675 | 226 | 10,52,96,455 | 6,72,88,120 | - | 10% | 38,00,833 | 7,10,88,953 | 3,42,07,502 | 3,47,12,886 |
| 6 | Office Equipments | 4,78,41,738 | 20,38,445 | 18,69,920 | 39,08,365 | (76,708) | 5,18,26,811 | 3,22,73,089 | (1,81,918) | 15% | 29,05,772 | 3,53,60,779 | 1,64,66,032 | 1,55,68,649 |
| 7 | Air Conditioning Equipments | 4,80,53,112 | 8,27,297 | 2,66,481 | 10,93,778 | - | 4,91,46,890 | 3,65,69,631 | - | 15% | 18,86,589 | 3,84,56,220 | 1,06,90,670 | 1,14,83,481 |
| 8 | Computer Peripherals | 1,11,46,05,342 | 5,09,66,919 | 2,74,54,137 | 7,84,21,056 | - | 1,19,30,26,398 | 1,01,60,48,848 | - | 60% | 10,61,86,531 | 1,12,22,35,379 | 7,07,91,019 | 9,85,56,494 |
| 9 | Electrical Installations | 6,30,07,263 | 6,60,647 | 1,03,311 | 7,63,958 | 24,37,200 | 6,13,34,021 | 3,77,98,938 | 15,18,011 | 10% | 25,05,308 | 3,87,86,235 | 2,25,47,786 | 2,52,08,325 |
| 10 | Electronic Tools & Lab Equipments | 8,54,30,562 | 21,66,162 | 47,36,189 | 69,02,351 | - | 9,23,32,913 | 6,68,82,208 | - | 15% | 38,17,605 | 7,06,99,813 | 2,16,33,100 | 1,85,48,354 |
| 11 | Library Books | 3,88,34,237 | 43,190 | 1,43,800 | 1,86,990 | 7,400 | 3,90,13,827 | 3,83,57,840 | 7,316 | 60% | 3,97,981 | 3,87,48,505 | 2,65,322 | 4,76,397 |
| 12 | Copyright Know-how | 4,40,660 | - | - | - | - | 4,40,660 | 4,40,548 | - | 25% | 28 | 4,40,576 | 84 | 112 |
| 13 | Other Fixed Assets | 70,73,990 | - | - | - | - | 70,73,990 | 45,38,366 | - | 15% | 3,80,345 | 49,18,711 | 21,55,279 | 25,35,624 |
| | **Total** | 1,80,43,90,919 | 6,56,35,294 | 4,09,94,269 | 10,66,29,563 | 32,02,540 | 1,90,78,17,942 | 1,51,27,65,370 | 21,71,275 | | 13,09,77,382 | 1,64,15,71,477 | 26,62,46,465 | 29,16,25,549 |
| | Capital Work-in-progress | 97,80,32,677 | - | 1,46,32,100 | 1,46,32,100 | - | 99,26,64,777 | - | - | | - | - | 99,26,64,777 | 97,80,32,677 |
| | **Grand Total** | 2,78,24,23,596 | 6,56,35,294 | 5,56,26,369 | 12,12,61,663 | 32,02,540 | 2,90,04,82,719 | 1,51,27,65,370 | 21,71,275 | | 13,09,77,382 | 1,64,15,71,477 | 1,25,89,11,242 | 1,26,96,58,226 |
| | Previous Year | 2,48,36,79,934 | 6,00,11,456 | 23,94,62,905 | 29,94,74,361 | 7,30,699 | 2,78,24,23,596 | 1,34,12,78,827 | 6,80,521 | | 17,21,67,064 | 1,51,27,65,370 | 1,26,96,58,226 | 1,14,24,01,107 |

**Schedule-7**    **FIXED ASSETS Acquired out of Project Grants**
*(Attached to and forming an integral part of Balance Sheet)*

Amount in ₹

| Sr.No. | Name of the Project | Gross Block | | | | | | Depreciation | | | | | Net Block | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Cost/Valuation as on beginning of the year | Additions During the Year | | | Deletion/Adjustments During the Year | Cost/Valuation as on end of the year | Depreciation as at beginning of the year | Depreciation Written Back | Depreciation Rate | Depreciation for Current Year | Total Depreciation up to the year end | WDV (Closing) | WDV (Opening) |
| | | | On or Before 30th September | After 30th September | Total Additions during the year | | | | | | | | | |
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 1 | Bangalore Centre Project Assets | 12,77,82,239 | 2,71,49,259 | 39,13,914 | 3,10,63,173 | - | 15,88,45,412 | 10,66,57,670 | - | | 2,77,01,327 | 13,43,58,997 | 2,44,86,415 | 2,11,24,569 |
| 2 | Chennai Centre Project Assets | 4,89,17,524 | 40,10,337 | 1,44,29,798 | 1,84,40,135 | - | 6,73,57,659 | 3,39,68,090 | - | | 1,18,42,607 | 4,58,10,697 | 2,15,46,962 | 1,49,49,434 |
| 3 | Corporate Project Assets | | | - | - | - | | | - | | | | | |
| 4 | Delhi Centre Project Assets | 15,72,623 | - | - | - | - | 15,72,623 | 15,30,577 | - | | 19,659 | 15,50,236 | 22,387 | 42,046 |
| 5 | Hyderabad Centre Project Assets | 8,86,59,438 | 1,04,42,006 | 2,21,78,703 | 3,26,20,709 | - | 12,12,80,147 | 7,32,29,812 | - | | 2,80,41,044 | 10,12,70,856 | 2,00,09,291 | 1,54,29,626 |
| 6 | Kolkata Centre Project Assets | | | | | | | | | | | | | |
| 7 | Mohali Centre Project Assets | 7,36,12,087 | 9,46,786 | 7,17,219 | 16,64,005 | - | 7,52,76,092 | 6,26,32,546 | 40,137 | | 20,90,627 | 6,46,83,036 | 1,05,93,056 | 1,09,79,541 |
| 8 | Mumbai Centre Project Assets | 27,19,82,175 | 12,89,580 | 1,08,31,352 | 1,21,20,932 | - | 28,41,03,107 | 22,38,64,187 | - | | 1,60,32,671 | 23,98,96,858 | 4,42,06,249 | 4,81,17,988 |
| 9 | Noida Centre Project Assets | 5,19,64,221 | 28,41,400 | 21,67,877 | 50,09,277 | - | 5,69,73,498 | 4,62,36,707 | - | | 26,54,254 | 4,88,90,961 | 80,82,537 | 57,27,514 |
| 10 | Pune Centre Project Assets | 39,86,11,144 | 28,02,965 | 2,75,80,967 | 3,03,83,932 | 2,33,70,694 | 40,56,24,382 | 37,01,50,163 | 2,10,43,777 | | 3,15,13,264 | 38,06,19,650 | 2,50,04,732 | 2,84,60,981 |
| 11 | Thiruvananthapuram Centre Project Assets | 21,09,55,433 | 96,74,824 | 2,42,33,132 | 3,39,07,956 | - | 24,48,63,389 | 12,92,99,864 | - | | 2,45,00,923 | 15,38,00,787 | 9,10,62,602 | 8,16,55,569 |
| | **Total** | 1,27,40,56,884 | 5,91,57,157 | 10,60,52,962 | 16,52,10,119 | 2,33,70,694 | 1,41,58,96,309 | 1,04,75,69,616 | 2,10,83,914 | | 14,43,96,376 | 1,17,08,82,078 | 24,50,14,231 | 22,64,87,268 |
| | Capital Work-in-progress | | | | | | | | | | | | | |
| | **Grand Total** | 1,27,40,56,884 | 5,91,57,157 | 10,60,52,962 | 16,52,10,119 | 2,33,70,694 | 1,41,58,96,309 | 1,04,75,69,616 | 2,10,83,914 | | 14,43,96,376 | 1,17,08,82,078 | 24,50,14,231 | 22,64,87,268 |
| | **Previous Year** | 1,10,83,42,582 | 6,47,50,034 | 10,12,54,268 | 16,60,04,302 | 2,90,000 | 1,27,40,56,884 | 91,19,87,284 | 1,74,000 | | 13,57,56,332 | 1,04,75,69,616 | 22,64,87,268 | 19,63,55,298 |

Amount in ₹

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|

## Schedule 8 - Current Assets, Loans and Advances Etc.

| | 2013-2014 | 2012-2013 |
|---|---|---|
| **A. Current Assets** | | |
| 1. Inventories : | | |
|   a) Stores and Spares | - | - |
|   b) Loose Tools | - | - |
|   c) Stock in trade | | |
|     Finished Goods | 1,08,460 | 16,73,360 |
|     Work-in-progress | 13,23,651 | 5,83,518 |
|     Raw Material | 11,68,766 | 23,93,042 |
|   d) Stock of Course Material | 11,94,750 | 9,15,754 |
| 2. Sundry Debtors | | |
|   Trade Receivables | 47,34,43,682 | 42,14,64,604 |
|   Less: Provision for Bad and Doubtful Debts | 14,71,96,233 | 14,05,93,453 |
| | 32,62,47,449 | 28,08,71,151 |
| 3. Cash balances in hand (including cheques/drafts and imprest) | 3,84,624 | 66,448 |
| 4. Bank Balances | | |
|   a) With Scheduled Banks | | |
|     On Deposit Accounts (includes margin money) | 3,25,72,45,880 | 3,84,35,84,611 |
|     On Savings/Current Account | 42,85,52,549 | 59,51,85,790 |
|   b) Funds/Goods in Transit | 72,53,419 | 85,68,439 |
| 5. Post Office-Savings Accounts | - | - |
| **Total (A)** | 4,02,34,79,548 | 4,73,38,42,113 |
| | | |
| **B. Loans, Advances and Other Assets** | | |
| 1. Loans | | |
|   a) Staff | 95,30,634 | 1,01,50,015 |
|   b) Other (Specify) | - | - |
| 2. Advances and other amounts recoverable in cash or in kind or for value to be received | | |
|   a) On Capital Account | - | - |
|   b) Prepayments (Advances to Suppliers) | 2,74,24,957 | 2,40,04,237 |
|   c) To Employees | 70,35,850 | 65,32,036 |
|   d) To Others | 1,36,40,905 | 1,89,47,962 |
| 3. Income Accrued | | |
|   a) On Investments from Earmarked/Endowment Funds | - | - |
|   b) On Bank Deposits | 13,42,80,782 | 14,08,74,402 |
|   c) Others | | |
|     I) Course Fee Receivable | 6,54,779 | 4,22,016 |
|     ii) Receivable from Guest House Receipts | - | - |
|     iii) Other Grants Receivables | 5,00,000 | - |
| 4. Claims Receivable | | |
|   a) Insurance Claims Lodged but not received | 68,044 | 5,58,403 |
|   b) Cliams due but not received | 6,25,354 | 6,25,354 |
|   c) Excise Duty paid under Protest | - | - |
|   d) Income Tax Deducted at Source | 9,92,50,947 | 7,21,97,477 |
|   e) Sales Tax Paid Under Protest | - | - |
|   f) Sales Tax Refund Due | 4,80,963 | 2,61,290 |
|   g) Receivable from PF Trust | 2,071 | 5,838 |
|   h) Other Receivables | 2,21,80,581 | 72,35,794 |
| 5. Prepaid Expenses | | |
|   a) Insurance | 19,23,259 | 17,16,984 |
|   b) Other Expenses | 52,01,768 | 81,12,491 |

Amount in ₹

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|
| 6. Deposits (Assets) | | |
| a) Telephone Deposit | 11,98,776 | 11,94,433 |
| b) Lease Rent Deposit | 5,16,07,953 | 4,17,56,950 |
| c) Other Deposits | 2,40,37,886 | 2,30,74,893 |
| d) Security Deposit | 3,42,04,309 | 5,27,84,873 |
| e) Excise PLA Deposit | 5,43,871 | 10,91,405 |
| f) Excise Under D3 and 57F3 | - | - |
| g) Tender Deposit | 51,22,415 | 69,86,945 |
| 7. Differed Expenses | | |
| a) Unutilised Modvat / Cenvat | 31,63,288 | 61,16,908 |
| b) Differed Expenses on Projects | - | - |
| **Total (B)** | **44,26,79,392** | **42,46,50,706** |
| **Total (A+B)** | **4,46,61,58,940** | **5,15,84,92,819** |

## Schedule 9 - Income from Sales/Services

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|
| 1. Income from Sales | | |
| a) Sale of Finished Goods | 13,43,95,937 | 13,11,32,310 |
| b) Sale of Raw Material | - | - |
| c) Sale of Scraps | 1,05,574 | 55,425 |
| 2. Income from Services | | |
| a) Software Development Charges | 11,74,36,621 | 2,83,13,690 |
| b) Others (Specify) | | |
| AMC Charges Received | 4,69,50,574 | 4,01,93,227 |
| Consultancy Charges / Service Charges | 31,88,32,962 | 21,49,53,681 |
| Networking Charges | - | - |
| 3. Inter Unit / Inter Branch Sales / (Purchases) | - | - |
| **Total** | **61,77,21,668** | **41,46,48,333** |

## Schedule 10 - Grants/Subsdies
*(Irrevocable Grants & Subsdies Received)*

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|
| 1. Central Government | 1,04,00,00,000 | 97,91,00,000 |
| 2. Others (Specify) | | |
| a) C-DAC's own Contribution and Other Adjustments | 32,44,654 | - |
| 3. Less : Amount utilised for Capital Expenditure in the current year transferred to Capital Reserve | 4,66,27,712 | 6,22,14,494 |
| **Total** | **99,66,16,942** | **91,68,85,506** |

## Schedule 11 - Fees/Subscriptions
*(Accounting Policies towards each item are to be disclosed)*

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|
| 1. Entrance Fees | 25,600 | 29,100 |
| 2. Course Fees | 51,96,85,602 | 50,44,96,818 |
| 3. Annual Fees/Subscriptions | 2,44,54,866 | 2,82,92,974 |
| 4. Authorization Fees | 42,00,000 | 27,79,993 |
| 5. Others (Specify) | | |
| a) Virtual Centre Processing Fees | 47,000 | 20,000 |
| b) Admission Cancellation Fees | 30,91,926 | 23,33,045 |
| c) Examination Fees | 1,99,22,496 | 1,45,30,127 |
| d) Late Fee | 71,211 | 1,11,736 |
| e) Registration Fees / Project Fee | 9,71,667 | 16,53,737 |
| f) Students Hostel Fees | 1,20,90,227 | 93,31,476 |
| **TOTAL** | **58,45,60,595** | **56,35,79,006** |

Amount in ₹

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|

## Schedule 12 - Income From Investments
*Income on Investment from Earmarked/Endowment Funds transferred to Funds)*

| | 2013-2014 | 2012-2013 |
|---|---|---|
| **Interest** | | |
| **1. On Term Deposits** | | |
| a) With Scheduled Banks | (4,81,64,145) | 3,93,12,507 |
| **2. On Savings Accounts** | | |
| a) With Scheduled Banks | (4,43,719) | 60,80,566 |
| **3. On Loans** | | |
| a) Employees/Staff | (25,666) | 25,666 |
| **Total** | (4,86,33,530) | 4,54,18,739 |
| **Transferred to Earmarked/Endowment Funds** | (4,86,33,530) | 4,54,18,739 |
| **Net Balance** | - | - |

## Schedule 13 - Interest Received

| | 2013-2014 | 2012-2013 |
|---|---|---|
| **1. On Term Deposits** | | |
| a) With Scheduled Banks | 20,37,47,378 | 20,30,24,825 |
| **2. On Savings Accounts** | | |
| a) With Scheduled Banks | 1,41,80,405 | 43,47,833 |
| **3. On Loans** | | |
| a) Employees/Staff | 2,97,341 | 8,17,155 |
| **Total** | 21,82,25,124 | 20,81,89,813 |

## Schedule 14 - Other Income

| | 2013-2014 | 2012-2013 |
|---|---|---|
| 1. Profit on Sale/Disposal of Assets | | |
| a) Owned Assets | (2,53,033) | 3,51,287 |
| b) Assets acquired out of grants, or received free of cost | (4,79,418) | 2,45,746 |
| 2. Exports Incentives Realized | - | - |
| 3. Fees for Miscellaneous Services | 41,41,952 | 80,38,421 |
| 4. Miscellaneous Income | 1,54,46,714 | 1,27,25,621 |
| **Total** | **1,88,56,215** | **2,13,61,075** |

## Schedule 15 - Increase/(Decrease) In Stock of Finished Goods & Work-In-Progress

| | 2013-2014 | 2012-2013 |
|---|---|---|
| a) Closing Stock | | |
| Finished Goods | 1,08,460 | 16,73,360 |
| Work-in-progress | 13,23,651 | 5,83,518 |
| Raw Material | 11,68,766 | 23,93,042 |
| Loose Tools | - | - |
| Course Material Stock | 11,94,750 | 9,15,754 |
| b) Less : Opening Stock | | |
| Finished Goods | 16,73,360 | 19,55,762 |
| Work-in-progress | 5,83,518 | 5,49,830 |
| Raw Material | 23,93,042 | 33,84,324 |
| Loose Tools | - | - |
| Course Material Stock | 9,15,754 | 7,34,621 |
| **Total (a-b)** | **(17,70,047)** | **(10,58,863)** |

Amount in ₹

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|
| **Schedule 16 - Establishment Expenses** | | |
| **a) Salaries & Wages** | 90,32,39,794 | 67,16,94,308 |
| **b) Allowances & Bonus** | | - |
| Awards & Prizes | 1,95,042 | 3,07,450 |
| Bonus | 19,50,726 | 21,22,761 |
| Canteen Facility | 2,62,16,940 | 1,23,78,341 |
| Hire Charges - Contractual Services | 4,95,82,380 | 4,09,19,834 |
| Lease Rent for Employees Quarters | 4,75,01,364 | 3,58,51,913 |
| Leave Travel Concession | 58,33,358 | 94,82,748 |
| Medical Reimbursement | 4,79,38,003 | 4,02,46,809 |
| Members Medical & Accident Insurance Expenses | 15,52,920 | 16,51,360 |
| Misc. Allowances and Other Reimbursements | 88,45,276 | 89,58,761 |
| Reimbursement of Conveyance Expenses | 13,33,622 | 4,55,653 |
| Staff Recruitment Expenses | 30,16,840 | 50,69,569 |
| Staff Training Expenses | 48,32,636 | 14,97,995 |
| Transfer & Relocation Expenses | 1,95,223 | 3,84,698 |
| **c) Contribution to Provident Fund** | 6,69,06,366 | 5,34,07,873 |
| **d) Contribution to Other Funds (Benevolent Fund)** | - | - |
| **e) Staff Welfare Expenses** | 1,17,20,330 | 94,59,536 |
| **f) Expenses on Employees Retirement and Terminal Benefits** | | - |
| Gratuity | 1,02,32,949 | 3,39,38,386 |
| Leave Encashment | 4,30,03,770 | 1,93,20,745 |
| Leave Salary & Pension Contribution | 1,57,61,654 | 1,25,46,145 |
| **g) Others (Specify)** | 14,39,408 | 19,94,361 |
| **Total** | **1,25,12,98,601** | **96,16,89,246** |
| **Schedule 17 - Other Administrative Expenses Etc.** | | |
| **a) Purchases** | 4,74,13,908 | 5,11,98,845 |
| **b) Direct Expenses** | | |
| Consumables | 1,88,14,974 | 1,11,60,938 |
| Design and Development Charges | 20,00,000 | - |
| Excise/Custom Duty/Service Tax Paid | 30 | 47,60,129 |
| Freight and Handling Expenses | 4,11,817 | 2,59,219 |
| Labour Charges | 75,559 | 2,78,219 |
| Liquidated Damages | - | 36,477 |
| Material Insurance Expenses | - | - |
| Octroi | 15,20,699 | 1,11,196 |
| Other Packing Charges | 54,159 | 45,615 |
| Royalty and Support Fees | 14,000 | 11,498 |
| Software Development Consultancy Charges | 1,10,11,777 | 1,82,16,825 |
| Technical Service Charges | 46,87,022 | 50,77,450 |
| Warehouse Charges | - | - |
| **c) Expenses on Courses** | | |
| Advertisement Expenses | 1,50,13,859 | 1,24,20,614 |
| ATC's Share in Fees | 15,12,67,112 | 12,97,28,838 |
| Awards & Prizes | - | - |
| Campus Interview Expenses | 15,61,146 | 13,65,729 |
| Course Material Production Expenses | 1,68,40,701 | 2,24,09,100 |
| Data Entry & Scanning Expenses | 47,524 | 4,47,357 |
| Examination Expenses | 26,64,658 | 76,49,981 |
| Faculty Members Expenses | 2,99,90,703 | 2,80,46,600 |
| Other Course Related Expenses | 1,71,88,886 | 2,20,12,940 |
| Printing of Forms & Prospectus | 4,42,474 | 2,19,909 |
| Students Hostel Expenses | 3,73,795 | 9,13,451 |

Amount in ₹

| Particulars | 2013-2014 | 2012-2013 |
|---|---|---|
| **d) Administrative Expenses** | | |
| Administrative Charges on Provident Fund | 26,91,702 | 25,31,004 |
| Asset Hire Charges | 18,78,378 | 10,32,904 |
| Auditors Remuneration | 10,36,515 | 9,91,509 |
| Bank Charges and Commission | 16,09,868 | 17,34,979 |
| C-DAC's Contribution to Funded Projects | 20,86,793 | 16,56,692 |
| Cultural Program Expenses | 26,44,031 | 30,48,098 |
| Development Contracts and Spon. Project Expenses | 11,16,440 | 10,45,642 |
| Electricity, Power and Water Charges | 5,86,77,401 | 3,85,59,115 |
| Entertainment/Hospitality Expenses | 19,52,350 | 18,39,512 |
| Foreign Exchange Fluctuation | 14,64,820 | 1,06,614 |
| Gifts and Presentation | 24,95,723 | 22,82,621 |
| Insurance | 8,31,523 | 12,26,828 |
| Interest Paid | 6,90,329 | 8,53,392 |
| Irrecoverable Balances Written-off/(Written-back) | (15,67,924) | 1,73,287 |
| Legal & Professional Charges | 2,10,77,152 | 1,10,72,545 |
| Miscellaneous Expenses | 27,86,368 | 57,39,373 |
| Office Expenses | 78,57,578 | 1,04,13,640 |
| Postage, Telephone & Communication Charges | 1,76,13,348 | 1,53,04,091 |
| Printing and Stationery | 89,72,433 | 76,32,110 |
| Provision for Bad and Doubtful Debts/Advances | 90,97,039 | (27,73,526) |
| Rent, Rates and Taxes | 8,39,29,700 | 6,66,02,106 |
| Sales Tax | 33,76,893 | 21,90,902 |
| Service Hire Charges | 5,12,43,827 | 3,18,87,133 |
| Subscription of Periodicals & Newspapers | 26,49,787 | 20,82,393 |
| Tender Expenses | 1,19,620 | 69,758 |
| Training Expenses | 5,26,652 | 7,17,167 |
| Transit Quarter & Guest House Expenses | 34,72,953 | 34,95,338 |
| Transportation Charges | 8,99,364 | 3,32,839 |
| Vehicles Hire, Running and Maintenance | 1,45,74,383 | 83,30,169 |
| **e) Repairs and Maintenance** | | |
| Air Conditioning Equipments | 34,96,716 | 33,10,621 |
| Building | 2,06,32,702 | 43,99,573 |
| Computers | 74,82,615 | 68,91,821 |
| Electrical Fittings | 92,97,791 | 92,42,404 |
| Furniture and Fixtures | 60,55,906 | 12,21,297 |
| Garden Maintenance | 5,53,198 | 6,22,956 |
| Lab Equipments | 12,17,393 | 4,65,524 |
| Office Equipments | 19,88,942 | 21,12,322 |
| Other Assets | 34,08,918 | 7,25,005 |
| **f) Travelling and Conveyance Expenses** | | |
| Inland Travel Expenses | | |
| Director | 44,87,218 | 33,85,016 |
| Members | 2,83,49,711 | 2,40,63,369 |
| Others | 25,07,158 | 15,41,266 |
| Foreign Travel Expenses | | |
| Director | 2,89,224 | 10,79,103 |
| Members | 69,32,131 | 83,41,800 |
| Others | 2,87,594 | 2,45,563 |
| Conveyance Expenses | - | - |
| **g) Selling Distribution and Business Promotion Expenses** | | |
| Advertisement Expenses | 32,67,337 | 16,54,162 |
| Expenses on Exhibition, Seminars/Workshops | 58,74,406 | 1,21,08,174 |
| Distribution Expenses | 83,83,755 | 20,89,714 |
| Product Literature & Brochures Expenses | - | 1,01,644 |
| Other Sales Promotion Expenses | 1,89,557 | - |
| **h) Corporate Office Expenses** | - | - |
| **i) Other Expenses** | 6,79,934 | 2,21,386 |
| **Total Other Administrative Expenses** | 74,25,82,055 | 62,03,71,885 |

# Schedule 18: Significant Accounting Policies:

## 1. Accounting Convention

The financial statements are prepared under the historical cost convention C-DAC follows Mercantile System of Accounting and recognizes Income and Expenditure on Accrual basis except otherwise stated, and the following items, due to their peculiar nature are recognized otherwise:

1.1. The course fees of Diploma in Advanced Computing and other Courses commencing before the end of financial year and the duration of which falls beyond the financial year are recognized entirely in the year under audit. In respect of these courses, entire expenditure of course material and agreed proportionate share of the Authorized Training Centers (ATCs) is also accounted for in the year under audit.

1.2. Bonus is accounted for on Cash Basis.

1.3. Expenditure incurred on incomplete Software Development Projects is expensed out in the year of incurrence.

## 2. Revenue Recognition

2.1. Sales are recognized as net of Trade Discount, Sales Returns and Excise Duty, but including Central Sales Tax & Vat.

2.2. Software Development Charges are recognized on the basis of Terms of Individual Contract and / or as per Phases of completion.

2.3. The income in respect of Annual Maintenance Contract is recognized on accrual basis and as per the terms of individual contracts entered into with parties.

2.4. Income in respect of consultancy charges/service charges is recognized on accrual basis and on the basis of terms of individual contracts entered into with the parties.

2.5. Grants in aid received from the government are treated as income to the extent of net of capital expenditure incurred during the year.

2.6. Interest and other miscellaneous incomes are accounted for on accrual basis.

## 3. Fixed Assets

3.1 Actual cost of fixed assets acquired is accounted for as per the terms of purchase order; any recovery is netted off to the cost of the asset and all expenses directly attributable to the acquisition and installation of the fixed assets are capitalized.

3.2 Fixed Assets are stated at Cost less Accumulated Depreciation.

3.3 Direct Material Cost with respect to major Fixed Assets developed in-house is capitalized along with manpower and Overhead costs. The Manpower and Overhead costs are charged on basis of man-days spent on the development of Assets as ascertained by the Management. Cost of prototype incurred in the process is charged to Revenue.

3.4 Costs incurred on Assets, which are in process of acquisition, or installation or development is treated as Capital WIP.

3.5 Fixed Assets created out of Sponsored Project Grants and lying at project site are not capitalized and shown as consumables under revenue expenditure.

## 4. Depreciation

4.1. The ownership of assets acquired out of Mission Grants & Sponsored Projects Grants rests with the respective funding agencies. However, depreciation is charged on the WDV basis on all assets including on those acquired out of Mission and Sponsored Project Grants. The Written-Down Value of the said assets is represented by an equivalent amount of Capital Reserve.

4.2. All additions to Fixed Assets are fully depreciated irrespective of the date of acquisition. Depreciation is charged at the rates prescribed by Income Tax Act 1961.

5. **Inventory Valuation**

The inventories are valued and certified by the Management as under –

5.1. Components, Raw Materials and Loose Tools in stock are valued at cost or net realizable value which ever is lower.

5.2. Work in Progress and Finished Goods are valued at cost.

5.3. Course Material stock is valued at landed cost. The course material, which is outdated due to change in the syllabus, is shown at nil value.

6. **Deferred Expenditure on Projects**

The expenditure incurred on incomplete business projects for which income is to be recognized in the ensuing period is deferred.

7. **Foreign Currency Transaction**

7.1. Transactions denominated in foreign currency are accounted at the exchange rate prevailing on the date of transaction and difference between the date of transaction and payment/receipt are accounted for as income or expenditure as the case may be.

7.2. Current assets and current liabilities denominated in foreign currency are converted at the exchange rate prevailing as at the year-end and the resultant gain/loss is adjusted to revenue account. Contingent liabilities denominated in foreign currency are converted at the exchange rate prevailing as at the year-end.

8. **Retirement Benefits**

Retirement benefits in respect of Provident Fund, Pension Fund, Gratuity and Leave Encashment has been provided for on accrual basis.

9. **Other Policies**

All other Accounting Policies are generally consistent with normally accepted accounting practices.

**CA Raghu Bhargava**
Director (Finance)

**R.Y. Deshpande**
Registrar

**Prof. Rajat Moona**
Director General

For **M/S Patil Ranadive & Associates**
Chartered Accountants
FR no. 107816W

**CA Janardan Ranadive**
Partner
M.No. 032953

Date: **17ᵗʰ September 2014**
Place: Pune

## Schedule 19: Notes to Accounts

1. **Merger of Societies with C-DAC**

   The Assets, Liabilities and Other obligations at the book value as on December 15, 2002 are merged in C-DAC in respect of the societies viz. Electronics Research And Development Centre at Kolkata, Noida, Thiruvananthapuram, National Centre for Software Technology Mumbai, and Centre For Electronics Design And Technology of India, Mohali, due to merger of these Societies in C-DAC as per the Government of India orders.

   However the process for transfer of title deeds of Immovable property of the above centre is under process. The Management of C-DAC is of the opinion that there will be no liability on transfer of assets for stamp duty, taxes and other expenses and hence the same is not provided for in the books. However liability if any will be accounted for in the year of payment.

2. **Capital Commitment**

   Capital Commitments ₹317.57 Lacs not provided for. (Previous year ₹164.19 Lacs)

3. **Sponsored Projects**

   Funded Projects show the unspent balance of ₹8,778.31 Lacs and amount receivable from the granting authorities of ₹2,452.32 Lacs.

4. **Contingent Liabilities**

   4.1.  Against Bank Guarantees: ₹383.54 Lacs.  (Previous year ₹1,109.58 Lacs)

   4.2.  Against Letter of Credit ₹45.20 Lacs. (Previous year ₹116.60 Lacs)

   4.3.  Against Service Tax: ₹315.42 Lacs (Previous year ₹313.10 Lacs)

   4.4.  Against Sales Tax: ₹ 21.64 Lacs (Previous year ₹21.64 Lacs)

   4.5.  Sales Tax / VAT Assessments are completed up to financial year 2004-.05 for Delhi, 2006-07 for Noida, 2008-09 for Bangalore 2010-11 for Pune, 2011-12 for Mahali and 2012-13 for Thiruvananthapuram.  Chennai, Hyderabad, Kolkata are not covered by VAT/Sales Tax.

   4.6.  Against disputed matters ₹145.44 Lacs. (Previous year ₹61.86 Lacs)

   4.7.  Cases related to staff are pending at various levels for which liability cannot be assessed.

5. **Statutory Liabilities**

   5.1.  The entire income of C-DAC is exempt u/s 10(21) being a scientific research association u/s 35(1)(ii) of the Income Tax Act, 1961, Hence no provision for income tax has been made.

   5.2.  The Management of C-DAC is of the opinion that C-DAC is exempt from payment of Contribution u/s 58 and Rule 32 of the Bombay Public Trust Act, 1959.  Consequently, no provision has been made in books of account.

6 **Foreign Currency Transactions**

   6.1 **Imports:** Total Rupee value of imports (CIF) during the year is as follows:

(₹ in lacs)

| Centre | Raw Material / Components | Capital Goods | Total |
|---|---|---|---|
| Current Year | 513.13 | 274.35 | 787.48 |
| Previous Year | 386.81 | 1,523.94 | 1,910.75 |

   6.2 **Expenditure in foreign currency for Travel:** ₹48.03 Lacs. (Previous Year ₹99.20 Lacs.)

   6.3 **Other Expenditure in foreign currency:** ₹36.01 Lacs (Previous Year ₹43.15 Lacs.)

**6.4 Earnings in Foreign Exchange:** Total Earnings in Foreign Exchange during the year are as follows.

| Currency | Current Year | Previous Year |
|---|---|---|
| US Dollars | 1,12,173.04 | 2,78,636.00 |
| GB Pounds | 0.00 | 0.00 |
| UAE Derham | 0.00 | 0.00 |
| Euro | 48,802.78 | 92,789.04 |
| Total Value in ₹ (In Lacs) | 115.21 | 214.50 |

7  **Remuneration to Statutory Auditors (for Branch Auditor)**

For Statutory Audit ₹5.41 Lacs. (Previous year ₹5.46 lacs) For Other Services Including Tax audit ₹0.84 Lacs  (Previous year ₹ 0.66 Lacs) Out of Pocket Expenses ₹0.69 Lacs (Previous year ₹ 0.33 Lacs)

8  Accounting of grants is made on accrual basis as per policy instead of receipt basis. The Core Grants (net off capital expenditure) & expenditure related to Core Grants is routed trough Income & Expenditure account.

9  Interest received on grants is treated as liability. Expenses on the core/sponsored projects are also charged to respective grant account and not routed through Income & Expenditure Account.

10  **Fixed Assets**

The depreciation on the assets purchased out of grants is debited to Capital Reserve.

11  **Current Assets and Current Liabilities**

a.  Balances of Debtors, Creditors, Receivables and Payables are subject to adjustments, writing off and confirmation and reconciliation from parties.

b.  The amount outstanding for more than three years has been provided for as Bad and Doubtful Debts except the amount realized till date & the amount realizable from the existing customers. In the opinion of Management the said provision is adequate.

Age wise Analysis of Sundry Debtors is as follows:

₹ In Lacs

| Centre | Less than 6 months | More Than 6 months | More Than 1 year | More Than 2 years | More Than 3 years | Total |
|---|---|---|---|---|---|---|
| Bangalore | 1.12 | 0.00 | 0.00 | 3.11 | 217.23 | 221.46 |
| Chennai | 0.03 | 0.02 | 0.00 | 0.00 | 0.00 | 0.05 |
| Delhi | 345.42 | 0.76 | 37.08 | 0.77 | 129.44 | 513.47 |
| Hyderabad | 2.46 | 0.00 | 0.00 | 0.00 | 0.00 | 2.46 |
| Kolkata | 41.40 | 0.00 | 0.00 | 0.00 | 5.00 | 46.40 |
| Mohali | 1.69 | 220.52 | 38.98 | 14.40 | 38.25 | 313.84 |
| Mumbai | 0.00 | 161.21 | 95.70 | 14.70 | 14.34 | 285.95 |
| Noida | 290.20 | 5.19 | 85.25 | 444.85 | 468.61 | 1,294.10 |
| Pune | 449.57 | 42.80 | 21.46 | 112.78 | 933.08 | 1,559.69 |
| Thiruvananthapuram | 43.02 | 295.56 | 63.52 | 0.28 | 94.63 | 497.01 |
| Total | 1,174.91 | 726.06 | 341.99 | 590.89 | 1,900.58 | 4,734.43 |
| Previous Year | 1,258.77 | 204.35 | 820.66 | 311.08 | 1,619.79 | 4,214.65 |

## 12. Physical Verification

Physical verification of Fixed Assets/ stores has been carried out during the year. Reconciliation of some of the centers is in progress.

## 13. Internal Audit / Internal Control Systems

The centre has an internal control system, which is commensurate with the size and financial transactions of C-DAC. Internal audit is being conducted by external auditors during the year.

## 14. Lease Obligations AS19

Lease rent of ₹ 1256.90 Lacs for various premises are debited in the various heads of Income & Expenditure Account for the period under audit.

## 15. Other Discloser Requirements

The Management of C-DAC is of the opinion that C-DAC being a scientific society and not a commercial, industrial or a business entity the reporting requirements as per, Accounting Standard 3 on Cash flow statement, Accounting Standard 14 on Accounting for Amalgamations, Accounting Standard 17 on Segment Reporting, Accounting Standard 18 on Related Party Disclosure, Accounting Standard 26 in respect of Intangible Assets and Accounting Standard 29 in respect of Provisions, Contingent Liabilities & Contingent Assets, are not applicable.

16. The provisions of Gratuity and Leave Encashment are made on the basis of actuarial valuation & as per the provisions of AS 15.

17. Advances paid to employees include ₹ 0.39 Lacs as advances paid to directors.

## 18. Centre Specific Notes

### 18.1 Bangalore Centre

C-DAC, Electronic City, Bangalore unit merged with C-DAC, Knowledge Park, Bangalore centre on 30.10.2012 (As per Office Order No. 19/12 dated 30.10.2012). All project assets and other assets procured up to 31.03.2013 for C-DAC, Electronic City Unit has been shown under C-DAC, Mumbai books of accounts and Depreciation for the same has been provided at C-DAC, Mumbai.

### 18.2 Hyderabad Centre

No provision is made towards Service Tax of ₹29 lacs and penalty of ₹13.02 lacs & ₹100 per day as per the orders of Joint Commissioner Central Excise (Service Tax) for the year for 2004-05 to 2005-06. Similarly no provision is made against the show cause Notice issued by the Joint Commissioner Central Excise (Service Tax) for the year 2006-07 to 2009-10 for ₹67.55 lacs & penalty of ₹13.70 lacs. Appeals against above disputes are pending with various authorities.

### 18.3 Kolkata Centre

Fixed Assets amounting to ₹15.05 lacs (W. D.V. as on 31.03.2014 ₹0.20 lacs included in the Fixed Assets – Schedule – 7) is in physical possession of SAMEER, Kolkata under DeitY, Govt. of India on loan basis.

### 18.4 Mohali Centre

Provision for an amount of ₹78.00 lacs approximately as show cause notice issued by Service Tax Department, Chandigarh is not paid as the reply has been sent.

### 18.5 Mumbai Centre

18.5.1 Unspent balance of ₹ 163.95 Lacs in the DGF – R&T project (DGF Project Ph. II) as on 31.03.2014 is grouped under Sundry Creditors. This unspent amount is to be

utilized for the evaluation of the product developed under the project and for the future activities related thereto.

18.5.2   No liability is provided for an amount of ₹2,799.00 Lacs. (₹1,191.00 Lacs license fees & ₹1,608.00 Lacs Interest) Claimed by Air India for payment of enhanced license fee for 8th Floor, of Air India Bldg, Nariman Point, Mumbai for the period April 1995 to Feb 2013 as per orders of the arbitrator as the appeal is filled before the competent authority.

18.5.3   The provision for Pension is made for an amount of ₹152.86 lacs against the Actuarial Valuation of ₹798.74 lacs

18.5.4   As per the policy followed by the Centre since inception, subscriptions for Journals (Periodicals) have been capitalized and added with Library Books.

18.5.5   Conveyance Deed for the office and residential buildings in Mumbai has not been executed by the Bombay Housing & Area Development Board (BH&ADB), though the Centre has made the payment towards the acquisition of the said assets. The possession for the office building and the residential buildings has been obtained from BH&ADB from April 1, 1986 and June 1, 1986, respectively.

## 18.6   Noida Centre

Cabling of 1,28,932 meters was done in contract of PGIMER Chandigarh with a cost of ₹200.31 lacs and Vat of ₹31.91 lacs and Service Tax of ₹ 2.92 lacs. Against this cost CDAC has billed ₹318.48 lacs inclusive Taxes on 29th March 2012. PGIMER has confirmed ₹24.20 lacs inclusive of Taxes as quoted in the Tender. The balance amount of ₹294.28 lacs approximately is disputed by PGIMER. Further FMS Billing for the month of February and March 2014 of ₹ 6.16 lacs has not been booked in during the year, whereas the expenses of ₹5.90 lacs has been booked during the year.

## 18.7   Pune Centre

18.7.1   Activities of ACTS, Pune are shifted from Bio-Informatics Building, Pune University Campus to the premises located at 12 Thube Park, Shivajinagar, Pune 5, in the year 2004-2005. Some of the fixed assets of ACTS, Pune could not be shifted to this premises. Written down value of these assets as on 31st March 2014 is ₹8.30 Lacs.

18.7.2   Activities of C-DAC, Pune are shifted from 12 Thube Park, Shivajinagar, Pune 5 to the premises located at NSG-IT Park, Aundh, Pune, in the year 2008-2009. Some of the fixed assets of C-DAC, Pune could not be shifted to this premises. Written down value of these assets, as on 31st March 2014 is ₹46.03 Lacs.

18.7.3   "Memorandum of Understanding" (MOU) or "Leave and License Agreement", as the case may be, entered into with University of Pune and Small Industries Development Institute (SIDI) regarding transfer of rights to use and develop immovable properties viz. Main Building, NPSF Building, NMRC Building and assets therein respectively are not registered. Lease agreements for accommodations hired for staff are not registered since most of the cases lease agreements are for the period of 12 months.

18.7.4   The Lease period of Vishrantwadi land has not been extended.

18.7.5   CDAC is holding the funds of CDAC Employees Benevolent Fund and CDAC Members Welfare Fund, which are not invested separately as on the date of Balance Sheet.

18.7.6   Advances of ₹29.79 lacs is pending against various claims of employees, will be booked during the financial year 2014-15. Since most of the claims will directly be debited to the Projects / Grants no provision is made and Surplus will not be affected.

**18.8    Thiruvananthapuram Centre**

18.8.1    Advances include the amount paid to M/s. Eworkz, Los Angels, USA, ₹25.41 lacs for the supply and installation of a LCD based video wall system at police control room Kochi.   Centre has taken action to recover the advance through legal recourse.

18.8.2    In the absence of lease deed of land allotted by Govt. of Kerala, no lease rent is provided in the books of accounts.

19    The consolidated Income & Expenditure and Balance Sheet is prepared based on the Annual Audited Accounts received from the centers. Centre wise "Financial Performance" and centre wise details of Assets and Liabilities, Income & Expenditure is attached as Annexure 19 (A) and 19 (B)

20    Current year figures from audited financial statements of centres are regrouped wherever necessary in preparation of consolidated financial statements. Previous years figures are regrouped, rearranged and reclassified wherever necessary.

21    Figures in the Financial Statements are rounded off to nearest rupee.

**CA Raghu Bhargava**          **R.Y. Deshpande**          **Prof. Rajat Moona**
Director (Finance)                   Registrar                         Director General

For **M/S Patil Ranadive & Associates**
Chartered Accountants
FR no. 107816W

**CA Janardan Ranadive**
Partner                                                              Date:   17<sup>th</sup> September 2014
M.No. 032953                                                  Place: Pune

## Annexure 19(A): FINANCIAL PERFORMANCE OF C-DAC FOR THE FINANCIAL YEAR 2013-2014

*(Attached to and forming an integral part of Balance Sheet)*

Amount in Crore ₹

| Sr.No. | Particulars | Total | Bangalore | Chennai | Corporate | Delhi | Hyderabad | Kolkata | Mohali | Mumbai | Noida | Pune | Silchar | TVM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | OPENING BALANCE | | | | | | | | | | | | | |
| (i) | Grant -in- Aid | 75.74 | | | | | | | | | | | | |
| | Plan | 30.43 | 8.06 | 1.13 | 15.82 | 0.01 | 0.76 | 1.77 | 1.03 | 0.16 | 1.69 | 0.00 | 0.00 | 0.00 |
| | Non-Plan | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Core Grant Projects | 45.31 | 14.90 | 3.29 | 38.34 | 0.00 | -0.69 | 2.03 | -0.75 | -0.78 | -0.07 | -8.07 | 0.00 | -2.89 |
| (ii) | Grant for Sponsored Projects | 88.26 | | | | | | | | | | | | |
| | DIT | 60.31 | 2.10 | 6.95 | 0.00 | -0.07 | 7.38 | 9.74 | 0.24 | 5.87 | 0.33 | 7.59 | 0.00 | 20.19 |
| | Other Agencies | 27.95 | 0.43 | 0.00 | 0.00 | 9.31 | 0.00 | 1.14 | 3.89 | 0.00 | 0.72 | -0.23 | 0.00 | 12.70 |
| B | RECEIPTS & INCOME | | | | | | | | | | | | | |
| (i) | Grant -in- Aid | 126.35 | | | | | | | | | | | | |
| | Plan | 101.00 | 4.75 | 3.45 | 1.19 | 2.45 | 3.89 | 4.63 | 4.94 | 11.13 | 9.63 | 28.94 | 1.00 | 25.00 |
| | Non-Plan | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.00 |
| | Core Grant Projects | 22.35 | 1.66 | 0.50 | -6.37 | 0.00 | 1.59 | 2.90 | 0.99 | 2.08 | 2.09 | 8.27 | 0.00 | 8.63 |
| (iii) | Grant for Sponsored Projects | 112.96 | | | | | | | | | | | | |
| | DIT | 97.89 | 10.10 | 2.77 | 0.00 | 1.93 | 11.49 | 2.81 | 1.35 | 16.71 | 11.96 | 12.77 | 0.00 | 26.01 |
| | Other Agencies | 15.07 | 0.65 | 0.00 | 0.00 | 3.70 | 0.00 | 0.20 | 0.00 | 1.78 | 0.18 | 1.78 | 0.00 | 8.56 |
| (iv) | Revenue Earnings | 120.23 | | | | | | | | | | | | |
| | Training | 58.46 | 5.97 | 0.74 | 0.00 | 0.00 | 2.14 | 0.35 | 3.92 | 2.56 | 6.74 | 33.89 | 0.00 | 2.14 |
| | Commercial | 61.77 | 0.16 | 1.73 | 0.00 | 2.28 | 0.04 | 1.18 | 2.27 | 4.03 | 10.00 | 25.98 | 0.00 | 14.09 |
| (v) | Interest, Other Income & C-DAC Contribution | -3.29 | | | | | | | | | | | | |
| | Plan | -4.15 | -1.53 | -0.34 | -2.39 | 0.00 | -0.10 | 0.09 | 0.00 | -0.08 | 0.00 | -0.05 | 0.00 | 0.25 |
| | Core Grant Projects | 0.86 | 0.07 | 0.05 | -0.88 | 0.00 | 0.00 | 0.16 | 0.00 | 0.02 | 0.00 | 1.34 | 0.00 | 0.10 |
| | | 5.41 | | | | | | | | | | | | |
| | DIT Spon Projects | 4.41 | 0.37 | 0.59 | 0.00 | 0.00 | 0.60 | 0.48 | 0.13 | 0.31 | 0.02 | 0.52 | 0.00 | 1.40 |
| | Spon. By Other Agencies | 0.99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.29 | 0.00 | 0.00 | 0.05 | 0.00 | 0.64 |
| | | 24.29 | | | | | | | | | | | | |
| | Training | 13.02 | 0.80 | 0.36 | 0.07 | 0.00 | 2.08 | 0.02 | 2.46 | 0.18 | 2.84 | 2.37 | 0.00 | 1.85 |
| | Commercial | 11.26 | 0.15 | 0.25 | 0.04 | 1.75 | 0.00 | 1.59 | 0.47 | 0.18 | 3.20 | 2.74 | 0.00 | 0.89 |
| | **TOTAL B** | 549.94 | 48.65 | 21.47 | 45.82 | 21.36 | 29.18 | 29.11 | 21.23 | 42.35 | 49.33 | 117.89 | 1.00 | 122.55 |
| C | REVENUE EXPENDITURE | | | | | | | | | | | | | |
| (i) | Expenditure from Grant-In-Aid | 156.82 | | | | | | | | | | | | |
| | Plan Total Expenses | 105.98 | | | | | | | | | | | | |
| | Establishment Expenses | 79.91 | 8.33 | 1.81 | 2.39 | 1.32 | 3.12 | 3.01 | 4.44 | 6.87 | 8.09 | 20.52 | 0.05 | 19.94 |
| | Other Administrative Expenses | 26.08 | 2.01 | 1.26 | 2.19 | 0.56 | 1.07 | 0.93 | 0.85 | 3.90 | 2.31 | 8.02 | 0.06 | 2.91 |
| | Non Plan Total Expenses | 3.00 | | | | | | | | | | | | |
| | Establishment Expenses | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.00 |
| | Other Administrative Expenses | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Core Grant Projects | 47.84 | | | | | | | | | | | | |
| | Establishment Expenses | 27.68 | 5.97 | 4.44 | -0.33 | 0.00 | 0.61 | 0.59 | 0.55 | 0.99 | 1.19 | 9.87 | 0.00 | 3.81 |
| | Other Administrative Expenses | 20.16 | 3.58 | 1.56 | -0.11 | 0.00 | 0.38 | 0.87 | 0.27 | 0.26 | 0.51 | 8.01 | 0.00 | 4.84 |
| (ii) | Expenditure on Sponsored Projects | 114.64 | | | | | | | | | | | | |
| | DIT Total Expenses | 88.41 | | | | | | | | | | | | |
| | Establishment Expenses | 42.59 | 3.49 | 4.15 | 0.00 | 0.34 | 4.15 | 2.41 | 0.53 | 2.56 | 5.13 | 10.65 | 0.00 | 9.18 |
| | Other Administrative Expenses | 45.82 | 3.14 | 1.51 | 0.00 | 0.66 | 4.74 | 2.38 | 0.34 | 8.42 | 1.93 | 6.24 | 0.00 | 16.46 |
| | Other Agencies Total Expenses | 26.23 | | | | | | | | | | | | |
| | Establishment Expenses | 8.89 | 0.41 | 0.00 | 0.00 | 0.15 | 0.00 | 0.26 | 0.47 | 0.00 | 0.00 | 0.96 | 0.00 | 6.64 |
| | Other Administrative Expenses | 17.33 | 0.33 | 0.00 | 0.00 | 8.94 | 0.00 | 0.24 | 0.19 | 0.00 | 0.08 | 3.59 | 0.00 | 3.96 |

## Annexure 19(A): FINANCIAL PERFORMANCE OF C-DAC FOR THE FINANCIAL YEAR 2013-2014

*(Attached to and forming an integral part of Balance Sheet)*

Amount in Crore ₹

| Sr.No. | Particulars | Total | Bangalore | Chennai | Corporate | Delhi | Hyderabad | Kolkata | Mohali | Mumbai | Noida | Pune | Silchar | TVM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (iii) | Other Revenue Expenditure | 99.84 | | | | | | | | | | | | |
| | Training Total Expenses | 52.50 | | | | | | | | | | | | |
| | Establishment Expenses | 14.63 | 0.64 | 0.12 | 0.00 | 0.00 | 0.55 | 0.00 | 1.68 | 1.29 | 4.36 | 5.29 | 0.00 | 0.70 |
| | Other Administrative Expenses | 37.87 | 1.74 | 0.52 | -0.60 | 0.00 | 0.59 | 0.04 | 1.32 | 1.42 | 1.00 | 31.20 | 0.00 | 0.64 |
| | Commercial Total Expenses | 47.34 | | | | | | | | | | | | |
| | Establishment Expenses | 27.60 | 0.00 | 0.11 | 0.00 | 0.41 | 0.00 | 0.08 | 0.72 | 2.70 | 6.39 | 17.18 | 0.00 | 0.00 |
| | Other Administrative Expenses | 19.75 | 0.26 | 0.05 | -0.61 | 0.76 | 0.06 | 0.45 | 0.39 | 0.93 | 2.02 | 11.89 | 0.00 | 3.55 |
| | **TOTAL C** | **371.30** | **29.65** | **15.35** | **3.56** | **11.97** | **15.20** | **10.73** | **10.64** | **25.70** | **24.60** | **104.37** | **0.11** | **72.08** |
| D | **CAPITAL EXPENDITURE** | | | | | | | | | | | | | |
| (i) | Expenditure from GIA for Core R&D | 12.02 | | | | | | | | | | | | |
| | Plan | 4.66 | 0.50 | 0.20 | 0.06 | 0.01 | 0.36 | 0.79 | 0.68 | 0.43 | 0.92 | 0.32 | 0.00 | 0.40 |
| | Non Plan | 0.00 | | | | | | | | | | | | |
| | Core Grant Projects | 7.36 | 2.78 | 0.14 | 0.00 | 0.00 | 0.43 | 0.00 | 0.08 | 0.27 | 0.47 | 2.89 | 0.00 | 0.29 |
| (ii) | Expenditure from GIA for Sponsored Proj. | 16.52 | | | | | | | | | | | | |
| | DIT | 15.97 | 3.07 | 1.84 | 0.00 | 0.00 | 3.26 | 0.00 | 0.17 | 1.21 | 0.50 | 2.95 | 0.00 | 2.97 |
| | Other Agencies | 0.55 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | | 0.42 |
| (iii) | Expenditure from Own Funds | 7.80 | | | | | | | | | | | | |
| | Training | 1.63 | 0.27 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.34 | 0.24 | 0.18 | 0.50 | 0.00 | 0.05 |
| | Commercial | 6.17 | 0.08 | 0.00 | 0.00 | 4.98 | 0.00 | 0.00 | 0.01 | 0.12 | 0.16 | 0.78 | 0.00 | 0.03 |
| | **TOTAL D** | **36.35** | **6.74** | **2.24** | **0.06** | **5.00** | **4.05** | **0.79** | **1.27** | **2.28** | **2.23** | **7.53** | **0.00** | **4.16** |
| E | **REFUND / TRANSFER OTHER ADJUSTMENTS** | | | | | | | | | | | | | |
| (i) | From GIA for Core R&D | 25.27 | | | | | | | | | | | | |
| | Plan | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Core Grant Projects | 25.27 | 9.27 | 2.14 | 15.84 | 0.00 | 0.00 | 0.50 | 0.00 | 0.36 | 0.89 | 0.00 | 0.00 | -3.72 |
| (ii) | From Sponsored Projects | 12.21 | | | | | | | | | | | | |
| | DIT | 9.08 | 0.35 | 1.73 | 0.00 | 0.00 | 1.14 | 2.96 | 0.09 | 0.68 | 1.09 | 1.37 | 0.00 | -0.34 |
| | Other Agencies | 3.13 | 0.00 | 0.00 | 0.00 | 1.09 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | -2.37 | 0.00 | 4.28 |
| | **TOTAL (E)** | **37.48** | **9.62** | **3.87** | **15.84** | **1.09** | **1.14** | **3.59** | **0.09** | **1.04** | **1.97** | **-0.99** | **0.00** | **0.22** |
| F | **TOTAL EXPENDITURE (C+D+E)** | **445.12** | **46.00** | **21.45** | **19.45** | **18.05** | **20.39** | **15.12** | **12.01** | **29.02** | **28.80** | **110.90** | **0.11** | **76.47** |
| G | **Unspent Balance / Surplus / Deficit (A+B-F)** | | | | | | | | | | | | | |
| (i) | Grant-in-Aid | 4.69 | | | | | | | | | | | | |
| | Plan | 16.63 | 0.45 | 0.97 | 9.98 | 0.56 | 0.00 | 1.75 | 0.00 | 0.00 | 0.00 | 0.03 | 0.89 | 2.00 |
| | Non-Plan | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Core Grant Projects | -11.94 | -4.97 | -4.43 | 15.69 | 0.00 | -0.52 | 3.13 | -0.66 | -0.55 | -1.03 | -19.23 | 0.00 | 0.63 |
| (ii) | Sponsored Projects | 63.26 | | | | | | | | | | | | |
| | DIT | 49.16 | 2.52 | 1.07 | 0.00 | 0.86 | 6.18 | 5.27 | 0.59 | 10.02 | 3.66 | -0.34 | 0.00 | 19.33 |
| | Other Agencies | 14.10 | 0.31 | 0.00 | 0.00 | 2.84 | 0.00 | 0.72 | 3.51 | 0.00 | 0.82 | -0.68 | 0.00 | 6.59 |
| (iii) | Other | 44.68 | | | | | | | | | | | | |
| | Training | 18.98 | 4.39 | 0.47 | 0.67 | 0.00 | 3.08 | 0.33 | 3.39 | 0.02 | 4.22 | -0.23 | 0.00 | 2.65 |
| | Commercial | 25.69 | 0.05 | 1.83 | 0.65 | 2.86 | -0.01 | 2.25 | 1.62 | 0.57 | 4.79 | -0.35 | 0.00 | 11.43 |

**Annexure 19(B):**

## CENTRE WISE BALANCE SHEET AS AT 31st March 2014

*(Attached to and forming an integral part of Balance Sheet)*

*Amount in Crore ₹*

| Particulars | Total | Bangalore | Chennai | Corporate | Delhi | Hyderabad | Kolkata | Mohali | Mumbai | Noida | Pune | Silchar | TVM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CORPUS/CAPITAL FUND AND LIABILITIES** | | | | | | | | | | | | | |
| Corpus/Capital Fund | 310.83 | 5.76 | 6.52 | 2.28 | 14.63 | 22.32 | 16.05 | 36.73 | 2.22 | 86.48 | 101.48 | - | 16.36 |
| Reserves and Surplus | 150.39 | 5.57 | 3.13 | 0.12 | 0.43 | 13.49 | 1.86 | 3.15 | 6.89 | 5.87 | 53.80 | - | 56.09 |
| Earmarked and Endowment Funds | 68.36 | (1.68) | (2.38) | 25.67 | 4.27 | 5.66 | 10.88 | 3.45 | 9.48 | 3.44 | (19.84) | 0.89 | 28.54 |
| Secured / Unsecured Loan from Bank | 9.50 | - | - | - | - | 1.50 | 2.00 | - | - | - | - | - | 6.00 |
| Current Liabilities and Provisions | 95.10 | 3.42 | 0.68 | 3.56 | 8.18 | 2.64 | 1.05 | 3.38 | 6.61 | 5.24 | 32.43 | - | 27.91 |
| Branch & Divisions | (0.00) | 24.18 | 3.07 | (1.45) | 7.41 | (0.08) | 0.31 | (1.32) | (1.69) | (1.24) | (26.90) | (0.89) | (1.41) |
| **Total** | 634.19 | 37.25 | 11.01 | 30.18 | 34.91 | 45.54 | 32.15 | 45.38 | 23.52 | 99.79 | 140.96 | - | 133.50 |
| **ASSETS** | | | | | | | | | | | | | |
| **Fixed Assets** | | | | | | | | | | | | | |
| Acquired out of Own Funds | 37.18 | 5.44 | 0.11 | - | 7.10 | 0.31 | 1.09 | 1.21 | 0.34 | 9.71 | 10.51 | - | 1.36 |
| Acquired out of Grant in Aid | 125.89 | 3.13 | 0.97 | 0.12 | 0.42 | 11.49 | 1.86 | 2.09 | 2.47 | 5.06 | 51.29 | - | 46.98 |
| Acquired out of Project Grants | 24.50 | 2.45 | 2.15 | - | 0.00 | 2.00 | - | 1.06 | 4.42 | 0.81 | 2.50 | - | 9.11 |
| Investments-from Earmarked/Endowment Funds | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Investments-Others | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Current Assets, Loans, Advances etc. | 446.62 | 26.24 | 7.78 | 30.06 | 27.38 | 31.74 | 29.20 | 41.03 | 16.29 | 84.20 | 76.66 | - | 76.05 |
| Miscellaneous Expenditure | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Total** | 634.19 | 37.25 | 11.01 | 30.18 | 34.91 | 45.54 | 32.15 | 45.38 | 23.52 | 99.79 | 140.96 | - | 133.50 |

## CENTRE WISE INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st March 2014

*Amount in Crore ₹*

| Particulars | Total | Bangalore | Chennai | Corporate | Delhi | Hyderabad | Kolkata | Mohali | Mumbai | Noida | Pune | Silchar | TVM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **INCOME** | | | | | | | | | | | | | |
| Income from Sales/Services | 61.77 | 0.16 | 1.73 | - | 2.28 | 0.04 | 1.18 | 2.27 | 4.03 | 10.00 | 25.98 | - | 14.09 |
| Grants/Subsidies | 99.66 | 4.57 | 3.25 | 1.13 | 2.44 | 3.53 | 3.84 | 4.26 | 10.70 | 8.71 | 28.62 | 1.00 | 27.60 |
| Fees/Subscription | 58.46 | 5.97 | 0.74 | - | - | 2.14 | 0.35 | 3.92 | 2.56 | 6.74 | 33.89 | - | 2.14 |
| Income from Investments (Income on Investments from earmarked/endowment funds transferred to funds) | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Interest Earned | 21.82 | 0.87 | 0.35 | 0.08 | 1.74 | 2.07 | 1.60 | 2.73 | 0.35 | 5.54 | 4.95 | - | 1.53 |
| Other Income | 1.89 | 0.06 | 0.01 | - | 0.01 | 0.01 | 0.07 | 0.20 | 0.07 | 0.11 | 0.03 | - | 1.33 |
| Prior Period Income | 0.96 | 0.03 | 0.27 | 0.03 | - | - | 0.04 | 0.00 | 0.00 | 0.39 | 0.09 | - | 0.13 |
| Increase/(decrease) in stock of Finished Goods and Work-in-progress | (0.18) | (0.01) | - | - | - | - | - | (0.08) | - | (0.07) | (0.01) | - | (0.00) |
| **Total** | 244.39 | 11.65 | 6.36 | 1.25 | 6.47 | 7.79 | 7.08 | 13.30 | 17.71 | 31.42 | 93.55 | 1.00 | 46.82 |
| **EXPENDITURE** | | | | | | | | | | | | | |
| Establishment Expenses | 125.13 | 8.97 | 2.04 | 2.39 | 1.73 | 3.67 | 3.09 | 6.84 | 10.86 | 18.84 | 42.99 | 0.05 | 23.65 |
| Other Administrative Expenses | 74.26 | 3.56 | 1.48 | 0.93 | 1.27 | 1.66 | 1.27 | 2.12 | 5.94 | 3.97 | 45.17 | 0.06 | 6.82 |
| Prior Period Expenses | 5.41 | (0.01) | 0.31 | 0.05 | 0.05 | 0.03 | 0.03 | 0.00 | 0.03 | 0.16 | 4.76 | - | - |
| Depreciation (corresponding to Schedule 5) | 3.85 | 0.44 | 0.04 | - | 0.01 | 0.03 | 0.13 | 0.36 | 0.28 | 1.12 | 1.18 | - | 0.27 |
| **Total** | 208.65 | 12.97 | 3.86 | 3.38 | 3.06 | 5.38 | 4.51 | 9.33 | 17.11 | 24.10 | 94.10 | 0.11 | 30.74 |
| Transferred to / (from) Balance of Core Grants | (8.94) | (5.76) | 0.20 | (3.45) | 0.56 | (0.66) | (0.02) | (1.03) | 0.00 | (1.69) | 0.03 | 0.89 | 2.00 |
| **SURPLUS / (DEFICIT)** | 44.68 | 4.43 | 2.30 | 1.32 | 2.86 | 3.07 | 2.58 | 5.01 | 0.60 | 9.02 | (0.58) | - | 14.08 |

CDAC

Centre for Development of Advanced Computing, Pune
ANNUAL ACCOUNTS 2013-14

## Receipt and Payments for the year ended 31st March 2014

Amount in ₹

| Receipts | 2013-2014 | 2012-2013 |
|---|---|---|
| I. Opening Balance | | |
| a) Cash on hand | 66,448 | 11,79,226 |
| b) Bank Balances | | |
| i) In Savings/Current Accounts | 59,51,85,790 | 38,73,39,287 |
| II. Grants Received | | |
| a) From Government of India | 72,11,00,000 | 74,63,00,000 |
| b) From State Government | - | 3,73,14,509 |
| c) Grant and Other Income Received for Projects | 1,37,14,06,228 | 1,70,81,20,959 |
| III. Income from Encashment of FDRs | 3,60,23,69,632 | 9,23,80,65,757 |
| IV. Interest Received | | |
| a) On Bank Deposits | 10,92,42,088 | 21,41,88,321 |
| b) Loans and Advances | 7,07,723 | 2,45,61,119 |
| V. Other Income (Specify) | | |
| a) Previous years Income recovered | (2,13,048) | 1,85,47,155 |
| b) Advances Received from Customers | 5,75,15,837 | 4,89,44,191 |
| d) Fees/Subscription & Direct Income | 53,73,51,041 | 49,33,92,371 |
| e) Other Income | 12,91,24,568 | 12,41,06,113 |
| f) Amount Received from Debtors | 45,85,73,773 | 42,48,29,017 |
| g) Loans and Advances Recovered | 7,38,92,682 | 3,10,48,814 |
| VI. Amount Borrowed | | |
| Branch and Divisions | 91,41,07,657 | 1,15,00,64,255 |
| Bank Loan | 4,51,57,114 | 3,00,00,000 |
| VII. Any Other Receipt (Give Details) | | |
| a) Deposits (Liabilities) | 12,72,26,631 | 8,68,68,145 |
| b) Addition to Reserve Fund | - | - |
| **Total** | **8,74,28,14,164** | **14,76,48,69,239** |

Amount in ₹

| Payments | 2013-2014 | 2012-2013 |
|---|---|---|
| I. Expenses | | |
| a) Establishment Expenses | 87,91,62,629 | 77,91,79,201 |
| b) Administrative Expenses | 35,49,15,585 | 72,87,04,744 |
| c) Payment made to Creditors for Goods and Others | 1,78,70,01,641 | 1,48,94,75,486 |
| II. Payments made against funds for various projects | 15,40,13,244 | 14,03,91,889 |
| (Name of the Fund or Project along with the particulars of payment made for each project shown in separate schedule) | | |
| III. Investments and Deposits made | 3,01,17,41,505 | 9,48,44,82,980 |
| IV. Expenditure on Fixed Assets and Capital Work in Progress | | |
| a) Purchase of Fixed Assets | 7,36,78,175 | 1,85,35,162 |
| b) Expenditure on Capital Work in Progress | - | - |
| V. Refund of Surplus money/loans | 10,20,66,629 | 4,94,97,526 |
| VI. Finance Charges (Interest) | 1,10,17,317 | 2,25,068 |
| VII. Other Payments (Specify) | | |
| a) Deposit (Assets) | - | - |
| b) Loans and Advances | 5,51,29,939 | 1,93,02,226 |
| c) Previous years outstanding payments | 11,00,67,395 | 9,40,99,090 |
| d) Prepaid Expenses | 68,89,35,730 | 15,55,91,135 |
| e) Branch and Divisions | 56,31,538 | 39,76,704 |
| f) Deposits (Liabilities) Refunded | 1,01,66,48,543 | 1,05,71,32,050 |
| VIII. Closing Balance | | |
| a) Cash on hand | 6,38,67,121 | 14,90,23,740 |
| b) Bank Balances | 3,84,624 | 66,448 |
| i) In Savings Accounts | 42,85,52,549 | 59,51,85,790 |
| **Total** | **8,74,28,14,164** | **14,76,48,69,239** |

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
FOR PATIL RANADIVE & ASSOCIATES (FR NO. 107816W)
CHARTERED ACCOUNTANTS

CA Raghu Bhargava
Director (Finance)
Pune

R.Y. Deshpande
Registrar

Prof. Rajat Moona
Director General

CA Janardan Ranadive
Partner (Membership Number 032953)
Date:    17-Sep-2014

C-DAC's 11th Centre in North East at National Institute of Technology (NIT) campus, Silchar, Assam was inaugurated by Shri J Satyanarayana, Hon'ble Secretary, DeitY, MCIT, Govt. of India on February 21, 2014.



Prof Rajat Moona, Director General, C-DAC signs an MoU with Mr Fadi Chehade on behalf of C-DAC and ICANN respectively to setup a joint Centre for Excellence in DNS Security in the presence of Shri Kapil Sibal, Hon'ble Minister for Communications and IT, Government of India, Shri J Satyanarayana, Hon'ble Secretary, DeitY, Government of India, and other senior officials

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Advanced Computing For Human Advancement

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