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Annual Report
2016-17

CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

Governing Council

(As on 31st March 2017)

Shri Ravi Shankar Prasad
Hon'ble Minister Law & Justice,
Electronics & Information Technology and
Chairperson, Governing Council, C-DAC

Shri P.P. Chaudhary
Hon'ble Minister of State Law & Justice,
Electronics and Information Technology and
Deputy Chairperson, Governing Council, C-DAC

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New Delhi

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Information Technology, New Delhi

Ms Anuradha Mitra
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Ministry of Electronics & Information Technology,
New Delhi.

Shri Rajiv Kumar
Joint Secretary, Ministry of Electronics &
Information Technology, New Delhi.

Dr. Debashis Dutta
Group Coordinator (R&D in IT),
Ministry of Electronics &
Information Technology, New Delhi
and Director General (in-charge), C-DAC

Prof. Gautam Barua
Director, IIIT Guwahati

Prof. B N Jain
Department of Computer Science and Engineering,
Indian Institute of Technology Delhi

Shri Ajit Balakrishnan
Chairman and CEO, Rediff.com India Ltd.,
Mumbai

Shri Kiran Karnik
Panch Sheel Park, New Delhi

Dr. A S Kiran Kumar
Chairman, Indian Space Research Organisation
(ISRO), Antariksh Bhavan, Bangalore

Shri Sanjeev Saran
Principal Secretary, IT, Lucknow, Uttar Pradesh

Shri M. Sivasankar
Secretary, (IT), Thiruvananthapuram, Kerala

Col. Anoop Kumar Khare (Retd.)
Registrar, C-DAC and
Non-Member Secretary,
Governing Council, C-DAC

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Overview

C-DAC, a scientific society under the Ministry of Electronics and Information Technology (MeitY), Government of India, completed 29 years of glorious existence in March 2017. C-DAC has been the torchbearer of several national initiatives in Electronics and Information Technology for the socio-economic benefit of the Nation. The solutions and products developed by C-DAC play a vital role and become a valuable instrument in realizing the Digital India dream of the Government of India. C-DAC has its footprint across the entire length and width of the country spanning across 11 cities. C-DAC has executed Projects / Established Centres of Excellence / Training centres in more than 32 countries across the globe. C-DAC Advanced Computing Training School (ACTS) is a well-known brand in the area of High-end training in Electronics and IT in the country. The biggest strength of C-DAC is its vast spectrum of expertise spreading over all domains of Information and Communication Technology as well as electronics.

Like previous years, the year 2016-17 was also marked by several technological accomplishments, events and recognitions for C-DAC. Under National Supercomputing Mission (NSM) initiative, C-DAC started putting basic constructs of HPC testbed for evaluating latest technologies and testing of software components. PARAM ISHAN Supercomputing Facility established by C-DAC at IIT, Guwahati was inaugurated by Shri Prakash Javadekar, Hon'ble Union Minster for HRD. An HPC facility named "PARAM Kilimanjaro" was established at Nelson Mandela African Institute of Science and Technology (NMAIST), Arusha, Tanzania. Enhanced versions of end-system security (USB-Pratirodh and AppSamvid) and mobile security solution were launched for free download by Shri. Ravi Shankar Prasad, Hon'ble Minister for Electronics and Information Technology. C-DAC carried out transfers of technology of various solutions including Intelligent Transportation Systems (ITS), Smart Energy Meters, Sensor based quality assessment solutions of agri-products and Internet of Things (IoT) Products.

C-DAC's Supercomputer - PARAM Yuva II system, accomplished an enviable milestone by logging more than 2,25,000 processed computing jobs. These jobs were executed by 940 HPC Users from 90 different institutions spread across the country from various science and engineering domains. A next generation upwardly scalable HPC network "Trinetra" with 100 Gbps communication speed offering world class performance for use in HPC systems is on the cross-hairs of C-DAC under NSM. C-DAC took another step forward in spearheading the Supercomputing revolution in the country and taking it to scientific and academic community through its affordable range of PARAM Shavak – Supercomputer in a Box solutions. It unveiled PARAM Shavak DL GPU System, a new variant for research in Deep Learning applications. SuMegha Cloud Builder and Meghdoot – software suite for building cloud computing environment were enhanced. Big Data Analytics frameworks for Healthcare Analytics and Rice Genome Analysis were developed. Three tools were launched during the year namely DPICT for drug visualization, MOSAIC for drug screening and NEURON for indentiying the process of causality in gene.

C-DAC maintained its leadership position in the area of Multi-Lingual and Heritage Computing. A Web portal and Mobile App for disseminating micro-climatic weather data for farmers were launched by Shri. Randhir Kumar Singh, Hon'ble Minister for Agriculture, Animal Husbandry and Co-operative, Government of Jharkhand. Deployment of agri-commodity price dissemination system through telephone/mobile in Bengali language was carried out at Singur, West Bengal. Localization of several Government websites was carried out using C-DAC's Localization Project Management Framework (LPMF) solution. C-DAC developed Content Management System for Uttar Pradesh Vidhan Sabha was used extensively in Vidhan Sabha for digitizing 2000 Book proceedings and 2500 hours of videos during the year.

Aligned with the National Policy of ESDM, C-DAC continued to develop innovative solutions in Professional Electronics. 50,000 plus units of TARANG – C-DAC's Digital Programmable Hearing Aid using indigenously developed ASIC

have been supplied under several Government schemes. A compact FM receiver system in the V/UHF band providing improved sensitivity and performance has been delivered to key government agencies. The Smart Energy Meter technology has been developed by C-DAC under National Mission on Power Electronics Technology (NaMPET) program as per Indian Standards for Advanced Metering Infrastructure (AMI). The Bio Secure Login, a solution developed for Linux Based Operating Systems, imposes an extra layer of security to a desktop by means of verification of operator biometrics, smart card authentication and PIN verification. Various Wi-Fi based solutions for Fire Detection, Data Logging and communication of early alerts have been developed.

C-DAC continued to develop various software solutions benefiting society at large. Centralized e-Auction Portal for NE states was launched by Shri Somnath Poudyal, Hon'ble Minister of Food Security and Agricultural Development, Government of Sikkim. Pilot trial implementation of Electronically Transmitted Postal Ballot System (ETPBS) was carried out in UP, Punjab, Uttarakhand, Goa and Manipur state general elections. Workshops/Training were conducted for rollout of Online Labs (OLabs) and a total of 1768 books were published on eBasta portal. Vikaspedia portal was enhanced with additional features and 434 workshops were organized. 3576 State government departments have been integrated by using Mobile Seva platform. 110 services have been integrated and 1,72,67,783 transactions have been completed using e-Pramaan, national e-authentication service of C-DAC. C-DAC carried out integration with various Government and private agencies for leveraging eSign service and nearly 10 Lakh signatures were offered to 26 agencies. C-DAC has developed and operationalized Unified Portal for EPFO which is handling transactions of around 40 million active members for 6 lakh establishments. C-DAC developed and deployed sensor based Glacial Lake Outburst Floods (GLOF) Early Warning System in Sikkim. Bharat Operating Software Solution (BOSS) and its variants were deployed across many Government agencies.

Cyber Security and Cyber Forensics remains to be the most important area of research and training in C-DAC. M-Kavach, a comprehensive mobile device security solution for Android devices is hosted on google playstore and number of downloads is about one lakh. Vulnerability Assessment and Penetration Testing (VAPT) services were extended to around 120 organizations. C-DAC continued to deploy its enhanced Cyber Forensics tools for LEAs and offered training. As part of Information Security Education and Awareness (ISEA) initiative, 17 advanced faculty training programs and 41 industry based workshops were conducted covering 1383 participants, 48 short term courses were conducted covering 1561 participants and 81 government official trainings were conducted covering 2346 participants.

As part of national roll-out of its Health Informatics solutions, C-DAC initiated deployments of e-Aushadhi (Drug Supply Chain Management Solution) in the states of Bihar, Manipur, Meghalaya, Jharkhand, Himachal Pradesh, and Uttar Pradesh. C-DAC established three telemedicine sub networks under the aegis of project titled "Digital Inclusive and Smart Community (DISC)" which is a part of Digital India Programme of Government of India. C-DAC has developed monitoring and diagnostic solutions for leprosy and diabetes. C-DAC also initiated development of Maxillo-Facial Surgery Planning and Simulation system. C-DAC provided 192 SNOMED CT toolkit affiliate licenses in India and direct implementation support to vendors and hospitals.

As part of initiatives in Education, C-DAC's Automation tools for managing online examinations were used by more than 10 lakh candidates for GATE 2017 and 60,000 candidates for JAM 2017 examinations. C-DAC has offered new post graduate diploma programmes in the areas of Internet of Things (IoT) and High Performance Computing (HPC). C-DAC continued to offer its M.Tech programmes, PG Diploma programmes and other training and skill development programmes during the year.

The above mentioned activities have resulted in several research publications, patents, awards, recognitions and new collaborations with academic organizations within the country and abroad thus providing vibrant and congenial environment for sustaining a thriving R&D eco-system. This annual report, highlights the achievements and major activities of C-DAC during the year 2016-17, reflecting the expertise and capabilities of the organization.

Major Activities in Thematic Areas

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

C-DAC is deeply engaged in various activities in the areas of HPC Systems and Facilities, HPC System Software, HPC Applications, HPC Solutions and Services, Grid Computing, Cloud Computing and Big Data. Approval of "National Supercomputing Mission" (NSM) by Cabinet Committee on Economic Affairs (CCEA) in 2015 has provided boost to activities in HPC, in particular, infrastructure development, research & development, applications, and human resources in HPC. The activities carried out by C-DAC in this thematic area during the year 2016-17 are briefly covered below.

National Supercomputing Mission (NSM)

An integrated approach is being followed for building systems with scalable architecture, ranging from workstation class having performance of a few teraflops to single rack mid-range self-contained systems with performance of 100 teraflops to high end systems with performance up to 10s of petaflops.

Inline to the "Make in India" initiative of Government of India, at least half of the 70 systems are planned to be installed using "Build Approach" by developing indigenous HPC technologies, products and solutions in a phased manner. C-DAC is entrusted with building systems indigenously in phased manner (Phase-I: Assembly in India, Phase-II: Manufacturing in India, Phase-III: Design and Manufacturing in India) with all the phases to start simultaneously. C-DAC has started putting basic constructs of HPC testbed for evaluating latest technologies and testing of software components.

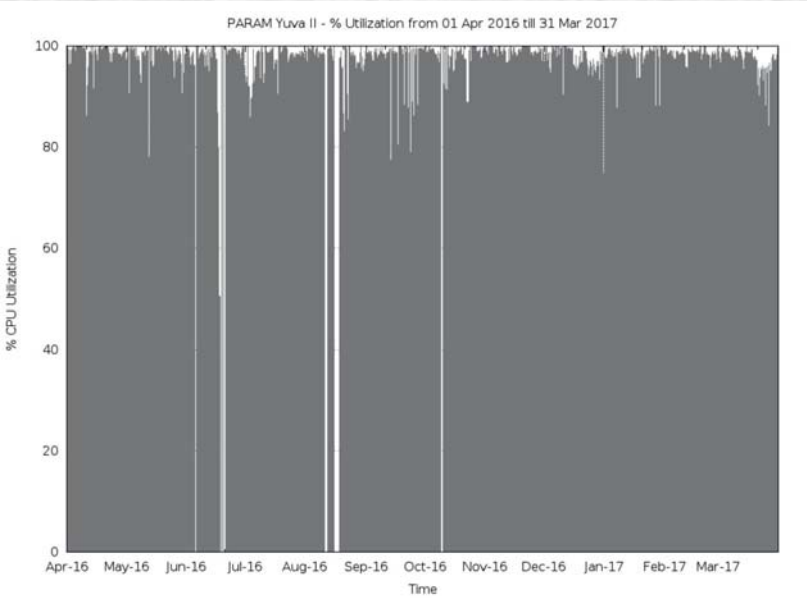
HPC Interconnection Network (HIN) is an important and critical component of HPC systems. **C-DAC has started developing a next generation HPC network "Trinetra" that is scalable to higher speeds offering world class performance for use in HPC systems. The development of HIN covers multiple hardware and software components.** In addition to development of hardware, C-DAC has also started development of critical system software components and tools along with use of available Open Source Software (OSS) components with appropriate modification, customization and optimization. The mission includes building capacity in HPC-aware human resources at all levels for meeting the challenges of development of HPC applications and managing, monitoring and running complex HPC systems. C-DAC is conducting PG Diploma in HPC System Administration (HPCSA) twice a year and is also contributing to conduct Faculty Development Programmes.

High Performance Computing (HPC)

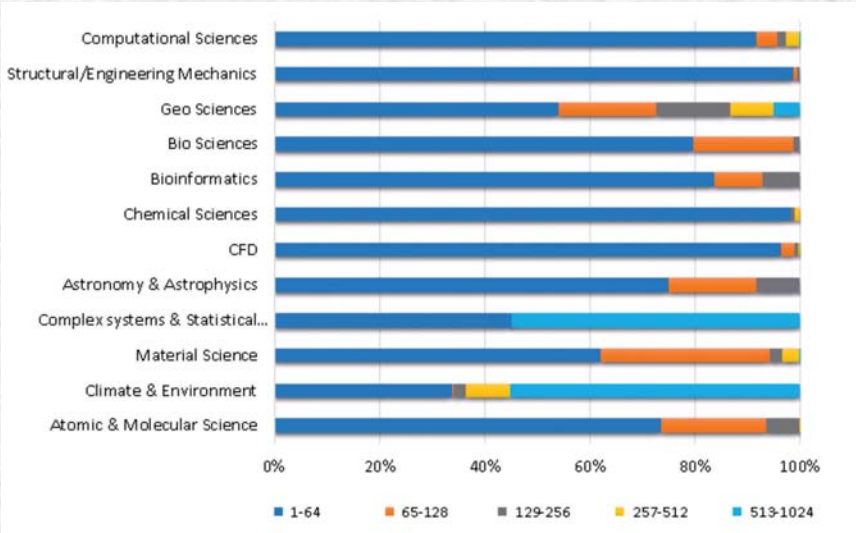
HPC Systems and Facilities

PARAM Yuva II

Since its commissioning in February 2013 at C-DAC's National PARAM Supercomputing Facility (NPSF), PARAM Yuva II has been extensively used by scientists and engineers for research related activities. **More than 2,25,000 jobs have been processed by PARAM Yuva II till March, 2017. About 940 users including 188 PhD scholars across 90 institutions executed their jobs on PARAM Yuva II for their scientific research covering a large number of cross functional domains.** Utilization of PARAM Yuva II was high throughout the year barring the scheduled maintenance periods as seen from the CPU utilization shown in the figure below.



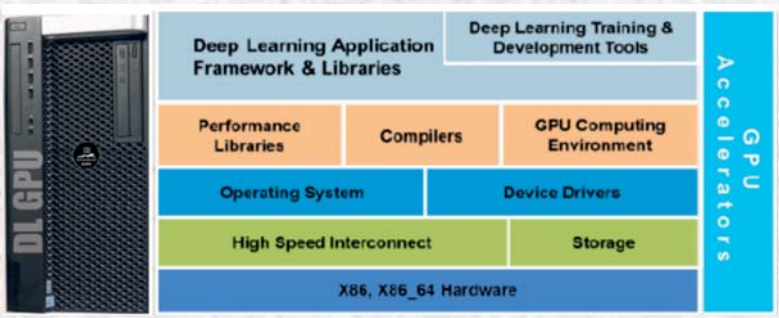
CPU Utilization of PARAM Yuva II from April 1, 2016 - March 31, 2017



Job Size (CPU cores) across application domains

PARAM Shavak DL GPU System - Supercomputer in a Box

"PARAM SHAVAK DL GPU System" is designed for academic institutions and research organizations that employ deep learning techniques for GPU accelerated machine learning applications, big data problems (computer vision, speech recognition, natural language processing and life sciences) and artificial intelligence. Using nVIDIA Pascal architecture, the system delivers up to 25 Teraflops of single precision performance for deep learning workloads and enhanced application scalability. **PARAM SHAVAK DL GPU System was launched during 30th Foundation Day of C-DAC on March 27, 2017 at Pune.**



PARAM Shavak DL GPU System

Supercomputing Facility for Capability Building and High End Computational Research at IIT Guwahati

C-DAC established PARAM ISHAN Supercomputing Facility for high end computational academic/ engineering research at IIT, Guwahati. **PARAM ISHAN has a peak compute power of approximately 250 TFs and High Performance Storage of 300 Terabytes. It was inaugurated on September 19, 2016 by Shri Prakash Javadekar, Hon'ble Union Minster for HRD.** It is currently being used by researchers of IIT Guwahati and users from C-DAC.

PARAM ISHAN Supercomputing Facility

HPC for Science & Engineering, Capacity Building and High End Computational Research at NIT, Sikkim

C-DAC established Computational Resource Centre for capacity building and high end computational research with advanced technologies at National Institute of Technology (NIT), Sikkim. The Centre has a peak performance of 15 TF with 40 TB storage. It was inaugurated by Shri Shriniwas Patil, Hon'ble Governor of Sikkim on April 14, 2016 at NIT Sikkim located at Ravangla. Four workshops on HPC and parallel processing were also conducted at NIT Sikkim.

Establishment of Supercomputing Centre at Tezpur University, Tezpur, Assam

C-DAC established a hybrid technology based HPC facility at Tezpur University. The facility has 12 TF of compute power using 2 PARAM Shavaks with advanced accelerator technologies. C-DAC also conducted two workshops on HPC at Tezpur University following inauguration of HPC facility in August 2016.

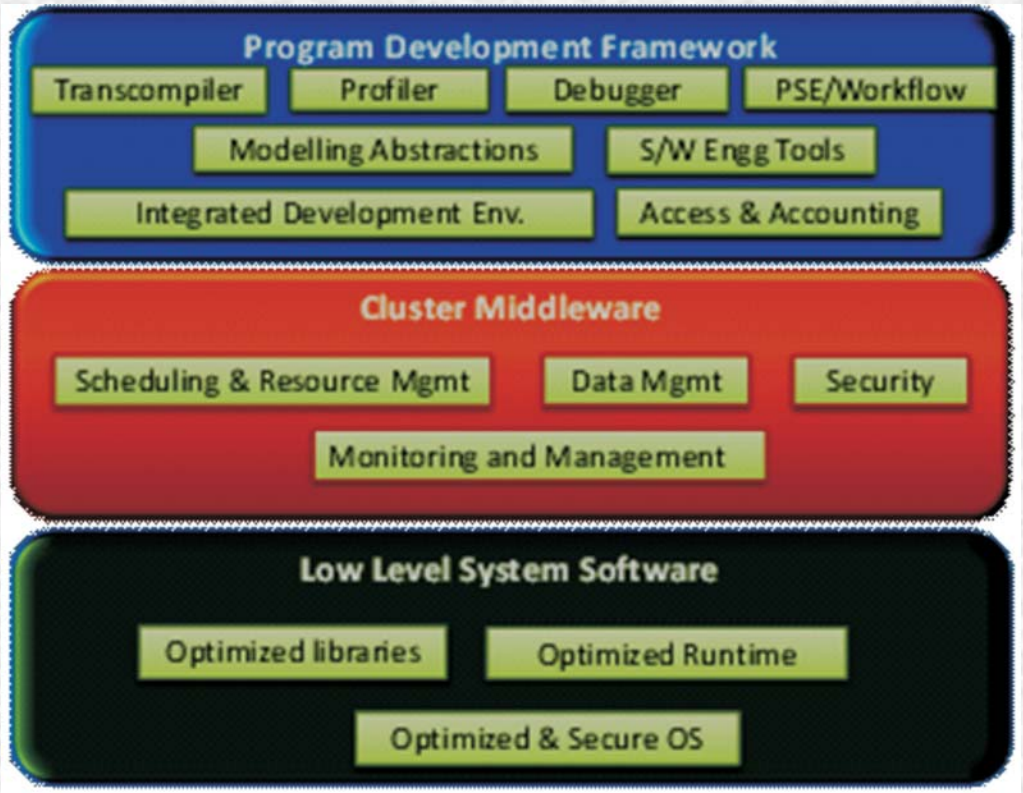
Development and Utilization of Bioinformatics Resources and Applications Facility

C-DAC has established Bioinformatics Resources and Applications Facility (BRAF) to provide services in the area of genome analysis, molecular modeling and systems biology including maintenance of databases, software, and high-end computing resources with application software. BRAF computing facility is servicing more than 150 active users from IITs, Universities, and Government labs among others. A semi-empirical code such as MOPAC to meet cloud requirement was developed and deployed on cloud testbed as SaaS. BRAF facilitated promotion of basic and applied research in computational biology, doctoral and post-doctoral fellowships. This is one of the initiatives towards the growth of the bioinformatics industry in India which has contributed to the genome based drug discovery in the Indian pharmaceutical sector.

HPC System Software

System Software Development for NSM Petascale Systems

A System Software Laboratory (NSM-SSL) is envisaged to be setup as part of NSM project.



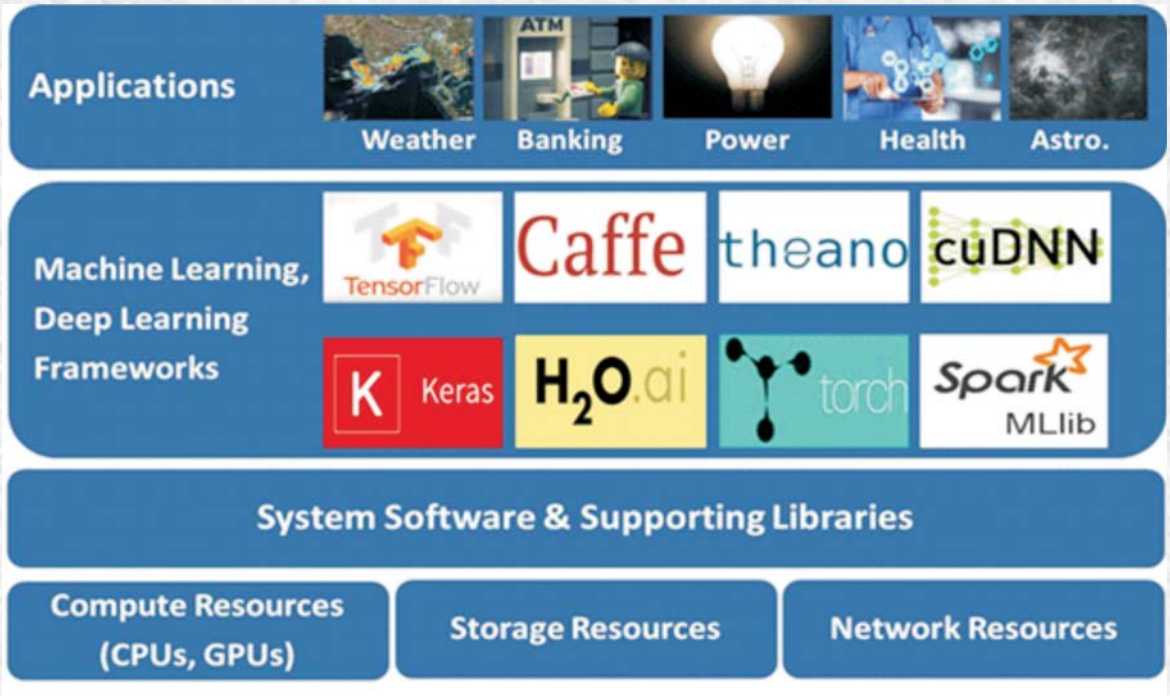
System Software Stack for NSM HPC Systems

Following software for NSM HPC clusters are under development:

- SuParikshan (Monitoring and Management for HPC Clusters): It monitors critical parameters of large supercomputers, enables to analyze metrics, detects service degradations and issues alerts to ensure normal functioning of cluster and prompt rectification.
- ParaDE (Integrated development environment for Hybrid Parallel Program Development): It provides an integrated environment for application developers to develop hybrid parallel programs using multiple programming paradigms such as MPI, OpenMP, CUDA/OpenCL to express task or data decomposition, mapping to processors and agglomeration.
- PMAC (Power monitoring and Controlling Tool): This is an agent-based power monitoring and controlling tool, which reports applications, nodes and cluster's power consumption in real-time and manages power based on application's power profile and optimal operating points
- EERT (Energy efficient Rescheduling Tool): A dynamic rescheduling tool which reduces overall energy consumption by maximizing the core utilization based on the cluster state and switching off the unused nodes to minimize energy.
- C-BDSS: It is a C-DAC Big Data Software Suite for application developers.

MLStack- A Scalable Machine Learning Framework on Heterogeneous HPC Clusters

C-DAC's Machine Learning Stack (MLStack) is an automated integration of state-of-the-art open source Machine Learning and Deep Learning tools and frameworks, which facilitates deployments on modern computing infrastructure with ease and comfort. It aims to enable novice users to leverage full power of existing tools on latest computing frameworks (Hadoop, Spark, MPI, OpenMP, CUDA etc.), which accelerates the path to informed decisions. MLStack would blend the Big Data technologies onto heterogeneous HPC resources that are well suited for structured, unstructured and streaming data with enhanced speed and flexibility for adhoc data exploration, discovery and analysis. MLStack will be made available on heterogeneous HPC Clusters in the form of APIs/ libraries.

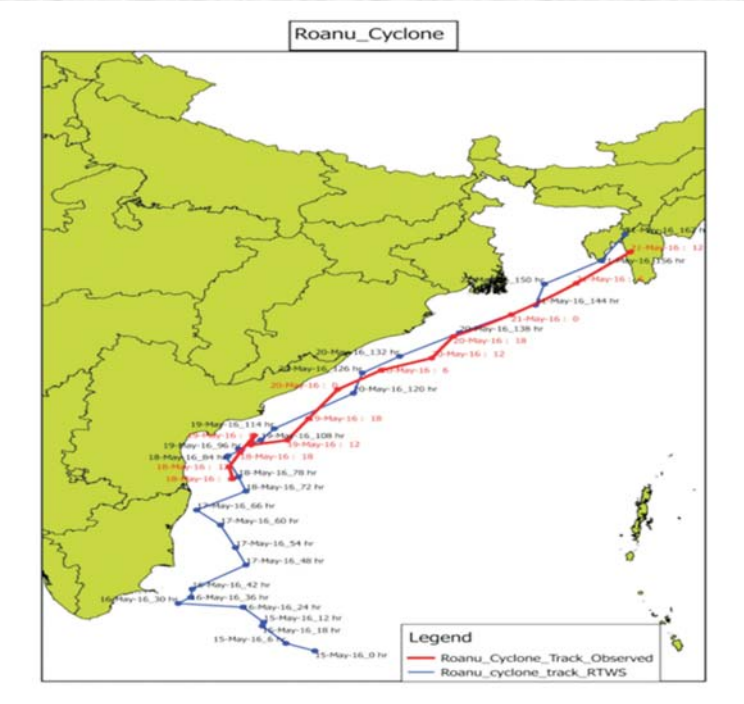


C-DAC Machine Learning Stack on Heterogeneous HPC Clusters

HPC Applications

Real Time Weather System (RTWS)

"Anuman" (*http://rtws.cesgroup.in/*) comprises daily operational weather products in real time. **It provides high-resolution (12x4 km grids) weather simulations over Indian sub-continent along with daily and 6-hourly weather forecasts over nearly 50,000 locations.** Real time operational forecasts have been carried out daily using C-DAC's PARAM Yuva-II. Cyclone Roanu was formed on May 17, 2016 and dissipated on May 23, 2016. The case was simulated with Real Time Weather System (RTWS) data. The track forecast was simulated well by the model. Outputs from Anuman are also being used to provide micro climatic data which is very useful for farmers.



Tracking of Cyclone Roanu by Real Time Weather System

Seasonal Monsoon Forecast

Since 2005, C-DAC is one of the stakeholders in Extended Range Monsoon Prediction Program of DST. It has been issuing extended range prediction of Indian summer monsoon using a National Center for Environmental Prediction (NCEP) T170/L42 global model. The seasonal summer monsoon forecast for the year 2016 using May conditions is shared with Indian Meteorological Department for the official monsoon forecast.

Short Range Weather Information Services for Agro Ecological Units of Kerala State

C-DAC has automated short range real time weather forecast for Agro Ecological Units of all districts of Kerala state (*https://www.rtws.cesgroup.in/kaalavastha*). Daily weather forecasts are simulated on 640 cores PARAM YUVA-II. Agro advisory information system is prepared with the help of agricultural scientists and meteorologists based on forecasted weather and is made available for each district through the kalavastha portal.

Near Real Time Urban Flood Forecasting

In collaboration with IIT Bombay and support from Ministry of Earth Sciences (MoES), C-DAC has started development of urban flood forecasting system in Mumbai using regional weather model along with hydrology modeling system. Sensitivity analysis of WRF-UCM model was setup on PARAM Yuva-II and simulation of heavy rainfall cases was carried out.

Impact of Urbanization on Current and Future Heavy Rainfall over Urban Cities in India

This initiative is targeted at understanding the increasing urbanization effects on different meteorological disasters' frequency and intensity in the coming a few years. A coupled model WRF-UCM is being adapted for PARAM YUVA-II to establish a tool for assessing the long term impacts of urbanization due to change of land use land cover over urban areas.

Panorama - GIS based Marine Visualization and Forecast System

C-DAC is developing a software named “Marine Forecast and Visualisation System - Panorama” to provide naval vessels with high resolution weather forecasts for optimal voyage planning. The complete automated system has real time data download from multiple sources, database management, state of the art data compression, multi-parameter visualization, extreme event analysis, alerts and real time data dissemination. This can also be customized for land based installations requiring such forecast for various contingencies.

DPICT Visualizer – Tool to assist Drug Discovery

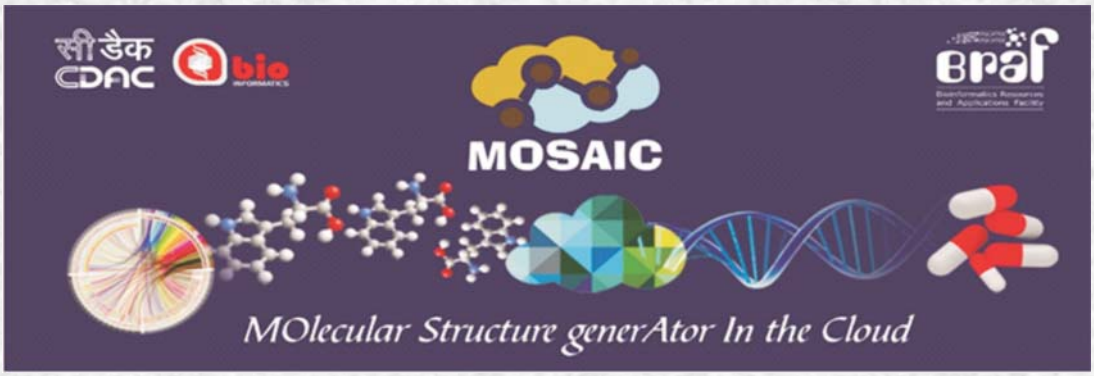
DPICT Visualizer is a standalone application developed by C-DAC to assist Drug Discovery. It facilitates researchers to visualize multiple simulation trajectory data in accelerated and efficient way. Its key feature is to load multiple trajectory files simultaneously so as to view them together and perform operations on them. The application supports AMBER and GROMACS Trajectory formats and can load pdb files to view molecular structure in ribbon, cartoon and wire rendering options. Various colour coding schemes for the structures according to the users' choice are also incorporated.

NEtwork relationship Using causal ReasONing (NEURON)

NEURON is a tool developed by C-DAC that focuses on deriving gene regulatory networks. A gene regulatory network is a collection of genes/molecules and their interactions which together control their functionality. NEURON provides an easy to use interface and helps researchers understand the process of identifying causality in a gene, the relationship of cause and effect. The statistical significance of predictions has been tested using multinomial coefficients derived from randomized data sets. NEURON has been used in studying 70,000 varieties of rice crops in collaboration with the Indian Council of Agricultural Research. **DPICT Visualizer and NEURON were launched during the event named “Accelerating Biology 2017: Delivering Precision” held at Pune during January 17-19, 2017.**

MOlecular Structure GenerAtor In the Cloud (MOSAIC)

MOSAIC is an OpenStack cloud based conformational search tool developed by C-DAC to explore potential energy surface of biomolecules of interest in parallel mode using semi-empirical method. The tool is useful for finding the target drug ligands. The torsion angle driven conformational search method is useful in a range of chemical design applications, including drug discovery and design of targeted chemical hosts. MOSAIC has easy-to-use interface for the bioinformatics community over Software as a Service (SaaS) platform. **MOSAIC was launched during 30th Foundation Day of C-DAC on March 27, 2017 at Pune.**



MOSAIC- Cloud based Conformational Search Tool

HPC Solutions and Services

During the year, C-DAC deployed HPC solutions and offered HPC related services to various national and international agencies. The details regarding some of the deployments are given below.

- **C-DAC established HPC facility named "PARAM Kilimanjaro" at Nelson Mandela African Institute of Science and Technology (NMAIST), Arusha, Tanzania under an agreement with Ministry of External Affairs**. It has 14 TF computing power and 100 TB of storage along with relevant backup software and a backup server. PARAM Kilimanjaro was inaugurated by Prof. Joyce Ndalichako, Hon'ble Minister of Education, Science and Technology, Tanzania on July 18, 2016. An advanced Workshop on HPC and parallel Programming was also conducted at NMAIST, Arusha, Tanzania
- C-DAC deployed multiple PARAM Shavak systems across the country. The notable installations are at Manipal University Manipal, Manipal University Jaipur, Tezpur University, Jadavpur University and CV Raman college of engineering

Trainings/Workshops on HPC

Capacity building through Internship Scheme for students of NE India for strengthening R&D in HPC

C-DAC has established facilities in HPC in North-Eastern States including Assam (NIT Silchar, Assam University, Tezpur University, Assam Engineering College), Meghalaya (North Eastern Hill University, NIT Meghalaya), Sikkim (NIT Sikkim), Tripura (NIT Agartala) and imparted training in the area of Parallel Computing to enable the students in the North Eastern region for proper use of HPC system. More facilities in HPC are under deployment in various institutions in NE region.

Cloud, Grid Computing and Big Data

Cloud Computing

SuMegha Cloud Builder

SuMegha Cloud Builder is a tool to install cloud stack automatically for building private cloud. SuMegha Cloud Builder was enhanced with cloud middleware openStack support. Mitaka version of OpenStack was installed on Scicloud Testbed machine using CentOS 7.2 and MPI and Hadoop Clustering and submission of Job through Job submission Portal for Cloud (JSPC) was completed.

Sumegha Cloud Builder

Meghdoot - Software Suite for building Cloud Computing Environment

Meghdoot is a comprehensive software suite designed and developed by C-DAC for building cloud computing environment. Key features includes service provisioning and deployment, ease of management through web services and enhanced security etc. It also provides simplified graphical installation and configuration of cloud, exhaustive monitoring, metering, simplified management of resource and services, inclusion of security features focusing on data in transit, data at rest, multi-level authentication and authorization, high availability across all services and resources, backup and disaster recovery solutions etc. **During the year, Eucalyptus based Meghdoot Cloud environment was enhanced with Openstack based Meghdoot Cloud environment at Tamil Nadu State Data Centre, Chennai. Management, maintenance and support activities were also carried out for existing cloud environment in Green Mini Data Centre (GMDC), Sabarkantha District Panchayat, Himmatnagar.**

Open Stack based Infrastructure as a Service (IAAS) Facility

A state-of-the-art computing and storage infrastructure for services and research was installed at Kolkata Centre that includes Tier II data centre with provision of 8 high density racks, 45 TB SAN storage and networking equipment including firewall, router with 10 Gbps backbone.

National Grid Computing initiative-GARUDA

GARUDA (Global Access to Resources Using Distributed Architecture) provides pan-India e-infrastructure to catalyze the research in Science & Engineering. Users belong to virtual organizations such as Bioinformatics, Computer Aided Engineering and Open Source Drug Discovery community, etc. Activities during the year involved provisioning the trending architectural components such as the Science gateways, Visualization gateways and Data grid solutions which have largely contributed to overall utility of the grid infrastructure worldwide. Grid operational activities include constant monitoring and management of grid components along with user support.

Big Data Analytics

C-DAC's Big Data Software Suite (Desktop Version)

C-DAC's Big Data Software Suite (C-BDSS) (Desktop Version) is an open source platform that provides the processing and analysis capabilities to run Big Data applications in varied domains. It enables novice users to leverage power of Hadoop and its ecosystem components including Spark and accelerates the path to informed

decisions. It comes with modest set of Big Data analysis tools which have been chosen for ease-of-use and computational power. **C-BDSS was launched during National Conference on Parallel Computing Technologies during February 23-24, 2017.**

Framework for Healthcare Analytics

C-DAC has developed a Big Data analytical framework that uses multiple inputs of health care data for deriving metric based insights. Such insights enable healthcare providers (hospitals, doctors) and funding agencies to standardize best practices on medication, improve the patients' experience and institute preventive and corrective measures in the field of healthcare. Key features include Open Refinery, Infection Control Registry, Heat Map, Symptom Based Registry, Emergency Patient Timeline and GTM Search Engine. Test deployment of the solution was carried out at AIIMS, New Delhi.

Big Data Analytics Framework for Rice Genome Analysis

C-DAC developed a Big Data Analytics Framework to analyze the genetic variations (SNPs - Single Nucleotide Polymorphisms) across varieties of rice genomes with origin from different countries and to visualize the level of genetic variations among them by applying machine learning techniques. The data was taken from International Rice Informatics Consortium (IRIC) and the framework is developed using a combination of pre-processing, processing and post-processing tools. Pre-processing and Post-processing components are developed in-house using Python and processing is done using VariantSpark, a machine learning analysis framework for genomic data.

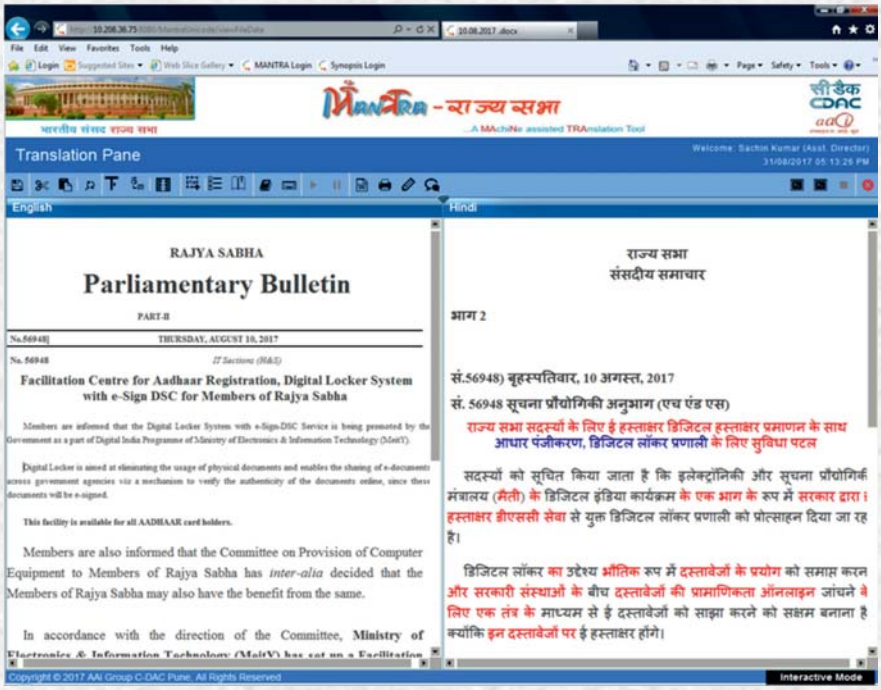
Multilingual Computing and Heritage Computing

Towards dissolving the language barrier C-DAC has been developing various multilingual tools and solutions since its inception and carried out enhancement and deployment across the country. For digitization and digital preservation of heritage and culture, C-DAC has developed and deployed various solutions in Heritage Computing. Major contributions during the year include machine translation, speech technologies, language technologies tools and solutions, solutions for the differently-abled, centre for excellence in digital preservation and digital preservation system for court records.

Machine Translation (MT)

Mantra-Rajya Sabha

MANTRA-Rajya Sabha Translation system translates English documents to Hindi pertaining to Parliamentary domain (Upper House of Parliament of India). List of Business [LOB], Papers to be Laid on the Table [PLOT], Bulletin Part-I are migrated to Unicode version and deployed at Rajya Sabha Secretariat which is being used for their daily proceedings. At present, Bulletin Part-II is being developed. **During the year 126 files were created using the system and synopsis document were prepared using Mantra-Rajya Sabha system for four sessions.**



Mantra-Rajya Sabha

Indian Language to English Machine Translation System (IL-EMT) for Judicial domain

C-DAC in collaboration with IIT Delhi, IIT Patna, IIIT Allahabad, IIT Bombay, IIIT Hyderabad is developing a Web-based hybrid MT system for Hindi to English. During the year various activities were carried out including fine tuning / adaptation of various tools, lexical resources and engines such as Input Format Extractor, Parallel corpora, Morphological analyser (MA), Part of Speech tagger (PoS), Named Entity Recognizer (NER), dependency parser, Word Sense Disambiguation (WSD), Post Processing Tools and Linguistic Resource Management Tools.

AnglaKokBorok: English-KokBorok Machine Aided Translation (MAT) System

AnglaBharati (English to Indian Language Machine Translation System): The AnglaBharati Machine Translation system has been adapted for generating translation from English into eight Indian languages viz. Assamese, Bangla, Hindi, Malayalam, Nepali, Punjabi, Telugu and Urdu. The Systems are deployed on Meghraj Cloud for Hindi, Urdu, Punjabi, Bangla, Nepali, Malayalam and Telugu languages. **During the year AnglaKokBorak: English-**

KokBorok Machine Aided Translation (MAT) System has been specifically designed for translating English to KokBorok language, based on Anglabharati technology. It analyses English only once and creates an intermediate structure with most of the disambiguation performed. In AnglaKokBorok, this intermediate structure is then converted to KokBorok language through a process of text-generation. A translation workbench has been developed that collects user's feedback through crowd sourcing.

AnglaKokBorok is a Machine-Aided Translation (MAT) System

Sampark - Indian Language to Indian Language Machine Translation System

This is a combined initiative of 11 institutions in India based on which language technology for 9 Indian languages resulting in MT for 18 language pairs have been developed. These are 14 bi-directional pairs between Hindi and Urdu / Punjabi / Telugu / Bengali / Tamil / Marathi / Kannada and 4 bidirectional between Tamil and Malayalam / Telugu. Hosted on Meghraj Cloud of NIC server, services are made available on www.tdil-dc.gov.in for Hindi, Urdu, Punjabi, Bangla, Malayalam and Telugu languages. **During the year the system was leveraged for providing translation services by National Institute for Open Schooling (NIOS) and Vikaspedia portal.**

Cross Lingual Information Access (CLIA)

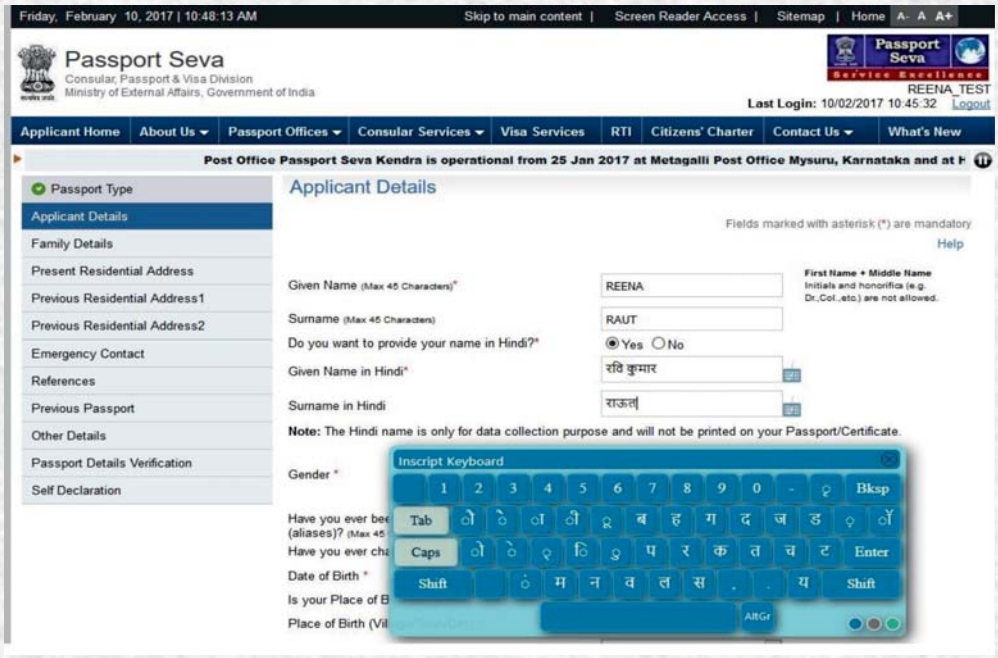
CLIA is a mission mode project being executed by a consortium of academic and research institutions. Cross Lingual Information Access systems makes it possible for users to directly access sources of information which may be available in languages other than the language of query. The languages involved are Bengali, Hindi, Marathi, Punjabi, Tamil and Telugu, Gujarati, Assamese and Oriya. During the year various enhancements were carried out in CLIA system such as (a) redesign and development to make it cloud ready, (b) Making the system fault tolerant using state of the art technologies, (c) upgradation of the User Interface and (d) addition of indexes pertaining to government website and the system is hosted at Meghraj Cloud at NIC.

Indian Language Switch & Localization Projects Management Framework (LPMF)

C-DAC has developed Go-Translate framework that enables community participation in localization initiative and can be used to translate website(s) dynamically on the fly just by the click of a button. The framework is backed up with the requisite Natural Language Processing (NLP) tools and technologies and is based on the reuse of Translation Memories, Term Banks, and other linguistic resources including Machine Translation systems. During the year, as part of this initiative (*http://localisation.gov.in*) following developments and deployments were carried out

- **Go Translate snippet -** C-DAC has carried out integration of Go-Translate snippet for on-the-fly localization of web pages of various government portals including Digital India Portal, Controller of Certifying Authorities and Directorate of Plant protection etc.
- **Translation Proxy** - Localized version of the original website as a translation proxy. C-DAC has localised Andhra Pradesh capital Amaravati's website and core Dashboard Portal.

- **Services Deployment**- Deployed Transliteration and Indian language typing solutions as a service for various agencies including Bhuvan India Map, Indian language typing in Passport India portal, National Voters Services Portal, Uttar Pradesh Vidhan Sabha portal and Aaple Sarkar Maharashtra Govt. portal etc.



Passport site enabled with LPMF

Speech Technologies

Bi-lingual (Bangla-English) Text to Speech Synthesis System

This solution has been developed for generation of synthesized voice having same tonal quality across the sentence both for Bangla and English text along with the correct pronunciation of the chemical name and quantity. As of today, around 5,50,000 farmers are availing services for their crop related problem. **During the year the TTS application has been deployed for Matir Katha application, an ambitious project of Government of West Bengal.**

Speech-based Agriculture Price Information System

C-DAC has developed Agriculture Price Information System which is a platform for farmers and various stakeholders for dissemination of relevant information like (live price, stock availability) of agricultural products over the telephone. **Carried out deployment of agricultural commodity prices retrieval system through telephone/mobile (including Android app) in Bengali Language at Sufal Bangla Project Unit, Agri Marketing Directorate, Government of West Bengal.**

Agriculture Price Information System

Deployment of Automatic Speaker Recognition System on Conversational Speech Data for North-Eastern states

Automatic speaker recognition system is developed on conversational speech data for north eastern states key capabilities of the system are (a) speaker diarization and (b) speaker recognition, where the former can detect the individual speech sources automatically from a given conversational speech data and the later validates the diarized speech data through Automatic Speaker Recognition. In addition, the system has mechanisms to carry out voice matching with the individual source segments, whenever a target source profile (voice file) is provided separately. System uses voice biometrics from conversational speech data which is a distinguishable trait and inseparable part of any individual. During the year the system was further fine-tuned for separating voice samples into language/dialect compartmentalization and deployed for usage by Government agencies.

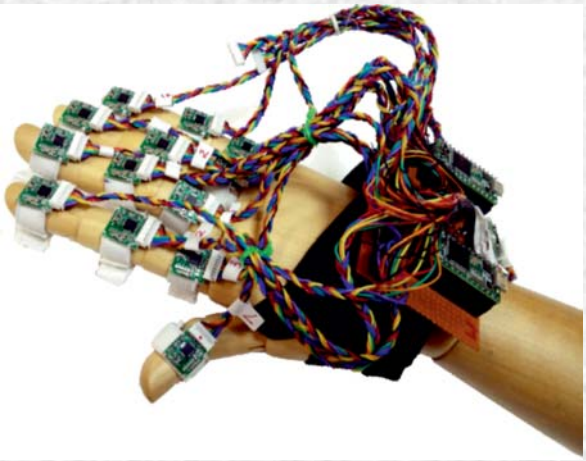
Solutions for differently-abled persons

Speech based Assistive Aids in Bangla for Visually Impaired People of Tripura

C-DAC is developing a comprehensive communication tool for the visually impaired population of to act as a man machine interface (MMI) with a computer. The system is being developed for Tripura with limited vocabulary command control based Automatic Speech Recognition in Bangla, TTS integrated screen reader in Bangla language and talking keyboard with Bangla pronunciation.

Indian Sign Language Captioning Framework

Sign languages are natural languages that use different means of expression for communication in everyday life. More particularly it is the only means of communication for the hearing impaired. C-DAC has developed a framework for Indian Sign Language Captioning for enhancement of literacy, reading skills & learning comprehension among the Hard of Hearing (HoH) / Deaf people. The sign languages have many challenges; the major one is non-availablity corpus which covers entire nuances of Indian Sign language. The Framework currently focuses on sign language for the disaster domain. It has facility to embed the captioning in the sign language animation using indigenously developed character generator. Additionally, C-DAC has developed digital gloves hardware using accelerometer, gyroscope and magnetometer sensors to track finer movement of at least two fingers.



Digital gloves

Mobile based Language Tools

Mobile apps

C-DAC has developed various mobile based language applications. This includes

- Several mobile based educational applications in Indian languages were developed and deployed in m-Gov App Store and Google Play Store.
- Development of mobile based expert system for crops such as Rice, Ragi, Sugarcane, Banana, and Coconut

- Android Mini App for Yatra - Budget Hotel Booking module is localized in 11 Indian languages: English, Hindi, Tamil, Telugu, Kannada, Malayalam, Gujarati, Bengali, Punjabi, Urdu, Marathi and Odiya.

LILA–Rajbhasha on mobile (for Android and iOS platform)

During the year C-DAC developed this solution to impart basic to advanced functional knowledge of Hindi through the medium of 15 Languages (English, Assamese, Bangla, Bodo, Gujarati, Kannada, Kashmiri, Manipuri, Malayalam, Marathi, Nepali, Oriya, Punjabi, Tamil and Telugu). It consists of three packages namely Prabodh, Praveen and Pragya delivered via mobile (Android and iOS) platforms.

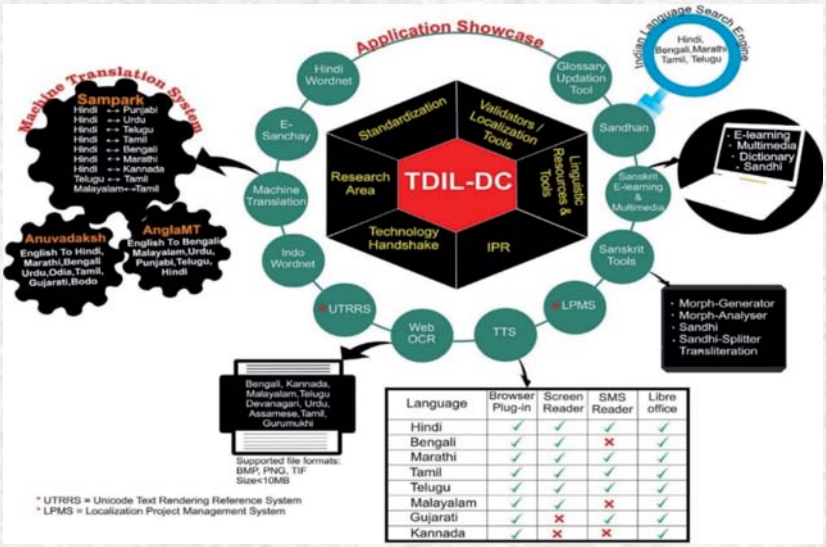
e–Mahashabdkosh on mobile (for Android and iOS platform)

e–Mahashabdkosh is a domain based bi-lingual and bi-directional English/Hindi Dictionary with pronunciation, description and usage. It has been developed for the domains such as administration, agriculture, banking, finance, healthcare, industry, IT, legal and tourism. During the year C-DAC carried out activities of porting the same on mobile (Android and iOS) platforms. e–Mahashabdkosh on mobile and smartphones would help language translators, linguists, individuals, government offices, departments and ministries etc., in their day-to-day official/ non-official requirements for translating and drafting documents in Hindi and English.

Language Tools

Indian Language Technology Proliferation & Deployment Centre - Phase II

A single window system for hosting and distribution of all the outcomes of TDIL, MeitY funded projects. It also acts as a national centralized repository for linguistic resources, standards, contents of language CDs, tools and applications being developed under the various MeitY/TDIL funded projects. In the second phase of the project, the portal is redesigned with a new user-friendly look & feel and also scaled up to provide better accessibility.



Indian Language Technology Proliferation & Deployment Centre

Indian Language Computing Initiative: National Roll Out Plan

Main objective of this initiative is to make available the Basic Information Processing Tool Kit (BIPK) for free usage to common man for language requirements. This includes a set of open source software localized into all 22 scheduled Indian languages, with alternate scripts. Compatible with Windows (vista, XP, 7, 8) and Linux- Ubuntu flavour.

Following are the major outcomes of this initiative

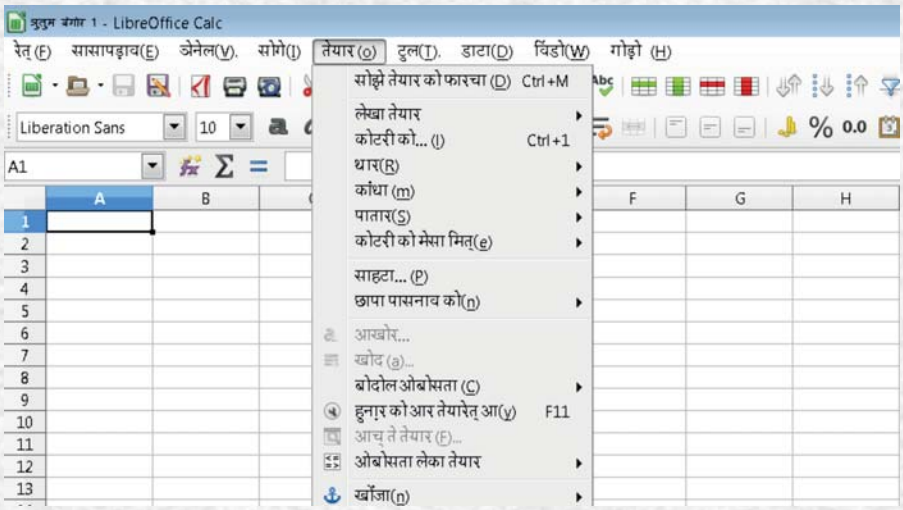
- Tools for Desktop - This set includes Unicode fonts compliant with Unicode version, Software for typing in INDIAN language called Unicode Typing Tool, and the software for day to day office uses or documentation

purposes called LibreOffice.

- Tools for Internet- This set of software includes Local language open source Web browser called Mozilla Firefox, software for sending and receiving emails (email client) called Mozilla Thunderbird, and software for chatting with others over Internet called PIDGIN.
- Utilities - Includes accounting software called GNUCash, a graphics design software called INKSCAPE, drawing software for children called TUXPAINT, and content management system called Joomla.

Indian Language Data center

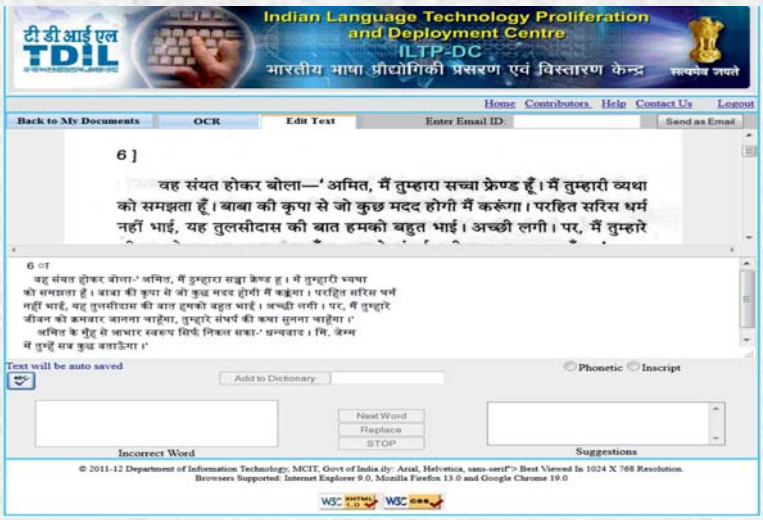
Based on this initiative Indian language tools and technologies to being made available freely to the people. This website is built in all 22 official Indian languages. From this website user can request for the free CD of the particular language. All the localized tools such as Libre office, Mozilla Firefox, Thunderbird, Tux paint, Unicode-typing Tool, Inkscape etc. are available on the website to download.



Localised Libre Office

Development of Robust OCR for Documents in Indian Scripts

C-DAC has developed Optical Charter Recognition (OCR) for Linux, Windows, Web Based and Mobile platforms. The solution supports layout retention, underline removal, rubber stamp removal as advanced pre-processing routines. It provides Inscript and phonetic keyboards for user editing and supports braille output generation. The Script wise lite versions of OCR are developed and shall be made available for free download from TDIL data centre (www.tdil-dc.in). **During the year e-Aksharayan solution is developed supporting 7 languages. (Assamese/Bengali, Hindi, Marathi, Gurmukhi, Malayalam, Telugu and Tamil).**



Webservice OCR for Documents in Indian Scripts

Online Handwriting Recognition System for Indian Languages

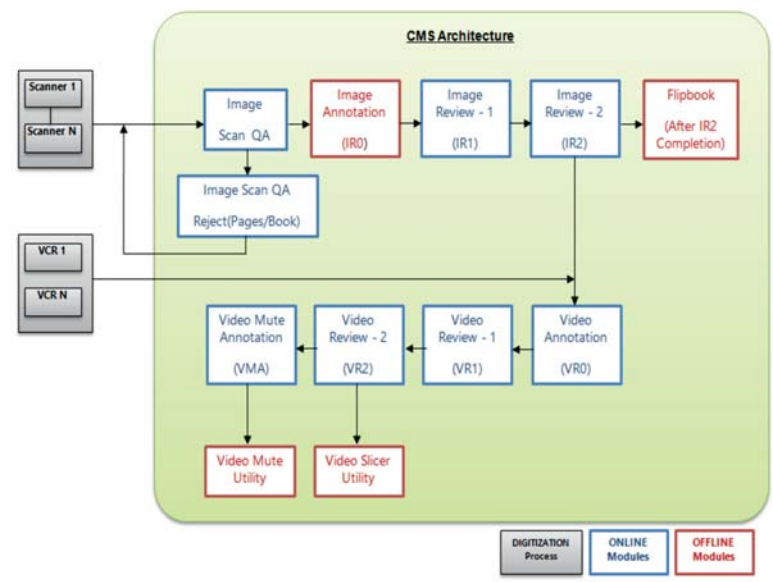
Developed handwriting recognition system for Indian Languages and the carried out testing of the same. Data collected from the native Hindi writers of north India was used to annotate with the help of semi-automatic annotation tool. As part of the same, developed various algorithms of pre-processing, feature extraction, classification, and post processing. Achieved the performance of 93.01% on approximately 1 lacs words. C-DAC has also designed and developed various apps both for windows and android platforms.

Web Portal and Mobile app for Micro level Weather Forecast

As part of the ongoing Digitally Inclusive Smart Community (DISC) project of C-DAC under the Digital India Initiative of Government of India, C-DAC has developed and deployed Web Portal and Mobile app for Micro level Weather Forecast in three languages (English, Hindi and Nagpuri). The same was launched by Shri Randhir Kumar Singh, Hon'ble Minister, Department of Agriculture, Animal Husbandry and Co-operative, Government of Jharkhand during Agrotech 2017 Kisan Mela at Birsa Agricultural University (BAU), Ranchi.

Digitization of Uttar Pradesh Vidhan Sabha Proceedings

Content Management System (CMS) is developed for digitizing the proceedings of Vidhan Sabha and newspaper clippings of UP Vidhan Sabha into database. Vidhan Sabha digitization process includes two major parts i.e. Digitization of Vidhan Sabha proceeding images and Digitization of Video Cassette (VCR). Also this includes Search Engine for searching the annotated books online including lemmatizer, transliteration, flip book and video streaming.



CMS System

Image Annotation Tool is developed for annotating text with respect to proceeding books of Vidhan Sabha. IA tool is featured with NLP tools like OCR (Optical character recognition), auto complete for keypersons, inter word and intra word suggestions and spell checkers for Hindi annotated text. This solution is deployed in the premises of UP Vidhan Sabha and all the tools developed were used extensively in Vidhan Sabha for digitizing more than 2000 Book proceedings and approximately 2500 Hours time of videos.

National Council for Promotion of Sindhi Language (NCPSL)

Under MOU with NCPSL basic tools and technologies for Sindhi-Devanagari and Sindhi-Persoarabic are being developed. CD with enhanced tools are being developed and handed over to NCPSL for implementation in their training centres. The CD contains localised versions of Libre office, Thunderbird email client, TuxPaint, Pidgin, GNUCash, InkScape and others. E-Books in Sindhi, transliteration and dictionaries are also planned to be included.

Heritage Computing

Centre of Excellence for Digital Preservation

As part of this initiative, C-DAC has helped Indira Gandhi National Centre for Arts (IGNCA) in developing the digital repository of National Cultural Audiovisual Archives (NCAA). The digital repository of NCAA is established using DIGITALAYA (डिजिटालय). An e-Library and Archival System is being established where the archivists from 13 partner institutions can access DIGITALAYA (डिजिटालय) online from their respective locations and ingesting the data. C-DAC has also designed and developed the backend architecture for audio video streaming in this digital repository to enable efficient public access. The National Cultural Audiovisual Archives is available online from http://www.ncaa.gov.in where around 4500 cultural audio and video recordings are searchable. C-DAC has also helped IGNCA in completing the initial stage audit for the digital repository of NCAA as per the requirements of ISO 16363.

eGoshwara: Digital Preservation System for Court's Records

Objective of this initiative is to ensure long term and trustworthy digital preservation of disposed cases for Indian Judiciary. Towards building such a solution and enable users whole new trust and online experience the system is developed based on high level framework components (Open Archival Information System (OAIS: ISO 14721) and Trustworthy Digital Repositories (TDR: ISO 16363) for Audit and Certification this takes care of various aspects right from case record packet generation to archival repository, to the web based applications. During the year the ongoing pilot project for creating a digital preservation for disposed case records was extended and the dispose case portfolio manager component was further customized for the same subsequent to which few cases of Supreme Court were handled successfully on trial basis.

Annotation and Archiving System for Heritage Script with Special Reference To MODI Script

Modi is historical script and invented as a cursive "shorthand" or speed writing to note down the royal edicts. Modi is included in Unicode 7.0. Modi Search Portal provides searching facility for digitized historical Modi documents which are in public domain. User can search for document with keywords and different search types are provided for searching documents. Modi search portal is available at *http://modiarchives.in/*

Development of the Portal for setting up of National Virtual Library of India with multilingual federated and integrated search and retrieval

Main objective of this initiative supported by Ministry of Culture is to bring the bibliographic databases and diverse knowledge resources in the form of informative datasets, e-books, digitized rare book collections, digital libraries, audio and video archives, 3D virtual walkthroughs, e-thesis and research papers etc. C-DAC has integrated the sample data for a wide variety of digital resources and developed the pilot version of NVLI Portal with various functionalities such as federated and cross-lingual search and retrieval across various digital resources, crowdsourcing / curation framework, Integration of e-news and website crawling setup, automated UDC ontological classification and Personalization of user experience. During the year the pilot version of NVLI Portal is also hosted on the cloud infrastructure provided by IIT Mumbai. C-DAC also conducted a workshop on data structuring on February 28, 2017 at New Delhi for the participants from 15 organizations under the Ministry of Culture where data preparation and transfer guidelines were shared.

Standardisation and Solutions for Media

World Wide Web Consortium - W3C India Office

Along with various contributions being made by C-DAC towards standardisation for languages and digital preservation, C-DAC is actively engaged in the World Wide Web Consortium forum discussions and hosts the W3C India office. Apart from Web Standards, the key areas of activity in this include Digital Publishing, Web payments, Indic task force, Accessibility and Web & TV, Web & Auto, and Web of Things.

Multilingual DVB Subtitle Solution

C-DAC has developed Multilingual DVB subtitle solution which is an end-to-end solution that caters to all the phases of subtitle file creation, validation, software preview, overlay preview to transmission. Subtitle Language can be selected by the viewer through Set-top-box remote. The solution is designed for the same to support 24x7 operations, provides various subtitle graphic effects and interfaces with playout automation systems. It is also compatible with various set-top-boxes and professional Integrated Receiver Decoders (IRDs).

Multilingual DVB Subtitle Solution

Professional Electronics, VLSI and Embedded Systems

C-DAC has demonstrated its expertise over the years in developing sophisticated, compact and cost effective electronic systems for defense, law enforcement agencies, industrial purposes and social empowerment. Primary areas of focus under Professional Electronics include smart system solutions, security & surveillance, power electronics, strategic electronics, and intelligent traffic systems.

Intelligent Traffic System

TraMM – Traffic Signal Monitoring & Management software

Traffic Signal Monitoring & Management (TraMM) is an application that enables monitoring and managing road traffic signal controllers remotely from a central server located at the Traffic Management Centre (TMC). TraMM is integrated with C-DAC's other Intelligent Transporation System (ITS) solutions like Wireless Traffic Control System (WiTraC) and Urban Traffic Control system (UTCS) controllers. It provides visualization for real time monitoring of signal coordination between traffic junctions using Time Space Diagram. **During the year, Transfer of Technology (ToT) of the above solution was carried to industry partners M/s ARS Traffic & transport Technology Pvt. Ltd., Thiruvananthapuram, M/s Keltron, Thiruvananthapuram, M/s Envoys Electronics, New Delhi, M/s Onnyx Electronics, New Delhi and M/s Shakti Enterprises, Jaipur.**

Screenshot of Traffic Signal Monitor

CUTE – CDAC Urban Traffic Control Equipment

C-DAC Urban Traffic Control Equipment (CUTE) is a Vehicle Actuated Adaptive Traffic Control System (ATCS) compatible traffic signal controller. It can take input from any type of vehicle detectors (inductive loop, camera, microwave radar etc.) and can operate on grid power, Solar Power or hybrid power. CUTE has a very small form-factor for pole mounting and can be monitored from a remote location over fiber or Managed Leased Line Network (MLLN). CUTE can be used as a retrofit at already signalized junctions by replacing the existing Pre-timed traffic signal controller.

WiTrac – Wireless Traffic Controller

The Wireless Traffic signal Controller (WiTraC) is used for controlling the Road Traffic Signal without a physical connection between the Traffic Controller equipment and the signal lamps. In WiTraC, the signal switching is done over air using 2.4GHz license free ISM band. WiTraC is a Vehicle Actuated (VA) traffic signal controller in which the signal timings are generated based on the real time demand and is compatible for Adaptive traffic signaling.

Transfer of Technology (ToT) has been carried out during the year to industry partners M/s. Bharat Electronics Limited, Bangalore, M/s. Shakti Enterprises, Jaipur, M/s. Keltron, Thiruvananthapuram, M/s. DIMTS Ltd, Delhi, M/s. Envoys Electronics, Gurgoan, M/s. Metro Infrasys, Gurgoan, M/s. Onnyx Electronics, Delhi and M/s. ElectroAds, Indore.

Adaptive Traffic Control System

Composite Signal Control Strategy–WiTrac (CoSiCoSt-W) is an Adaptive Traffic Control System software compatible with Wireless Traffic Control System (WiTraC). CoSiCoSt is designed to address the highly heterogeneous traffic conditions by continuously assessing real-time traffic demand from vehicle detectors deployed at strategic locations. Based on the assessment, the system generates optimum signal timings for signal coordination in vehicle actuated mode of traffic signal operation, thereby minimizing stops and delay at traffic junctions and reduce overall journey time. **The Transfer of Technology (ToT) of the above solution was carried to the same five industry partners as that of TraMM.**

C-DAC is also implementing ATCS for traffic signaling at 43 junctions and 10 midblock pedestrian crossings in Bus Rapid Transit System (BRTS) between Hubli and Dharwad (22.25km) in the state of Karnataka using C-DAC Urban Traffic signal controllers (CUTE) and Composite Signal Control Strategy (CoSiCoSt) software. This shall reduce stop delay at intersections and midblock pedestrian corssings leading to decreased travel time between the twin cities.

iRIDS – Red Light Violation Detection System

C-DAC has developed Red Light Violation Detection System (iRIDS) that provides solution to automatic identification of red light violations at signalized traffic junctions. It automatically captures and presents evidence of the red light violation that helps smooth functioning of law enforcement. It is devised in such a way that it is compatible with any traffic signal controller and can operate during low light condition and night operation using Infra-Red sensors. **During the year, Transfer of Technology (ToT) of the above solution was carried to industry partner M/s. Onnyx Electronics, New Delhi.**

Safety Enhancement and Priority at Traffic Junctions

Solution for Pedestrian Safety Enhancement and Emergency Service Vehicle Priority System at Signalized Traffic Junctions have been developed. The pedestrian safety enhancement system enables safe crossing of differently-abled pedestrians at motorways by enhancing the crossing time through assessment of the level of disability of the pedestrians. The emergency service vehicle priority system provides priority green at signalized traffic junction for emergency service vehicle using Vehicle to Infrastructure (V2I) communication.

Smart Systems

Portable Weather Monitoring Station

It is a micro climate monitoring station that enables monitoring of wind speed, wind direction, temperature, and relative humidity. The portable weather station logs the data to a centralized server from which a user can get the analyzed data. The system is an IEEE 802.15.4 compliant communication node and includes gateway to aggregate the data for end nodes and cloud for analytics and web for visualization.

Wi-Fi Enabled Fire Detector

The fire detection node developed by C-DAC senses temperature, relative humidity, LPG leakage, smoke in the environment and sends back these parameters to the back end through Wi-Fi connectivity for data analysis and efficient prediction. The early warning messages are sent over email or through SMS to the intended personnel to take safety measures during fire instances. Currently, EMI/EMC certification testing is under progress.

Wi-Fi Datalogger

C-DAC has developed Wi-Fi datalogger consisting of Wi-Fi communication module compliant to IEEE 802.11b/g/n with embedded temperature and relative humidity sensor. The data logger has interactive Web interface for device configuration and alerting mechanism via email and SMS. It provides Android based configuration tool for administrators. The EMI/EMC certification testing is under progress.

Wi-Fi Data Logger

Systems and Solutions for Smart Cities

Smart City Dashboard

C-DAC is developing various systems that enable effective functioning of smart cities such as Traffic Information Management, Live Video Surveillance, Pollution Index System, Emergency Alerts, Garbage Collection Planning, Sewage Management, Water Management, etc. C-DAC has developed a smart Dashboard to facilitate city officials and citizens to visualize the data related to entire city on a unified platform.

Air Quality Monitoring

The air pollutant concentrations vary spatially and temporally due to changes in meteorological conditions, endangering health and wellbeing. C-DAC is developing a monitoring toolkit for estimating and visualizing the pollution indices at various locations of a city, based on low-cost and accurate sensors integrated with wireless sensor networks.

Screen Shot of Air Quality Monitoring

Conditional Access System (CAS)

A Conditional Access System (CAS) enables authorized viewers alone to access TV signals. C-DAC is involved as a monitoring agency for Indian Conditional Access System being developed by By-Design India Pvt. Ltd, which is used at different stages of distribution of a TV channel through which normally the paid channels can transmit in encrypted form to prevent unauthorized reception. A set-top box containing a conditional access module is used in the customer premises to receive and decrypt the signal.

Security & Surveillance

Systems and Solutions for Smart Cards

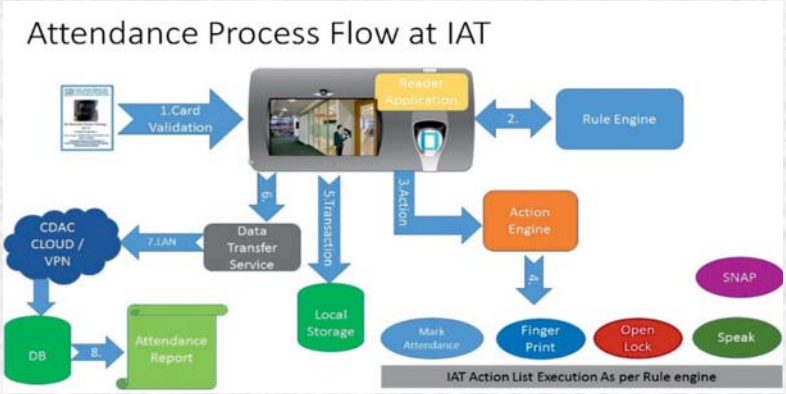
Smart Desktop Bio Secure Login

The Bio Secure Login imposes an extra layer of security to a desktop by means of verification of operator biometrics, smart card authentication, and PIN verification. The solution has been developed by C-DAC for Linux based Operating System (OS) – CentOS, RHEL, BOSS, Ubuntu and extra layer of security has been added to the default login process of the OS. Secure servers, workstations and PC containing high security data can leverage this solution. The solution has been deployed for key government agencies.

Smart Desktop Bio Secure Login

Smart Card based Identity Management System

C-DAC has developed Identity Management System which includes smart card, reader, backend web application and database system. The solution has been developed keeping in view the dynamics of various Institutional policies and their geographically distributed nature. If a member moves from one campus to another, his/her access control will be taken care of irrespective of the location. It is a secure design with two factor authentication which also includes Aadhaar based authentication.



Smart Card Based Intelligent Attendance Terminal (IAT)

City Video Surveillance

C-DAC is developing event and object detection algorithms, to transform standard surveillance networks into intelligent and effective systems. Video surveillance systems can perform four key tasks: Recognizing actions, searching for specific persons, crowd tracking, and anomaly detection.

Portable Supervisory Unit and Programmable Automation Controller (PUSPAC)

Portable Supervisory Unit and Programmable Automation Controller (PUSPAC) offers a complete solution including data acquisition, communication, data logging, system control and simulation. PUSPAC can capture various digital and analog signals from sensors, store data, monitor them against the pre-set threshold, communicate with a remote system and also control the actuators. Currently, EMI/EMC certification testing is under progress. The system is useful in SCADA development/learning platform for students and researchers, as an RTU/PAC in industries and as a platform for SCADA security research.

Portable Supervisory Unit & Programmable Automation Controller

Internet of Things (IoT) Middleware Framework

C-DAC has developed cloud based middleware framework that can provide automation of Standard Operating Procedures via a rule interface. Different types of data from disparate systems: structured, unstructured, log files, pictures, audio files, communication records, emails, etc. are collected, stored and maintained in a distributed file system. The Framework provides APIs for data sharing between applications and enables authenticated and secured data sharing.

Power Electronics

Smart Energy Meters

The Smart Energy Meter technology, developed by C-DAC under National Mission on Power Electronics Technology (NaMPET) program is a Smart metering technology developed as per Indian Standards IS16444-2015, IS15959 (1), IS15959 (2)-2016 for Advanced Metering Infrastructure (AMI). The main features of this Smart Meter are Bi-directional energy flow measurement, Bi-directional communication, Remote load control, Tamper & event logging and integrated communication module configurable for GPRS / Wi-Fi, IrDA and Bluetooth. The communication of meter is based on DLMS / COSEM protocol with high level security and encryption. This technology can also be used for measurement of different mediums like gas (LPG), water and Low Voltage DC energy. **Transfer of Technology (ToT) has been carried out this year to industry partners M/s. ITI Limited, Palakkad on August 31, 2016 and M/s. Powrtec Energy Pvt. Ltd., New Delhi on September 5, 2016.**

Smart Energy Meter

Intelligent Protective Relay

The intelligent protective relay node senses any abnormal rise in the in-line current or voltage. It is embedded with a low power microcontroller that trips the circuit in case of malfunctioning of the connected electrical loads. The system is enabled with back-up battery and works even when power gets disconnected. Currently, EMI/EMC certification testing is under progress.

Strategic Electronics

V/UHF FM Receiver for Weapons and Electronics Systems

The FM Receiver in the V/UHF band is to be used for receiving signals from OFDM based baseband modem of 25 kHz bandwidth modulated using FM modulation scheme. The receiver developed by C-DAC is a compact system that can be used to replace currently used receiver to provide improved sensitivity and cosite performance resulting in improved communication range. The system has been delivered to key government agencies.

V/UHF Receiver

Ultrasonic High Precision Diameter Measurement System – PreSys

PreSys is used to measure the diameter of pipe structures of heat-resistant composite alloy pipes with high precision better than 10µm in water/heavy water. This helps to prolong the periodic replacement of pipes thereby reducing the overall cost for maintaining the nuclear power plant. The precise diameter measurement is achieved using innovative digital signal processing techniques and real time calibration algorithm to compensate for errors due to change in environmental parameters. It is being tested by user agency for commissioning.

High Precision Diameter Measurement System

Portable Acoustic Landmine Detector (PALD)

Portable Acoustic Landmine Detector (PALD) exploits the acoustic resonance of buried objects and identifies the mine from the clutter with its unique acoustic signature. The system employs several innovations including non-contact ground vibration measurement of mine resonant frequencies and low power ground excitation. PALD is a low cost, portable, battery operated, landmine detector with minimal weight.

Medical Electronics

TARANG – Digital Programmable Hearing Aid

TARANG is a feature rich state-of-the-art Digital Programmable Hearing Aid which uses Digital Signal Processing (DSP) techniques based on the indigenously developed 32-bit microprocessor based Application Specific Integration Circuit (ASIC). It offers superior and stable characteristics over a wider dynamic range and frequency dependent filtering helps to finely match the audiogram of the specific user. **The product has been supplied to users under several Government schemes such as Rajiv Vidya Mission (SSA), ADIP Scheme and RBSK Scheme. About 50000 units have been supplied till March 2017.**

Other Solutions

Electronic System Design and Training Through e-learning

C-DAC is developing low-cost boards in the area of electronic system design along with the experiment manual and e-learning contents. The developed platform is an easy to use Low cost FPGA Development board featuring Xilinx Spartan-6 FPGA. It is specially designed for experimenting and learning digital system design with FPGAs.

Low cost FPGA Development board featuring Xilinx Spartan-6 FPGA

Handheld Electronic Nose

Handheld Electronic Nose (HEN) is an artificial olfaction device that can sense smell and finds applications in quality assessment of agro, horticulture and food products such as tea, jasmine and cardamom. It is a portable and battery operated device. **During the year, Transfer of Technology (ToT) of the above solution was carried to industry partner M/s. Nagarjuna Fertilizers and Chemicals Limited, Hyderabad on April 29, 2016.**

Internet of Things (IoT) Solutions

C-DAC has developed number of Internet of Things (IoT) technologies and systems. This includes solutions such as Wireless IP Network Gateway for Zigbee (WINGZ), Ubimote for high performance wireless communication, BLE-MOTE for Bluetooth compliant communication and Wi-Fi Mote for IEEE 802.11b/g/n and Ubisense, a generic sensor board. **Transfer of Technology (ToT) of the IoT Products has been carried out to industry partner M/s. Electronics Corporation of India (ECIL), Hyderabad on July 12, 2016.**

Software Technologies including FOSS

C-DAC is deeply engaged in development and deployment of various software solutions in e-Governance, Free and Open Source Software (FOSS), Social Development and eLearning domains. Details of various activities carried out during the year by C-DAC in this thematic area are given below.

e-Governance

e- Governance Platforms and Frameworks

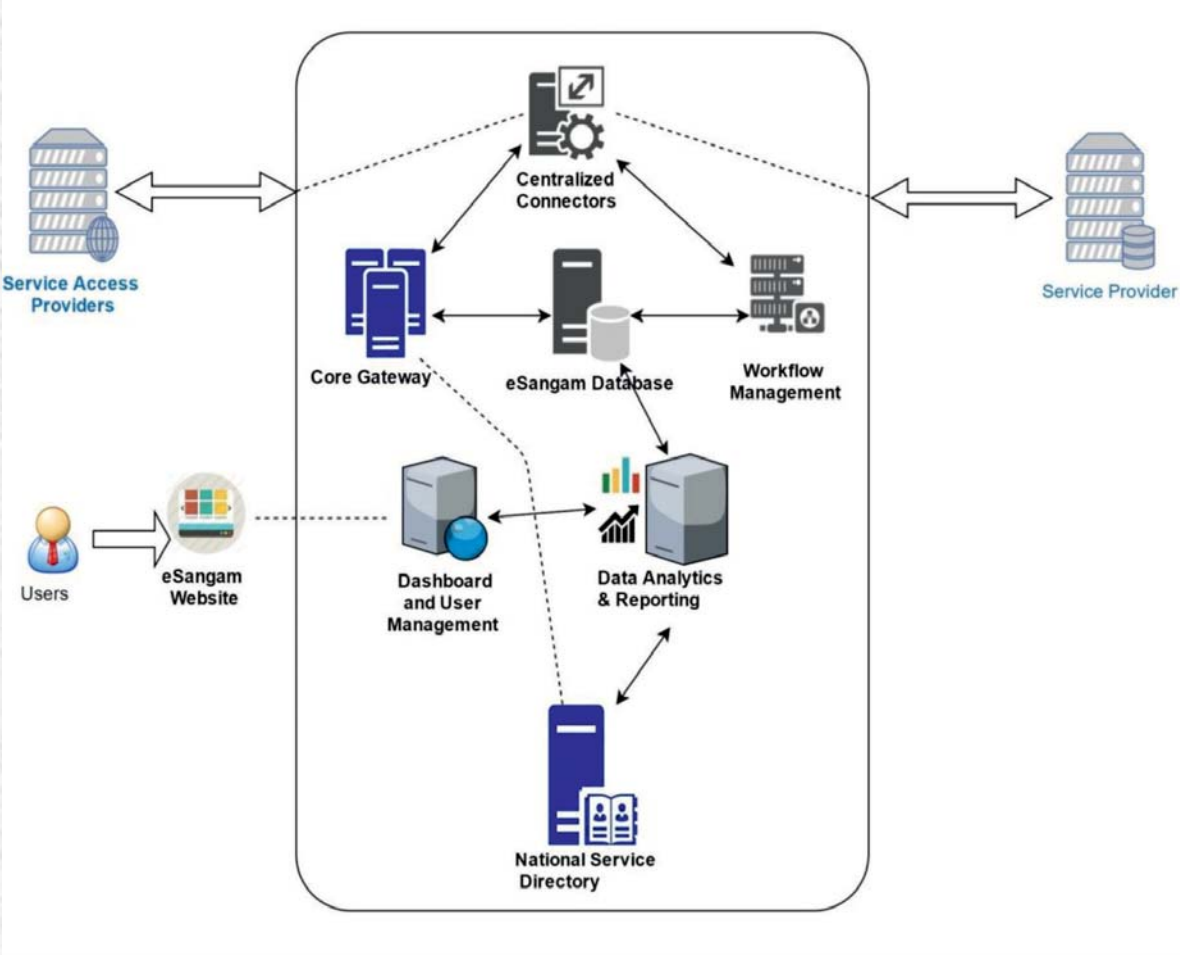
e-Pramaan: A National e-Authentication Service

e-Pramaan is a uniform standard based national e-authentication service developed by C-DAC to authenticate users of various Government services in a safe and secure manner for accessing services through desktop as well as mobile. This framework facilitates expeditious onboarding of any Government department or agency in the country for the purpose of standard based e-Authentication without having to create its own infrastructure. It offers secure authentication with various levels of assurances by verifying the credentials of e-Pramaan users accessing different Government services through internet or mobile devices. It provides various authentication mechanisms such as password based authentication, OTP based authentication, digital certificate based authentication and biometric (fingerprint) based authentication. **110 services have been integrated and 1,72,67,783 transactions have been completed using e-Pramaan till March, 2017.**

e-Pramaan – A National e-Authentication Service

eSangam: e-Governance Services Integration Framework

eSangam is a Service Oriented Architecture (SOA) based constellation of National and State eGovernance Service Delivery Gateways. eSangam (NSDG), a Mission Mode Project under NeGP has gone live in August, 2008 and is currently in its second phase that started on July 7, 2015 for five year duration. eSangam, facilitates service integration and message exchange between integrated departments. C-DAC plays the role of implementation agency and is also the Gateway Service Provider for Meity, Government of India. **During the year C-DAC integrated various services such as 139 Services of e-District application of Daman and Diu, Dadra and Nagar Haveli Union Territories, PAN and TAN issuance services of CBDT through NSDL and a few services of Ministry of Corporate Affairs, Ministry of Environment and Forests, Department of Industrial Policy and Promotion and Odisha State Industries Department.**



eSangam Architecture

Mobile Seva: A National Mobile Governance Platform

Mobile Seva is a national mobile governance platform that facilitates delivery of public services over mobile devices using mobile based channels such as SMS, USSD, IVRS and m-Apps. SMS, USSD and IVRS based services are accessible to citizens through very basic phones. Mobile Seva platform provides a Government App Store which hosts a number of mobile applications developed for various Government departments. The App Store supports hosting of applications for multiple mobile platforms (e.g. Android, JavaME, etc.). Government departments can develop and deploy mobile applications for providing their services through mobile devices. **1387 departments were integrated during the year using this platform and a total of 3576 Government departments have been integrated using Mobile Seva.**

e-Governance Applications and Services

Unified Portal for EPFO

C-DAC has developed a unified portal for Employees' Provident Fund Organization (EPFO). The portal facilitates Online Registration of Establishment (OLRE), Universal Account Number Allocation, Electronic Challan cum Remittances, integration with five nationalized banks, integration with Unique Identification Authority of India (UIDAI) for demographic AADHAAR authentication for registering member KYC, integration with Income Tax Portal for PAN verification services and integration with e-Biz, e-Nivesh and Shram Suvidha Portal. The portal is handling transactions amounting to approximately Rs. 10,000 crore remittances per month paid by approximately 6 lakh establishments for around 40 million active members.

Pradhan Mantri Rojgar Prothsahan Yojana (PMRPY) for EPFO

C-DAC has developed a solution for Pradhan Mantri Rojgar Prothsahan Yojana (PMRPY) for EPFO so that an establishment covered under the EPF act which logs into the unified portal using the custom credentials can login to the PMRPY portal by using either the allotted PF code or Labour Identification Number (LIN). The solution facilitates Aadhaar verification with UIDAI, comprehensive MIS to monitor the scheme statistics and integration with Indian Bank for reimbursement of the benefits passed on to the establishment to EPFO account.

Solutions for Election Commission of India (ECI)

Roll out of National e-Services of Election Commission of India (ECI) (*http://nvsp.in*)

National Voters Services Portal (NVSP) envisages e-delivery of services of ECI to the citizen of India through optimum use of ICT. Highlights of this initiative include search based on demographic details and EPIC number, facility of online application for inclusion, modification and deletion in E-Roll in 14 Indian languages with keyboards and auto transliteration support, tracking status of application, facility to know BLO/ ERO/ DEO/ CEO and Constituency/ Part, submitting family details, absent, shifted and dead elector details, linking of Aadhaar number with EPIC number, services for ECI officials, synchronizations services between national and state databases, digital repository and knowledge management, mobile applications for citizens and ERONET mobile application for booth level officers.

Electronically Transmitted Postal Ballot System (ETPBS)

Electronically Transmitted Postal Ballot System (ETPBS) (*http://etpbs.in*) has been developed by C-DAC in collaboration with ECI for the use of service voters. It is a fully secured system that enables entitled service voters to cast their vote using electronically received postal ballots from anywhere outside their constituency. Electors/ Service voters eligible for Electronically Transmitted Postal Ballot may make a choice of casting their vote through this system. The voter who makes such a choice will be entitled for Electronically Transmitted Postal Ballot for a particular election. Postal Ballots for entitled voters will be uniform across all categories. It will be delivered in electronic data format to the entitled voter on a real-time basis. **Pilot and trial implementation of this system was carried out in UP, Punjab, Uttarakhand, Goa and Manipur state general elections held during the year 2017.**

System for Central Drugs Standard Control Organization (SUGAM)

C-DAC has developed SUGAM, a web-based system for Central Drugs Standard Control Organization (CDSCO), to facilitate complete life-cycle of user application starting from application submission to CDSCO till grant of licenses and approvals from CDSCO. Its key features include Real Time Tracking of status of applications, Analytical Dashboard and Responsive UI, Data Mining, Statistical Analysis, Report Generation and Alerts and Notifications. During the year, operationalization of various processes including Grant of approval to conduct clinical trials for drugs & vaccines in India, grant of permission, to manufacture/import new drugs In India, generation of comprehensive database for drug manufacturing sites and drug formulations in India, generation of comprehensive database for drug wholesalers and retailers in India and process automation for drug sample testing and generation of reports and comprehensive database for drugs/ vaccines was carried out.

e-Hastakshar – C-DAC's eSign Service

C-DAC has developed e-Hastakshar – C-DAC's eSign service that facilitates instant signing of documents online by citizens in a legally acceptable form. Using this, an Aadhaar holder with registered mobile number with Aadhaar can electronically sign a form/document anytime, anywhere, using any device. Through e-Hastakshar, C-DAC offers hassle-free fully paperless citizen services and convenience to users. C-DAC utilizes service of Unique Identification Authority of India (UIDAI) for on-line authentication and Aadhaar eKYC service. During the year, C-DAC carried out integration with various Government and private agencies for leveraging eSign service. **As on March 31, 2017, nearly 10 lakh signatures have been generated for 26 agencies.**

Electronic Project Proposal Management System (e-PPMS)

C-DAC has developed a solution called electronic Project Proposal Management System (ePPMS) to manage the life cycle of funded research projects, enable researchers to make online submission of proposals, technical evaluation of proposals, financial approvals and tracking of status of proposals etc. **During the year, four major schemes/programs of Science and Engineering Research Board (SERB) including Ayurvedic Biology Program, J. C. BOSE Fellowship, Financial Assistance to Professional Bodies and Seminar/Symposia and Empowerment and Equity Opportunities for Excellence in Science were launched in the online system.**

Works and Accounts Management Information System (WAMIS)

WAMIS – Works and Accounts Management Information System is a comprehensive solution designed and developed by C-DAC to encompass the entire lifecycle of a typical construction project work right from its inception to its final completion. This system is being implemented in 6 departments of Jharkhand State including Department of Water Resources, Drinking Water Supply, Rural Works, Forest, Road Construction and Building Construction covering over 400 divisional offices. **This was formally launched at the hands of Shri Raghubar Das, Hon'ble CM of Jharkhand on February 11, 2017.**

Glacier Lake Management and GLOF Early Warning System for Sikkim

C-DAC has developed Glacier Lake Management and Glacial Lake Outburst Floods (GLOF) Early Warning System and deployed in Sikkim. It is useful for giving timely warnings to administration for evacuating people in case of overflow of glacial lakes. The ultrasonic level sensors to monitor the water level in glacial lakes on real time basis have been indigenously designed and developed by C-DAC. Currently, the sensors have been deployed at Kuppup Chho and South Lhonak Chho. Sensor communication and data transmission has been established with the base station at Gangtok.

IT Enabled Operation, Maintenance & Awareness of Semiconductor Integrated Circuits Layout Design Registry (SICLDR)

C-DAC developed a pilot solution for SICLDR to facilitate online IC Design Registration and Maintenance of records as per the Semiconductor Integrated Circuits Layout Design Act 2000 and Rules 2001. An e-filing system for facilitating online filing of Design Registration applications and a Backend e-Processing application for processing the online filed applications have been developed as part of this solution.

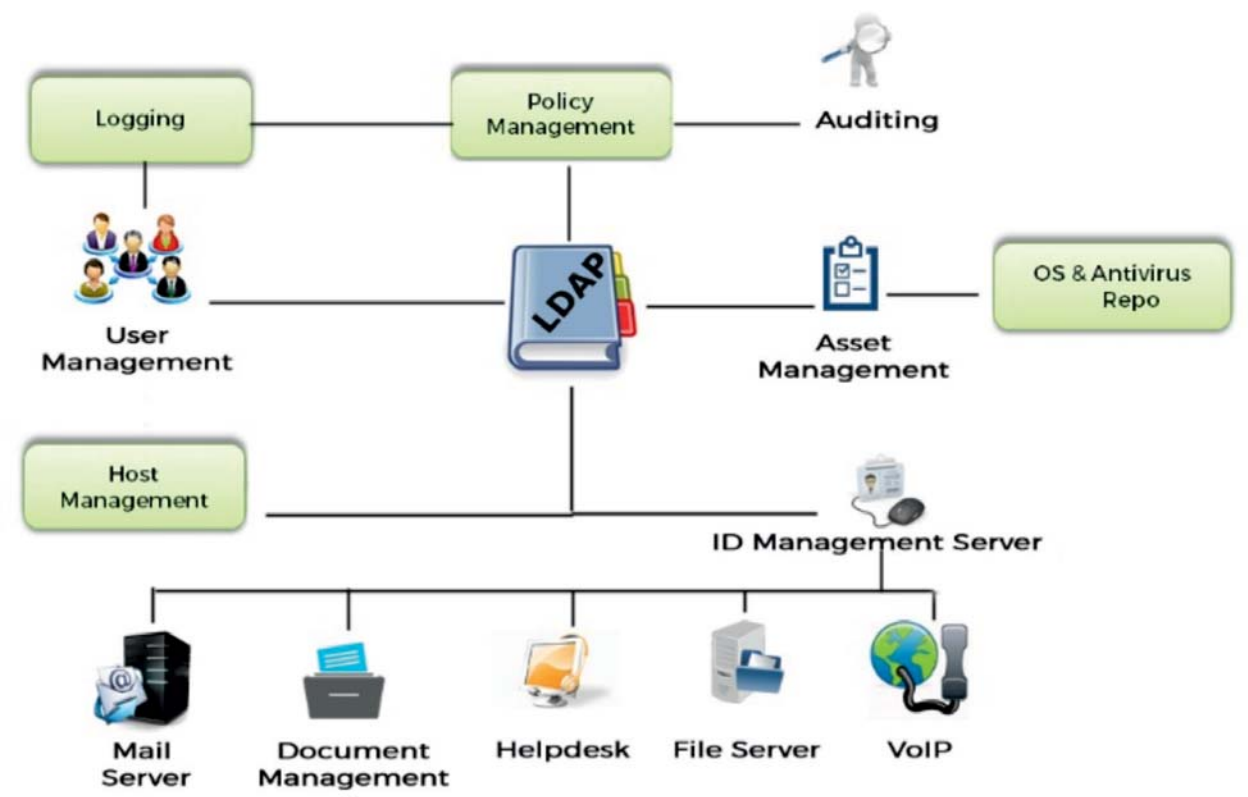
Free and Open Source Software Solutions (FOSS)

BOSS Linux

Bharat Operating Software Solutions (BOSS) GNU/Linux has been developed by C-DAC for enhancing the use of Free/Open source software throughout India. It provides wide Indian language support and packages relevant for use in the Government domain. During the year, C-DAC carried out several deployments/upgradations of BOSS variants for defence forces. **There were around 15 lakhs deployments of BOSS under Tamil Nadu Student Laptop Scheme and around 15000 deployments of BOSS under Laptop Scheme for Government of Odisha.**

BOSS Enterprise Management Suite

C-DAC is developing BOSS Enterprise Management Suite which is aimed towards providing solutions for the enterprise Local Area Network (LAN)/ Wide Area Network (WAN) related management issues in Government and strategic sectors. Its key features include User Management, Host Management, Asset Management with OS and Antivirus updates, Policy Management, ID Management and File Server etc. This suite is currently being deployed for Indian Army and Indian Navy as Proof of Concept setup.



BOSS Enterprise Management Suite Architecture

EduBOSS

EduBOSS is an educational variant of BOSS Linux developed by C-DAC in collaboration with teachers. It is a full-featured, user-friendly Linux operating system having educational applications useful for primary and higher level schools. It facilitates creation of interactive teaching material. **During the year, C-DAC carried out more than 1000 deployments of EduBOSS across Government schools of Maharashtra and Directorate of Technical Education (DOTE) Tamil Nadu.**

NavIOS

NavIOS is the custom secure operating system designed specifically for Indian Navy. Its key features include improved login security, secured file system permission, increased logging and audit information and alerts for defined events that are significant from security standpoint. **During the year, several deployments of NavIOS were carried out for Indian Navy.**

Self-aware Service Oriented Component based Operating System

C-DAC has carried out the development of Service Oriented Component based Operating System based on the research work of IIT Madras. Two variants of Operating systems namely BOSS MOOL and BOSS DHARA have been developed. **During the year, many universities and engineering colleges have signed MoUs to adopt BOSS MOOL in their labs and various workshops were also conducted for the same.** C-DAC also signed an MOU with FUJITSU for bundling BOSS MOOL operating system in Laptops/ Desktops/ Servers to be deployed across the country in various Government departments and educational institutions.

E-learning

Rollout of Online Labs for Schools

CDAC in collaboration with Amrita University has developed Online Labs (OLabs) with phase I covering experiments of Physics and Chemistry for class 9th and 10th in English language and then extended the efforts for other subjects such as Physics, Chemistry, Maths, Biology and English for higher classes (9th -12th) in other languages such as Hindi, Marathi, Malayalam, etc. C-DAC is working on an initiative to create the infrastructural and support framework for making OLabs accessible and usable by students and teachers across India. **During the year, C-DAC conducted 45 workshops and trained 1422 teachers from 638 schools covering 11 states. A total of around 11889 teachers covering around 3638 schools have been trained by both C-DAC and Amrita University.**

e-Basta: School Books to eBooks

In line with the government's Digital India initiative, C-DAC has developed a framework named "eBasta" as part of its ongoing project titled "Digitally Inclusive Smart Community" (DISC) to make the school books accessible in digital form as e-books. The objective is to reduce the burden of school books for the students, enable the schools and teachers to overcome the logistic problems of book publishing, transport and delivery, especially at remote locations, and significantly shorten the cycle of editing or changing the book content, which today is limited to a yearly cycle at best. A **total of 1768 books [1735 pdf + 8 ePub + 25 mp4] have been published on the portal by CBSE, State Boards and private publishers. Payment of paid content has been made operational through** *http://paygov.in*. Workshops are being conducted for creating awareness about eBasta.

Continuous and Comprehensive Evaluation (CCE) Framework

C-DAC is developing a computer enabled Continuous and Comprehensive Evaluation (CCE) framework for schools/ teachers in collaboration with Amrita Vishwa Vidyapeetham to manage the complex assessment activities of schools using the CCE scheme of CBSE. The framework comprises managing formative and summative assessments, calculating and storing student data such as marks, grades and percentage for scholastic and co-scholastic areas and analyzing the performance related data of students. CCE System has been installed in Amrita school network in Kerala and has also been deployed for public access at URL: *http://www.amf4schools*.

Augmented Reality (AR) Book App

C-DAC developed an Augmented Reality (AR) Book App that can show augmented content contextually such as interactive 3D, videos, audio content and animations adding new dimensionality to it. The AR Book App can run on any Android device with a front facing camera and sufficient memory to store the content of the book. A simple to use Authoring Tool is available for the users to author their own AR Books. Context to content associations can also be modified by the author of the AR Book without the need to re-print the AR Book. **The technology has been transferred to industry partner M/s Amaze Infotainment, Hyderabad on July 12, 2016.**

Augmented Reality (AR) Board Application

C-DAC has developed an application for creating a virtual drawing board for interactive contextual information presentation. User can write on this board with a red laser pointer pen and no physical contact of the pen with the board is required to draw on it. It has many capabilities of a software drawing tool including line width and color choice, undo, redo, store and retrieve drawing and some additional special modes such as symmetric drawing. AR Board can be used for class/discussion room scenarios having an overhead projector and a computer to run the presentation with the use of a suitable digital camera/webcam. It provides a more immersive and informative experience for the audience. **During the year, Transfer of Technology (ToT) of this solution was carried out to industry partner M/s. Amaze Infotainment, Hyderabad on July 12, 2016.**

ICT for Social Development

Vikaspedia Portal Enhancements

Vikaspedia is a multilingual, multi-sectoral knowledge portal developed by C-DAC to empower poor and underserved communities through provision of information, products and services in all 22 scheduled languages of the country, besides English. During the year, Vikaspedia portal was enhanced with additional features to improve utility of the platform. These enhancements include cross-linking of language portals, development of APIs to enable sharing of Vikaspedia data with other information portals and integration of TDIL's Indian language TTS as part of screen reader access in 9 Indian languages. **434 outreach workshops on Vikaspedia were organized at various levels (block / district / state) across 20 states and 2 UTs to build capacities of 54,280 first level service providers for accessing and sharing of digital content in regional languages. Special campaign on digital payments was also taken up by conducting about 990 events through various partnering agencies which covered about 32 lakh citizens across 2360 blocks of 21 states.**

Vikaspedia Portal

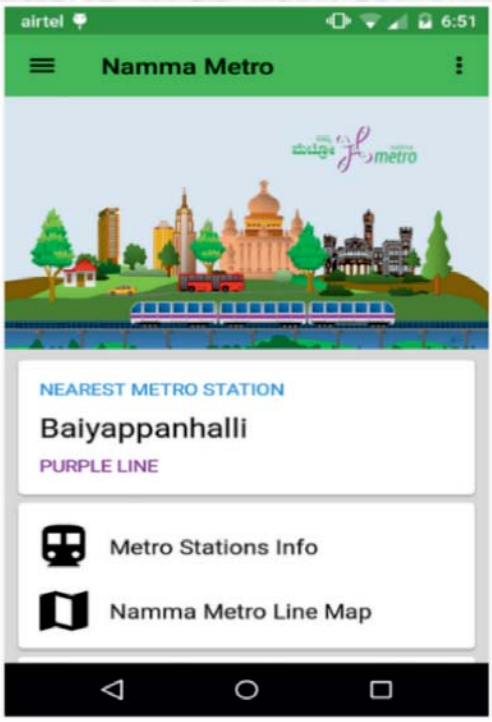
IT enabled Computer Aided Design (CAD) for Weavers and Artisans of Silchar, Assam

The objective of this initiative is to create a pool of master trainers who would in turn give training to other weavers/ artisans. C-DAC in collaboration with Directorate of Handloom and Textile, Cachar, Silchar, Government of Assam, imparted training to 22 Master trainers of first batch as part of its initiative to upgrade skills of Weavers / Artisans of Silchar, Assam to create innovative designs using state-of-the art IT-based tools and techniques. Training is also being provided to 16 master trainers of the second batch. Around 451 designs have been created.

Citizen Facilitation Services

Namma Metro App

C-DAC has developed an Android app for giving unified public transport information to commuters in Bengaluru. It has a trip planner for commuters to plan their journey between any two locations on Bengaluru Metro route. All static information about the facilities and services available at metro stations is provided by the application. Other key features include real-time train timings, fares, feeder bus timings and messaging service. **The application was officially launched by Bengaluru Metro Rail Corporation Limited (BMRCL) on November 04, 2016.**



Namma Metro App

Electronic Forms Application through State Portal and SSDG for State of J&K

C-DAC is working on an initiative for the state of Jammu and Kashmir that enables citizens to download forms and submit applications electronically through a common gateway. The physical forms presently available for various government services are to be converted into e-forms and made accessible to the citizens through the state portal. The submitted e-forms are then routed through State Service Delivery Gateway (SSDG) to respective field offices of the concerned department responsible for providing that particular service. This is the first step towards the eventual computerization of the processes that involve G2C service delivery. **During the year, Post Matric Scholarship Scheme of J&K SSDG Project and integrated Social Security Scheme have been deployed at State Data Center, Jammu.**

Centralized e-Auction Portal for North Eastern States

Centralized e-Auction Portal for NE states (*https://eauction-neramac.in*) has been developed and deployed in the North-East region for the use of North East Regional Agricultural Marketing Corporation Ltd. for conducting live auctioning of NE Farmers' produces for better prices. Its key features include registration of buyers and sellers, item-lot wise auction declaration with start/end date-time, goods receipt for auction, search, online bidding on secure server, notification to winners, sold goods shipment assistance, payment transactions, sales order issuance, returning unsold goods, audit trail, bidding history and reports etc. **The system was launched on August 10, 2016 at Gangtok by Shri Somnath Poudyal, Hon'ble Minister of Food Security and Agricultural Development Department, Government of Sikkim.**

Cyber Security and Cyber Forensics

C-DAC has developed various Cyber Security and Cyber Forensics solutions aimed for wide-scale deployments. During the year C-DAC enhanced the existing solutions and carried out deployment of various solutions and proliferation related activities. Along with this, C-DAC actively contributed towards vulnerability assessment and penetration testing, conducting skill-based training and nation-wide awareness programmes. The activities carried out during the year 2016-17 in this thematic area are listed below.

Endpoint Security Solutions (Desktop and Mobile)

USBPratirodh is a software solution which controls unauthorized usage of portable USB mass storage devices such as pen drive, external hard drives, cell phones, IPods and camera. USB mass storage devices are registered and binded to users enabling only the authorized users to access the registered devices. Solution also supports Data Encryption of USB device content, Auto run protection, Malware Detection using heuristic analysis and Configurable read / write privilege protection. It has been adopted for use by IRISET Hyderabad, ECIL Hyderabad, IDRBT Hyderabad, MSDG project, Heavy Water Works and various Defence agencies.

M-Kavach is a comprehensive mobile device security solution for android devices addressing various threats related to mobile phones, available on google and playstore. M-Kavach prevents unauthorized access to resources such as Wi-Fi, bluetooth, and camera and protects against JavaScript malware. Users can restrict the access to critical applications such as mobile wallets, social media apps etc. and also blocks unwanted Calls. It also helps the users in tracking SIM card changes on the device in case of device loss/theft and provides an option to remotely wipe Contacts/Call-Logs & Factory Reset the device.

AppSamvid is application whitelisting software for Windows based PCs. This software is available as standalone version and helps to protect users from threats through unknown applications / malware. All applications running on the system are monitored and only whitelisted items are allowed for execution and all other items are blocked.

During the year, enhanced versions of USB Pratirodh, M-Kavach and AppSamvid were launched for free download by Shri Ravi Shankar Prasad, Hon'ble Minister for Electronics and Information Technology, Govt. of India as part of Cyber Swachhta Kendra inauguration on February 21, 2017 at New Delhi. As on date there are around 16 thousand downloads for USB Pratirodh, 1 Lakh downloads for M-Kavach and 12 thousand downloads for AppSamvid.

Cyber Threat Analyzer

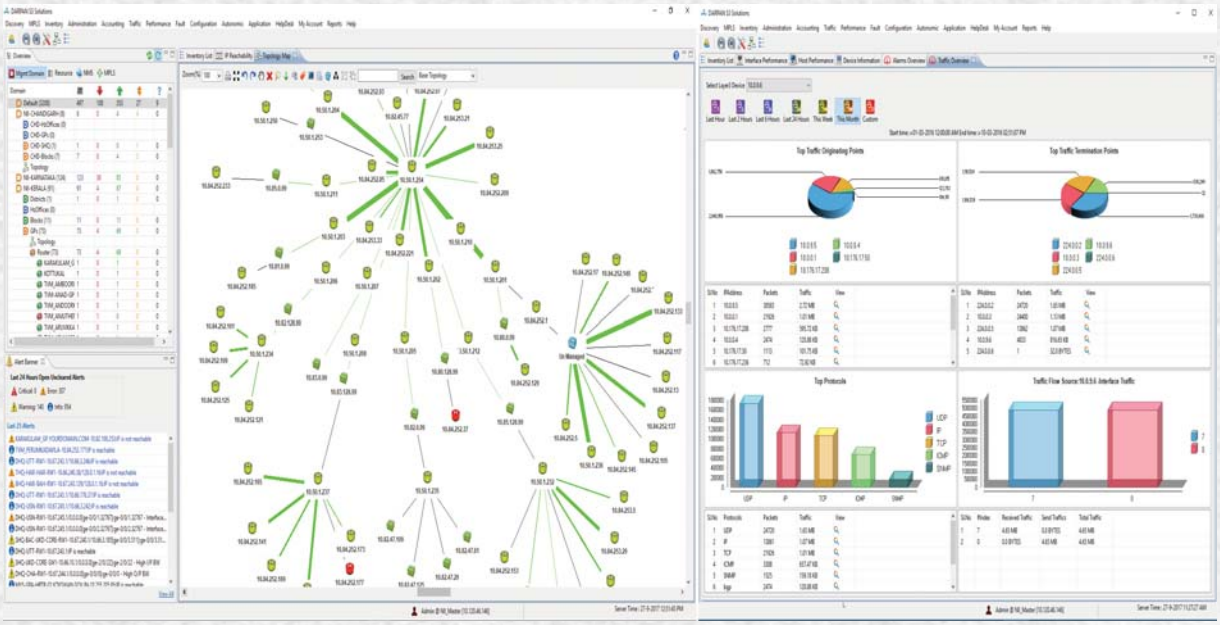
C-DAC has actively contributed towards R&D in the area of attack analysis and modeling. As part of this activity C-DAC has developed and enhanced various solutions for carrying out Cyber Threat Analysis. During the year enhancement of these solutions was carried out such as dynamically configurable solutions, UAC (URL Analyzer & Classifier) and confirming malicious URLs based on dynamic analysis. C-DAC has deployed these solutions across India which are effective in capturing the latest malware.

SCADA Security - Update and Monitoring of Remote Terminal Units (RTU)

Supervisory Control and Data Acquisition (SCADA) systems are used by critical infrastructures such as electricity, water, oil for monitoring and control. SCADA being a critical block in the Critical Infrastructure, any attack on SCADA systems will have a cascading effect. To address the challenges in secure updating of RTU, C-DAC is developing solutions for reliable operation, secure update and patch management of RTU. This includes development of (a) Security Monitoring Unit (SMU) to monitor and analyze RTU events for any abnormalities with field devices/ master station and (b) Secure update solution to provide a unique approach to update the configuration and patch management of RTU.

DARPAN S3 Network Management System (NMS)

DARPAN S3 NMS is a policy based autonomic network management suite of solutions for heterogeneous multi-vendor IP networks and is developed based on ITU –T recommended FCAPS Model which includes Fault management, Configuration management, Accounting management, Performance management and Security management. **DARPAN was deployed in 8 organizations on commercial basis.**



DARPAN Network Management System

DARPAN S3 NMS supports both centralized and distributed hierarchical management and is suitable for any size network ranging from small Local Area Network (LAN) to large geographically distributed multi-site enterprise networks. DARPAN S3 NMS supports self-CHOP (Self-Configuration, Self-Healing, Self-Optimisation, Self-Protection) functions and management of Multiprotocol Label Switching (MPLS) networks. It ensures a hassle free administration of networks through unified visibility and control of network with the help of feature rich dashboards. The system supports wide range of management protocols including SNMP v1/v2/v3, SSH, Telnet, NetFlow, JFlow, IPFIX etc. The feature rich report engine supports wide variety of near real time statistical and historical reports.

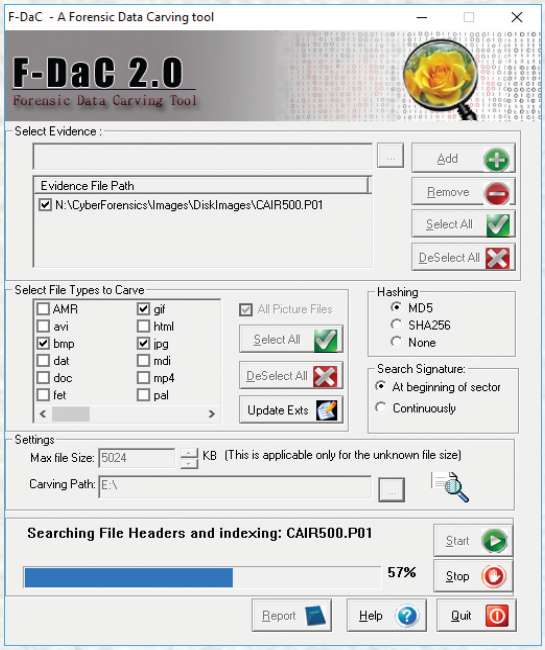
Face Recognition System

C-DAC has enhanced its face recognition system to identify and verify human's identity from the facial image. The software ideally works on frontal facial image. The tool can identify/verify human's identity from the facial image. The software ideally works on frontal facial image. The tool can tolerate moderate pose, intensity and illumination variation. The system is devised to handle large database and can handle 1,00,000 to 5,00,000 facial images and supports different types of input images like digital image, scanned image, color image and b/w image etc. Pilot deployment has been carried out for Law Enforcement Agencies.

Cyber Forensics

C-DAC is continuously enhancing the cyber forensics tools and solutions, keeping in view the increasing demand for the forensic tools and the evolving requirement for new features. C-DAC has developed various Cyber Forensics tools for Disk Forensics, Network Forensics, Mobile Forensics, Live Forensics, Image Forensics and Data Recovery. C-DAC enhanced various tools including CyberCheck suite 6.0 (Disk Forensic Solution), F-DaC (Forensic Data Carving tool), F-Ran (Forensic Registry Analyzer), MobileCheck (Forensics tool for Mobiles / Smart Phones), Advik (CDR Analyser), Netforce Suite, Win-LiFT (A Windows Live Forensics tool), SIMXtractor, SIMAnalyzer (SIM card Imaging and Analysis Tool), True Traveller v3.1 and True Imager3.0.

During the year, C-DAC continued its efforts in deploying the enhanced versions of the solutions for various organizations including law enforcing agencies across the county. These deployments include CyberCheck suite 6.0 at 24 organizations, F-DaC and F-Ran at 1 organization, MobileCheck at 13 organizations, Advik CDR Analyser at 9 organizations, Netforce Suite at 12 organizations, Win-LiFT a Windows Live Forensics tool at 9 organizations, SIMAnalyzer at 9 organizations, True Traveller at 11 organizations and True Imager3.0 at 11 organizations.



Cyber Forensics - Data Carving Tool

Information Security Services Offered

As a CERT-In empaneled organization, C-DAC continues to offer Vulnerability Assessment and Penetration Testing (VA/PT), security testing and auditing services for government and private organizations. C-DAC is actively involved in carrying out Network VA/PT, Web Application Penetration Testing & Mobile Application Penetration Testing, e-Sign Compliance Audit services, Audits for Aadhaar compliant services etc. **During the year, these services were extended to around 120 organizations across the country.**

Training and Awareness Generation Initiatives

As part of National Digital Crime Resource and Training Centre (NDCRTC) setup at SVP National Police Academy by C-DAC, 72 training programmes were conducted in Disk Forensics, Mobile Foensics, CDR Analysis and Network Forensics. 2237 participants were training which include IPS Probationers, police officers of different ranks from different States of India, Department of Telecom Officers, Ordinance Factory Faculty, Counter Intelligence Staff, DoF Intelligence, Central Exercise & Service Tax, DRI, Cabinet Secretariat, CBDT, ED, Navy etc.

As part of Information Security Education and Awareness (ISEA) initiative, 17 Advanced Faculty training programs & 41 industry based workshops were conducted covering 1383 participants, 48 short term courses were conducted covering 1561 participants and 81 government official trainings were conducted covering 2346 participants. Under National Awareness Campaign on Information Security, various workshops were conducted across India. Three cyber security awareness weeks were conducted at Coimbatore, Mangalore City & Rural Police and Himachal Pradesh. Specialized awareness programs were telecasted in Doordarshan as well as AIR in Telangana and Andhra Pradesh.

Health Informatics

Use of information systems and concepts in healthcare continues to be C-DAC's major area of contribution to development of technologies and solutions for societal benefit. During the year C-DAC developed systems and solutions for diagnosis, improvisation of health processes, healthcare standards and telemedicine. The activities carried out by C-DAC during the year in this thematic area are described below.

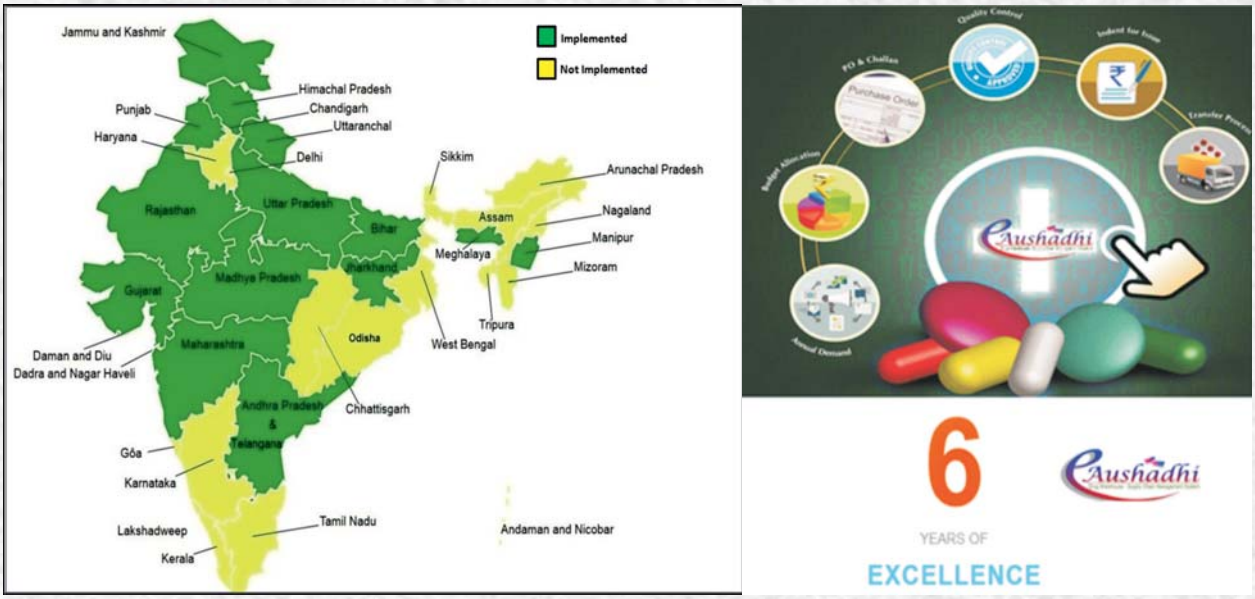
Health Information Systems and Telemedicine Solutions

Drug Supply Chain Management Solution

C-DAC's 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) from where the drugs are issued to the patients in an entire state, who are the final consumers in the chain.

The e-Aushadhi solution has been selected for deployment at States of Bihar, Manipur, Meghalaya, Jharkhand, Himachal Pradesh, and Uttar Pradesh. The solution will also be deployed at department/agencies namely Central Tuberculosis Division (CTD) and Division of Family Planning of Ministry of Health & Family Welfare. e-Aushadhi contributes to serve around 1-2 lakh patient in a state/day or even more and managing huge volumes of data with recurrent transactions

Additionally, States of Bihar and Jharkhand have also selected **Equipment Maintenance and Management System (EMMS)** and **Human Resource and Finance Management System (HFMS)** solutions for upkeep of equipment and administration of personnel and related financial affairs.



Nation-wide Implementation of e-Aushadhi

Telemedicine Network under DISC Initiative

C-DAC established three telemedicine sub networks under the aegis of project titled "Digital Inclusive and Smart Community (DISC)" which is a part of Digital India Programme of Government of India in order to extend tertiary level healthcare services to the rural population at community level in rural & remote areas of India through Tele Consultation Centres (TCC).

The first phase of Tele-medicine services of Employees State Insurance Corporation (ESIC) has been established for providing specialist medical services at a distance to insured workers. With this, ESIC's Model Hospital at Basaidarapur has been connected with three ESIC dispensaries at Katihar (Bihar), Unnao (UP) and Rudarpur (Uttrachal). The second phase of telemedicine services implemented by C-DAC consists of ESIC dispensary, Dimapur (Nagaland), Shillong (Meghalaya) and Agartala (Tripura) connected to ESIC Hospital, Joka, Kolkata w.e.f. December 1, 2016. These were launched by Shri Bandaru Dattatreya, Hon'ble Minister of State (Independent Charge) for Labour & Employment.

C-DAC also completed telemedicine deployment at 4 hospitals at Jodhpur and Pali; All India Institute of Medical Sciences (AIIMS), Jodhpur, Mahatma Gandhi Hospital, Jodhpur, MDM Hospital, Jodhpur and District Hospital, Pali for setting up of Telemedicine Network DISC-Health (TND) in Rajasthan.

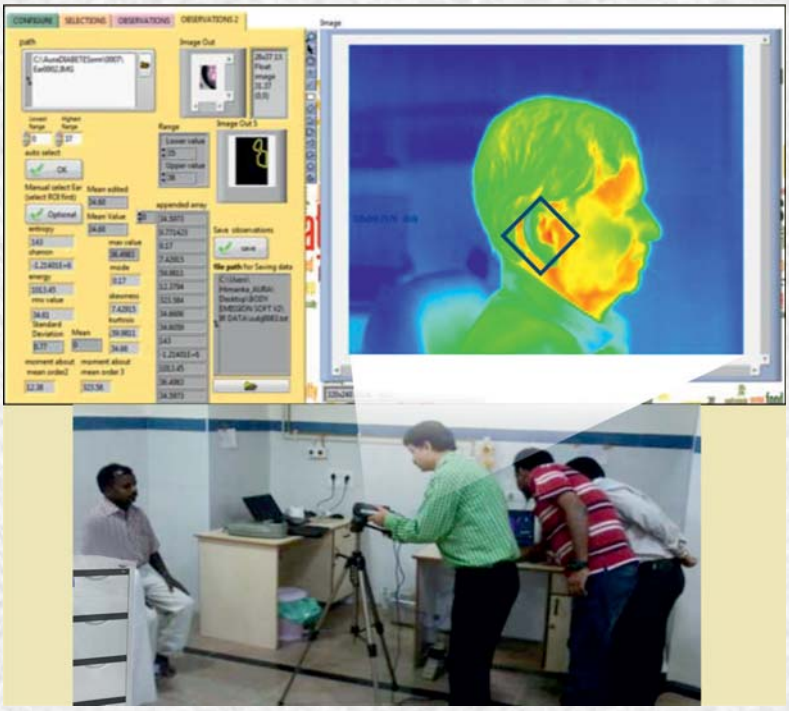
Healthcare Solutions

Intelligent Diabetic Olfactory device (iDol)

Intelligent Diabetic Olfactory Device (iDol) is a portable and battery operated instrument for rapid, in-situ and non-invasive detection of diabetic disease through exhaled breath analysis. Medical College and Hospital, Kolkata provided experimental support and medical domain expertise to build the system. **The system has been validated for around 500 subjects.**

Infrared (IR) and Gas Discharge Visualization (GDV) based Diabetes Screening System

A solution for Diabetes disorder screening using Infra-Red (IR) and Gas Discharge Visualization (GDV) imaging has been developed by C-DAC in virtual instrumentation environment. The solution uses infrared thermal imaging or GDV imaging to analyze Human Body Emission to establish diabetes screening through pattern recognition techniques to develop interpretation software for integrating in Advanced Computing Systems. The solution has been verified through clinical bio-chemical test results for accuracy. The research work and allied developmental experiments were carried out in collaboration with SRM Hospital and Research Centre, Chennai and Defense Institute of Physiology and Allied Sciences (DIPAS-DRDO), Delhi which provided experimental support and medical domain expertise.



Data Acquisition and Testing of IR based Imaging System for Diabetes Screening

Diabetic Retinopathy Identification Software for Timely Intervention

C-DAC has developed an automated system for early detection and screening of Diabetic Retinopathy (DR) from retinal images. The system detects various lesions of DR like micro aneurisms, exudates and hemorrhages and classifies the retina as DR or non-DR. **The system has been validated on around 5000 retinal images taken from Regional Institute of Ophthalmology (RIO), Thiruvananthapuram.**

Bio Informatics Computational Research for Development of recombinant BCG vaccine and complimentary diagnostics for TB control in cattle

BCG vaccination is not used to control bovine tuberculosis, despite its proven efficacy in cattle, as vaccination interferes with the Purified Protein Derivative (PPD) test. Hence need has been identified to generate a modified BCG vaccination with specific antigens deleted. These antigens could then be incorporated into currently available diagnostic tests in order to enhance sensitivity and specificity. **C-DAC has developed a computational pipeline for analysis of transposon sequence data and handed over to Department of Biotechnology, Government of India to be further used for vaccine design.**

Development of Computer Aided Detection System for Mammograms

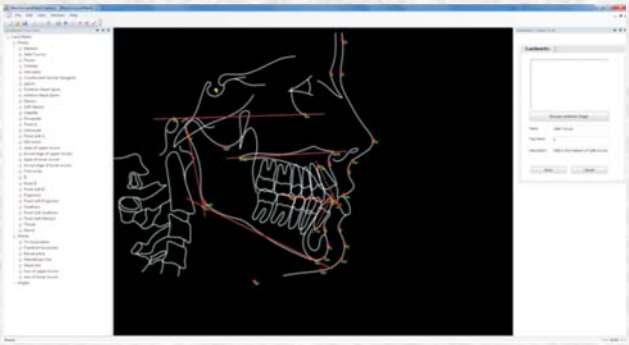
C-DAC developed an automated system for early detection and screening of breast cancer based on mammogram image analysis. This is a software system which detects breast lesions like micro-calcifications, mass and architectural distortion from mammogram images. The application provides facility for Breast Imaging-Reporting and Data System (BIRADS) standard based reporting. **The application was validated on around 10000 mammogram images from Regional Cancer Centre (RCC), Thiruvananthapuram.**

Leprosy Monitoring System

A web and mobile based solution for systematic data management and real-time monitoring of Leprosy suspects and patients has been developed to facilitate Leprosy Eradication initiative in the country. The solution enables Accredited Social Health Activists (ASHAs), Auxiliary nurse midwives (ANMs), field executives, medical or paramedical staff at Block or Primary HealthCare (PHC) level to collect healthcare information of suspected to confirmed cases, monitor and supervise treatment and its outcome at central level, timely intervention for Multidrug Therapy (MDT) treatment, follow-up, patient relocation, drug stock and other details. The application uses GIS and generates alerts and reminders using SMS service. It is made available for use at http://www.leprosy.gov.in/

Maxillo-Facial Surgery Planning and Simulation System

C-DAC has undertaken a project to develop an efficient, reliable, and cost effective planning and simulation system for maxillo-facial surgery. The system enables precise 2D cephalometric analysis and interactive manipulations of the three-dimensional reconstruction of the facial tissues in order to visualize the patient's post-operative appearance. The project is being carried out in collaboration with All India Institute of Medical Sciences (AIIMS), New Delhi. The figure given below shows "Downs Analysis Template" which is the landmark template for analyzing facial profiles using Downs method.



Software Screen Shot of Maxillo-Facial Surgery Planning and Simulation System

Healthcare Standards

Setting up of Interim National Release Centre (iNRC) of India as Member Country of IHTSDO

C-DAC setup and operated an Interim National Release Centre (iNRC) in India for SNOMED CT after India became member of the International Health Terminology Standards Development Organization (IHTSDO). The iNRC acted as the central point of contact for distribution of SNOMED CT release files, promotion, tools, and knowledge regarding incorporation and usage of SNOMED CT in healthcare applications across the country. **C-DAC provided 192 SNOMED CT affiliate licenses in India and provided direct implementation support to vendors and hospitals**. C-DAC also conducted workshops on SNOMED CT, trainings to vendors and Nurse Informatics Specialists (NIS) Staff, and several sessions/ talks/ lectures in various regional and national events. Around 2000 people got directly benefitted from the support, awareness and training programs under iNRC. With promotion and support of IHTSDO administered training program carried out by C-DAC, there are more than 100 certified SNOMED CT professionals in India.

Setting up of National Resource Centre for EHR Standards (NRCeS)

C-DAC has undertaken a project to setup and operate a Centre of Excellence for providing tools, training, knowhow and other resources in developing, implementing and using EHR standards in healthcare applications within India. The six chosen functional areas under the project, selected as necessary to build ecosystem, knowledge and technical support structure towards adoption and adherence of notified EHR Standards are; Training and Promotion, Tools Development, Implementation Support, National Releases and Extensions, Liaison with Standards Organization, and Advisory & Consultation. The project is funded by Ministry of Health & Family Welfare, Government of India.

National Resource Centre for EHR Standards (NRCeS)

Education and Training

Education and Training activities at C-DAC are dedicated to create high quality manpower for R&D and the IT industry in general. The courses are offered through training centers associated with C-DAC R&D known as Advanced Computing Training School (ACTS) at 11 locations and network of 15 Authorized Training Centers (ATCs) in India. ACTS emerged as the top finishing school in IT training through its unique curriculum and in anticipating upcoming requirements of IT industry by launching new courses. Through its state of art training methodology, it is fulfilling its objective of creating highly skilled IT resources and recognized by major corporate in India to be a preferred high-end provider of skilled manpower in areas of ICT.

Over the last twenty five years, the activities of ACTS have extended manifold nationally and internationally. These have proliferated abroad with collaborative training operations at more than 35 countries around the world.

C-DAC's Education and Training division is involved in the following activities:

- Industry-specific PG Diploma programmes
- Industry-Academia collaborative formal education programmes
- Corporate training programmes
- Tech Sangam -Industry-academia collaborative programmes
- IT Skill Development programs for social sector
- International Initiatives
- Development and deployment of technologies for education and training

Following are the major activities carried out under these categories during the year:

Industry-Specific PG Diploma Programmes

Major focus of C-DAC's education and training is to generate industry-ready manpower in ICT areas. Towards this objective, C-DAC conducts the following PG Diploma programmes:

- PG Diploma in Advanced Computing (PG-DAC)
- PG Diploma in Big Data Analytics (PG-DBDA)
- PG Diploma in Mobile Computing (PG-DMC)
- PG Diploma in System Software Development (PG-DSSD)
- PG Diploma in IT Infrastructure, Systems & Security (PG-DITISS)
- PG Diploma in Geo-informatics (PG-DGi)
- PG Diploma in Embedded Systems Design (PG-DESD)
- PG Diploma in VLSI Design (PG-DVLSI)
- PG Diploma in Biomedical Instrumentation & Health Informatics (PG-DBIHI)

During the year, 6918 students enrolled in these nine PG Diploma programmes after clearing national level stringent admission test and 70% students were placed after successful completion of the PG Diploma programmes through National Common Campus Placement Programme.

During the year, two new Post-Graduate Diploma programmes have been launched:

- Post Graduate Diploma in High Performance Computing System Administration (PG-DHPCSA)
- Post Graduate Diploma in Internet of Things (PG-DIoT)

Formal Education Programmes in Collaboration with Universities

Towards high-end education and research, C-DAC conducts the following programmes in collaboration with leading universities for award of Masters Degree. Total of 31 students were enrolled in these programmes during the year:

- M.Tech. / M.E. in VLSI & Embedded Systems Design

- M.Tech. in High Performance Computing
- M.Tech. / M.E. in IT Systems & Network Security

Corporate Training Programmes

C-DAC based on its expertise in various R&D areas offers corporate training programmes to the government and corporate sector. As a part of this initiative, C-DAC has conducted various types of training programmes for personnel of Indian Post Office, L&T Technology, Life Insurance Corporation, National Crime Record Bureau, Southern Command, Military Engineering School & Depot and other defense establishments. Corporate training programmes conducted by C-DAC during the year include training programmes on Information and System Security, IT Manager Program, System Administration and Networking Management, Basic and Advanced Java, Certificate courses in Information Security, etc. Corporate training programmes were conducted at various locations including New Delhi, Pune, Mumbai, Ahmednagar, Vishakhapatnam, Ahmedabad, Bengaluru, etc.

Tech Sangam: Industry-Academia Collaborative Programmes

C-DAC has collaborated with the leading technical Institutions for providing various programmes including Faculty Development Programmes (FDP), e-Learning, Research & Development and IT skill courses for the students. Details of these programmes are given below.

- FDP on “Advanced Computing and Application Development: A Parallel Programming Approach” in association with Intel.
- FDP’s in association with NIT Warangal in 4 areas for 113 faculty members from Telangana and Andhra Pradesh.
- Established C-DAC Centre of Excellence in ICT in collaboration with C.V Raman College of Engineering, Bhubaneshwar for R&D activities and ICT Education and Training benefitting 180 students and faculties of this college.

IT Skill Development Programs for Social Sector

In-line to the government’s IT skill development initiative, C-DAC has carried out various training programmes during the year. Details of these programmes are given below.

- **Free Training Program for SC, ST and OBC Candidates of Bihar**
  Conduct of PG Diploma in Advanced Computing (PG-DAC) and various certificate courses for the candidates from Scheduled Caste (SC), Scheduled Tribes (ST) and Other Backward Class (OBC) belonging to the state of Bihar in association with Department of Information Technology (DIT), Government of Bihar and Bihar Knowledge Society (BKS). 45 students were trained in Certificate courses and 72 students were trained in PG-DAC courses.

- **Free IT Training Program for SC and ST Candidates of Jharkhand**
  Conduct of various IT Certificate courses in the areas of Business Computing, Java Programming and Multimedia & website designing for the candidates from SC and ST belonging to the state of Jharkhand in association with Information Technology Department, Government of Jharkhand. 87 students were trained in Certificate Courses.

- **IT Training for Economically Challenged students**
  Conduct of training in five Certificate Courses in Java Programming, Software Testing, Android Programming, Embedded Programming and Network Security in association with NASSCOM Foundation and AMDOCS. 250 students were trained in these courses.

- **Capacity Building in IT Skills for ST Candidates in Andaman & Nicobar and Chhattisgarh**
  Set up IT training centers equipped with necessary IT infrastructure to promote entrepreneurship in Andaman & Nicobar and state of Chhattisgarh and to impart job oriented training to ST candidates (including women).

- **Short-term Courses on Data Science**

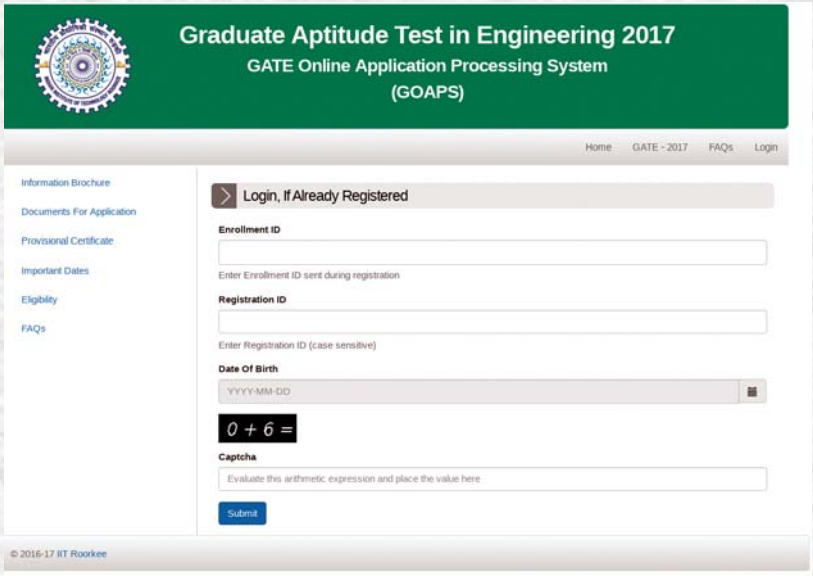
  Conduct of various short-term courses on Data Science for about 100 members in various areas such as "Using R for Data Visualization and Analytics", "Text Analytics and Predictive Analytics" and "Recommender Systems (PARS)".

Development and Deployment of Technologies for Education and Training

C-DAC develops and uses various software that aid in management and delivery of education and training in effective manner. Some of these are described below.

GATE 2017 and JAM 2017 Exam Automation

- Automation of GATE 2017 examination covering candidate registration, Online application, application scrutiny, seat allocation, hall ticket issue, result processing and score generation. **About 10 Lakh candidates appeared for the examination.**



GATE Online Application Processing System – GOAPS

- Automation of JAM 2017 examination covering candidate registration, Online application, application scrutiny, seat allocation, hall ticket issue, result processing and score generation, Choice Filling, Application Scrutiny, Seat Allocation. **About 60000 candidates appeared for the examination.**

Deployment of eMentor- Learning Management System (LMS) and Learning Content Management System (LCMS)

eMentor is a web-enabled LMS and LCMS that encompasses training, education, just-in-time information and communication, computer-based learning, virtual classrooms and digital collaborations. **During the year, the system was deployed at ICT Resource Centre at Nelson Mandela African Institute of Science & Technology (NM-AIST), Arusha, Tanzania.**

Resources, Facilitation Services and Initiatives

International Collaborations/Initiatives

With support from Ministry of External Affairs (MEA), C-DAC extends its expertise in ICT to collaborating nations and nurtures their ICT centres. During the year, the following activities were carried out as part of this initiative:

1. Centers of Excellence in Software Development and Training (CESDT) in Cambodia, Lao PDR, Myanmar and Vietnam for capacity development in Education and Training in collaboration with Ministry of External Affairs (MEA), Govt. of India and respective countries.
2. ICT Resource Centre at Nelson Mandela African Institutions of Science & Technology (NM-AIST) in Arusha, Tanzania in collaboration with Ministry of External Affairs (MEA), Govt. of India, Ministry of Communication Science & Technology, Government of the United Republic of Tanzania and Nelson Mandela African Institutions of Science & Technology.
3. Centre of Excellence in IT at INICTEL-UNI in Lima, Peru in collaboration with Ministry of External Affairs (MEA), Govt. of India, Ministry of Science & Education, Government of Peru and National Institute of Research and Telecommunication Training, Government of Peru.
4. Centre of Excellence in IT at UTN in Ibarra, Ecuador in collaboration with Ministry of External Affairs (MEA), Govt. of India, Ministry of Foreign Affairs, Trade & Integration, Government of Ecuador, Universidad Tecnica Del Norte, Government of Ecuador and Yachay University, Government of Ecuador.
5. Centre of Excellence in IT at Technopark Casablanca, Morocco in collaboration with Ministry of External Affairs (MEA), Govt. of India, Ministry of Industry, Trade Investment, Digital Economy, Government of Kingdom of Morocco, National Institute of Post & Telecommunications (INPT) and Government of Kingdom of Morocco.
6. Centre of Excellence in IT at Al Azhar University Cairo, Egypt in collaboration with Ministry of External Affairs (MEA), Govt. of India, Ministry of Foreign Affairs, Government of the Arab Republic of Egypt and Al Azhar University, Government of the Arab Republic of Egypt.
7. 'India – Palestine Centre of Excellence in ICT and Digital Learning & Innovation Centre' (IPCEICT & DLIC) in collaboration with Ministry of External Affairs, Government of India and Al-Quds University, Government of Palestine.
8. Central Asia e-Network to offer Tele-education and Tele-medicine services to support the 5 Central Asian countries namely Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan & Kazakhstan in collaboration with Ministry of External Affairs (MEA), Govt. of India and respective Governments, Hospitals and Universities of corresponding Central Asian countries.
9. Computer labs in 37 Schools of Tajikistan in collaboration with Ministry of External Affairs, Government of India and Ministry of Education & Science, Government of the Republic of Tajikistan.
10. Upgradation of the existing IT Infrastructure and associated software at the CARICOM Secretariat, Guyana and its associated offices in Barbados & Jamaica in collaboration with Ministry of External Affairs (MEA), Govt. of India and Caribbean Community Secretariat in Guyana with associated offices in Barbados & Jamaica.
11. India – Papua New Guinea Centre of Excellence in IT (CEIT) at Port Moresby in collaboration with Ministry of External Affairs, Govt. of India and University of Papua New Guinea (UPNG), Government of Independent State of Papua New Guinea.
12. India – Vanuatu Centre of Excellence in IT (CEIT) at Port Vila in collaboration with Ministry of External Affairs,

Govt. of India and Vanuatu Institute of Public Administration (VIPAM), Government of Vanuatu.

13. India – Guyana Centre of Excellence in IT (CEIT) at Guyana in collaboration with Ministry of External Affairs, Govt. of India and Government of Guyana.
14. Computer labs in 50 schools of Vayots Dzor Region of Armenia in collaboration with Ministry of External Affairs, Govt. of India and Hayastan All Armenian Fund (HAAF), Government of Armenia.
15. E-libraries at 49 Schools and 12 Colleges across Bhutan to access knowledge base with the help of modern ICT technologies in collaboration with Ministry of Foreign Affairs, Government of India, Ministry of Education, Royal Government of Bhutan and Gross National Happiness Commission, Royal Government of Bhutan.
16. India – Kazakhstan Centre of Excellence in ICT (IKCEICT) in Astana, Kazakhstan in collaboration with Ministry of External Affairs, Government of India, Ministry of Education and Science of the Republic of Kazakhstan and L.N. Gumilyov Eurasian National University, Republic of Kazakhstan.

Patents

Patents Awarded

1. "A method and system for debugging or run-time profiling of applications on heterogeneous computational grids and geographically distributed systems", Inventor(s): Asvija B, Shamjith KV, Mangala N, Prahlada Rao BB, Mohanram N, Indian Patent No.275095.
2. "Instrument for Appearance based Fermentation Process", Inventor(s): Amitava Akuli, Abhra Pal, Vamshi Krishna Palakurthi, Nabarun Bhattacharyya, Jayanta Kumar Roy, Rabindranath Kanjilal, R.Ravindra Kumar, Indian Patent No. 277032.

Patents Filed

1. "A System and Method for Facilitating Web Page Security", Inventor(s): Sai Gopal Tatikayala, Ravi Kishore Koppuravuri, Jyostna Grandhi, P Reddy Lakshmi Eswari, Magesh Ethirajan.
2. "A Field Portable Uniform Illumination Imaging Biosensory System (UIIBS) based Remotely Screening Chemical Contaminants In Agri based Setup", Inventor(s): Sunil Bhand, A. K. Barooah, Subhankar Mukherjee, Abhra Pal, Souvik Pal, Devdulal Ghosh, Subrata Sarkar, Arun Jana, Ravi Sankar, Raktim Pal, Sangeeta Brochetia.
3. "A Process based forming a Molecular Imprinted Polymer (MIP) based Electrode based Accurate Quantitative Detection of Total Theaflavin (Tf) In Black Tea", Inventor(s): Nabarun Bhattacharyya, TrisitaNandy Chatterjee, Runu Banerjee Roy, Bipan Tudu, Panchanan Pramanik, Pradip Tamuly, Rajib Bandyopadhyay, Devdulal Ghosh.
4. "An Electrical Device to Delimit the Current Change Rate in Switch and Energy in Microwave Tube during Crowbar Operation", Inventor(s): Subhash Joshi, Aby Joseph, Lakaparampil, Vinod John.
5. "A Novel Evaluation Method based Microwave Tube Protective Device with Fuse Wire based on Exact Fault Current", Inventor(s): Subhash Joshi, Rajiv Iyappan, Aby Joseph, Lakaparampil, Vinod John.
6. "Device and Method based Real-Time Monitoring and Control of Distributed Power Generating Systems", Inventor(s): Sreekumari, Bhavani Amma, Jiju Kuttipalakkal, Brijesh Puthumana, Saranya Sarachandran, Stanley Regis Muthuswamy, Anoop Podiyan.
7. "System based Securing User Identity Information and a Device Thereof", Inventor(s): Jiju Kuttipalakkal, Arya Girija Lal, Stanley Regis Muthuswamy.

Copyrights

Copyrights Awarded

1. "Syllabus of Parallel Computing Training Programme titled 'THINK PARALLEL'", Inventor(s): Mangala N, N Sarat Chandra Babu.

2. “Web-based Integrated Office Automation System”, Inventor(s): Mina H.K. Desai, Sankha Nath Ghosh, Niladri Sekhar Saha, Samaresh Das, Arghya Ghosh, Argha De, Abhijit Roy.

Copyrights Filed

1. “Ne-Fresh Online Auction System”, Inventor(s): Gautam Kumar Saha, Debdulal Basak, Raja Gupta, Manas Chakraborty, Manish Kumar Saha, Samaresh Das, Sandeep Kumar, Niladri Sekhar Saha, Shampa Dey.
2. “DRISTI“, Inventor(s): Athulya K Das, Deepak R U, Sharath Kumar P N, Midhun Raj R S, Rajesh Kumar R.
3. “Automated Real Time Retinal Image Quality Notifier”, Inventor(s): Athulya K Das, Deepak R U, Sharath Kumar P N, Sasi P M, Rajesh Kumar R.
4. “Bio Medical Signal Analyzer based Seizure Prediction”, Inventor(s): Sudalaimani C, Asha S A, Parvathy K, Devanand P, Elizabeth Thomas T, Sasi P M.
5. “Web based Medical Information Extractor System”, Inventor(s): Thara S Pillai, Asha S A, Elizabeth Thomas T.
6. “Automated Feature Extractor based Biomedical Signals”, Inventor(s): Parvathy K, Asha S A, Sudalaimani C, Elizabeth Thomas T, Sasi P M.
7. “EEG Analyser based Seizure Detection”, Inventor(s): Asha S. A., Sudalaimani C, Devanand P, Elizabeth Thomas T.
8. “mCAD – A Computer Aided Detection Software for Mammograms”, Inventor(s): Byju N B, Rajesh Kumar R, Pournami S Chandran, Nisha Kumari K N, Sasi P M.
9. “Advik CDR Analyzer”, Inventor(s): AnwerRevaz J, Akhi M B, Sajeena A.
10. “Cyber Check”, Inventor(s): Balan C, Dija S , AnwerReyaz J , Sreeja S.C, Anoop, Danalakshmi, Suma, Dagma Gonsalvez, Kumar S, Anaswara Nair, Aakrishta A L, Gayathri S.
11. “Mobile Check”, Inventor(s): Satheesh Kumar S., Jinu Kumar S V, Bibin Thomas, Kevin Joseph Francis, Anil, Vishnu R G, Rahul S, Dija S , Indu V, Mohammed Shanji T H.
12. “DLMS Protocol Stack based AMI Smart Meter”, Inventor(s): Reshma S L, Sreekumari B, Jiju K, Ajin A, Sreedevi V S.

Awards/Recognitions

1. **HARITA-PRIYA** (WSN Application in Agriculture) project received **World Summit on Information Society (WSIS) 2016** Prize under ICT Application: e-Agriculture category at WSIS Summit 2016 held at Geneva during May 2 – 6, 2016.

HARITA PRIYA won WSIS 2016 prize

2. C-DAC received CSI Nihilent e-Governance Awards for the projects listed below in various categories at Coimbatore, Tamil Nadu on January 24, 2017.
   a. **SUGAM – An e-Governance Solution**
   b. **Electronic Project Proposal Management System (ePPMS)** for Science and Engineering Research Board (SERB)
   c. **Mobile Seva**

Mobile Seva won CSI-Nihilent e-Governance Award

3. C-DAC has been awarded **Digital India Awards 2016** – Gold under "Most Innovative Citizen Engagement" category for the project "Online Management, Monitoring and Accounting System (OMMAS) for Pradhan Mantri Gram Sadak Yojana (PMGSY)" during award ceremony held at New Delhi on December 19, 2016.
4. C-DAC has been awarded awards listed below for the project "Centralized e-Auction System for North Eastern States (Sikkim, Assam, Arunachal Pradesh, Meghalaya, Mizoram, Manipur, Tripura and Nagaland)".
   a. **6th e-North East Award** at Shillong. Meghalaya.
   b. **South Asia Manthan Award 2016** at Faridabad, Haryana on February 25, 2017.

Centralized e-Auction System for North Eastern States won 6th eNorth East Award 2016

5. C-DAC received the prestigious **Platinum Skoch Award for 2016** for the project titled "**Cloud Enabled Energy Market Services for SLDCs of NER States**" at the 45th Skoch Summit held at Hyderabad, Andhra Pradesh on September 9, 2016.

Cloud Enabled Energy Market Services for SLDCs of NER States won Platinum Skoch Award

Events/Conferences

1. Inauguration of "Indo-Bhutan e-Library" in collaboration with Embassy of India, Bhutan, Ministry of Education, Royal Government of Bhutan and Gross National Happiness Commission, Royal Government of Bhutan at Motithang Higher Secondary School, Motithang, Thimphu, Bhutan on September 5, 2016.

Inauguration of Indo-Bhutan e-Library by Indian Ambassador, Jaideep Sarkar and Minister of Education (Bhutan) Norbu Wangchuk

2. Inauguration of "PARAM Shavak" at Mini Data Centre and laboratory visit of Honourable IT Minister of West Bengal at C-DAC Kolkata on November 24, 2016.

Inauguration of PARAM Shavak by Hon'ble IT Minister of State West Bengal Shri Bratya Basu

3. Visit of Hon'ble President of India to "India – Ghana Kofi Annan Centre of Excellence in ICT (AITI-KACE) in Accra, Ghana" in collaboration with India – Ghana Kofi Annan Centre of Excellence in ICT (AITI-KACE) in Accra, Ghana, High Commission of India, Accra, Ghana, Ministry of External Affairs, Government of India at AITI-KACE, Accra, Ghana on June 15, 2016.

Visit of Hon'ble President of India Shri Pranab Mukherjee to India-Ghana Kofi Annan Centre of Excellence

4. Conference on "Industry 4.0 and its impact on the patent system" at Technology Information, forecasting and assessment Council (TIFAC), Delhi on September 30, 2016.

Dr. Debashis Dutta at Conference on Industry 4.0 and its impact on the patent system

5. "Indo Belarus Bilateral Workshop on Cyber Security" for the scientists of Belarus in collaboration with Department of Science and Technology, Government of India on November 15 – 16, 2016.

Indo Belarus Bilateral Workshop on Cyber Security

6. Launch of USB Pratirodh 3.0, M-Kavach 2.1.9 and AppSamvid 2.0.1 for free download by Shri Ravi Shankar Prasad, Hon'ble Minister for Electronics and Information Technology as part of Cyber Swachhta Kendra inauguration at New Delhi on February 21, 2017.
7. Conclave on "PARAM Supercomputing" in collaboration with Intel at Bhubaneswar, Odisha during January 20 - 21, 2017.

Conclave on PARAM Supercomputing at Bhubaneswar

8. Inauguration of ACTS facility by Sh. P.P. Chaudhary, MoS Law and Justice, Electronics & IT, Government of India at C-DAC, Pune on November 19, 2016.

Inauguration of ACTS facility by
Shri P P Chaudhary , Hon'ble Minister of State Law and Justice, Electronics & IT

9. Workshop on "Accelerating Biology 2017: Delivering Precision" at Yashada, Pune during January 17 - 19, 2017.

Workshop on Accelrating Biology 2017: Delivering Precision at Yashada, Pune

10. Inauguration of PARAM ISHAN at IIT Guwahati and HPC Workshop in collaboration with IIT Guwahati at IIT Guwahati on September 19, 2016.
11. Workshop on "Mobile Seva Consultation" at MeitY on November 21, 2016; at C-DAC Mumbai on February 24, 2017.
12. “GARUDA-NKN Partners’ Meet 2016” at IISc Bangalore during September 8 - 9, 2016.
13. Conference on "PARCOMPTECH INDIA 2017" at IISc Bangalore during February 23 - 24, 2017.
14. Launch of Web-enabled Access of Weather Information and Agri-Advisories through website and Mobile Devices (WEAAI) in “AgroTech 2017, Kisan Mela” in collaboration with Birsa Agriculture University (BAU), Ranchi at Birsa Agriculture University (BAU), Ranchi on March 21, 2017.

Event on Agrotech 2017, KisanMela in collaboration with Birsa Agriculture University (BAU), Ranchi at Ranchi.

15. Workshop on "Big Data Analytics" at Centre for e-Governance (CeG), MeitY, New Delhi on January 25, 2017.
16. “Indo-German workshop on HPC Architectures & Applications” at C-DAC Pune during November 29 - 30, 2016.
17. Inauguration of HPC Facility and HPC workshop at Tezpur University, Assam during August 09-11, 2016.
18. Workshop on "HPC and Parallel programming" at India Kazakhstan CoEICT, Astana during August 29 - September 2, 2016; at Nelson Mandela Advanced Institute for Science and Technology, Arusha, Tanzania during October 17-21, 2016 and at C-DAC Pune during November 14-19, 2016.

19. Workshop on "Hydroponics" in collaboration with University of Horticulture and Forestry (UHF), Solan at UHF, Solan on December 19, 2016.
20. Workshop on "Speech Processing Applications on North East Languages" in collaboration with Assam University, Silchar and North Eastern Regional Institure of Science and Technology (NERIST), Arunachal Pradesh at NERIST, Arunachal Pradesh and Assam University, Silchar on August 6, 9, 10, 2016.
21. Workshop on "Machine Translation (KokBorok)" in collaboration with ICFAI University at ICFAI, Tripura during August 17 - 18, 2016.
22. Workshop and Training on "EHR Standards, Introduction & Integration Approaches for SNOMED CT Standard" in collaboration with State Health Systems Resource Centre Kerala (SHSRCK), Trivandrum at Trivandrum during June 24-25, 2016.
23. Workshop on "Introduction to EHR Standards" in collaboration with AIIMS Raipur at AIIMS Raipur on February 28, 2017.
24. Conference "GEOVISION – 2016 – Smart Cities and Geo-ICT initiative" in collaboration with Indian Society of Geomatics (ISG), Pune chapter, Indian Water Resources Society (IWRS), Pune centre, Symbiosis Institute of Geoinformatics (SIG), Pune at Symbiosis Institute of Geoinformatics, Pune on June 18, 2016.
25. Workshop on "Cyber Security" in collaboration with Department of Science and Technology, Government of India during November 15 - 16, 2016.

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ToT of Handheld Electronic Nose (HEN) to M/s. Nagarjuna Fertilizers and Chemicals Limited, Hyderabad on April 29, 2016

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114. Anjali Taya, Balwinder Singh, Hitesh Pahuja, “Design and Analysis of Low Power Universal Line Encoder & Decoder”, Microelectronics and Solid State Electronics, Volume 5, Issue 1, Pp. 7 – 13, 2016.

115. Navneet Kaur, Hitesh Pahuja, Neha Gupta, Balwinder Singh, “Low Power FinFET based 10T SRAM Cell“, 2nd International Innovative Applications of Computational Intelligence on Power, Energy and Controls with their Impact on Humanity (CIPECH), 2016.

116. Gupta N, Pahuja H, “Design and Analysis of Single-Ended Robust Low Power 8T SRAM Cell”, MATEC Web of Conferences, Volume 57, 2016.

117. Phalit Mehta, Kriti Saroha, “Recommendation System for Learning Management System”, 2nd International Conference on ICT for Sustainable Development, July 1 – 2, 2016.

118. Sheshera Mysore, Manish Gupta, Swapnil Belhe, "Connected Operators for Non-text Object Segmentation in Grayscale Document Images", Proceedings of International Conference on Computer Vision and Image Processing (CVIP), Pp. 399 – 407, 2016.

119. Amit Saxena, Uddhavesh Sonavane, Sunitha Manjari, Rajendra Joshi, Sandra Gesing, Rolf A Heckemann, Michael Sullivan, Kenneth Buetow, Cezary Mazurek, Devdatt Dubhashi, Pankaj Agarwal, H Kim Lyerly, Jayashree Kalpathy-Cramer, Meenakshi Thakur, Sudeep Gupta, Rajendra Badwe, Paul Courtney, Anil Srivastava, “Insights into Cancer Research by the ICTBioMed Consortium”, Computational Approaches for Cancer Workshop (CAFCW-2016), 2016.

120. Ramesh Naidu Laveti, Prahlada Rao B B, Vineeth Simon Arackal, Arunachalam B, "Seasonal Ensemble Forecasting Application on Dependable Sumegha Scientific Cloud Infrastructure", International Symposium on Grids and Clouds (ISGC), ISGC, 2016.

121. Vineeth S Arackal, Arunachalam B, Kalasagar B, Sumit Kumar, Mangala N, Sarat Chandra Babu, Prahlada Rao, Sukeshini, “SuMegha Cloud Kit: Create Your Own Private Scientific Cloud”, International Symposium on Grids and Clouds (ISGC), ISGC, 2016.

122. Ramesh Naidu Laveti, Janaki Ch, Supriya N Pal, N Sarat Chandra Babu, “A Hybrid Recommender System using Weighted Ensemble Similarity Metrics and Digital Filters”, 23rd International Conference on High Performance Computing Workshops (HiPCW), 2016.

Invited Talks

1. N Sarat Chandra Babu, "Engineers in Nation Building", The Kongu Vellalar Institute of Technology Erode, Tamil Nadu, March 28, 2016.
2. N Sarat Chandra Babu, "IOT for Smart Cities and Related Concepts", APS College, Bangalore, August 18, 2016.
3. N Sarat Chandra Babu, "C-DAC's Role in High Performance Computing", Ritz Carlton, Bangalore, September 23, 2016.
4. N Sarat Chandra Babu, "IOT Systems and Solutions for Smart Cities", 3rd Edition of Sustainable Smart cities summit, Bangalore, September 23, 2016.
5. N Sarat Chandra Babu, "e-Science Activities in India/C-DAC", International Symposium on Grids & Clouds 2017 (ISGC 2017), Academia Sinica, Taiwan, March 4-10, 2017.
6. Shamjith K V, "Message Passing Interface", NIT Calicut, March 09, 2017.
7. Vineeth Simon Arackal, "MPI, Think Parallel- 2016 Workshop, C-DAC", Bangalore, April 21 and October 6, 2016.
8. Arunachalam, "Advanced MPI, Think Parallel- 2016 Workshop, C-DAC", Bangalore, April 22 and October 7, 2016.
9. Arunachalam, "Cloud Computing for IoT", Bangalore, April 27, 2016.
10. Kalasagar, "SuMegha Cloud Lab Kit", NIT Sikkim, May 14, 2016.
11. Kalasagar, "OpenStack Package Keystone and Glance", C-DAC Bangalore, June 23, 2016.
12. Arunachalam, "OpenStack Package Nova", C-DAC Bangalore, June 24, 2016.
13. Vineeth Simon Arackal, Kalasagar, "SuMegha", C-DAC Bangalore, October 1, 2016.
14. Vineeth Simon Arackal, Kalasagar, "SuMegha - Build Your Own Private Cloud", C-DAC Bangalore, October 4, 2016.
15. Arunachalam, "SuMegha Cloud Builder", Rajiv Gandhi University (RGU), Doimukh, Arunachal Pradesh, October 26,, 2016.
16. Kalasagar, Vineeth Simon Arackal, "Cloud computing and SuMegha", Sambhram Institute of Technology (SaIT), Bangalore, December 1, 2016.
17. Kalasagar, "OpenStack components", C-DAC Bangalore, December 21, 2016.
18. Vineeth Simon Arackal, "Cloud Interoperability and portability requirements", C-DAC Bangalore, December 22, 2016.
19. Vineeth Simon Arackal, "Tutorial on Convergence of Big Data, Cloud and IoT for the benefit of humanity", C-DAC Bangalore, February 22, 2017.
20. Vineeth Simon Arackal, "Smart City Panel discussion", VIT Chennai, March 23, 2017.
21. MohitVed, "Applications of Machine Learning and an Introduction to Deep Learning", Philips, Bangalore, November 24, 2016.
22. Supriya N Pal, "Career Path for Data Scientist/Analyst", Bangalore, November 19, 2016.
23. Ramesh Naidu Laveti, "Machine Learning Techniques and Demo/Lab with Application Use-Case Scenarios", Bangalore, November 19, 2016.
24. Janaki C H, "Variant spark to analyze diversity in rice genomes", ICRISAT, Hyderabad, November 23, 2016.
25. Supriya N Pal, "Open Source Tools & Technologies for Big Data Analytics in Government Applications", New Delhi, June 13, 2016.
26. Tulasi Dwarakanath V, Harikrishna V, "IoT protocols, Software for IoT", Periyar University, Salem, Tamil Nadu,

March 23, 2017.

27. Tulasi Dwarakanath V, Annie Joyce V, "IoT protocols and software", Sree Vidyaniketan College of Engineering, Tirupati, January 27, 2017.
28. Vaibhav Pratap Singh, Tulasi Dwarakanath V, "IoT protocols, Software Defined Networking", Siddhaganga Institute of Technology, Tumkur, December 21, 2016.
29. Kaushik Nanda, "IoT Workshop on Internet of Things", University of Calicut, Kerala, March 2017.
30. Mohanasundaram S V, "Applications of IoT in horticulture", Indian Institute of Horticulture Research (IIHR), Bangalore, September 2016.
31. Haribabu P, Kaushik Nanda, Mohanasundaram S V, Tulasi Dwarakanath V, Annie Joyce, Vaibhav Pratap Singh, "IoT - Technologies, Protocols and Applications", UbiComp INDIA 2016, The Chancery, Bangalore, May 27 - 28, 2016.
32. G Dhivya, M A Sherin, "AVR Microcontrollers", Indian Navy INS Shivaji, Lonavala, Maharashtra, November 15 - 23, 2016.
33. Raja M Vasudevan, "ARM Microcontrollers", Indian Navy INS Shivaji, Lonavala, Maharashtra, November 15 - 23, 2016.
34. P Poonguzhali, "Embedded Linux", Indian Navy INS Shivaji Lonavala, Maharashtra, November 15 - 23, 2016.
35. A Sivanantham, P Prasanth, V Arunkumar, "MATLAB for Engineering Students", Dr. B. R. Ambedkar Institute of Technology, Port Blair, Andaman & Nicobar Islands, June 15 - 25, 2016.
36. A Sivanantham, P Prasanth, "MATLAB for Faculty Members", Dr. B. R. Ambedkar Institute of Technology, Port Blair, Andaman & Nicobar Islands, May 9 - 20, 2016.
37. P Prasanth, "Embedded Systems", Meenakshi Sundararajan Engineering College, Chennai, January 27, 2017.
38. K Vijay Kumar, "Introduction to e-Governance (Principles & Practices)", Anna Institue of Management, RA Puram, Chennai, Tamil Nadu, February 20, 23, 27, 2017.
39. K Vijay Kumar, "Big Data Analytics in Agriculture", ICAR-National Academy of Agricultural Research Management, Hyderabad, Telangana, June 15 - 16, 2016.
40. S Kailash, "Meghdoot- The Open Cloud Initiative", The International Training Centre for Information Systems and Audit, New Delhi, January 12, 2017.
41. Sunil Kumar, "Digital India – A programme to transform India into digital empowered society and knowledge economy", Centre for e-Governance (CeG), Ministry of Electronics and IT, March 20, 2017.
42. Sunil Kumar, "Implementation of e-Governance in India", Centre for e-Governance (CeG), Ministry of Electronics and IT, February 14, 2017.
43. Sunil Kumar, "Digital India Programme", Centre for e-Governance (CeG), Ministry of Electronics and IT, January 25, 2017.
44. Sunil Kumar, "Digital India Program: A Tool to Empower Citizen", Centre for e-Governance (CeG), Ministry of Electronics and IT, October 5, 2016.
45. P R Lakshmi Eswari, "Cloud Security - Challenges", Bangalore, June 7, 2016.
46. Himanshu Pareek, Sandeep Romana, "Malware Analysis", Institute of Development and Research in Banking Technology (IDRBT), June 2, 2016.
47. Mahesh U Patil, "Mobile Device Security", Mobile app development for banks", IDRBT, June 21, 2016.
48. Mahesh Uttam Patil, "Mobile Security", Mobile app development for banks, IDRBT, October 11, 2016.
49. Sai Gopal, "Public Key Infrastructure", CVR college of Engineering, Hyderabad, October 20, 2016.
50. Ravi Kishore, "Web Application Security", Andhra Loyola College, Vijayawada, November 24, 2016.

51. Ravi Kishore, "Malware Injections & Mitigations", Andhra Pradesh Human Resource Development Institute (AP HRDI), Bapatla, August 29 - 31, 2016.
52. M K Chaithanya, "Security in Android Apps", C-DAC Hyderabad, November 18, 2016.
53. Mahesh U Patil, "Mobile Security", Hartron, Chandigarh, Feburary 18, 2017.
54. Mahesh U Patil, "Mobile Security", C-DAC Mohali, Feburary 20 2017.
55. Ravi Kishore, "Web application security", BITS Pilani, Hyderabad Campus, March 1 - 05, 2017.
56. Vijayalakshmi B, "Content Development in Regional Languages: Fonts, Language Tools & Technologies", National Academy of Agricultural Research Management (NAARM), Hyderabad, April 21, 2016.
57. Jagadish Babu M, "Vikaspedia – a multilingual knowledge portal", Telangana University, Nizamabad, August 24, 2016.
58. Jagadish Babu M, "Vikaspedia – a multilingual knowledge portal", JNTU, Kakinada, Andhra Pradesh, August 29, 2016.
59. Vijayalakshmi B, "e-trade in Medicinal plants", Jaipur, Rajasthan, August 19, 2016.
60. Vijayalakshmi B, "Digital India- Government initiatives with special reference to development communication", College of Home Science, Hyderabad, September 16, 2016.
61. Sandeep Kumar, "e-CHARAK – a virtual buyer-seller platform for medicinal plants", Bengaluru, September 10, 2016.
62. Vijayalakshmi B, "e-CHARAK - e-Channel for Herbs, Aromatic, Raw material And Knowledge", Authority Vidhana Soudha, Bengaluru, November 16, 2016.
63. Vijayalakshmi B, "e-CHARAK - e-Channel for Herbs, Aromatic, Raw material And Knowledge", Kolkata, December 1, 2016.
64. Vijayalakshmi B, "Multilingual resources on Digital Payments", National Institute of Rural Development Panchayat Raj, Hyderabad, December 14, 2016.
65. Vijayalakshmi B, "Networking, Knowledge Management and IT intervention for MAP sector", New Delhi, January 19 - 20, 2017.
66. Vijayalakshmi B, "Gender and Technology – perspectives for policy making", Hyderabad, March 8, 2017.
67. M Kumar, "M-Health Applications", Hyderabad, April 29 - 30, 2016.
68. M Kumar, "M-Seva and Mobile Apps", Bapatla, Andhra Pradesh, July 14, 2016.
69. M Kumar, "Mobile Apps for Agriculture", University of Agricultural Sciences (UAS), Bangalore, August 10, 2016.
70. M Kumar, "Mobile Governance", Andhra Pradesh Human Resource Development Institute (APHRDI), Bapatla, Andhra Pradesh, August 24, 2016.
71. M Kumar, "Next Generation E-Learning", UGC HRD Centre, JNTU Hyderabad, October 7, 2016.
72. M Kumar, "Mobile based Expert System Tools", Tamil Nadu Agricultural University (TNAU), Coimbatore, October 22, 2016.
73. M Uday Kumar, "Web Analytics and Megh-Sikshak", School of IT, JNTUH, October 25, 2016.
74. M Kumar, "Emerging Trends in Mobile & Cloud Computing", C-DAC Hyderabad, November 19, 2016.
75. M Kumar, "Disseminating Oil Palm Technologies through Mobile Technologies", Indian Council of Agricultural Research – Indian Institute of Oil Palm Research (ICAR-IIOPR), Pedavegi, West Godavari, Andhra Pradesh, December 20, 2016.
76. M Kumar, "Mobile based expert system tools", Coimbatore, February 7, 2017.
77. M Kumar, "e-Learning & Learning Management System (LMS)", St. Ann's Degree College, Hyderabad, March 15, 2017.
78. Ramu Parupalli, "E-learning (Megh-Sikshak) project of Maharashtra Police Academy", Ministry of Home

Affairs, Government of India, Vigyan Bhavan, New Delhi, April 28, 2017.

79. M Kumar, "C-DAC Tools & Applications in Cyber Security", Ministry of Home Affairs, Government of India, Vigyan Bhavan, New Delhi, May 23, 2017.
80. Nabarun Bhattacharyya, "Application of ICT in Agri and Environmental Electronics", ITMO State University, St Petersburg, Russia, April 16 - 23, 2016.
81. Amit Chaudhuri, "Mobile based Cyber Crime", Jadavpur University, Kolkata, February 28, 2017.
82. Amit Chaudhuri, Definition of Cyber Crime, DIG State Crime Record Bureau (SCRB), Kolkata, March 20, 2017.
83. Jayanta Parial, "Data Center and Cloud Forensics", State Crime Record Bureau (SCRB), Kolkata, March 24, 2017.
84. Jayanta Parial, "Cyber Forensics Investigation", National University of Judicial Sciences (NUJS), Kolkata, March 20, 2017.
85. Jayanta Parial, "Cyber Forensics Case Study", National University of Judicial Sciences (NUJS), Kolkata, March 21, 2017.
86. Amit Chaudhuri, "Cyber Security - Cyber space environment and its characteristics in Cyber space operations", Regional Training Centre of Eastern India, Kolkata, January 24, 2017.
87. Amit Chaudhuri, "Types & Trends in Cybercrime", Auditorium of the High Court of Tripura, January 22, 2017.
88. Amit Chaudhuri, "Cyber Forensics – Principals and Procedures", Auditorium of the High Court of Tripura, January 22, 2017.
89. Amit Chaudhuri, "Internet and IT law", National University of Juridical Sciences (NUJS), Kolkata, January 18, 2017.
90. Amit Chaudhuri, "Cyber Crime Awareness", Jadavpur University, Kolkata, January 7, 2017.
91. Jayanta Parial, "Initial steps in Investigation of Cyber Crime and Analysis with Cyber Check", NIT Durgapur, January 9, 2017.
92. Jayanta Parial, "Digital Forensic Challenges for a Data Center Scenario", BIT Pilani, January 30, 2017.
93. Biswajit Saha, "Challenges in Mobile Forensics", NIT Durgapur, January 09, 2017,
94. Aniruddha Datta, "Cyber Forensics Case Study", National University of Juridical Sciences (NUJS), Kolkata, West Bengal, January 18, 2017.
95. Amit Chaudhuri, "Big Data Analytics and C-DAC", Techno India University Campus, February 15, 2017.
96. Sanjay Kumar Choudhury, "Sampling in MCMC", Techno India University, Kolkata, February 15, 2017.
97. Abhijit Chatterjee, "Speech, Affordable HPC &PARAM Shavak (Hardware / Software)", Techno India University, Kolkata, February 15, 2017.
98. Jayanta Parial, "Hadoop, MapReduce", Techno India University, Kolkata, February 16, 2017,
99. Aniruddha Datta, "Network Concepts", State Crime Record Bureau, Kolkata, February 13, 2017,
100. Kousik Maiti, "Cloud Computing", State Crime Record Bureau, Kolkata. February 13, 2017.
101. Asok Bandyopadhyay, "Technical issues related to Machine Translation, Handwriting Recognition at Digital Publishing", Jadavpur University, Kolkata, November 26, 2016.
102. Jayanta Parial, "Cyber Forensic Need and Current Scenario", Kolkata, November 18, 2016.
103. Amit Chaudhuri, "Infrared Image Processing Techno-scientific Issues and Innovations", Jadavpur University, Kolkata, October 19 - 20, 2016,
104. Himanka Sekhar Mondal, "Some Case Studies on Infrared Image Processing in Biomedical Instrumentation", Jadavpur University, Kolkata, October 20, 2016,
105. Asok Bandyopadhyay, "Introduction to biometrics and it's Application in Security Domain", Gurunanak Institute

of Technology, Sodepur, Kolkata, October 18, 2016.

106. Jayanta Parial, "Overview on Digital Electronic and Digital Data", October 24 - 25, 2016.
107. Jayanta Parial, "Analysis of Mobile Card Data and Mobile Phone", October 24 -25, 2016.
108. Biswajit Saha, "Role of Mobile Devices on Forensic Investigation", October 24 - 25, 2016.
109. Biswajit Saha, "Overview on SIM Card Technology", October 24 - 25, 2016.
110. Biswajit Saha, "SIM Card Data Extraction and Analysis", October 24 - 25, 2016.
111. Biswajit Saha, "Mobile Forensic Tool", October 24 - 25, 2016.
112. Biswajit Saha, "CDR Analyser", October 24 - 25, 2016.
113. Jayanta Pariyal, "Forensic and Security Aspect of Cloud", Kolkata, September, 15 - 16, 2016.
114. Kousik Maity, "Fundamental of Cloud Computing", Police HQ, Kolkata, September, 15 - 16, 2016.
115. Amit Chaudhuri, "Crimes in Cyber Space", RCCIIT Engineering college, August 3 - 4, 2016.
116. Jayanta Parial, "Introduction to Cloud Computing", RCC Institute of Information Technology (RCCIIT) Engineering College, August 3 - 4, 2016.
117. Sourav Mitra, "Indian IT act e-commerce and e-governence", RCCIIT Engineering College, August 3 - 4, 2016.
118. Biswajit Saha, "Mobile Forensic", RCCIIT Engineering College, August 3 - 4, 2016.
119. Asok Bandyopadhyay, "Intelligent IR based image processing techniques for medical application", London, UK, July 13 - 15, 2016
120. Amit Chaudhuri, "Workshop on MAT", Vidyasagar University, Midnapur, West Bengal, April 19, 2016.
121. Bibekananda Kundu, Machine Translation: Techniques, Technologies and Challenges, Vidyasagar University, Midnapur, West Bengal, April 19, 2016.
122. Mridusmita Mitra, "Machine Translation: A Linguistics' Perspective", Vidyasagar University, Midnapur, West Bengal, April 19, 2016.
123. Amit Chaudhuri, SouravMitra, "Cyber Forensic", Administrative Training Institute, Government of West Bengal, June 27, 2016.
124. Biswajit Saha, "Voice Evidence Extraction from Mobile Device", Kolkata Police Headquarter Lal Bazar, Bibadi Bag, June 27, 2016.
125. Sourav Mitra, "Forensic Challenges in New Trends in Cyber Crimes", Indian Institute of Engineering Science and Technology (IIEST) Shibpur, Feburary 11, 2017.
126. Rakesh Sehgal, "Honeynet Technologies & Botnet Detection", NIT Kurukshetra, March 7, 2017.
127. Sanjay Madan, "URL Analysis & Detection using Client Honeypot", NIT Kurukshetra, March 7, 2017.
128. Rakesh Kumar Sehgal, "Information sharing for collective defense Policies, enablement, technologies, collaborations", Gurgaon, December 15 2016.
129. Rakesh Kumar Sehgal, "Advanced persistent and targeted attacks", New Delhi, July 22, 2016.
130. Jaspal Singh, "Automation and hydroponics", University of agricultural sciences, Dharwad, Karnataka, February 17 - 18, 2017.
131. Tushar Patnaik, Bhupendar Kumar, "Indian language OCR", Jaipur, January 23 – 28, 2017.
132. Y Kirani Singh, "Improving MSME's in the North East using ICT", City Convention Centre, Imphal, Manipur, April 7 – 9, 2016.
133. Y Kirani Singh, "Introduction to C-DAC activities, Managing Innovation and Technology for competiveness", Academic Staff College of India, Bella Vista, Hyderabad, January 27, 2017.
134. K S Selvakumar, "Initiatives of C-DAC in Digital Preservation, Role of ICT in Preservation of Indigenous Knowledge in North-Eastern Region", NIT Silchar, March 15 - 17, 2017.

Human Resource Development

Human Resource Management eco system is an essential determinant for competencies and effective/efficient organizational output leading to meaningful organizational sustenance and qualitative growth, for an R&D organization like C-DAC.

HRD team in C-DAC ensured that the right facilitation is extended to the core functions to meet their goals in the interest of the organisation and that of the Nation at large.

Continuous and effective communication between HRD function and various stake holders across the board have helped in successful partnering for various initiatives.

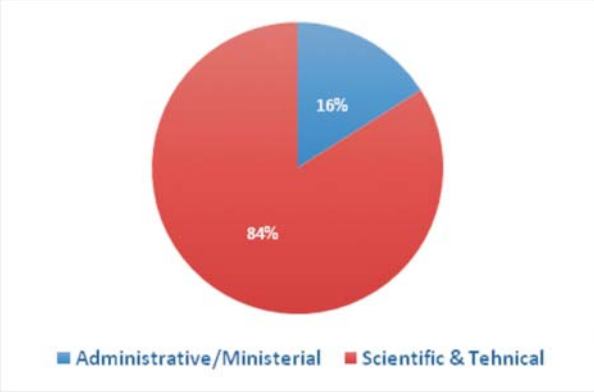
Some of the highlights from the HRD department during the year 2016-17 are:

- 722 man-days of specialized centralized trainings on the various topics across C-DAC centers, in addition to center specific trainings at Centers.
- Knowledge sharing and value addition through employee exchange program across centers.
- Special Recruitment Drive and open recruitment for various S&T and Non S&T posts, to strengthen the workforce as per the Government directions.
- Increased transparency in HR matters.

Human Resources Structure

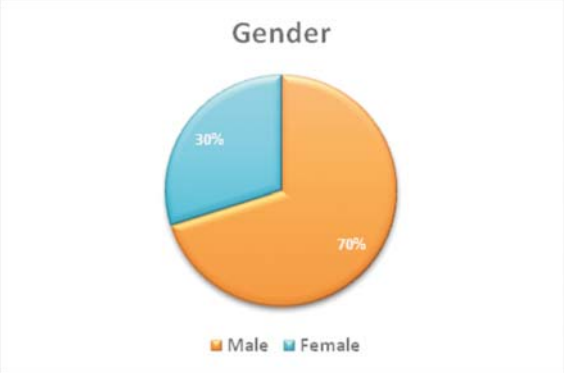
Functional Distribution

C-DAC has 2638 employees as on March 2017, spread across 11 centres and Corporate Office. The functional composition of the employees is as shown below:



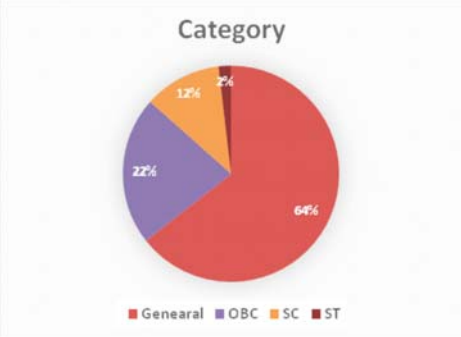
Gender Distribution

C-DAC has been paying due attention to gender equality and inclusion in employment. Female employees account for 30 percent of the total C-DAC workforce against the national average of around 24 percent in the sector. The proportion of women in the senior executive positions also is encouraging in C-DAC.



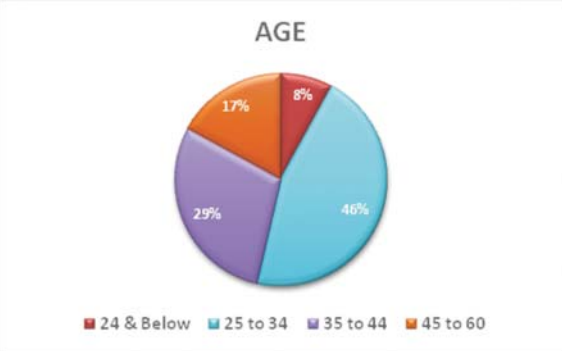
Category Distribution

As a law-abiding model employer, C-DAC has ensured adequate representation of Scheduled Caste (SC), Scheduled Tribes (ST) and OBC members. C-DAC obliges the national priority in fair terms and has significant representation of the reserved categories, even when Group A S&T positions above the entry level are exempted from the purview of reservation orders.



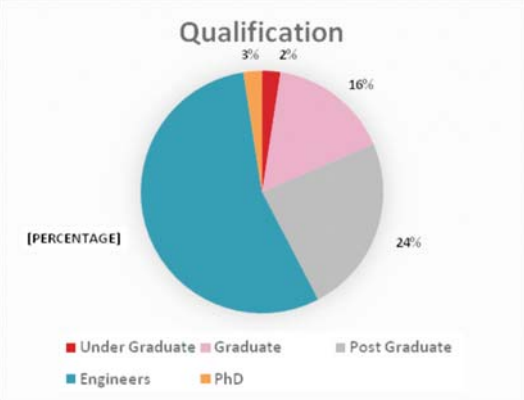
Age Distribution

Since C-DAC always retained itself in the growth and expanding track, it retains an impressive age distribution among its employees. Fifty four percent of the employees are below the age of thirty five.



Qualification Distribution

C-DAC being a knowledge driven organization is mandated to attract and retain highly qualified individuals. It is successful in doing so and holds an excellent mix of educated employees.



Apprentices/Trainees

Considering the importance of skill development of youth of the nation, C-DAC is providing opportunities to eligible youth to learn new things in the respective area as intern/trainee/apprentice at various centres. The no. of apprentices/ trainees engaged in C-DAC are Ninety Five.

C-DAC, is all out to get emerged as one of the top employer in the domain it is in, leveraging all possible avenues for employee development and engagement.

Legal

Legal Cell plays a crucial role in the smooth and effective functioning of C-DAC. Its key activities are as follows:

- All Centres of C-DAC and Corporate Office has a Legal Cell, which take up all the Legal issues relating to employees of C-DAC, vendor and other parties.
- During the financial year, approx. 95 Court cases were dealt at various CATs, High Courts, Tribunals, Courts, Arbitrators etc. These cases are mostly related to service matters and 20 cases are related with other parties.
- In the above court cases, Legal Cell with the help of Advocate prepares the Draft replies/legal documents based on facts provided by the concerned divisions, rules, regulation and bye laws of C-DAC. Legal Cell takes necessary action as per the advice of MeitY and decisions of various Courts.
- Legal Cell of Corporate Office also provides legal opinion on various Legal issues. During the financial year, more than 36 Legal Opinions were given to different Divisions/Centres of C-DAC.
- In addition to above, Legal Cell also Draft/Vet various MOU/Agreements to be signed with various stake holders. During the year, more than 121 documents were vetted/drafted by the Legal Cell.
- Corporate Legal Cell coordinates with MeitY, Advocates and Centres for the court cases and provides valuable inputs supported by relevant judgments pronounced by various courts of India.

IPR

C-DAC is executing the MeitY funded project “Centre of Excellence in IP”. Under this project, C-DAC/MeitY offers a few select Intellectual property related services free of cost to SMEs/Academia/R&D Institutions/Inventors etc. This year, the total number of registered users crossed 3400 nos. The project deliverables have been met within the given time frame.

RTI

C-DAC is a Public Authority 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 rtionline.gov.in. Mandatory disclosures as per the guidelines of Section 4(1)(b) have been published in the RTI module on C-DAC’s website. The same are updated periodically.

During the financial year 2016-17, total 564 RTI applications were received, which were duly processed.

ISO Implementation

STQC conducted the re-certification audit for ISO 9001:2008 for Corporate Office of C-DAC on August 25-26, 2016 and recommended the continuation of certification.

Financials

INDEPENDENT AUDITOR'S REPORT

To,
The Members,
Governing Council,
Centre for Development of Advanced Computing,
Pune University Campus,
Pune-411007

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 31st March, 2017, and the consolidated Income Expenditure Account and the consolidated Receipts & Payments Account for the year 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 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 risk 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 Society's preparation and presentation of 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 Delhi, Noida, Kolkata, Mohali, Bangalore, Hyderabad, Thiruvananthapuram and Chennai Centre's whose financial statements reflect total assets of Rs. 502.68 crores as at 31.03.2017 and total revenues of Rs. 152.19 crores 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. 20 of Schedule 18, wherein Centre specific notes are disclosed.

ii. The Institute has made provision of Rs 20.64 crores up to 31st March, 2017 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. Balance of Debtors, Creditors, Current Assets, Loans & Advances and Current Liabilities are subject to confirmation and further reconciliation. The extent of adjustment that may arise and their effect on accounts is not ascertainable at this stage.

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 no's. 1, 4, 5, 11, 12 and 20, regarding Centre specific notes of Schedule 18 and significant accounting policy no. 4.2, 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 society as at 31st March 2017.

b) In the case of the consolidated Income & 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 B. N. Adke & Co.
Chartered Accountant
FRN 100038W

Place: Pune
Date 19.09.2017

C.A.B.N.Adke
M.No.033988

CONSOLIDATED BALANCE SHEET AS AT 31st March 2017

Amount in ₹

Particulars	Schedule	2016-2017	2015-2016
CORPUS/CAPITAL FUND AND LIABILITIES			
Corpus/Capital Fund	1	3,23,72,70,211	3,18,35,13,088
Reserves and Surplus	2	1,89,45,86,521	1,62,53,33,674
Earmarked and Endowment Funds	3	2,12,11,10,190	1,64,06,86,844
Secured / Unsecured Loan from Bank		60,00,000	1,00,00,000
Current Liabilities and Provisions	4	1,08,89,36,238	1,11,31,09,734
Total		**8,34,79,03,160**	**7,57,26,43,340**
ASSETS			
Fixed Assets			
Acquired out of Own Funds	5	32,43,64,881	33,14,55,351
Acquired out of Grant in Aid	6	1,64,42,38,134	1,35,76,60,001
Acquired out of Project Grants	7	25,03,48,387	26,76,73,673
Investments-from Earmarked/Endowment Funds		-	-
Investments-Others		-	-
Current Assets, Loans, Advances etc.	8	6,12,89,51,758	5,61,58,54,315
Miscellaneous Expenditure		-	-
Total		**8,34,79,03,160**	**7,57,26,43,340**

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

CA Raghu Bhargava
Director Finance & Registrar

Dr. Debashis Dutta
Director General

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
M/s B.N. Adke & Co. (FRN: 100038W)
CHARTERED ACCOUNTANTS

CA B.N. Adke
Proprietor (Membership No. 033988)
Pune **Date : 19-Sep-2017**

Consolidated Income and Expenditure Account for the year ending 31st March 2017

Amount in ₹

Particulars	Schedule	2016-2017	2015-2016
INCOME			
Income from Sales/Services	9	98,40,46,589	67,25,93,788
Grants/Subsidies	10	60,94,75,685	53,70,69,972
Fees/Subscription	11	68,50,63,733	69,82,16,325
Interest Earned	12	24,03,92,251	24,75,44,280
Other Income	13	1,21,35,692	97,65,727
Prior Period Income		1,25,36,350	79,51,895
Increase/(decrease) in stock of Finished Goods and Work-in-progress	14	(11,05,728)	(2,12,088)
TOTAL (A)		**2,54,25,44,572**	**2,17,29,29,899**
EXPENDITURE			
Establishment Expenses	15	1,39,89,48,667	1,40,50,54,980
Other Administrative Expenses	16	87,53,74,544	75,48,78,411
Prior Period Expenses		1,54,05,672	37,54,644
Depreciation (corresponding to Schedule 5)		4,20,52,160	4,48,99,822
TOTAL (B)		**2,33,17,81,043**	**2,20,85,87,857**
Transferred to / (from) Balance of Mission Grants		(10,77,768)	(6,37,41,943)
BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**21,18,41,297**	**2,80,83,985**
SIGNIFICANT ACCOUNTING POLICIES	17		
CONTINGENT LIABILITIES AND NOTES TO ACCOUNTS	18		

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

CA Raghu Bhargava
Director Finance & Registrar

Dr. Debashis Dutta
Director General

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
M/s B.N. Adke & Co. (FRN: 100038W)
CHARTERED ACCOUNTANTS

CA B.N. Adke
Proprietor (Membership No. 033988)
Pune **Date : 19-Sep-2017**

Centre for Development of Advanced Computing, Pune

CONSOLIDATED ANNUAL ACCOUNTS 2016-17

Amount in ₹

Particulars	2016-2017	2015-2016
Schedule 1 - Corpus/Capital Fund		
Balance as at the beginning of the year	3,18,35,13,088	3,21,76,70,829
Add: Surplus as per Income & Expenditure Account	21,18,41,297	2,80,83,987
Less : Own contribution to Core / Projects and Other Adjustments / Transfers	15,80,84,174	6,22,41,728
Balance as at the year - end	**3,23,72,70,211**	**3,18,35,13,088**
Schedule 2 - Reserves and Surplus		
1. Capital Reserve :		
As per last Account	1,62,53,33,674	1,55,63,46,618
Addition during the year	47,48,18,603	33,74,19,742
Less : Deductions during the year	20,55,65,756	26,84,32,686
Total	**1,89,45,86,521**	**1,62,53,33,674**
Schedule 3 - Earmarked/Endowment Funds		
1. Balance of Core Grants		
a) Opening balance of the funds	10,77,768	6,48,19,711
b) Additions to the Funds		
I) Donations/Grants	61,50,00,000	54,50,00,000
II) Income from Investments made on account of funds	-	-
III) Other additions (C-DAC Contribution and Other Income)	2,47,500	37,02,707
Total (b)	61,52,47,500	54,87,02,707
Total (a)+(b)	61,63,25,268	61,35,22,418
c) Utilization/Expenditure towards objectives of funds		
I) Capital Expenditure		
Fixed Assets	55,24,315	79,30,028
Others	-	-
Total I	55,24,315	79,30,028
II) Revenue Expenditure		
Salaries, Wages and Allowances etc.	51,00,11,727	47,19,64,404
Components, Consumables and Other Direct Expenses	8,25,529	15,99,835
Travel	78,36,361	78,49,277
Contingencies, Overheads and Other Administrative Expenditure	9,21,27,336	12,31,01,106
Total II	61,08,00,953	60,45,14,622
Total (c)	61,63,25,268	61,24,44,650
Net Balance as at Year - End (a+b-c) Total 1	-	10,77,768
Projects wise Allocated Core Grant (Annexure 1)		
d) Opening balance	16,94,79,431	(11,94,88,099)
e) Additions to the Funds		
I) Donations/Grants	25,00,00,000	41,90,36,000
II) Income from Investments made on account of funds	2,96,040	(26,37,647)
III) Other additions (C-DAC Contribution and Other Income)	15,80,84,174	10,83,56,885
Total (e)	40,83,80,214	52,47,55,238
Total (d)+(e)	57,78,59,645	40,52,67,139

Amount in ₹

Particulars	2016-2017	2015-2016
f) Utilization/Expenditure towards objectives of funds		
I) Capital Expenditure		
Fixed Assets	34,05,66,376	11,85,34,236
Others	-	-
Total I	34,05,66,376	11,85,34,236
II) Revenue Expenditure		
Salaries, Wages and Allowances etc.	6,39,43,320	8,55,03,748
Components, Consumables and Other Direct Expenses	11,29,81,947	1,62,21,558
Travel	78,69,581	66,68,543
Contingencies, Overheads and Other Administrative Expenditure	2,06,36,063	88,59,622
Total II	20,54,30,911	11,72,53,471
Total Expenditure (f)	54,59,97,287	23,57,87,707
g) Refund / Transfer and Other Adjustments	3,20,83,314	1
Net Balance as at Year - End (d+e-f-g) Total 2	(2,20,956)	16,94,79,431
Core Grant Balance as at Year - End (Total 1 + Total 2) Total 3	(2,20,956)	17,05,57,199
2. Balance of Unutilized Funded Project Grants (Annexure 2)		
a) Opening balance of the funds	1,46,52,61,352	1,47,39,44,963
b) Additions to the Funds		
I) Donations/Grants	2,45,70,47,913	2,00,32,16,366
II) Income from Investments made on account of funds	5,94,79,373	5,10,29,845
III) Other additions (C-DAC Contribution and Other Income)	20,82,97,604	16,88,91,916
Total (b)	2,72,48,24,890	2,22,31,38,127
Total (a)+(b)	4,19,00,86,242	3,69,70,83,090
c) Utilization/Expenditure towards objectives of funds		
I) Capital Expenditure		
Fixed Assets	12,94,30,416	21,13,29,121
Others	-	-
Total I	12,94,30,416	21,13,29,121
II) Revenue Expenditure		
Salaries, Wages and Allowances etc.	93,51,87,089	83,36,68,929
Components, Consumables and Other Direct Expenses	30,16,32,975	28,22,94,420
Travel	7,69,97,693	7,00,74,603
Contingencies, Overheads and Other Administrative Expenditure	50,76,37,065	52,13,25,571
Total II	1,82,14,54,822	1,70,73,63,523
Total (c)	1,95,08,85,238	1,91,86,92,644
d) Refund / Transfer and Other Adjustments	12,29,84,504	31,31,29,093
Net Balance as at Year - End (a+b-c-d) Total 4	2,11,62,16,500	1,46,52,61,353
3. Employee and Other Funds:		
As per last Account	48,68,292	45,29,516
Addition during the year	4,17,869	5,22,453
Less : Deductions during the year	1,71,515	1,83,677
Total (5)	51,14,646	48,68,292
Grand Total (Total 3+ Total 4+Total 5)	**2,12,11,10,190**	**1,64,06,86,844**

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	-	-	-	-	-	-	-	-	-	-	-	-
2	Autonomic Real Time Multiprotocol Gateway	-	-	-	-	-	-	-	-	-	-	-	-
3	Building a Pan-C-DAC Cloud Computing Framework	(22,51,195)	22,51,195	-	-	-	-	-	-	-	-	-	-
4	Building Fund	3,23,35,314	5,00,00,000	-	15,80,84,174	32,31,69,844	9,74,667	-	13,136	1,52,94,212	33,94,51,859	-	(9,90,32,371)
5	E-Learning Solutions in Areas of Automated Grading & Analysis of Software Programs	51,05,890	-	-	-	-	-	-	-	-	-	51,05,890	-
6	E-Securities Initives Related to Security for USB Date Drives Automated Web Application Security Assessment Framework	(43,59,769)	1,17,25,939	-	-	-	49,66,070	3,87,820	6,12,280	14,00,000	73,66,170	-	-
7	IP Awarness in E&IT Sector	-	-	-	-	-	-	-	-	-	-	-	-
8	Mobile Computing and Applications	(35,20,934)	35,20,934	-	-	-	-	-	-	-	-	-	-
9	National Grid Computing Initiative - GARUDA - Grid Technology Services for operational Phase of Garuda	-	-	-	-	-	-	-	-	-	-	-	-
10	North East Projects	21,22,45,204	8,50,00,000	2,96,040	-	1,70,64,505	5,01,54,022	11,24,42,126	62,32,067	30,17,853	18,89,10,573	2,16,43,043	8,69,87,628
11	Pan C-DAC Knowledge & Resource Management Lab (PCKRML)	-	-	-	-	-	-	-	-	-	-	-	-
12	Pan C-DAC Research Initive in Perception Engineering	-	-	-	-	-	-	-	-	-	-	-	-
13	Power Optimization of HPC Sys & Facilities	(84,000)	84,000	-	-	-	-	-	-	-	-	-	-
14	Trainers Training and Students Talent Transfor	-	-	-	-	-	-	-	-	-	-	-	-
15	Speech to Speech MAT Based Dialogue Sys. From Hindi To Indian Language	(1,64,62,336)	1,64,62,336	-	-	-	-	-	-	-	-	-	-
16	Dev. & Adaption of applications, System S/W & H/W Tech. for Hybrid Archi.Based HPC System	(2,02,03,844)	2,02,03,844	-	-	-	-	-	-	-	-	-	-
17	Provisioning of Hybrid Tech. in NPSF and CTSF - A Step towards Next Generation HPC	(1,41,13,732)	1,41,13,732	-	-	-	-	-	-	-	-	-	-
18	Advanced Research in Ubiquitous Computing	(63,64,138)	63,64,138	-	-	-	-	-	-	-	-	-	-
19	Design and Development of a unified threat management (UTM) Solution	(37,51,545)	37,51,545	-	-	-	-	-	-	-	-	-	-
20	BOSS Support Centres and Business Dev. (Ph II)	(1,22,64,283)	1,22,64,283	-	-	-	-	-	-	-	-	-	-
21	Development of Advanced tools for Cloud Security Transactions	(4,50,936)	4,50,936	-	-	-	-	-	-	-	-	-	-
22	Centre of Excellence in Smart Card Technology	(35,04,737)	35,04,737	-	-	-	-	-	-	-	-	-	-
23	Design & Development of a Rapid Product Dev. Platform	-	-	-	-	-	-	-	-	-	-	-	-
24	OCR Sys. On Android based Handheld Devices using Multi Framework for Malayam, Bangla, Punjabi, Hindi, Urdu, Tamil & Telugu	-	-	-	-	-	-	-	-	-	-	-	-
25	Ubiquitous Speech Collection & Analysis System for Surveillance Application (USCAS)	(25,64,000)	25,64,000	-	-	-	-	-	-	-	-	-	-
26	C-DAC Silchar	96,88,472	1,50,00,000	-	-	3,32,027	78,48,561	1,52,001	10,12,098	9,23,998	1,02,68,685	25,96,000	1,18,23,787
27	Core Grants Projects	-	27,38,381	-	-	-	-	-	-	-	-	27,38,381	-
	Total	16,94,79,431	25,00,00,000	2,96,040	15,80,84,174	34,05,66,376	6,39,43,320	11,29,81,947	78,69,581	2,06,36,063	54,59,97,287	3,20,83,314	(2,20,956)

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
1	Bangalore Centre												
	MeitY Projects	97,74,977	11,59,08,979	10,46,353	-	1,62,30,264	5,21,23,326	1,63,36,452	47,10,276	1,22,76,879	10,16,77,197	26,30,480	2,24,22,632
	Other Agency Projects	(18,01,269)	68,81,710	3,025	-	-	13,60,913	25,215	2,39,487	27,98,626	44,24,241	-	6,59,225
	Total Bangalore Centre	79,73,708	12,27,90,689	10,49,378	-	1,62,30,264	5,34,84,239	1,63,61,667	49,49,763	1,50,75,505	10,61,01,438	26,30,480	2,30,81,857
2	Chennai Centre												
	MeitY Projects	69,35,982	3,47,36,000	7,29,020	-	60,13,019	5,10,59,798	16,29,799	63,33,795	25,98,809	6,76,35,220	16,38,003	(2,68,72,221)
	Other Agency Projects	(13,24,185)	-	-	-	-	-	-	-	-	-	(13,24,185)	-
	Total Chennai Centre	56,11,797	3,47,36,000	7,29,020	-	60,13,019	5,10,59,798	16,29,799	63,33,795	25,98,809	6,76,35,220	3,13,818	(2,68,72,221)
3	Corporate Office												
	MeitY Projects	-	-	-	-	-	-	-	-	2,75,000	2,75,000	-	(2,75,000)
	Other Agency Projects	-	-	-	-	-	-	-	-	-	-	-	-
	Total Corporate Office	-	-	-	-	-	-	-	-	2,75,000	2,75,000	-	(2,75,000)
4	Delhi Centre												
	MeitY Projects	1,14,88,394	1,06,83,016	62,414	-	-	80,31,466	25,20,557	-	6,84,558	1,12,36,581	21,78,641	88,18,602
	Other Agency Projects	12,59,16,737	7,16,26,656	-	-	-	46,90,521	13,32,42,755	39,09,690	1,73,06,204	15,91,49,170	(28,40,602)	4,12,34,825
	Total Delhi Centre	13,74,05,131	8,23,09,672	62,414	-	-	1,27,21,987	13,57,63,312	39,09,690	1,79,90,762	17,03,85,751	(6,61,961)	5,00,53,427
5	Hyderabad Centre												
	MeitY Projects	10,30,85,506	18,81,45,000	55,37,723	2,84,37,519	66,36,455	5,75,18,056	17,48,306	50,97,119	4,20,87,905	11,30,87,841	4,35,86,743	16,85,31,164
	Other Agency Projects	-	-	-	-	-	-	-	-	-	-	-	-
	Total Hyderabad Centre	10,30,85,506	18,81,45,000	55,37,723	2,84,37,519	66,36,455	5,75,18,056	17,48,306	50,97,119	4,20,87,905	11,30,87,841	4,35,86,743	16,85,31,164
6	Kolkata Centre												
	MeitY Projects	6,44,31,554	2,18,64,791	12,45,845	5,218	82,55,688	4,44,05,280	1,47,24,083	57,95,237	36,84,258	7,68,64,546	81,98,272	24,84,590
	Other Agency Projects	30,64,911	1,67,82,896	2,29,104	28,34,725	14,93,950	38,77,164	27,23,482	7,81,435	10,13,104	98,89,135	47,78,000	82,44,501
	Total Kolkata Centre	6,74,96,465	3,86,47,687	14,74,949	28,39,943	97,49,638	4,82,82,444	1,74,47,565	65,76,672	46,97,362	8,67,53,681	1,29,76,272	1,07,29,091
7	Mohali Centre												
	MeitY Projects	3,90,15,402	-	11,82,607	-	45,49,916	1,88,60,801	1,63,63,303	15,38,506	18,76,742	4,31,89,268	29,01,803	(58,93,062)
	Other Agency Projects	2,57,75,119	32,40,000	13,53,610	-	-	-	74,28,294	2,41,675	72,054	77,42,023	-	2,26,26,706
	Total Mohali Centre	6,47,90,521	32,40,000	25,36,217	-	45,49,916	1,88,60,801	2,37,91,597	17,80,181	19,48,796	5,09,31,291	29,01,803	1,67,33,644
8	Mumbai Centre												
	MeitY Projects	11,81,35,133	38,49,44,927	1,13,27,487	12,17,51,140	1,03,88,480	12,75,89,863	10,18,020	49,77,367	22,91,11,256	37,30,84,986	52,896	26,30,20,805
	Other Agency Projects	-	10,00,00,000	-	-	-	7,48,177	-	3,57,302	29,21,966	40,27,445	-	9,59,72,555
	Total Mumbai Centre	11,81,35,133	48,49,44,927	1,13,27,487	12,17,51,140	1,03,88,480	12,83,38,040	10,18,020	53,34,669	23,20,33,222	37,71,12,431	52,896	35,89,93,360
9	Noida Centre												
	MeitY Projects	11,99,900	2,10,23,405	-	-	1,06,43,792	33,11,000	27,88,055	10,66,417	50,93,261	2,29,02,525	(20,00,000)	13,20,780
	Other Agency Projects	(55,30,118)	3,93,85,855	3,59,000	-	98,149	1,47,13,445	70,64,498	2,91,872	55,34,794	2,77,02,758	2,29,172	62,82,807
	Total Noida Centre	(43,30,218)	6,04,09,260	3,59,000	-	1,07,41,941	1,80,24,445	98,52,553	13,58,289	1,06,28,055	5,06,05,283	(17,70,828)	76,03,587
10	Pune Centre												
	MeitY Projects	55,53,81,803	31,90,18,753	1,90,81,198	1,03,100	3,00,22,426	32,06,67,406	4,43,56,351	2,03,07,030	4,33,48,823	45,87,02,036	42,30,037	43,06,52,781
	Other Agency Projects	(1,11,70,916)	97,68,17,520	49,65,838	18,000	19,69,784	5,20,24,202	5,72,687	50,14,374	2,80,42,262	8,76,23,309	81,26,113	87,48,81,020
	Total Pune Centre	54,42,10,887	1,29,58,36,273	2,40,47,036	1,21,100	3,19,92,210	37,26,91,608	4,49,29,038	2,53,21,404	7,13,91,085	54,63,25,345	1,23,56,150	1,30,55,33,801

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
11	Thiruvananthapuram Centre												
	MeitY Projects	34,62,53,162	12,54,84,251	1,09,89,149	5,51,47,902	2,98,46,591	12,93,50,483	3,78,00,589	1,50,62,546	9,96,27,760	31,16,87,969	5,05,99,131	17,55,87,364
	Other Agency Projects	7,46,29,260	2,05,04,154	13,67,000	-	32,81,902	4,48,55,188	1,12,90,529	12,73,565	92,82,804	6,99,83,988	-	2,65,16,426
	Total Thiruvananthapuram Centre	42,08,82,422	14,59,88,405	1,23,56,149	5,51,47,902	3,31,28,493	17,42,05,671	4,90,91,118	1,63,36,111	10,89,10,564	38,16,71,957	5,05,99,131	20,21,03,790
	Total MeitY Projects	1,25,57,01,813	1,22,18,09,122	5,12,01,796	20,54,44,879	12,25,86,631	81,29,17,479	13,92,85,515	6,48,88,293	44,06,65,251	1,58,03,43,169	11,40,16,006	1,03,97,98,435
	Total Other Agency Projects	20,95,59,539	1,23,52,38,791	82,77,577	28,52,725	68,43,785	12,22,69,610	16,23,47,460	1,21,09,400	6,69,71,814	37,05,42,069	89,68,498	1,07,64,18,065
	Grand Total	1,46,52,61,352	2,45,70,47,913	5,94,79,373	20,82,97,604	12,94,30,416	93,51,87,089	30,16,32,975	7,69,97,693	50,76,37,065	1,95,08,85,238	12,29,84,504	2,11,62,16,500

Amount in ₹

Particulars	2016-2017	2015-2016
Schedule 4 - Current Liabilities and Provisions		
A. Current Liabilities		
1. Trade Payables (For Goods and Others)	35,90,55,309	33,45,96,075
2. Advances Received		
a) Advances Received from Parties	25,06,85,296	21,60,76,673
b) Fees Received in Advance	11,71,392	9,03,868
c) AMC Charges Received in Advance	-	-
d) Other Income Received in Advance	9,88,55,709	14,41,86,734
3. Statutory Liabilities		
a) Members CPF Recovery Payable	1,10,55,160	98,52,450
b) Members VPF Payable	14,97,921	13,12,055
c) Members CPF Loan Recovery Payable	3,311	19,228
d) Members Benevolent Fund Payable	11,10,504	9,80,254
e) Members CGEIS/Group Insurance Payable	37,444	39,261
f) Members Other Recoveries Payable	2,02,732	9,47,505
g) C-DAC's Contribution to CPF Payable	1,60,28,507	1,56,26,378
h) Gratuity Payable	84,59,776	1,15,37,936
i) Leave Salary and Pension Contribution Payable	5,51,69,071	3,82,84,227
j) Members Income Tax Payable	64,04,480	75,23,826
k) Tax Deducted at Source Payable	1,51,23,534	1,69,55,584
l) Profession Tax Payable	2,28,250	2,25,604
m) General Sales Tax / VAT Payable	12,70,084	2,49,218
n) Central Sales Tax Payable	5,13,336	10,38,159
o) Works Contract Tax Payable	2,12,801	27,008
p) Service Tax Payable	1,86,47,616	1,50,78,516
q) Local Body Tax Payable	-	-
4. Other Current Liabilities		
a) Unpaid Salaries	31,95,207	40,83,465
b) Library Deposits Payable	2,71,150	2,82,350
c) Other Security Deposits Payable	2,01,04,767	2,01,51,173
d) Earnest Money Deposit Contractors Payable	1,19,88,967	1,30,18,037
e) Retention Deposit Contractors	1,19,47,182	1,56,70,429
f) Refund of Course Fees Due	31,015	20,78,040
g) ATC's & Others Share in Fees Payable	35,73,692	32,08,388
h) Other Current Liabilities	13,54,88,211	16,06,96,904
Total (A)	1,03,23,32,424	1,03,46,49,345
B. Provisions		
1. Others (Specify)		
a) Provisions / Accrued Liabilities for Expenses	5,66,03,814	7,84,60,389
Total (B)	5,66,03,814	7,84,60,389
Total (A)+(B)	**1,08,89,36,238**	**1,11,31,09,734**

Schedule-5 FIXED ASSETS Acquired out of own funds

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

Amount in ₹

		Gross Block						Depreciation					Net Block	
Sr.No.	Particulars	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	Land													
	a) Freehold	3,21,67,475	-	-	-	-	**3,21,67,475**	-	-	0%	-	-	**3,21,67,475**	**3,21,67,475**
	b) Leasehold	17,45,87,413	3,80,909	-	**3,80,909**	39,14,426	**17,10,53,896**	1,81,30,923	-	0%	6,97,292	**1,88,28,215**	**15,22,25,681**	**15,64,56,490**
2	Building													
	a) On Freehold Land	89,12,956	-	1,61,470	**1,61,470**	-	**90,74,426**	40,05,399	-	10%	5,06,903	**45,12,302**	**45,62,124**	**49,07,557**
	b) On Leasehold Land	10,89,53,874	-	-	-	-	**10,89,53,874**	7,71,08,329	-	10%	31,84,555	**8,02,92,884**	**2,86,60,990**	**3,18,45,545**
	c) Ownership Flats/Premises	3,97,26,295	-	-	-	-	**3,97,26,295**	2,98,04,562	-	10%	9,92,173	**3,07,96,735**	**89,29,560**	**99,21,733**
	d) Superstructures on Land not belonging to the entity	1,47,34,869	-	-	-	-	**1,47,34,869**	1,27,50,017	-	10%	1,98,485	**1,29,48,502**	**17,86,367**	**19,84,852**
3	Plant, Machinery and Equipments	5,72,10,139	13,15,858	80,74,419	**93,90,277**	1,36,234	**6,64,64,182**	4,96,16,665	92,705	15%	25,41,032	**5,20,64,992**	**1,43,99,190**	**75,93,474**
4	Vehicles	1,32,54,754	-	10,080	**10,080**	-	**1,32,64,834**	86,31,226	-	15%	6,95,040	**93,26,266**	**39,38,568**	**46,23,528**
5	Furniture & Fixtures	9,19,06,101	7,42,515	9,45,330	**16,87,845**	3,73,539	**9,32,20,407**	6,37,35,976	3,14,387	10%	29,79,883	**6,64,01,472**	**2,68,18,935**	**2,81,70,125**
6	Office Equipments	3,30,28,466	6,48,862	18,31,676	**24,80,538**	1,40,812	**3,53,68,192**	2,23,85,572	95,234	15%	19,61,677	**2,42,52,015**	**1,11,16,177**	**1,06,42,894**
7	Air Conditioning Equipments	3,15,81,590	1,55,610	3,82,928	**5,38,538**	26,000	**3,20,94,128**	2,52,29,496	17,665	15%	10,32,345	**2,62,44,176**	**58,49,952**	**63,52,094**
8	Computer Peripherals	32,91,25,095	29,08,650	1,96,49,957	**2,25,58,607**	36,01,619	**34,80,82,083**	31,02,19,889	35,93,711	60%	2,48,73,543	**33,14,99,721**	**1,65,82,362**	**1,89,05,206**
9	Electrical Installations	5,40,63,802	88,868	8,85,051	**9,73,919**	1,675	**5,50,36,046**	4,22,73,717	687	10%	12,76,300	**4,35,49,330**	**1,14,86,716**	**1,17,90,085**
10	Electronic Tools & Lab Equipments	76,33,660	2,07,711	1,21,352	**3,29,063**	-	**79,62,723**	53,58,390	-	15%	3,90,650	**57,49,040**	**22,13,683**	**22,75,270**
11	Library Books	1,49,56,349	1,00,153	3,99,696	**4,99,849**	-	**1,54,56,198**	1,46,73,104	-	60%	4,69,856	**1,51,42,960**	**3,13,238**	**2,83,245**
12	Copyright Know-how	66,950	-	-	-	-	**66,950**	63,217	-	25%	933	**64,150**	**2,800**	**3,733**
13	Other Fixed Assets	62,64,357	30,510	-	**30,510**	-	**62,94,867**	46,18,258	-	15%	2,51,492	**48,69,750**	**14,25,117**	**16,46,099**
	Total	**1,01,81,74,145**	**65,79,646**	**3,24,61,959**	**3,90,41,605**	**81,94,305**	**1,04,90,21,445**	**68,86,04,740**	**41,14,389**		**4,20,52,159**	**72,65,42,510**	**32,24,78,935**	**32,95,69,405**
	Capital Work-in-progress	18,85,946	-	-	-	-	**18,85,946**	-	-		-	-	18,85,946	18,85,946
	Grand Total	**1,02,00,60,091**	**65,79,646**	**3,24,61,959**	**3,90,41,605**	**81,94,305**	**1,05,09,07,391**	**68,86,04,740**	**41,14,389**		**4,20,52,159**	**72,65,42,510**	**32,43,64,881**	**33,14,55,351**
	Previous Year	98,42,05,542	3,23,06,848	1,86,68,314	**5,09,75,162**	1,51,20,613	**1,02,00,60,091**	65,77,11,112	1,40,06,194		4,48,99,822	**68,86,04,740**	**33,14,55,351**	**32,64,94,430**

Schedule-6 FIXED ASSETS Acquired out of Grant-In-Aid

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

Amount in ₹

		Gross Block						Depreciation					Net Block	
Sr.No.	Particulars	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	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**	21,66,755	-	0%	1,59,103	**23,25,858**	**1,44,19,853**	**1,45,78,956**
2	Building													
	a) On Freehold Land	22,21,46,373	-	2,17,265	**2,17,265**	21,985	**22,23,41,653**	7,11,98,486	18,319	10%	1,51,16,149	**8,62,96,316**	**13,60,45,337**	**15,09,47,887**
	b) On Leasehold Land	12,63,47,496	45,38,501	-	**45,38,501**	-	**13,08,85,997**	9,35,37,169	-	10%	37,34,883	**9,72,72,052**	**3,36,13,945**	**3,28,10,327**
	c) Ownership Flats/Premises	33,41,269	-	-	**-**	-	**33,41,269**	28,36,720	-	10%	50,455	**28,87,175**	**4,54,094**	**5,04,549**
	d) Superstructures on Land not belonging to the entity	-	-	-	**-**	-	**-**	-	-	10%	-	**-**	**-**	**-**
3	Plant, Machinery and Equipments	8,66,82,690	55,10,816	-	**55,10,816**	-	**9,21,93,506**	7,11,99,392	-	15%	31,49,117	**7,43,48,509**	**1,78,44,997**	**1,54,83,298**
4	Vehicles	1,05,60,869	-	-	**-**	-	**1,05,60,869**	88,90,584	-	15%	2,50,543	**91,41,127**	**14,19,742**	**16,70,285**
5	Furniture & Fixtures	12,88,18,176	5,42,367	43,000	**5,85,367**	8,05,350	**12,85,98,193**	7,80,37,182	6,61,002	10%	51,22,202	**8,24,98,382**	**4,60,99,811**	**5,07,80,994**
6	Office Equipments	5,37,03,647	2,95,056	3,07,855	**6,02,911**	4,06,365	**5,39,00,193**	3,99,31,196	3,49,123	15%	21,47,719	**4,17,29,792**	**1,21,70,401**	**1,37,72,451**
7	Air Conditioning Equipments	5,38,35,408	-	-	**-**	5,74,328	**5,32,61,080**	4,26,47,680	5,57,627	15%	16,75,655	**4,37,65,708**	**94,95,372**	**1,11,87,728**
8	Computer Peripherals	1,25,76,39,738	56,66,069	23,75,219	**80,41,288**	22,22,704	**1,26,34,58,322**	1,23,03,54,166	22,19,854	60%	2,11,94,407	**1,24,93,28,719**	**1,41,29,603**	**2,72,85,572**
9	Electrical Installations	7,48,93,791	46,850	78,225	**1,25,075**	69,192	**7,49,49,674**	4,38,04,638	65,624	10%	31,21,067	**4,68,60,081**	**2,80,89,593**	**3,10,89,153**
10	Electronic Tools & Lab Equipments	9,85,16,966	12,64,113	8,80,637	**21,44,750**	82,490	**10,05,79,226**	7,80,38,062	69,500	15%	33,91,600	**8,13,60,162**	**1,92,19,064**	**2,04,78,904**
11	Library Books	3,98,34,895	37,678	22,200	**59,878**	-	**3,98,94,773**	3,96,35,365	-	60%	1,55,646	**3,97,91,011**	**1,03,762**	**1,99,530**
12	Copyright Know-how	4,40,660	-	-	**-**	-	**4,40,660**	4,40,613	-	25%	12	**4,40,625**	**35**	**47**
13	Other Fixed Assets	70,97,977	52,151	-	**52,151**	-	**71,50,128**	55,23,459	-	15%	2,43,999	**57,67,458**	**13,82,670**	**15,74,518**
	Total	**2,18,55,10,516**	**1,79,53,601**	**39,24,401**	**2,18,78,002**	**41,82,414**	**2,20,32,06,104**	**1,80,82,41,467**	**39,41,049**		**5,95,12,557**	**1,86,38,12,975**	**33,93,93,129**	**37,72,69,049**
	Capital Work-in-progress	98,03,90,952	4,26,817	32,67,46,187	32,71,73,004	27,18,951	**1,30,48,45,005**	-	-		-	-	1,30,48,45,005	98,03,90,952
	Grand Total	**3,16,59,01,468**	**1,83,80,418**	**33,06,70,588**	**34,90,51,006**	**69,01,365**	**3,50,80,51,109**	**1,80,82,41,467**	**39,41,049**		**5,95,12,557**	**1,86,38,12,975**	**1,64,42,38,134**	**1,35,76,60,001**
	Previous Year	3,04,37,82,240	8,58,45,136	16,41,13,506	**24,99,58,642**	12,78,39,414	**3,16,59,01,468**	1,73,03,05,786	43,45,036		8,22,80,717	**1,80,82,41,467**	**1,35,76,60,001**	**1,31,34,76,454**

Schedule-7 FIXED ASSETS Acquired out of Project Grants

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

Amount in ₹

		Gross Block						Depreciation					Net Block	
Sr.No.	Name of the Project	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	**28,67,05,097**	**23,30,192**	**1,39,00,072**	**1,62,30,264**	**42,167**	**30,28,93,194**	**25,29,93,361**	**11,701**		**1,97,74,771**	**27,27,56,431**	**3,01,36,763**	**3,37,11,736**
2	Chennai Centre Project Assets	**8,56,20,718**	**29,36,240**	**30,76,779**	**60,13,019**	**-**	**9,16,33,737**	**6,76,04,865**	**-**		**81,89,710**	**7,57,94,575**	**1,58,39,162**	**1,80,15,853**
3	Corporate Project Assets	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**-**	**-**	**-**	**-**
4	Delhi Centre Project Assets	**15,72,623**	**-**	**-**	**-**	**-**	**15,72,623**	**15,61,896**	**-**		**2,307**	**15,64,203**	**8,420**	**10,727**
5	Hyderabad Centre Project Assets	**17,48,82,132**	**33,96,882**	**32,39,573**	**66,36,455**	**-**	**18,15,18,587**	**15,51,49,514**	**-**		**1,45,26,602**	**16,96,76,116**	**1,18,42,471**	**1,97,32,618**
6	Kolkata Centre Project Assets	**51,74,492**	**44,65,085**	**52,84,553**	**97,49,638**	**-**	**1,49,24,130**	**35,55,995**	**-**		**68,20,881**	**1,03,76,876**	**45,47,254**	**16,18,497**
7	Mohali Centre Project Assets	**8,41,67,784**	**43,51,322**	**1,98,594**	**45,49,916**	**-**	**8,87,17,700**	**7,23,01,573**	**-**		**54,18,280**	**7,77,19,853**	**1,09,97,847**	**1,18,66,211**
8	Mumbai Centre Project Assets	**28,44,85,217**	**59,40,938**	**44,47,542**	**1,03,88,480**	**-**	**29,48,73,697**	**24,01,94,101**	**-**		**2,33,23,395**	**26,35,17,496**	**3,13,56,201**	**4,42,91,116**
9	Noida Centre Project Assets	**8,47,50,659**	**33,89,798**	**73,52,143**	**1,07,41,941**	**66,000**	**9,54,26,600**	**6,40,07,977**	**59,217**		**79,04,161**	**7,18,52,921**	**2,35,73,679**	**2,07,42,682**
10	Pune Centre Project Assets	**43,21,91,856**	**1,21,22,161**	**1,98,70,049**	**3,19,92,210**	**32,600**	**46,41,51,466**	**40,35,89,708**	**27,384**		**3,47,85,972**	**43,83,48,296**	**2,58,03,170**	**2,86,02,148**
11	Thiruvananthapuram Centre Project Assets	**29,10,09,458**	**77,15,322**	**2,54,13,171**	**3,31,28,493**	**18,84,391**	**32,22,53,560**	**20,19,27,373**	**12,24,352**		**2,53,07,119**	**22,60,10,140**	**9,62,43,420**	**8,90,82,085**
	Total	**1,73,05,60,036**	**4,66,47,940**	**8,27,82,476**	**12,94,30,416**	**20,25,158**	**1,85,79,65,294**	**1,46,28,86,363**	**13,22,654**		**14,60,53,198**	**1,60,76,16,907**	**25,03,48,387**	**26,76,73,673**
	Capital Work-in-progress	-	-	-	-	-	**-**	-	-		-	-	-	-
	Grand Total	**1,73,05,60,036**	**4,66,47,940**	**8,27,82,476**	**12,94,30,416**	**20,25,158**	**1,85,79,65,294**	**1,46,28,86,363**	**13,22,654**		**14,60,53,198**	**1,60,76,16,907**	**25,03,48,387**	**26,76,73,673**
	Previous Year	1,56,04,65,569	5,99,82,721	15,13,46,400	**21,13,29,121**	4,12,34,654	**1,73,05,60,036**	1,31,75,95,405	4,08,61,011		18,61,51,969	**1,46,28,86,363**	**26,76,73,673**	**24,28,70,164**

Amount in ₹

Particulars	2016-2017	2015-2016
Schedule 8 - Current Assets, Loans and Advances Etc.		
A. Current Assets		
1. Inventories :		
a) Stock in trade		
Finished Goods	26,88,960	30,73,526
Work-in-progress	52,970	6,93,880
Raw Material	21,93,075	25,14,446
b) Stock of Course Material	15,39,284	12,98,165
2. Sundry Debtors		
Trade Receivables	79,96,88,790	68,55,13,556
Less: Provision for Bad and Doubtful Debts	20,64,52,942	17,50,01,480
	59,32,35,848	51,05,12,076
3. Cash balances in hand (including cheques/drafts and imprest)	4,14,006	5,11,856
4. Bank Balances		
a) With Scheduled Banks		
On Deposit Accounts (includes margin money)	3,68,29,81,146	3,45,86,28,051
On Savings/Current Account	1,43,40,21,094	1,12,20,56,726
b) Funds/Goods in Transit	51,87,272	66,23,301
5. Post Office-Savings Accounts	4,849	3,235
Total (A)	5,72,23,18,504	5,10,59,15,262
B. Loans, Advances and Other Assets		
1. Loans		
a) Staff	91,70,556	1,05,30,568
b) Other (Specify)	94	-
2. Advances and other amounts recoverable in cash or in kind or for value to be received		
a) On Capital Account	2,59,24,000	2,59,24,000
b) Prepayments (Advances to Suppliers)	2,89,51,132	11,57,20,765
c) To Employees	1,12,72,049	1,02,00,109
d) To Others	96,36,684	1,54,77,387
3. Income Accrued		
a) On Investments from Earmarked/Endowment Funds	-	-
b) On Bank Deposits	7,78,41,927	11,68,14,983
c) Others		
I) Course Fee Receivable	20,22,030	8,47,466
ii) Receivable from Guest House Receipts	-	-
iii) Other Grants Receivables	11,99,608	-
4. Claims Receivable		
a) Insurance Claims Lodged but not received	-	-
b) Claims due but not received	6,25,354	6,25,354
c) Excise Duty paid under Protest	-	-
d) Income Tax Deducted at Source	8,39,26,201	7,03,36,559
e) Sales Tax / VAT Paid Under Protest	-	-
f) Sales Tax / VAT Refund Due	4,51,928	4,80,963
g) Receivable from PF Trust	600	32,501
h) Other Receivables	2,96,04,526	1,32,22,405
5. Prepaid Expenses		
a) Insurance	4,49,496	11,89,793
b) Other Expenses	36,66,614	65,07,778

Amount in ₹

Particulars	2016-2017	2015-2016
6. Deposits (Assets)		
a) Telephone Deposit	12,07,634	12,21,808
b) Lease Rent Deposit	4,30,10,670	4,41,15,042
c) Other Deposits	2,44,73,791	2,45,59,186
d) Security Deposit	4,33,23,344	4,02,22,938
e) Excise PLA Deposit	3,55,136	4,04,375
f) Excise Under D3 and 57F3	-	-
g) EMD / Tender Deposit	31,76,315	34,30,315
7. Differed Expenses		
a) Unutilised Modvat / Cenvat	63,43,565	59,96,280
b) Differed Expenses on Projects	-	20,78,478
Total (B)	40,66,33,254	50,99,39,053
Total (A+B)	**6,12,89,51,758**	**5,61,58,54,315**

Amount in ₹

Particulars	2016-2017	2015-2016
Schedule 9 - Income from Sales/Services		
1. Income from Sales		
a) Sale of Finished Goods	21,36,44,023	10,64,85,855
b) Sale of Raw Material	-	-
c) Sale of Scraps	27,14,130	18,26,904
2. Income from Services		
a) Software Development Charges	25,48,73,985	14,06,87,490
b) Others (Specify)		
AMC Charges Received	1,55,23,626	6,62,80,974
Consultancy Charges / Service Charges	45,48,14,040	33,36,52,220
TOT Fees Received	1,48,03,000	-
Royalty Received	32,94,864	-
Data Charges	2,43,78,921	2,36,60,345
3. Inter Unit / Inter Branch Sales / (Purchases)	-	-
Total	**98,40,46,589**	**67,25,93,788**
Schedule 10 - Grants/Subsidies		
(Irrevocable Grants & Subsdies Received)		
1. Central Government	61,50,00,000	54,50,00,000
2. Others (Specify)		
a) C-DAC's own Contribution and Other Adjustments	-	-
3. Less : Amount utilised for Capital Expenditure in the current year transferred to Capital Reserve	55,24,315	79,30,028
Total	**60,94,75,685**	**53,70,69,972**
Schedule 11 - Fees/Subscriptions		
(Accounting Policies towards each item are to be disclosed)		
1. Entrance Fees	-	8,850
2. Course Fees	63,98,92,274	64,94,40,637
3. Corporate Training Fees	4,42,000	-
4. Annual Fees/Subscriptions	42,10,000	57,65,000
5. Authorization Fees	-	25,00,000
6. Others (Specify)		
a) Virtual Centre Processing Fees	-	2,40,456
b) Admission Cancellation Fees	42,85,461	38,34,400
c) Examination Fees	2,30,55,300	2,36,81,150
d) Late Fee	44,437	3,21,193
e) Registration Fees / Project Fee	9,22,946	30,01,693
f) Students Hostel Fees	1,22,11,315	94,22,946
TOTAL	**68,50,63,733**	**69,82,16,325**
Schedule 12 - Interest Received		
1. On Term Deposits		
a) With Scheduled Banks	22,90,17,477	23,40,34,672
2. On Savings Accounts		
a) With Scheduled Banks	1,04,39,861	1,27,44,244
3. On Loans		
a) Employees/Staff	9,34,913	7,65,364
Total	**24,03,92,251**	**24,75,44,280**

Amount in ₹

Particulars	2016-2017	2015-2016
Schedule 13 - Other Income		
1. Profit on Sale/Disposal of Assets		
a) Owned Assets	72,639	(22,655)
b) Assets acquired out of grants, or received free of cost	(11,705)	4,43,737
2. Exports Incentives Realized	-	-
3. Fees for Miscellaneous Services	15,63,182	22,60,880
4. Miscellaneous Income	1,05,11,576	70,83,765
Total	**1,21,35,692**	**97,65,727**
Schedule 14 - Increase/(Decrease) In Stock of Finished Goods & Work-In-Progress		
a) Closing Stock		
Finished Goods	26,88,960	30,73,526
Work-in-progress	52,970	6,93,880
Raw Material	21,93,075	25,14,446
Loose Tools	-	-
Course Material Stock	15,39,284	12,98,165
b) Less : Opening Stock		
Finished Goods	30,73,526	38,72,610
Work-in-progress	6,93,880	1,59,608
Raw Material	25,14,446	25,99,807
Loose Tools	-	-
Course Material Stock	12,98,165	11,60,080
Total (a-b)	**(11,05,728)**	**(2,12,088)**
Schedule 15 - Establishment Expenses		
a) Salaries & Wages	98,87,33,632	97,29,37,420
b) Allowances & Bonus		-
Awards & Prizes	1,18,022	3,40,813
Bonus	62,32,112	23,79,393
Canteen Facility	2,91,78,521	2,77,93,669
Hire Charges - Contractual Services	5,40,44,616	7,64,24,819
Lease Rent for Employees Quarters	4,28,52,221	5,89,51,726
Leave Travel Concession	56,87,203	30,10,040
Medical Reimbursement	5,96,01,784	5,31,30,686
Members Medical & Accident Insurance Expenses	2,41,281	32,69,193
Misc. Allowances and Other Reimbursements	1,37,96,000	1,41,04,126
Staff Recruitment Expenses	32,19,768	37,15,411
Staff Training Expenses	10,87,328	3,17,629
Transfer & Relocation Expenses	1,01,384	1,33,354
c) Contribution to Provident Fund	9,70,25,306	9,94,37,934
d) Contribution to Other Funds (Benevolent Fund)	-	-
e) Staff Welfare Expenses	47,35,444	42,35,665
f) Expenses on Employees Retirement and Terminal Benefits		-
Gratuity	1,82,91,343	2,46,11,031
Leave Encashment	5,34,83,409	4,19,48,219
Leave Salary & Pension Contribution	2,04,55,182	1,73,72,599
g) Others (Specify)	64,111	9,41,253
Total	**1,39,89,48,667**	**1,40,50,54,980**

Amount in ₹

Particulars	2016-2017	2015-2016

Schedule 16 - Other Administrative Expenses Etc.

a) Purchases	13,01,97,477	3,51,67,488
b) Direct Expenses		
Consumables	2,28,51,149	1,26,89,908
Design and Development Charges	-	-
Excise/Custom Duty/Service Tax Paid	34,80,478	9,69,829
Freight and Handling Expenses	2,87,259	2,26,953
Labour Charges	47,350	41,100
Liquidated Damages	2,13,750	4,27,500
Material Insurance Expenses	57,521	-
Octroi	-	2,46,316
Other Packing Charges	3,094	-
Royalty and Support Fees	-	-
Software Development Consultancy Charges	4,37,855	69,000
Technical Service Charges	10,33,549	39,61,618
Warehouse Charges	3,09,600	3,50,700
c) Expenses on Courses		
Advertisement Expenses	90,31,566	1,25,25,425
ATC's Share in Fees	18,29,10,759	19,49,36,965
Awards & Prizes	25,000	33,391
Campus Interview Expenses	8,90,313	6,30,165
Course Material Production Expenses	2,86,74,959	2,76,70,540
Data Entry & Scanning Expenses	-	-
Examination Expenses	18,85,249	54,52,801
Faculty Members Expenses	1,99,19,114	1,70,56,596
Other Course Related Expenses	83,53,817	1,26,91,276
Printing of Forms & Prospectus	21,000	-
Students Hostel Expenses	1,84,040	1,33,719
d) Administrative Expenses		
Administrative Charges on Provident Fund	45,23,185	56,58,273
Asset Hire Charges	11,21,388	13,55,183
Auditors Remuneration	12,18,395	15,48,475
Bank Charges and Commission	16,35,093	13,26,537
C-DAC's Contribution to Funded Projects	1,32,000	27,90,277
Cultural Program Expenses	11,96,072	3,30,361
Development Contracts and Spon. Project Expenses	2,35,603	3,79,851
Electricity, Power and Water Charges	9,30,41,279	9,54,08,701
Entertainment/Hospitality Expenses	26,14,644	8,53,058
Foreign Exchange Fluctuation	(91,166)	9,12,071
Gifts and Presentation	6,01,881	3,58,494
Insurance	11,67,212	11,75,376
Interest Paid	78,61,818	7,61,403
Irrecoverable Balances Written-off/(Written-back)	2,39,068	(1,62,087)
Legal & Professional Charges	1,12,47,137	1,40,37,299
Miscellaneous Expenses	16,75,824	12,43,838
Office Expenses	57,61,442	40,35,417
Postage, Telephone & Communication Charges	1,70,34,210	1,73,55,933
Printing and Stationery	92,28,376	81,13,708
Provision for Bad and Doubtful Debts/Advances	3,16,84,173	(89,94,199)
Rent, Rates and Taxes	7,38,85,335	10,16,40,296
Sales Tax	44,37,360	31,78,505
Service Hire Charges	7,60,73,796	6,09,65,917
Subscription of Periodicals & Newspapers	15,49,736	34,24,616
Tender Expenses	3,26,497	4,64,968
Training Expenses	5,10,980	1,33,356
Transit Quarter & Guest House Expenses	31,63,234	38,98,199
Transportation Charges	10,33,525	1,43,118
Vehicles Hire, Running and Maintenance	1,50,60,633	1,70,99,373

Amount in ₹

Particulars	2016-2017	2015-2016
e) Repairs and Maintenance		
Air Conditioning Equipments	54,41,876	36,49,026
Building	1,04,09,222	1,66,80,230
Computers	80,05,346	62,86,738
Electrical Fittings	1,80,54,467	1,31,09,895
Furniture and Fixtures	16,14,342	9,50,898
Garden Maintenance	8,40,780	14,05,368
Lab Equipments	7,91,955	6,45,671
Office Equipments	11,65,141	9,52,100
Other Assets	33,24,440	26,28,145
f) Travelling and Conveyance Expenses		
Inland Travel Expenses		
Director	42,25,558	52,62,924
Members	2,79,66,425	2,64,71,036
Others	23,52,413	14,27,268
Foreign Travel Expenses		
Director	4,35,619	18,90,266
Members	10,71,211	17,65,766
Others	3,64,611	2,23,726
Conveyance Expenses	-	-
g) Selling Distribution and Business Promotion Expenses		
Advertisement Expenses	26,61,478	17,52,560
Expenses on Exhibition, Seminars/Workshops	52,56,945	40,94,491
Distribution Expenses	17,54,670	5,32,138
Product Literature & Brochures Expenses	-	-
Other Sales Promotion Expenses	6,54,416	4,21,965
h) Corporate Office Expenses	-	-
i) Other Expenses	-	10,593
Total Other Administrative Expenses	87,53,74,544	75,48,78,411

Schedule 17: 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 the 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 whichever 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 & Registrar

Dr. Debashis Dutta
Director General

For
M/s B.N. Adke & Co. (FRN: 100038W)
Chartered Accountants

CA B.N. Adke
Proprietor (Membership No. 033988)

Date: 19th September, 2017
Place: **Pune**

Schedule 18: 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.
The process for transfer of title deeds of Immovable properties in the name of C-DAC of the above centres is under process. No liability towards expenses such as stamp duty, taxes and other expenses (if any) is provided for. The same will be accounted for in the year of payment.

2. Capital Commitment

Capital Commitments ₹5,266.21 Lacs not provided for. (Previous year ₹5,291.81 Lacs)

3. Sponsored Projects

Balance of Core Grant Projects as per 'Annexure 1' of the Schedule 3 to the Balance Sheet includes unutilized grants amounting to ₹988.11 Lacs and ₹990.32 Lacs grants receivable on account of expenditure incurred in anticipation of release of grants on projects.

Balance of unutilized Funded Projects grants as per 'Annexure 2' of the Schedule 3 to the Balance Sheet includes unutilized grants amounting to ₹23,742.57 Lacs and ₹2,569.40 Lacs grants receivable on account of expenditure incurred in anticipation of release of grants on projects.

4. Contingent Liabilities

4.1. Against Bank Guarantees: ₹701.12 Lacs. (Previous year ₹646.25Lacs)

4.2. Against Letter of Credit ₹6.33 Lacs. (Previous year ₹34.97 Lacs)

4.3. Against Liquidated Damages: ₹0.00 Lacs (Previous year ₹4.28 Lacs)

4.4. Against Sales Tax: ₹71.73 Lacs (Previous year ₹71.73 Lacs)

4.5. Sales Tax / VAT Assessments are completed up to financial year 2011-12 for Noida, 2012-13 for Pune, 2013-14 for Bangalore, 2015-16 for Thiruvananthapuram and 2016-17 for Mohali. No assessment is pending for Chennai, Delhi, Hyderabad, Mumbai and Kolkata centres.

4.6. Against disputed matters ₹8.84 Lacs. (Previous year ₹8.84 Lacs)

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

5. Statutory Liabilities

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

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	1,297.48	141.16	1,438.64
Previous Year	116.51	267.92	384.43

6.2 **Expenditure in foreign currency for Travel:** ₹46.47 Lacs. (Previous Year ₹59.22 Lacs.)

6.3 **Other Expenditure in foreign currency**: ₹9.39 Lacs (Previous Year ₹49.57 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	44,960.26	42,935.00
Euro	11215.00	0.00
Total Value in ₹ (In Lacs)	38.44	28.52

7 Remuneration to Statutory Auditors (Including Branch Auditors)

(₹ in Lacs)

Particulars	Current Year	Previous Year
Audit Fees (Exclusive of Taxes)	3.40	3.40

8 Accounting of grants is made on accrual basis. The Core Grants (net off capital expenditure) & expenditure related to Core Grants is routed through Income & Expenditure account.

9 Interest received on grants is treated as liability. Expenses on the core/sponsored projects are charged to respective project 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.

c. Out of debtors outstanding for more than three years for ₹ 2365.59 Lacs (P.Y. ₹ 2275.50 Lacs) a provision of ₹ 2064.52 Lacs (P.Y. ₹ 1750.01 Lacs) has been made up to the current year. Provision for ₹ 301.06 Lacs has not been made (Noida ₹ 261.06 Lacs and Mumbai ₹ 40.00 Lacs) as they are for ongoing projects / parties and the management of the CDAC is of the opinion that the same will be realized shortly.

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	6.63	27.55	0.91	0.12	163.99	199.20
Chennai	52.20	31.17	19.36	0.00	0.00	102.73
Delhi	188.52	0.02	0.30	1.96	118.19	308.99
Hyderabad	67.63	10.03	0.00	0.00	0.00	77.66
Kolkata	55.09	0.00	0.00	32.98	5.00	93.07
Mohali	278.75	126.03	327.70	29.01	10.14	771.63
Mumbai	175.09	155.40	155.92	267.03	100.73	854.17
Noida	1344.90	324.85	768.62	64.67	860.17	3363.21
Pune	284.74	302.47	151.95	53.43	1,049.63	1842.22
Thiruvananthapuram	151.76	139.02	9.01	26.47	57.74	384.00
Total	2605.31	1116.54	1433.77	475.67	2365.59	7996.88
Previous Year	2328.87	1224.99	831.61	194.17	2275.50	6855.14

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

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

14. Employee Benefits

Employees benefit relating to Gratuity and Leave encashment has been paid/provided as per provisions of Accounting Standard I5 Employee Benefits.

15. Lease Obligations

Lease rent of ₹878.70 Lacs for various premises are debited in the various heads of Income & Expenditure Account for the period under audit as per Accounting Standard 19 Leases.

16. Impairment of Assets

As per Accounting Standard 28 Impairment of Assets, fixed assets are reviewed for impairment and there is no impairment of assets during the year, as the carrying amount of the assets are less than the realizable value.

17. Other Discloser Requirements

The Management of C-DAC is of the opinion that C-DAC being a scientific society and not a listed company and therefore the reporting requirements as per Accounting Standard 3 on Cash flow statement, Accounting Standard 17 on Segment Reporting, Accounting Standard 18 on Related Party Disclosures and Accounting Standard 26 in respect of Intangible Assets are not applicable.

18. Advances paid to employees include ₹1.67 Lacs as advances paid to Director General (Previous Year ₹0.23 Lacs).

19. The consolidated Balance Sheet and Income & Expenditure are prepared based on the Audited Annual Accounts received from the centers. Centre wise "Financial Performance" and centre wise details of Assets and Liabilities, Income & Expenditure is attached as Annexure 18 (A) and 18 (B). The details of assets procured and expenses incurred from NE funds received for Centre at Silchar is given in Annex 1 of schedule 3.

20. Centre Specific Notes

20.1 Delhi Centre

No liability has been provided for in respect of civil suit of recovery for ₹322.98 Lacs with Hon'ble High Court Delhi filed by M/s IBILT Technology Ltd in DIPP's IPO Project with an outlay of ₹2340 Lacs, since the case is under cross examination.

20.2 Hyderabad Centre

No provision was made towards Service Tax of ₹15.98 Lacs and penalty of ₹ 100/- per day, for the year 2004-05. CESTAT has made decision in favor of C-DAC. Being grieved by the Order, Service Tax Department has gone in appeal against the CESTAT order to Supreme Court, for which the decision is pending.

20.3 Mumbai Centre

20.3.1 The Law Secretary cum Appellate Authority has given an award for increase in the rent from 01-04-1995 till the date of vacation of premises(01-11-2013) of Air India located at Nariman point, Mumbai, for an amount along with interest at the rate of 6% till 30-06-2017 is ₹2201.99 Lacs and the Interest at the rate of 12% p.a. from July 2017 onwards for which no provision has been made in the books of accounts as the case is being filed at High Court.

20.3.2 As per LIC the total liability for Pension Fund is ₹ 2,469/- Lacs including the past deficit, as on 31st March2017, against the fund value of ₹1356 Lacs. Due to less allocation of GIA, a provision of ₹191 Lacs is made during the year. Out of above fund value an amount of ₹ 482 lacs is not paid.

20.3.3 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 1st April, 1986 and 1st June, 1986, respectively.

20.4 Pune Centre

20.4.1 Activities of C-DAC, Pune are shifted from 12 Thube Park, Shivajinagar, Pune 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 2017 is ₹32.79 Lacs.

20.4.2 "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 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.

20.4.3 The Lease period of Vishrantwadi land has not been extended till date.

20.4.4 Funds belonging to CDAC Employees Benevolent Fund and CDAC Members Welfare Fund was invested separately till August 2012; after that the funds are not separately invested up to the date of Balance Sheet.

20.4.5 Advances to employees of ₹53.28 Lacs against various claims, will be booked during the financial year 2017-18. Since most of the claims will directly be debited to the Projects / Grants no provision is made.

20.5 Thiruvananthapuram Centre

20.5.1 Advances includes 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 and the customs duty paid to clear the consignment. Since the Indian agent of the party has not come forward for the installation of the system, Centre has taken action to recover the advance through legal recourse.

20.5.2 Land on which the main building at Vellayambalam of the Centre is situated is on lease from Government of Kerala, but no lease deed has been registered so far and the land has not been assigned in favor of C-DAC's name. In the absence of specific demand, lease rent has not been provided in the books of account.

21 Current year figures from audited financial statements of Centre's are regrouped wherever necessary in preparation of consolidated financial statements. Previous year's figures are regrouped, rearranged and reclassified wherever necessary.

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

CA Raghu Bhargava
Director Finance & Registrar

Dr. Debashis Dutta
Director General

For
M/s B.N. Adke & Co. (FRN: 100038W)
Chartered Accountants

CA B.N. Adke
Proprietor (Membership No. 033988)

Date: 19th September, 2017
Place: **Pune**

Annexure 18(A): FINANCIAL PERFORMANCE OF C-DAC FOR THE FINANCIAL YEAR 2016-2017

(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	TVM
A	**OPENING BALANCE**														
(i)	**Grant -in- Aid**			**17.06**											
	Plan		0.11		0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.02	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
	Core Grant Projects		16.95		-0.47	-1.44	14.43	6.00	-3.04	0.88	0.68	-0.17	0.19	-0.21	0.10
(ii)	**Grant for Sponsored Projects**			**146.53**											
	MeitY		125.57		0.98	0.69	0.00	1.15	10.31	6.44	3.90	11.81	0.12	55.54	34.63
	Other Agencies		20.96		-0.18	-0.13	0.00	12.59	0.00	0.31	2.58	0.00	-0.55	-1.12	7.46
B	**RECEIPTS & INCOME**														
(i)	**Grant -in- Aid**			**86.50**											
	Plan		58.00		6.40	2.00	2.52	0.94	1.84	2.74	2.94	4.01	3.73	17.52	13.37
	Non-Plan		3.50		0.00	0.00	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Core Grant Projects		25.00		2.80	1.44	-9.27	1.50	0.54	3.92	0.10	0.17	2.52	19.41	1.87
(ii)	**Grant for Sponsored Projects**			**245.70**											
	MeitY		122.18		11.59	3.47	0.00	1.07	18.81	2.19	0.00	38.49	2.10	31.90	12.55
	Other Agencies		123.52		0.69	0.00	0.00	7.16	0.00	1.68	0.32	10.00	3.94	97.68	2.05
(iii)	**Revenue Earnings**			**166.91**											
	Training		68.97		7.23	0.44	0.00	0.00	3.27	0.31	2.39	4.08	6.32	43.03	1.90
	Commercial		97.94		1.05	3.62	0.01	2.96	1.93	4.25	2.53	5.43	36.54	17.70	21.92
(iv)	**Interest, Other Income & C-DAC Contribution**			**15.86**											
	Plan		0.02		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	Core Grant Projects		15.84		0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	15.00	0.79
				26.78											
	MeitY Spon Projects		25.66		0.10	0.07	0.00	0.01	3.40	0.13	0.12	13.31	0.00	1.92	6.61
	Spon. By Other Agencies		1.11		0.00	0.00	0.00	0.00	0.00	0.31	0.14	0.00	0.04	0.50	0.14
				26.48											
	Training		13.34		1.74	0.39	0.18	0.00	1.56	0.01	3.14	0.26	2.74	2.14	1.18
	Commercial		13.14		0.10	0.00	0.16	2.10	0.00	1.69	1.50	0.61	3.41	1.27	2.29
	TOTAL B		**731.82**	**731.82**	**32.05**	**10.56**	**11.63**	**35.47**	**38.64**	**24.84**	**20.34**	**88.00**	**61.12**	**302.28**	**106.89**
C	**REVENUE Expenditure**														
(i)	**Expenditure from Grant-In-Aid**			**81.62**											
	Plan Total Expenses		57.58												
	Establishment Expenses	47.50			4.41	2.00	0.68	0.90	1.22	1.75	2.72	2.18	3.23	15.15	13.27
	Other Administrative Expenses	10.08			1.97	0.00	1.89	0.04	0.62	0.61	0.23	1.75	0.50	2.35	0.13
	Non Plan Total Expenses		3.50												
	Establishment Expenses	3.50			0.00	0.00	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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
	Core Grant Projects		20.54												
	Establishment Expenses	6.39			0.76	0.00	0.00	0.00	0.40	2.54	0.27	0.00	0.59	1.36	0.46
	Other Administrative Expenses	14.15			0.51	0.00	0.00	0.00	0.14	0.81	0.26	0.00	0.50	11.84	0.08
(ii)	**Expenditure on Sponsored Projects**			**182.15**											
	MeitY Total Expenses		145.78												
	Establishment Expenses	81.29			5.21	5.11	0.00	0.80	5.75	4.44	1.89	12.76	0.33	32.07	12.94
	Other Administrative Expenses	64.48			3.33	1.06	0.03	0.32	4.89	2.42	1.98	23.51	0.89	10.80	15.25
	Other Agencies Total Expenses		36.37												
	Establishment Expenses	12.23			0.14	0.00	0.00	0.47	0.00	0.39	0.00	0.07	1.47	5.20	4.49
	Other Administrative Expenses	24.14			0.31	0.00	0.00	15.45	0.00	0.45	0.77	0.33	1.29	3.36	2.18

Annexure 18(A): FINANCIAL PERFORMANCE OF C-DAC FOR THE FINANCIAL YEAR 2016-2017

(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	TVM
(iii)	**Other Revenue Expenditure**			**172.21**											
	Training Total Expenses		63.88												
	Establishment Expenses	28.39			2.85	0.13	0.00	0.00	1.68	0.16	5.63	2.39	4.96	7.21	3.39
	Other Administrative Expenses	35.49			1.71	0.57	-0.69	0.00	1.40	0.10	1.76	1.32	2.03	26.71	0.58
	Commercial Total Expenses		108.33												
	Establishment Expenses	60.51			0.25	0.32	0.00	1.61	1.02	3.69	2.32	5.34	22.13	15.63	8.20
	Other Administrative Expenses	47.82			0.67	4.50	-0.93	1.47	0.85	1.92	1.05	2.40	8.23	16.97	10.69
	TOTALC		**435.98**	**435.98**	**21.20**	**8.86**	**5.41**	**17.97**	**16.11**	**13.66**	**15.50**	**44.31**	**15.79**	**116.06**	**52.77**
D	**CAPITAL Expenditure**														
(i)	**Expenditure from GIA for Core R&D**			**34.61**											
	Plan		0.55		0.01	0.00	0.04	0.00	0.00	0.38	0.00	0.08	0.02	0.02	0.00
	Non Plan		0.00												
	Core Grant Projects		34.06		0.27	0.00	0.00	7.48	0.02	0.03	0.17	0.00	0.55	24.28	1.25
(ii)	**Expenditure from GIA for Sponsored Proj.**			**12.94**											
	MeitY		12.26		1.62	0.60	0.00	0.00	0.66	0.83	0.45	1.04	1.06	3.00	2.98
	Other Agencies		0.68		0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.01	0.20	0.33
(iii)	**Expenditure from Own Funds**			**3.88**											
	Training		1.66		0.34	0.01	0.01	0.00	0.00	0.00	0.33	0.00	0.48	0.48	0.00
	Commercial		2.22		0.00	0.00	0.00	0.00	0.06	0.06	0.15	0.20	1.14	0.48	0.12
	TOTAL D		**51.43**	**51.43**	**2.25**	**0.61**	**0.05**	**7.48**	**0.74**	**1.45**	**1.10**	**1.32**	**3.27**	**28.47**	**4.68**
E	**REFUND / TRANSFER OTHER ADJUSTMENTS**														
(i)	**From GIA for Core R&D**			**3.21**											
	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
	Core Grant Projects		3.21		0.08	0.00	3.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
(ii)	**From Sponsored Projects**			**12.30**											
	MeitY		11.40		0.26	0.16	0.00	0.22	4.36	0.82	0.29	0.01	-0.20	0.42	5.06
	Other Agencies		0.90		0.00	-0.13	0.00	-0.28	0.00	0.48	0.00	0.00	0.02	0.81	0.00
	TOTAL (E)		**15.51**	**15.51**	**0.34**	**0.03**	**3.12**	**-0.07**	**4.36**	**1.30**	**0.29**	**0.01**	**-0.18**	**1.24**	**5.07**
F	**TOTAL Expenditure (C+D+E)**		**502.92**	**502.92**	**23.79**	**9.50**	**8.59**	**25.39**	**21.21**	**16.41**	**16.90**	**45.63**	**18.88**	**145.77**	**62.52**
G	**Unspent Balance / Surplus / Deficit (A+B-F)**														
(i)	**Grant -in- Aid**			**-0.02**											
	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
	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
	Core Grant Projects		-0.02		0.73	0.00	2.05	0.02	-3.04	1.42	0.07	0.00	1.06	-3.29	0.97
(ii)	**Sponsored Projects**			**211.62**											
	MeitY		103.98		2.24	-2.69	-0.03	0.88	16.85	0.25	-0.59	26.30	0.13	43.07	17.56
	Other Agencies		107.64		0.07	0.00	0.00	4.12	0.00	0.82	2.26	9.60	0.63	87.49	2.65
(iii)	**Other**			**21.18**											
	Training		18.43		4.42	0.14	0.87	0.00	1.75	0.06	-1.86	0.63	2.08	11.25	-0.90
	Commercial		2.75		0.23	-1.20	1.11	1.98	0.06	0.33	0.66	-1.71	9.59	-13.64	5.33

Annexure 18(B):

CENTRE WISE BALANCE SHEET AS AT 31st March 2017

(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	TVM
CORPUS/CAPITAL FUND AND LIABILITIES												
Corpus/Capital Fund	323.73	28.57	5.82	7.20	21.81	21.48	19.81	47.48	(4.68)	101.91	45.14	29.20
Reserves and Surplus	189.46	5.59	2.16	0.13	12.56	17.32	3.43	2.42	4.01	6.78	76.63	58.44
Earmarked and Endowment Funds	212.11	3.06	(2.68)	2.02	5.03	13.81	2.49	1.75	35.91	1.82	127.73	21.18
Secured / Unsecured Loan from Bank	0.60	-	-	-	-	-	0.60	-	-	-	-	-
Current Liabilities and Provisions	108.89	3.17	0.92	1.00	7.62	1.89	1.72	3.15	10.09	21.15	27.84	30.33
Branch & Divisions	(0.00)	8.58	(0.85)	(1.11)	(2.07)	0.48	0.02	(0.51)	0.63	(4.84)	(0.42)	0.09
Total	**834.79**	**48.97**	**5.37**	**9.23**	**44.94**	**54.98**	**28.06**	**54.29**	**45.97**	**126.83**	**276.93**	**139.24**
ASSETS												
Fixed Assets												
Acquired out of Own Funds	32.44	5.11	0.12	-	2.21	0.67	0.81	1.41	0.27	10.40	10.22	1.23
Acquired out of Grant in Aid	164.42	2.57	0.57	0.13	12.55	16.13	2.98	1.32	0.87	4.43	74.05	48.82
Acquired out of Project Grants	25.03	3.01	1.58	-	0.00	1.18	0.45	1.10	3.14	2.36	2.58	9.62
Investments-from Earmarked/Endowment Funds	-	-	-	-	-	-	-	-	-	-	-	-
Investments-Others	-	-	-	-	-	-	-	-	-	-	-	-
Current Assets, Loans, Advances etc.	612.90	38.27	3.09	9.11	30.17	36.99	23.82	50.46	41.69	109.65	190.08	79.56
Miscellaneous Expenditure	-	-	-	-	-	-	-	-	-	-	-	-
Total	**834.79**	**48.97**	**5.37**	**9.23**	**44.94**	**54.98**	**28.06**	**54.29**	**45.97**	**126.83**	**276.93**	**139.24**

CENTRE WISE INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st March 2017

Amount in Crore ₹

Particulars	Total	Bangalore	Chennai	Corporate	Delhi	Hyderabad	Kolkata	Mohali	Mumbai	Noida	Pune	TVM
INCOME												
Income from Sales/Services	98.40	1.05	3.62	0.01	2.96	1.93	4.25	2.53	5.43	36.54	17.70	22.39
Grants/Subsdies	60.95	6.39	2.00	5.98	0.94	1.84	2.36	2.94	3.93	3.71	17.50	13.37
Fees/Subscription	68.51	7.23	0.44	-	-	3.27	0.31	2.39	4.08	6.32	43.03	1.44
Interest Earned	24.04	1.83	0.35	0.35	1.81	1.56	1.68	3.49	0.45	6.01	3.20	3.30
Other Income	1.21	0.01	0.04	0.00	0.13	0.00	0.01	0.12	0.42	0.05	0.23	0.19
Prior Period Income	1.25	0.00	0.00	-	0.15	-	-	1.02	-	0.10	(0.02)	0.00
Increase/(decrease) in stock of Finished Goods and Work-in-progress	(0.11)	0.11	-	-	-	-	-	-	-	-	(0.22)	0.01
Total	**254.25**	**16.62**	**6.45**	**6.34**	**6.00**	**8.60**	**8.61**	**12.50**	**14.30**	**52.72**	**81.42**	**40.70**
EXPENDITURE												
Establishment Expenses	139.89	7.51	2.45	4.18	2.51	3.91	5.60	10.67	9.90	30.32	38.00	24.86
Other Administrative Expenses	87.54	3.96	5.05	0.27	0.73	2.76	2.50	2.28	5.16	9.16	44.50	11.17
Prior Period Expenses	1.54	-	-	0.01	0.76	0.01	-	0.26	0.05	0.07	0.39	0.00
Depreciation (corresponding to Schedule 5)	4.21	0.50	0.02	-	0.02	0.10	0.13	0.49	0.27	1.53	0.92	0.24
Total	233.18	11.97	7.52	4.46	4.02	6.79	8.22	13.70	15.37	41.07	83.80	36.27
Transferred to / (from) Balance of Core Grants	(0.11)	-	0.00	(0.09)	-	-	-	-	-	(0.02)	-	-
SURPLUS / (DEFICIT)	**21.18**	**4.65**	**(1.07)**	**1.97**	**1.98**	**1.82**	**0.39**	**(1.20)**	**(1.07)**	**11.67**	**(2.39)**	**4.43**

Centre for Development of Advanced Computing, Pune

CONSOLIDATED ANNUAL ACCOUNTS 2016-17

Consolidated Receipt and Payments for the year ended 31st March 2017

Amount in ₹ *Amount in ₹*

Receipts	2016-2017	2015-2016	Payments	2016-2017	2015-2016
I. Opening Balance			**I. Expenses**		
a) Cash in hand	5,11,856	9,35,803	a) Establishment Expenses	95,17,11,405	94,92,43,491
b) Bank Balances			b) Administrative Expenses	39,08,38,077	46,38,66,152
i) In Savings/Current Accounts	1,12,20,56,726	1,23,71,51,845	c) Payment made to Creditors for Goods and Others	2,33,79,57,289	2,11,89,23,613
II. Grants Received			**II. Payments made against funds for various projects**	10,19,81,769	16,85,81,422
			(Name of the Fund or Project along with the particulars of		
a) From Government of India	68,07,09,413	35,87,00,000	payment made for each project shown in separate schedule)		
b) From State Government	-	-			
b) Grant and Other Income Received for Projects	2,46,23,82,826	2,66,31,09,302	**III. Investments and Deposits made**	3,29,53,59,429	3,23,53,19,509
			IV. Expenditure on Fixed Assets and Capital Work in		
III. Income from Encashment of FDRs	3,11,29,17,360	3,00,25,12,522	**Progress**		
IV. Interest Received			a) Purchase of Fixed Assets	3,69,50,982	13,21,72,787
a) On Bank Deposits	18,55,01,704	15,64,77,624	b) Expenditure on Capital Work in Progress	(21,17,147)	5,12,100
b) Loans and Advances	1,29,01,586	36,20,420	**V. Refund of Surplus money/loans**	41,91,000	90,00,000
V. Other Income (Specify)			**VI. Finance Charges (Interest)**	1,856	-
a) Previous years Income recovered	51,32,036	2,34,97,067	**VII. Other Payments (Specify)**	-	-
b) Advances Received from Customers	9,81,11,010	3,04,99,757	a) Deposit (Assets)	63,89,269	26,75,714
d) Fees/Subscription & Direct Income	76,03,67,152	74,05,61,698	b) Loans and Advances	9,40,31,476	11,17,55,295
e) Other Income	25,48,20,056	23,85,25,203	c) Previous years outstanding payments	91,11,77,035	79,64,26,513
f) Amount Received from Debtors	72,28,12,647	47,23,89,852	d) Prepaid Expenses	27,08,369	62,73,960
g) Loans and Advances Recovered	19,55,64,298	16,17,90,070	e) Branch and Divisions	1,69,34,01,439	1,41,94,19,350
VI. Amount Borrowed			f) Deposits (Liabilities) Refunded	9,68,21,767	5,74,49,502
Branch and Divisions	1,67,26,87,339	1,46,91,54,607	**VIII. Closing Balance**		
Bank Loan	-	-			
VII. Any Other Receipt (Give Details)			a) Cash in hand	4,14,006	5,11,856
a) Deposits (Liabilities)	6,93,63,106	3,52,62,220	b) Bank Balances		
b) Addition to Reserve Fund	-	-	i) In Savings Accounts	1,43,40,21,094	1,12,20,56,726
Total	**11,35,58,39,115**	**10,59,41,87,990**	**Total**	**11,35,58,39,115**	**10,59,41,87,990**

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
M/s B.N. Adke & Co. (FRN: 100038W)
CHARTERED ACCOUNTANTS

CA Raghu Bhargava
Director Finance & Registrar
Pune

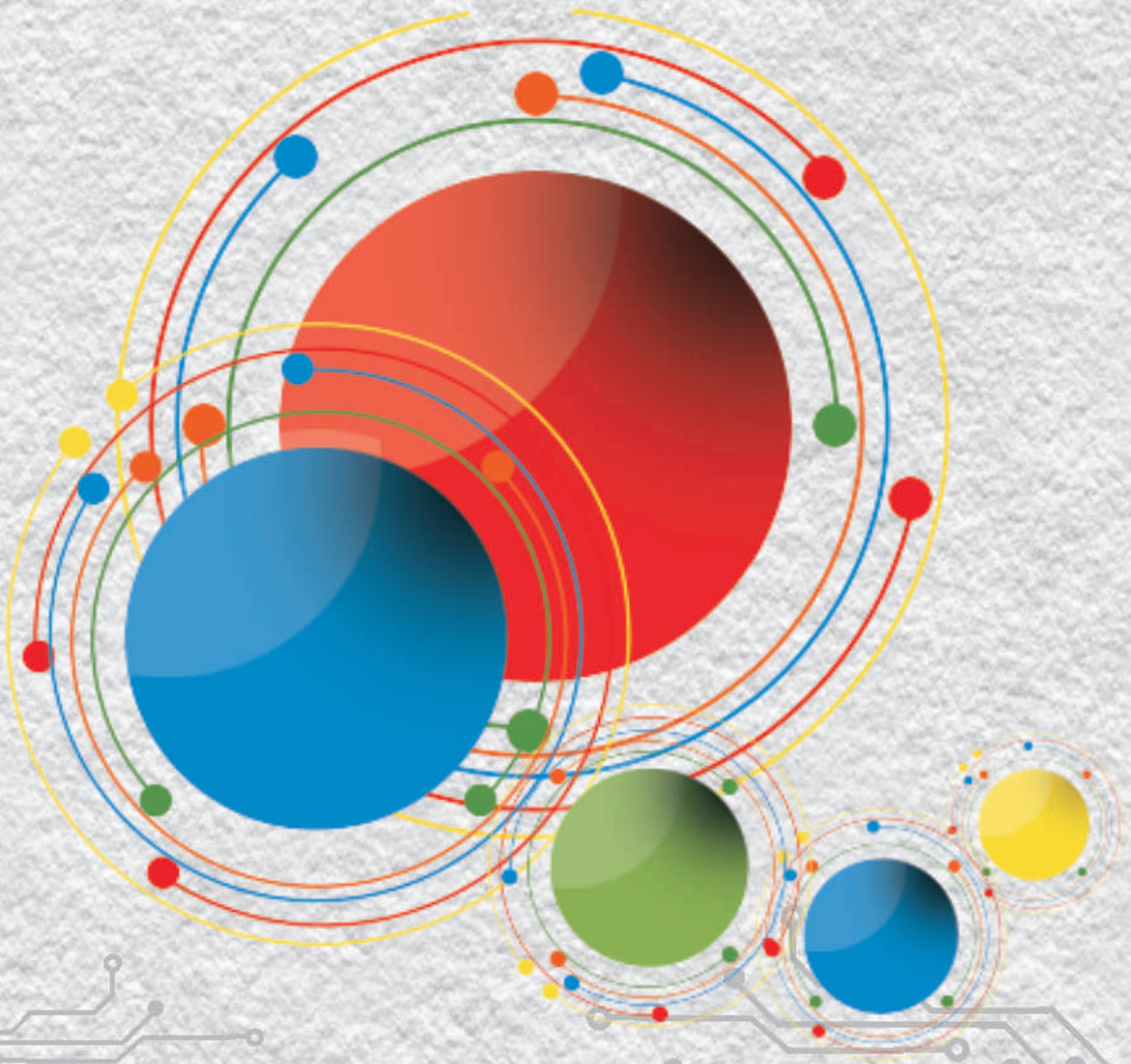
Dr. Debashis Dutta
Director General

CA B.N. Adke
Proprietor (Membership No. 033988)
Date: 19-Sep-2017

Inauguration of PARAM ISHAN at IIT Guwahati by Hon'ble Minister of HRD Shri Prakash Javadekar

Inauguration of C-DAC Innovation Park (Pune) by Hon'ble Minister for Law & Justice and Electronics & Information Technology Shri Ravi Shankar Prasad

Advanced Computing For Human Advancement



Bengaluru ◈ Chennai ◈ Hyderabad ◈ Kolkata ◈ Mohali ◈ Mumbai ◈ New Delhi ◈ Noida ◈ Pune (HO) ◈ Silchar ◈ Thiruvananthapuram