CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

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ANNUAL REPORT
2017-18

Governing Council

(As on 31.3.2018)

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Chairperson, Governing Council, C-DAC

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Shri Raghu Bhargava
Registrar-in-Charge, C-DAC and Non-Member Secretary, Governing Council, C-DAC

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Overview

The year 2017-18 witnessed several technological accomplishments, events and recognitions for C-DAC. LILA–Rajbhasha a self-tutoring Hindi learning package on mobile was launched by Shri Ram Nath Kovind, Hon'ble President of India during Hindi Divas Samaroh function on September 14, 2017 at Vigyan Bhavan, New Delhi. Towards building large HPC facilities under NSM, HPC Sangam Cluster was developed by C-DAC with compute power of about 160 TF. It is equipped with technologies to bring innovation in the field of Computational Science and Engineering through collaborative R&D in various application domains such as Weather Forecasting, Biotechnology, Molecular Dynamics, Big Data Analytics, Medicine, Computational Physics, Space Science, Astronomy, etc.

C-DAC's PARAM Yuva II system helped to process more than 2,67,000 jobs till March 2018. These jobs were executed by 1036 HPC Users from 106 different institutions spread across the country from various science and engineering domains. C-DAC signed MoUs with various educational institutes for deployments of many PARAM Shavak (Supercomputer in a Box) systems and a new variant PARAM Shavak – VR (Virtual Reality) was launched by the hands of Shri Rohan Khaunte, Hon'ble Minister of IT, Goa during National Param Shavak User Summit at Goa. C-DAC carried out R&D in HPC applications including Air Quality Research and Modeling, Impact of Urbanization on current and future heavy rainfall over Urban cities in India, Near Real time Urban Flood Forecasting, etc. and developed "ARNAV" – a GIS based Ocean Database Management and Visualization System. Meghdoot – software suite for building cloud computing environment was enhanced and Big Data Analytics PoC applications in Healthcare, Agriculture and Education were developed. Tools including "GAMUT", Genomics Big Data Management Tool for addressing high-throughput analysis and management of variant data generated by Next Generation Sequencing techniques and "LAMBDA", Biological Big Data Analytics on Dashboard, for faster analysis of the huge molecular dynamics trajectories to assist Drug Discovery were launched during "Accelerating Biology 2018 - Digitizing Life" event held during January 9-11, 2018 at IISER, Pune.

National Cultural Audiovisual Archive (NCAA) has been certified as world's 1st Trusted Digital Repository as per ISO 16363: 2013 standard, certificate number PTAB-TDRMS 0001. Shri Tapan Dasgupta, the Hon'ble Minister in charge of Agricultural Marketing Department, Government of West Bengal has formally inaugurated "Sufal Bangla Mobile APP" and "IVR System" on September 21, 2017 towards obtaining Agri price information system in Bengali language. C-DAC has employed deep learning in designing the multilingual OCR for Hindi, Marathi, Tamil, Kannada, Malayalam, Bangla and Gurumukhi. C-DAC has developed and deployed NameScore algorithm for De-duplication for the Government of Karnataka and the Government of Andhra Pradesh for checking Aadhaar seeding of Pensioners and Patadaars. A system for Automatic Speaker Recognition and North-East Language Identification System on conversational Speech Data for North-Eastern states has been developed and deployed for Defence.

In the domain of Intelligent Transport System, C-DAC has developed Radio based Emergency Service Vehicle Priority System that facilitates Emergency Service Vehicle (ESV) to pass through signalized traffic junctions without stoppage. Ultrasonic Level Sensor developed by C-DAC provides solution for level monitoring applications and has been deployed at Aruvikkara and Peppara reservoirs, Kerala for water level monitoring and alerts. Ultrasonic Solid propellant Burn rate Measurement System (USBMS) enables measurement of burning rate of solid propellant specimen of rocket motors and is being deployed at key government agencies. Five units of Thermography device have been handed over to Malabar Cancer Centre, Kannur, wherein Thermal Sensor Based Monitoring System uses temperature of skin surface for initial screening of women before referring potential patients for mammography. Bluetooth beacon technology based Omni Channel Ticketing Option (OCTO) has the capability to ascertain passengers without/invalid ticket and on-site unit communicates to the server for ticket activation, validation and other services.

Building on success of citizen centric services of Electoral Search (www.electoralsearch.in) and National Voters Services Portal (www.nvsp.in), C-DAC further participated in National e-roll Purification (NERP) exercise and initiated launch of ERO-Net for several states. C-DAC eSign service was migrated to newer version of software as per Controller of Certifying Authority (CCA) and UIDAI specifications and more than 29 lakh signatures have been offered for 44 agencies till March, 2018. 3799 Government departments and agencies have been integrated by using Mobile Seva platform. 171 departments have been integrated and around 6.23 Cr. transactions have been completed using e-Pramaan, National e-authentication service of C-DAC. Around 71 Workshops/Trainings were conducted for rollout of OLabs during the year and a total of 2781 books were published on eBasta portal by CBSE, State Boards and private publishers till March 2018. 499 outreach workshops were held on Vikaspedia at various levels (block/district/state) across 20 states/UTs during the year and about 40,923 first level service providers were trained on digital information access and sharing in regional languages. C-DAC completed the development of new version of Bharat Operating Software Solution (BOSS) 7.0 codenamed as Drishti (Vision) to enhance user experience in desktops and laptops. BOSS and its variants were deployed across many Government agencies.

C-DAC carried out the Technology transfer of Application Device Control solution to Industry partner on April 17, 2017. Number of downloads of C-DAC's M-Kavach, an indigenous mobile security solution for Android phones exceeds 2.80 Lakhs. Online Signature Verification System for Biometric Authentication for Access Control Scenario and Secured Smart Card ICT Solution were inaugurated on 13th Dec 2017. CyberView - Cyber Threat Monitoring System has been deployed for various academic institutions. C-DAC enhanced its Cyber Forensics solutions with new features and carried out deployment of various Cyber Forensics solutions to several government organizations. Total 52 workshops were conducted as part of the Information Security Education & Awareness (ISEA) initiative. As a CERT-In empanelled agency, C-DAC carried out Vulnerability Assessment and Penetration Testing (VAPT) to around 200 organizations across the country during the year.

As part of national roll-out of its Health Informatics solutions, C-DAC is awarded implementation of e-Aushadhi (Drug Supply Chain Management Solution). Implementation of e-Aushadhi is under way in the states of Bihar, Manipur, Meghalaya, Jharkhand, Himachal Pradesh, and Uttar Pradesh and also for National Programs of MoHFW, GoI which include the Central Dashboard for DVDMS, DVDMS for Family Planning Division and DVDMS for Centre for Tuberculosis. C-DAC also continues proliferation of its Hospital Management Information System at various hospitals and Blood Bank Management System. Personal Health Records Management System and analytic Big Data framework has been developed by C-DAC. Few other Healthcare solutions being developed include Medical Imaging Workstation for Virtual Endoscopy, software for treatment planning system (TPS) for Telecobalt and High Dose Rate (HDR) Brachytherapy machines and Mobile oncology system. Newer versions of C-DAC's Medical Informatics Software Development Kit (SDK) for DICOM PS3.0-2015 and ANSI/HL7 v2.8.2-2015 and SNOMED CT Toolkit (CSNOtk) v4.0 were developed and released during the year.

C-DAC has been entrusted by Indian Air Force (IAF) to automate their recruitment process for officers and airmen inducted through Air Force Common Admission Test (AFCAT) and Scheduled Test for Airmen Recruitment (STAR) examination and SSB, interviews stages. As part of initiatives in Education, C-DAC has been registered as assessment agency for PMGDISHA. Pradhan Mantri Gramin Digital Saksharta Abhiyaan (PMGDISHA) is a central government's initiative of the digital literacy program in the country. C-DAC centres having their presence across India will participate as assessment & certifying agency. C-DAC developed low cost Field Programmable Gate Array (FPGA), Embedded System Design (ESD) and Digital Signal Processing (DSP) boards to cater to the needs of institutions for setting up laboratory in Digital Electronics, Embedded System Design and Digital Signal Processing domains. C-DAC is also taking care of online registration for admission to JNV's and recruitment of NTRO. 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.

The annual report covers the achievements and major activities of C-DAC during the year 2017-18.

Major Activities in Thematic Areas

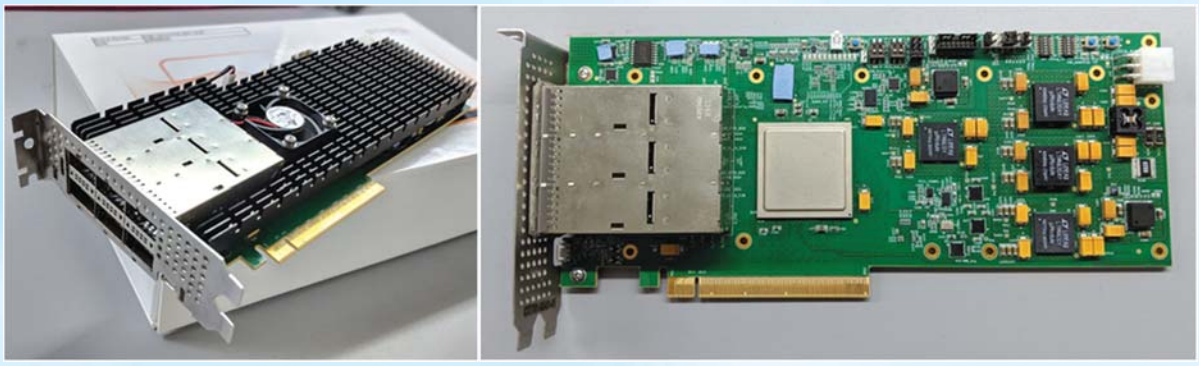
High Performance Computing (HPC), Grid Computing and Cloud Computing

C-DAC is known for its pioneering contribution in the areas of HPC Systems and Facilities, HPC System Software, HPC Applications, HPC Solutions and Services, Grid, Cloud Computing and Big Data. Currently, spearheaded under National Supercomputing Mission (NSM), C-DAC is engaged in research, design, development and deployment of infrastructure, applications, and human resources in HPC. The main activities carried out by C-DAC in the area of HPC during the year 2017-18 are briefly covered herewith.

National Supercomputing Mission (NSM)

The implementation of NSM under the aegis of MeitY and DST encompasses building systems of scalable architecture with performance ranging from a few teraflops to tens of petaflops along with development of Supercomputing Grid using National Knowledge Network (NKN). C-DAC has initiated sourcing components and identifying partners for building one system each with 650 TF performance for installation at IISER Pune and IIT Varanasi and one system with 1.3 PF at IIT Kharagpur under Phase-I 'build' approach.

During the year, C-DAC continued the development of a next generation HPC Interconnection Network (HIN) "Trinetra" with 100 Gbps communication speed, scalable to higher speeds offering world class performance for use in HPC systems. HIN is being implemented in a phased manner, beginning with the best technological options available at the time. Trinetra-A is a high-performance platform capable of supporting 3D Torus Architecture over six 100 Gbps, full duplex channels. It interfaces with the host over PCI-e Gen3, x16 links.



Trinetra - A

Following Applications by C-DAC and Consortium Partners are being initiated:

- NSM-Platform for Genomics and Drug discovery
- Multi-sectoral Simulation Lab and Science-based Decision Support Framework to address Urban Environment Issues
- MPPLAB (e-Teacher): A unified architecture, highly integrated and coherent implementation framework
- Application Porting, Optimization and Scaling Services

The mission also 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

conducted three six-day Faculty Development Programmes (FDP) on “Advanced Computing & Application Development: A Parallel Programming Approach” at IIT Bombay, IISc and IIT Mandi for around 75 participants from IISERs, NITs, IITs and State Government Engineering colleges.

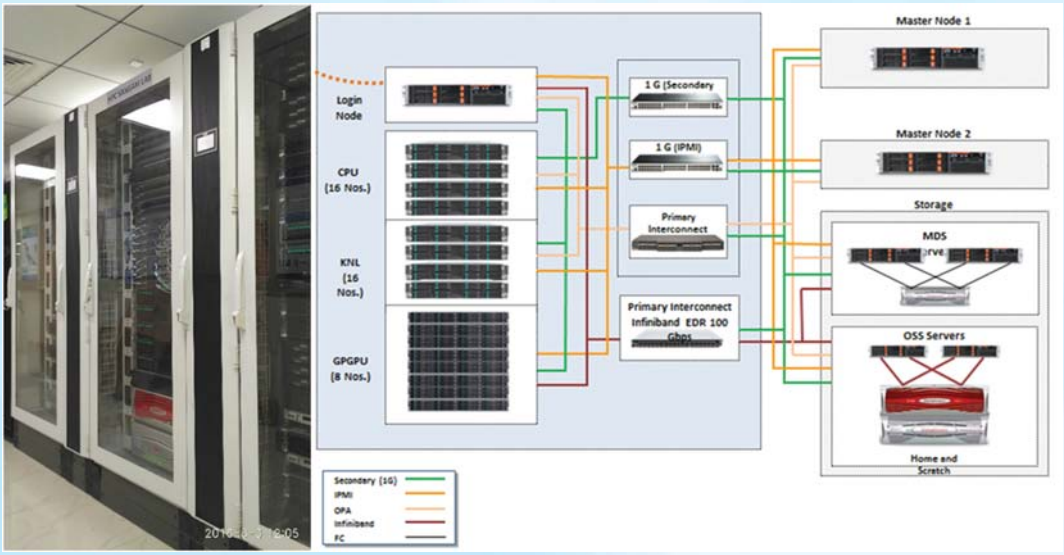
High Performance Computing (HPC)

HPC Systems and Facilities

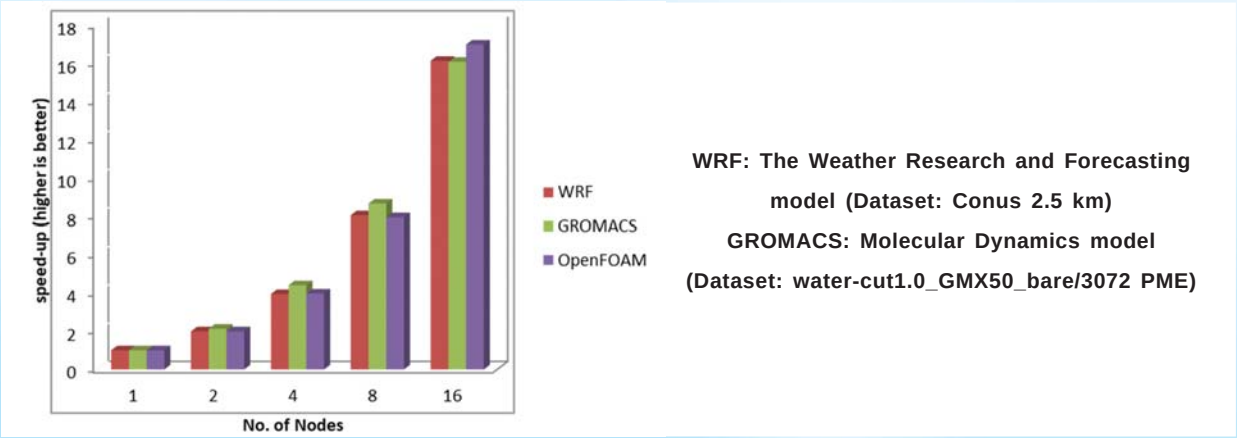
HPC Sangam Cluster

During the year, C-DAC developed HPC Sangam Cluster with compute power of about 160 TF at C-DAC. The hybrid system consists of Intel’s Broadwell based CPU only compute nodes and Intel’s Knights Landing based compute nodes connected via Intel OmniPath network and nVIDIA’s GPUs connected via high-speed EDR InfiniBand network. The Cluster is also connected to Lustre based parallel file system of size 150 TB. The software stack consists of Operating System, Monitoring and Resource Management tools, Middleware and HPC programming tools.

Towards building large HPC facilities under NSM, HPC Sangam Cluster is a testbed to evaluate the performance of current hardware architectures and to develop, validate and integrate the software stack. It is equipped with technologies to bring innovation avenues in the field of Computational Science and Engineering through collaborative R&D in various application domains such as Weather Forecasting, Biotechnology, Molecular Dynamics, Big Data Analytics, Medicine, Computational Physics, Space Science, Astronomy etc.



Overall Architecture of HPC Sangam Cluster



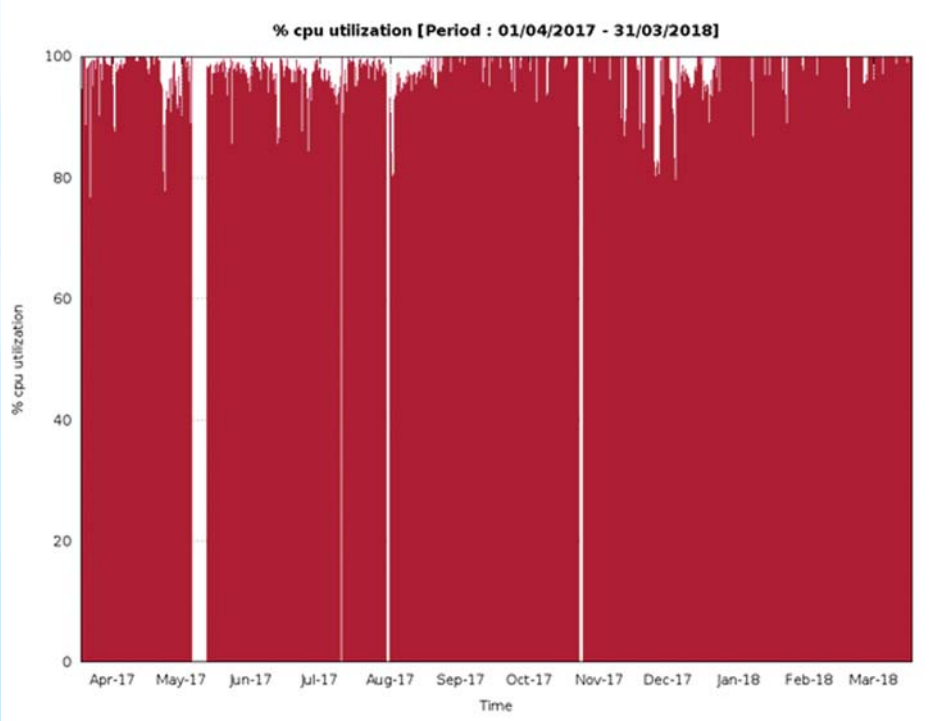
WRF: The Weather Research and Forecasting model (Dataset: Conus 2.5 km)

GROMACS: Molecular Dynamics model (Dataset: water-cut1.0_GMX50_bare/3072 PME)

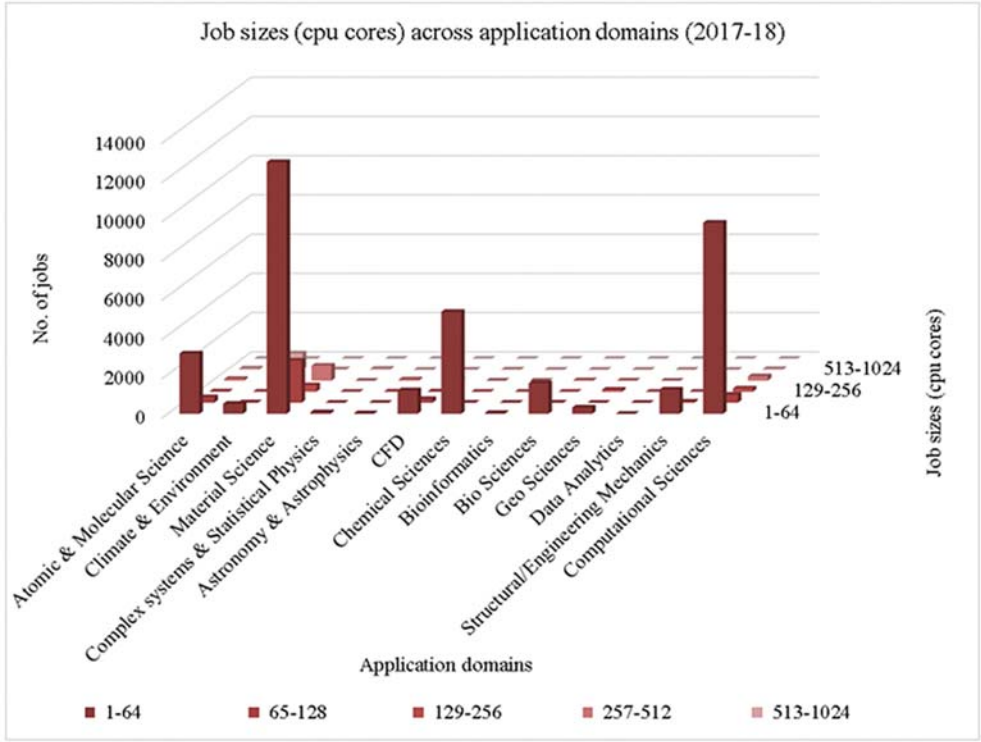
HPC Applications performance benchmark on CPU only nodes

PARAM Yuva II

Since its commissioning in February 2013 at C-DAC's National PARAM Supercomputing Facility (NPSF), PARAM Yuva II has been widely used by scientists and engineers for research. More than 2,67,000 jobs have been processed by PARAM Yuva II till March, 2018. About 1036 users including 225 PhD scholars across 106 institutions executed their jobs on PARAM Yuva II for their scientific research covering a large no. 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, 2017 - March 31, 2018



Job Size (CPU cores) across Application Domains

PARAM Shavak - VR

PARAM Shavak – A SuperComputer in a Box Solution is designed to provide the computing power necessary to keep academic institutions on the leading edge in today's competitive market at an affordable cost. More than 50 systems are deployed in the field till March 2018, since it was developed.During the year, C-DAC signed MoUs with various educational institutes for deployments of PARAM Shavak systems.

PARAM Shavak – VR (Virtual Reality) takes the experience of research and learning to a new level through interactive VR experiences such as simulation and provides greater scientific insights. It has applications in various areas such as drug discovery research for healthcare, advertising and education. Other applications include simulation in automobile engineering and archeology. Ancient extinct kingdoms such as Dwarka and civilizations such as Harappa can be recreated by visualizing the original structures using simulators providing multidimensional images. PARAM Shavak – VR was launched by the hands of Shri Rohan Khaunte Hon'ble IT minister of Goa during National Param Shavak User Summit at Goa.

HPC System Software

System Software Development for NSM Petascale Systems

NSM System Software Stack, being developed by C-DAC, comprises of Parallel Program Development and Productivity tools, Middleware and Low-level system software including Parallel IDE, Automatic Parallelizing Transcompiler, Profiler and Debugger for hybrid parallel programs, Cluster Resource Manager, Storage Solutions, Optimized Operating System, Runtime and HPC Cluster Monitor etc.

SuParikshan – a software for Supercomputer Monitoring and Management

SuParikshan is a light weight web-based software developed by C-DAC which monitors the health of the HPC system and easily identifies any problems through its intuitive visual interface. This software is useful for System Administrators, Company Managers and Application users of the large HPC clusters. System administrators can easily pinpoint any errors or degradations in the large system, even from distant location, so that rectification can be done in very short time span.

MLStack- Machine Learning Software Stack

MLStack is a collection of open source Machine Learning/Deep Learning libraries along with its dependent software which facilitate users to develop their deep learning applications as standard programs, which can directly run on top of existing HPC clusters or Desktop machines or servers having CPUs and GPUs. It provides a simple interface for configuration, installation and deployment. MLStack platform tools are useful for descriptive and predictive analytics in varied domains. MLstack packages various open source Machine learning & Deep Learning libraries such as Caffe, Theano, Torch, Keras, Mxnet, cuDNN and TensorFlow. During the year, MLStack platform release for PARAM Shavak Desktop Supercomputer and HPC Cluster was under development.

SUM

Supercomputing User Management (SUM) is a portal application, which aids facility managers to manage users data and take appropriate decision based on the data. Computational biologists as well as Facility managers are having very different requirements from general users. SUM is enabled with decision support modules such as Utilization Report in terms of graph, Pie Chart and Document Management etc. It is integrated with a dashboard which provides visual information of active users, their location, publication and facility visits info etc. for performance measures.

Supercomputing User Management

HPC Applications

Air Quality Research & Modeling

Application of satellite Remote Sensing for Air Quality Forecasting

Three regression models were developed using Moderate Resolution Imaging Spectroradiometer (MODIS) Aerosol optical depth (AOD) and Weather Research Forecasting (WRF) model meteorological fields, which can estimate hourly and daily Particulate Matter with 2.5 micrometers or less in diameter (PM2.5). The models were validated using hourly and daily averaged data over India during 2016. These models offer a cost-effective solution for PM2.5 estimations as MODIS sensor provides daily coverage over India, except under adverse weather conditions. The methodology is useful for environmental agencies to assess and plan air quality management in India.

Aerosol Contribution on Rainfall

WRF-Chem model simulation was used to investigate possible impact of Aerosol and Chemistry on two heavy rainfall events - Uttarakhand (June 2013) and Kashmir (September 2014) - witnessed over the northern part of India in the Himalaya foothills region. It was found that the Aerosols had non-negligible impacts.

Radiative Impact of Extreme Dust Event

A heavy dust storm was originated over the Arabian Peninsula region during pre-monsoon season (April 2015). Huge amount of dust particles reached over west and north India within a few days and affected the air quality and visibility. WRF-Chem model was used to simulate the dust storm to estimate radiative impact of dust. It was found that dust aerosols significantly alter the temperature profile in the atmosphere.

Aerosol Impact on Monsoonal Rainfall

Model simulations using WRF-Chem were performed to find the best suitable cloud microphysics option for Indian region. Contribution of different aerosols (dust, sea salt, biomass burning aerosol) in changing the convective and non-convective component of rainfall over India were studied. Model simulated parameters were validated against ground and satellite measurements. Changes in rainfall amount and distribution over India due to different aerosol types were quantified.

Simulation of Extreme Heat Waves over Bangalore city

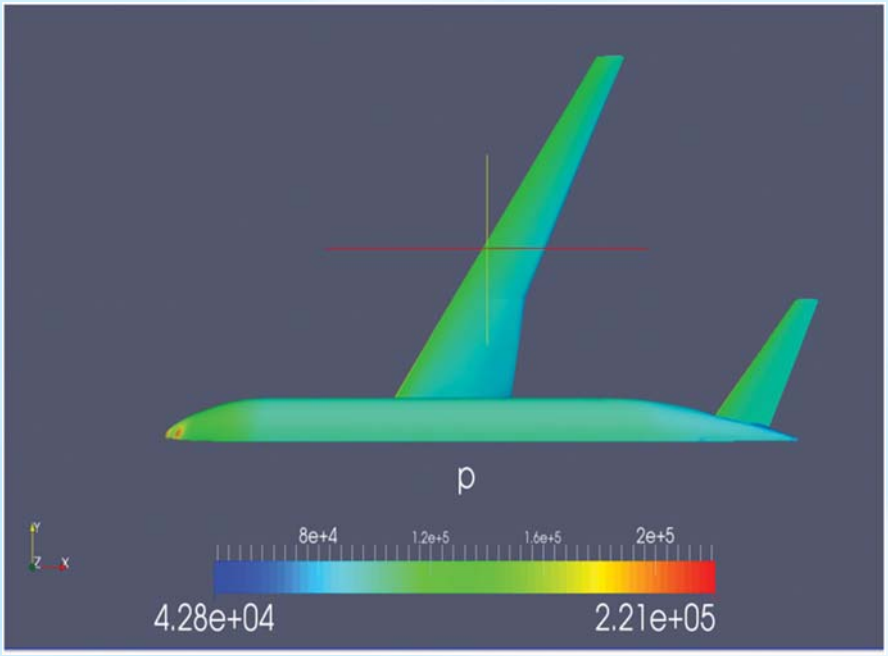
The study explored spatio-temporal dynamics and evolution of land use/cover changes and urban expansion in Bangalore region during transitional economy period (2005-2016). WRF-Chem version 3.8.1 was configured to simulate prevalent weather conditions over west and south India. Diurnal variations of meteorological parameters such as temperature and pollutant concentration were captured with high accuracy. PM10 concentration was analysed for heat wave period and it was observed that its concentration rapidly decreased during heat wave period when temperature elevated reaching its minimum value during March 2016.

Flood Analysis for Pune Urban Area using HEC-RAS Hydrology model

A Digital Elevation Model (DEM) with 30-meter resolution for Mula, Mutha and Pavana river catchment and Pune Urban Area was developed. It was integrated with 1-Meter river cross sections for HEC-RAS Hydrology model. Flood simulations using 2017 Pune rainfall and Dam Discharge data were carried out. The output was validated using the actual flood spread and discharges at bund garden location and detailed report was prepared.

Performance Evaluation of Large Scale HPC Cluster using Open Source CFD Code, OpenFOAM

OpenFOAM v1606+ version was used by C-DAC to conduct benchmark of NASA CRM Wing Body with 10 Million mesh on 168 processors. Result of Drag Coefficient obtained from simulation was compared with experimental results and found to be within prescribed limits.



Pressure Contour on WBT in -Z Direction

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

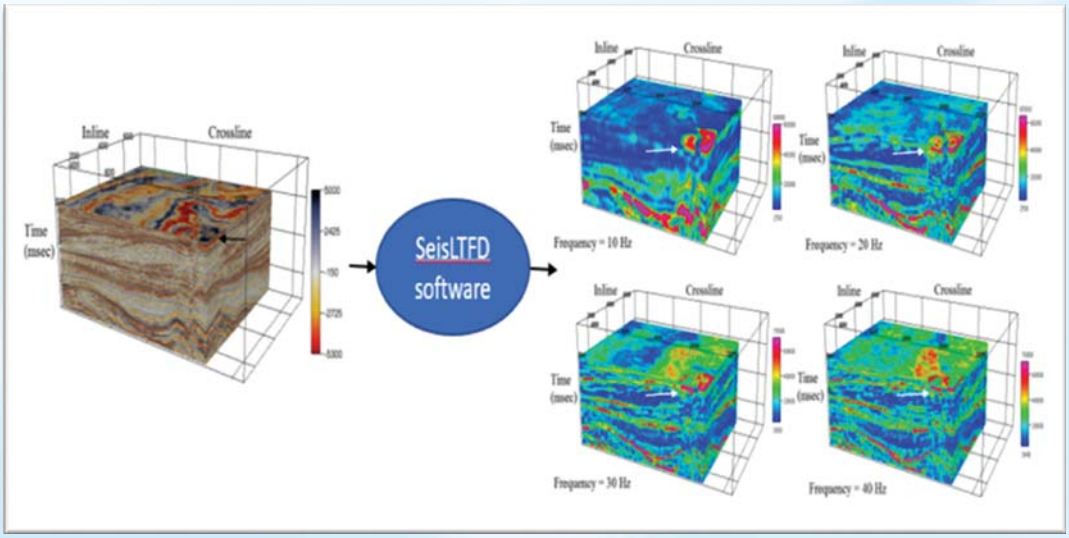
A coupled model Weather Research Forecast (WRF) – Urban Canopy Model (UCM) was optimized on PARAM Yuva II to assess the impacts of urbanization due to change of land use land cover on rainfall. The simulation results concluded that urbanization has a significant impact on heavy rainfall and if the pace of urbanization keeps increasing, more heavy rainfall cases may occur in urban cities in future.

Near Real time Urban Flood Forecasting

C-DAC in collaboration with IIT Bombay worked on an initiative funded by Ministry of Earth Science (MoES), for Urban Flood Forecasting System in Mumbai. A short-term Hydro-Meteorological forecasting using Weather Research and Forecasting (WRF) Model coupled with an Urban Canopy Model (UCM) was developed for land surface feedbacks. Preliminary experiment on Flood Prediction over Mumbai city using forecasted rainfall in real time was conducted on PARAM Yuva-II during monsoon season and validated with actual observation.

Spectral Decomposition of Seismic Data and its Application for Gas Hydrates Exploration

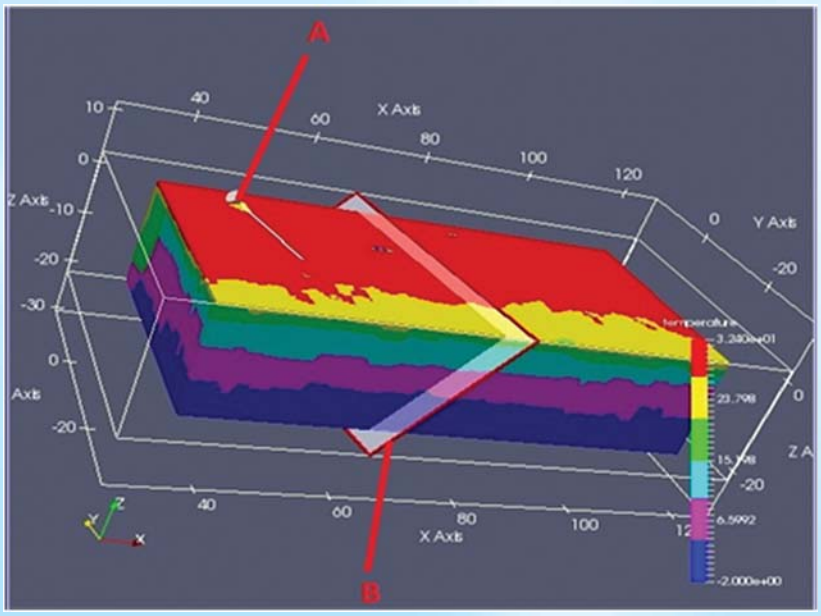
C-DAC in collaboration with Centre for Modeling and Simulation, S P Pune University, Pune worked on an initiative on Spectral Decomposition of Seismic data. Local Time-Frequency Decomposition (LTFD) program available in open source was modified and parallelized on PARAM Yuva II. It was used for spectral decomposition of real field seismic data collected in gas hydrate proven Indian basin and resultant iso-frequency sections were interpreted. It was concluded that “Local Time-Frequency Decomposition (LTFD)” technique provides optimal time and frequency resolution for seismic data.



Input and Output of SeisLTFD software

ARNAV: A GIS based Database Management and Visualization System

ARNAV is a GIS based system developed by C-DAC that comprises of ocean database management and GIS based visualization, analysis and retrieval system. The system performs basic quality checks of data and highlights the errors such as ground latitude / longitude, temperature and salinity with respect to open source Levitus data and depth order. GIS based module provides statistical analysis, extracts and saves data in text and csv formats and provides visualization in 2D and 3D environment, contour generation and map preparation.



3D Visualisation of Ocean Parameters

HPC Solutions and Services

During the year, C-DAC was engaged in providing / offering HPC solutions and HPC related services to various national and international agencies. The details regarding some of the engagements are given below.

- C-DAC is extending the consultancy services for Vikram Sarabhai Space Centre (VSSC) in implementing a 2 Petaflop supercomputing facility with 2 Petabytes of High Performance Storage along with the data center ecosystem to carry out operational research.
- C-DAC Signed an MoU with Indian Agricultural Statistics Research Institute (IASRI) to upgrade and maintain their existing HPC infrastructure at New Delhi and five research organizations under Indian Council of Agricultural Research (ICAR). As part of this initiative, HPC infrastructure at IASRI and other five sites shall be upgraded with the latest cutting edge HPC technologies and C-DAC shall provide the computational expertise and support services for this newly established HPC infrastructure.
- During September 17-25, 2017 on the invitation of Brazilian institutes CTI, PTI and FIOCRUZ, C-DAC delegation under Dr. Debashish Dutta, Director General C-DAC visited Brazil to study their HPC requirement and formulate a plan to improvise their HPC capability in collaboration with C-DAC.

Trainings/Workshops on HPC

During the year, C-DAC provided an internship opportunity for the students studying in the remote NE region with support under MeitY-C-DAC NE Funding Scheme. The internship was limited to HPC Technology encompassing Application Software, System Software, HPC Cluster Building and Administration, Storage and Interconnect technology.

Cloud, Grid Computing and Big Data

Cloud Computing

Meghdoot - Software Suite for building Cloud Computing Environment

Meghdoot is a comprehensive Cloud Suite developed by C-DAC constituting free and open source tools across all layers of Cloud. During the year, the Cloud Middleware – Openstack was enhanced with Newton version. Other key enhancements included High availability for Openstack controllers and services and Virtual Desktop Infrastructure etc. Deployments of the suite were carried out for various Government, Defense, Banking agencies and Educational institutions.

National Grid Computing initiative-GARUDA

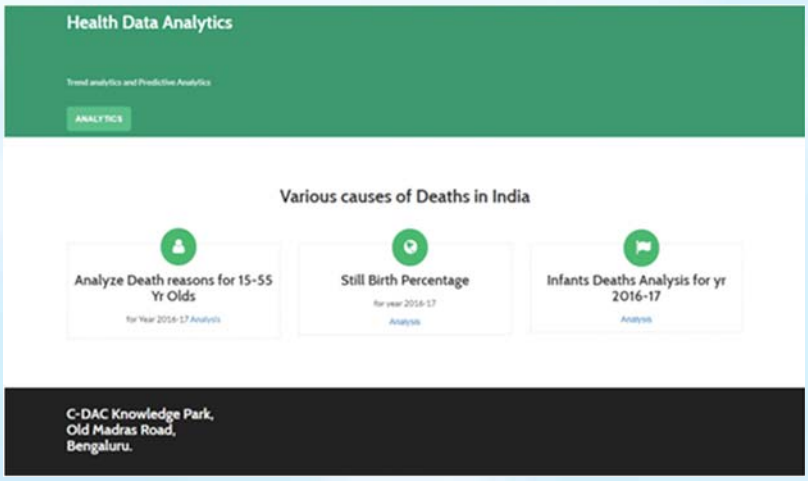
GARUDA (Global Access to Resources Using Distributed Architecture) provides pan-India e-infrastructure to catalyze the research in science & engineering. Users belong to virtual organizations such as Bioinformatics, Computer Aided Engineering and Open Source Drug Discovery community, etc. The Indian Grid Certification Authority (IGCA), located at C-DAC, provides X.509 certificates to support the secure environment in Grid Computing. It is an accredited member of the APgridPMA (Asia Pacific Grid Policy Management Authority) for Grid Authentication. During the year, it revised IGCA Certificate Policy and Certification Practice Statement (CP/CPs) and got it approved by APGridPMA. Other activities included drafting 'Site Registration Policy', issuing and revoking certificates.

Big Data

Big Data Analytics PoC Applications in Healthcare, Agriculture and Education

In collaboration with National Institute of Smart Governance (NISG), the following Big Data Analytics PoC Applications were developed and presented in Workshop on "Bigdata Analytics for Government" held on October 6, 2017 at India Habitat Centre, New Delhi:

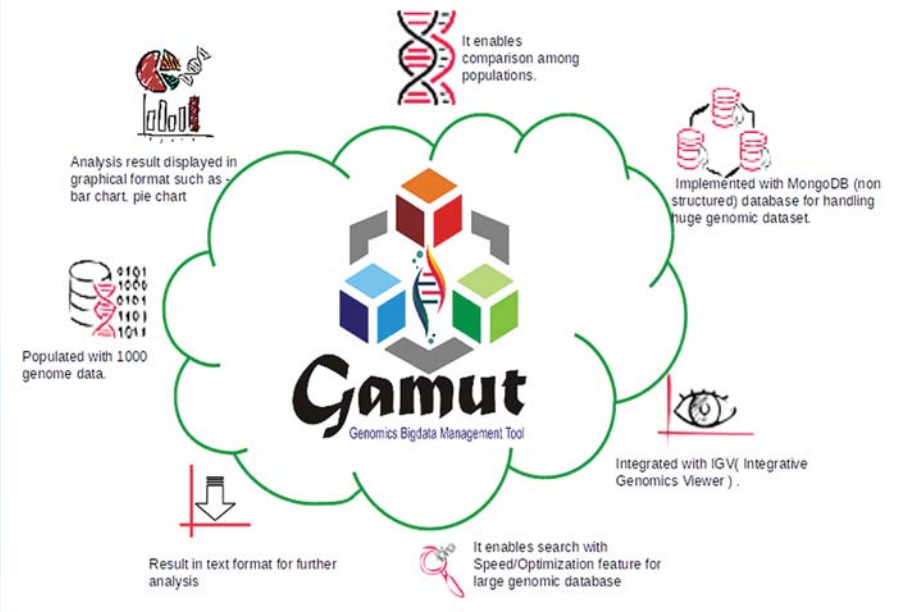
- Healthcare: Visualization of Trend and Comparative Analysis of Health Facilities and Parameters, and Predictive Analytics for Vital Features and Diseases for Preparedness.
- Agriculture: Interactive Visualization of increasing Farmer's Income through increase in Yield based on Crop cultivated, Land area and Trend in Market Price.
- Education: Visualization of Trends of Parameter ratings across Institutes and Predictive Analytics for Quality Improvement for the Institutes.



Big Data Analytics PoC Applications

GAMUT

GAMUT, Genomics Big Data Management Tool, is a platform for addressing high-throughput analysis and management of variant data generated by Next Generation Sequencing techniques. It compares genetic variant known as Single Nucleotide Polymorphisms (SNPs) from two different sets of samples and leads the analysis towards the direction of personalized medicine. It uses MongoDB, a Big-Data based solution at the back-end for faster analysis. GAMUT was released during "Accelerating Biology 2018 - Digitizing Life" event held during January 9-11, 2018 at IISER, Pune.



GAMUT – Genomics Bigdata Management Tool

LAMBDA

LAMBDA, Biological Big Data Analytics on Dashboard, is a big data analytics tool developed by C-DAC which helps in faster analysis of the huge molecular dynamics trajectories. Interpretation of huge structural data obtained from molecular dynamics simulation studies proves to be very crucial in understanding the properties of biomolecules useful in drug discovery and other biological functions. LAMBDA provides indigenously developed algorithm using Spark and Hadoop for crucial structural parameters such as Hydrogen Bond, RMSD, RMSF and Water Density. LAMBDA supports AMBER, GROMACS and PDB formats. LAMBDA was released during "Accelerating Biology 2018 - Digitizing Life" event held during January 9-11, 2018 at IISER, Pune.

LAMBDA – Biological Big Data Analytics on Dashboard

Multilingual Computing and Heritage Computing

Advancements in Artificial Intelligence have accelerated development of innovative language computing solutions. C-DAC has been developing various multilingual tools and solutions for speech, text analysis, Optical Character Recognition, Machine aided translation, Natural Language Processing etc. C-DAC has also developed key solutions for digitization and digital preservation of heritage and culture. Major contributions during the year include machine translation, speech technologies, language technologies tools and solutions, digital preservation and heritage computing solutions.

Speech Technologies

System for Agricultural commodity prices & Weather Information

Speech-based Access for Agricultural Commodity Prices & Weather Information in Bengali Language has been developed. The system has incorporated real-world telephony spoken dialogue mechanism that provides Market wise commodity prices information enlisted in AGMARKNET and District wise weather information enlisted in IMD to farmers (and other users). This system deployed in West Bengal and supports in Bengali vernacular which offers convenience the users. During the year the system has been ported to NIC and IIT-Madras server.

Automatic Speaker Recognition for North-East Language

A system for Automatic Speaker Recognition and North-East Language Identification System on conversational Speech Data for North-Eastern states has been developed and deployed. The system Uses Voice Biometric from conversational speech data - distinguishable trait and inseparable part of any individual, no need to carry passports /keys /badges /access cards or remember passwords /PINs, allows remote authentication via telephone and easy transmission. The solution has been customized and deployed installed as per the specific requirement of Defence.

Talking ATM solution in English and Hindi Languages

The Solution is deployed across the ATMs with customization as per the various banking requirements viz. SBI, IDBI, AU Small Finance Bank, Indian bank and OBC Bank. Talking ATM provides expressive Text-To-Speech solution that can work for financial domain and especially customized for the ATM domain. The solution inputs Unicode text and produces high quality natural sounding speech output. Being SAPI compliant, it can be easily integrated with existing SAPI compliant windows applications. It processes the numerals, account balance in currency format. The Talking ATM solution allows people with visual impairments or reading disabilities to interact with bank ATM system.

Sufal Bangla Agri. Price Information System

As part of the Digital India Initiative, C-DAC has developed and deployed this solution. This offers a platform for various stakeholders for dissemination of relevant information (live price, stock availability) of agricultural products using ICT. Deployment of agricultural commodity prices retrieval system through telephone/mobile in Bengali

Figure: Sufal Bangla Android App

Language – a Android Apps for dissemination of Sufal Bangla Commodity price information. Price information can be accessed for all the available specifications and varieties of a queried agricultural commodity.
Shri Tapan Dasgupta, the Hon'ble Minister in charge of Agricultural Marketing Department, Government of West Bengal has formally inaugurated "Sufal Bangla Mobile APP" and "IVR System" on September 21, 2017.

Translation Workbench for English to Indian Languages

The MAT based Workbench developed provides assistance to professional translators for quick translation of different texts written in English to Bengali, Assamese and KokBorok. Workbench improve overall performance of the translation by making use of user feedback while making choices from the translated output options or manual corrections. During the year the same is deployed at Women's College, Agartala, Govt. of Tripura.

Language Tools

Deep-Learning based Indian Language OCR for 7 languages

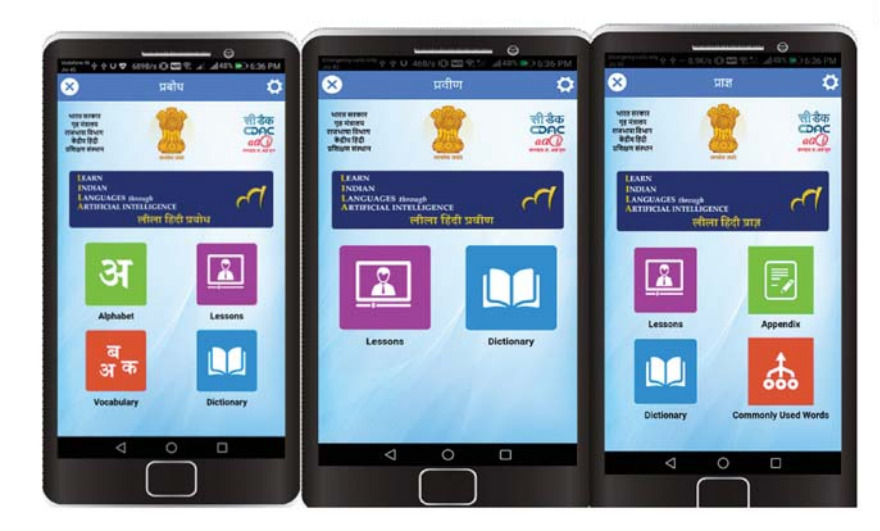
CDAC has employed deep learning in designing the multilingual OCR. Additionally, the data processing is done at the line level thus nocharacter/word segmentation is required. It directly works on the 2-D image of a line thus no hand-crafted features are required. The new innovative multi-dimensional OCR architecture outperforms any of the currently available OCRs and the same is available for various languages including Hindi, Marathi, Tamil, Kannada, Malayalam, Bangla and Gurumukhi.

NameScore Algorithm for De-duplication

De-duplication is required by various government departments in order to identify matching names and entries. The challenge is compounded when the data is in multiple languages. C-DAC has devised a novel algorithm by applying fuzzy logic to match names and addresses using Natural Language Processing techniques. This solution, helps in finding the same entity (person or company) within multiple databases, which might contain millions of records, based on one or more parameters like, names, addresses, PAN, phone number, etc. An API for getting the match score between two names have been developed, where name can comprise of one or more of first name, middle name, surname, initials, titles, aliases, etc. For example, using this it is possible to compare a name between a Bank account name and the name as it appears in PAN card. In addition it also has capabilities to compare when one of the input is in English and the other in Indian Language. This tool is currently being used by departments in Govt of Karnataka and Govt of Andhra Pradesh for checking Aadhaar seeding of Pensioners and Patadaars.

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

LILA (Learn Indian Languages through Artificial Intelligence) is a self-tutoring and learning package developed based on the support from Department of Official Language (DOL). The application consists of 03 courseware's Hindi Prabodh, Hindi Praveen & Hindi Pragya of Central Hindi Training Institute (CHTI) – a subordinate office of the



LILA–Rajbhasha on Mobile

Department of Official Language. The application is designed and developed to teach Hindi language through the mediums of English and 14 Indian Languages namely Assamese, Bangla, Bodo, Gujarati, Kannada, Kashmiri, Manipuri, Malayalam, Marathi, Nepali, Oriya, Punjabi, Tamil and Telugu languages. LILA-Rajbhasha is available on both web and Mobile. Mobile application can be downloaded from Google Play and Apple Store.

LILA–Rajbhasha on mobile was launched by Honorable President Shri Ram Nath Kovind of India in presence of Shri Rajnath Singh, Home Minister; Shri Hansraj Gangaram Ahir, Minister of State of Home Affairs; Shri Kiren Rijiju, Minister of State for Home Affairs during Hindi Divas Samaroh function on September 14, 2017 at Vigyan Bhavan, New Delhi.

Language detection module integration in Transliteration solution for CCTNS

- Transliteration solution is used by CCTNS for on the fly transliteration of proper nouns (Names, Address) in FIR registration module, where user selects source Language of input at the time of login.
- Automatic language detection module is developed and integrated in Reverse Transliteration API for automatically detecting the source locale.

ICANN - International collaborative initiative

C-DAC is collaborating with Internet Corporation for Assigned Names and Numbers (ICANN) for creating Root Zone Label Generation Rulesets for Top Level Domains. C-DAC has been an active participant in the broader "IDN Variant TLDs" program. The program has completed three phases so far viz. (1) Devanagari VIP Issues report; (2) Integrated Issues Report; and (3) Drafting procedure for Label Generation Rule-set for the root zone. C-DAC formed the "Neo-Brahmi Generation Panel" (NBGP), a community supported panel under the IC4ANN IDN Program. Currently the program is in its fourth phase "Creation of Label Generation Ruleset (LGR)" where C-DAC is actively involved in the "Neo-Brahmi Generation Panel" to create the LGRs for all the Brahmi derived scripts. C-DAC members are actively authoring four of the major Indian scripts viz. Devanagari, Gujarati, Bengali and Tamil. C-DAC members have been active participants of ICANN's Root Zone Label Generation Rule-set initiative as well.

Localization Management Framework on Cloud Platform (LPMF)

C-DAC has developed Go-Translate framework enables community participation in localization initiative that can be used to translate website(s) dynamically on the fly just by the click of a button. During the year, the Go-Translate has been updated with various features like surface plugin, GIST data converter, support for MS-Office and Libre Office and Mobile App localization etc.

Linguistic Translator Workbench

The GIST- Linguistic Translator Workbench has been designed to cater for a heavy demand for assisting translators in undertaking fast localization of documents and web content.

Linguistic Translator Workbench

Linguistic Translator workbench is powerful and easy to use translation editor equipped with built-in NLP (Natural Language Processing) components and translation assets like Prediction engine, Named Entity Identification and Tagging, Transliteration, Translation Memories, Glossary, WordNet to name a few. This makes the translation process simple and reduces the time for doing the actual translation.

Android Application Localization

CDAC GIST Localization Tool for Android, java and .net can help localize strings.xml file of android, .properties of java and .resx file of .net into various Indian language. Developers can use the converted files in their code and compile their applications for various Indian languages.

Sindhi language CD for National Council for Promotion of Sindhi Language (NCPSL)

This CD provides a set of Basic Input Processing Kit including Sindhi fonts, Keyboard drivers, localized free and open source software such as LibreOffice, Mozilla Firefox, Joomla and many others were bundled in a CD and released in April 2017.

PeshveKalin Modi Open Type font

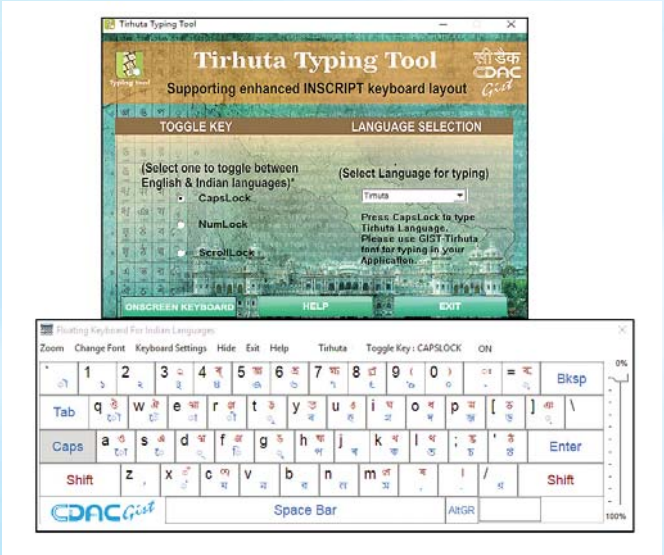
Modi is an invaluable database to explore the history of the Maratha Empire right from its inception under Chhattrapati Shivaji Maharaj up to the creation of moveable metal type when Modi was slowly relegated to a lower position.

Tirhuta Open Type font design and development

Tirhuta is the traditional writing system for the Maithili language, which is spoken in the state of Bihar in India and in the Narayani and Janakpur zones of Nepal by more than 35 million people.

Tirhuta Typing Tool

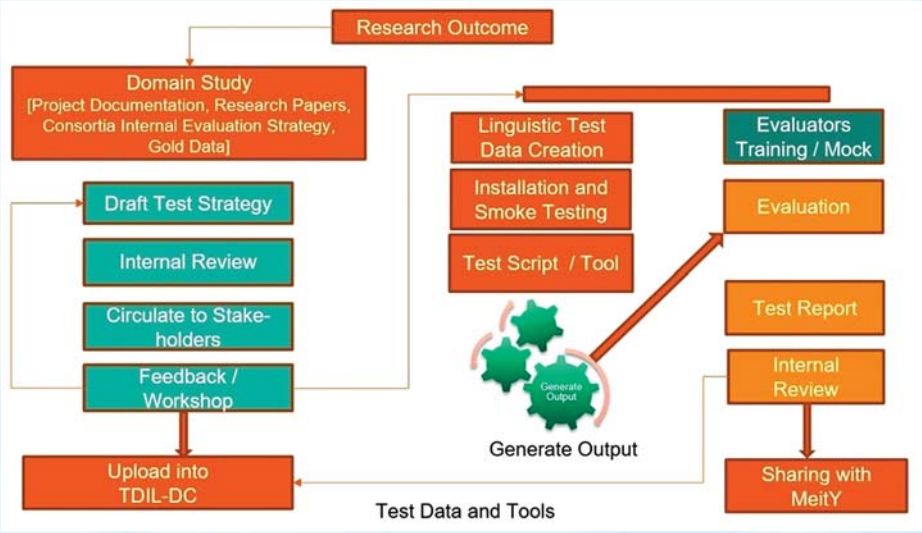
Unicode based Tirhuta Typing tool is primarily for creation of documents in Tirhuta script. On-screen keyboards for Tirhuta language are also provided in this tool to make typing easier.



Tirhuta Typing Tool

Testing and Benchmarking of TDIL Funded Project Outcomes

As part of this initiative testing and evaluation of language tools and solutions have been carried out. This includes, TTS Evaluation for 11 languages, Anuvadaksh Phase-II evaluation for 8 languages,Test Data for MT Acceptance, Evaluation Morphological Analyzerand the reports were prepared and submitted to MeitY.



Digital Preservation and Heritage Computing

Centre of Excellence for Digital Preservation

National Cultural Audiovisual Archive (NCAA) has been certified as world's 1st Trusted Digital Repository as per ISO 16363: 2013 standard, certificate number PTAB-TDRMS 0001. NCAA was taken up for development as a pilot digital repository as part of Centre of Excellence for Digital Preservation in collaboration with Indira Gandhi National Centre for Arts (IGNCA), New Delhi. NCAA digital repository is established with and powered by DIGITALAYA (डिजिटालय) which is developed in compliance with Open Archival Information System (OAIS) Reference Model ISO 14721:2012.

National Virtual Library of India

The Portal for National Virtual Library of India was successfully launched (soft launch) by Shri Shravan Kumar, Joint Secretary, Ministry of Culture on 15 February 2018 at IIT Mumbai. The soft launch is meant for limited users from various organizations under the Ministry of Culture. The purpose of the soft launch is to collect user feedback before going public.

JATAN: Virtual Museum Builder

Multi-museum version of JATAN software is deployed at Albert Hall Central Museum, Jaipur for Alwar Museum, Ahar Museum and Dungarpur Museum, Rajasthan. JATAN software is also deployed at Rabindra Bharati Museum, Kolkata and Indira Gandhi Rashtriya Manav Sangrahalaya (IGRMS), Bhopal. Archaeological Survey of India (ASI) has placed an order for JATAN software for 15 site museums.

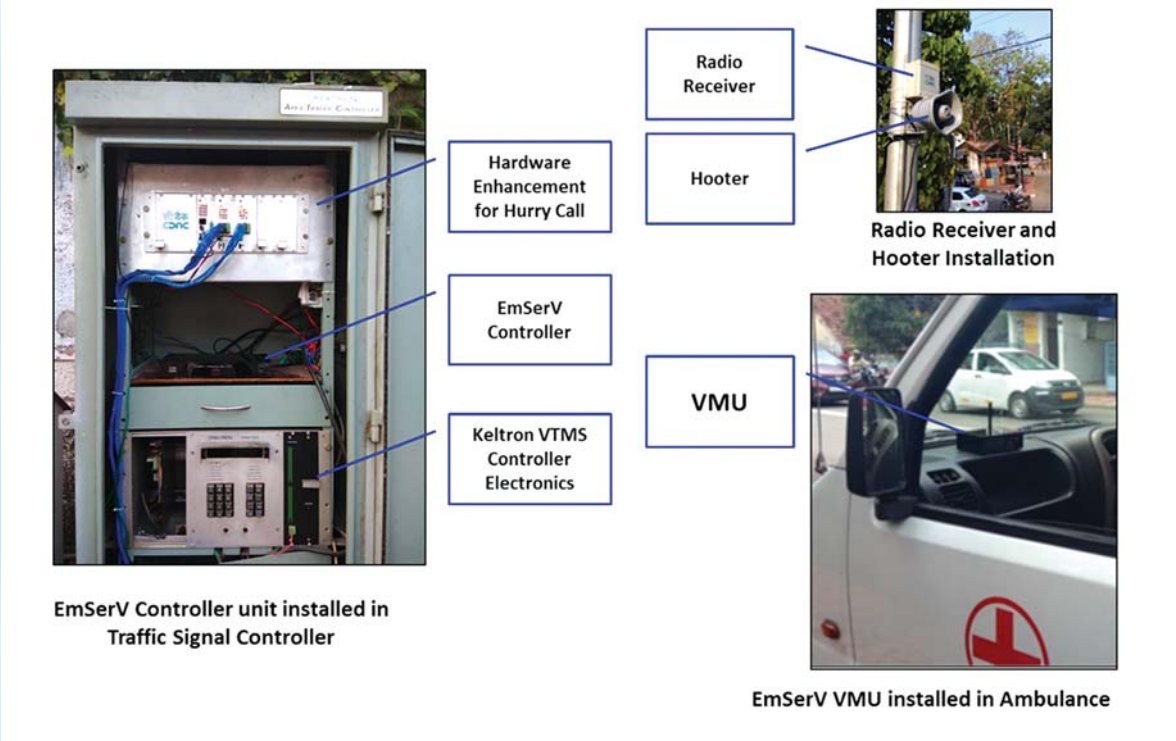
Professional Electronics, VLSI and Embedded Systems

C-DAC has expertise in the design, development and implementation of VLSI Systems, IoT solutions, microprocessor, microcontroller and DSP hardware & software technologies, which form the key building blocks in many commercial, industrial and strategic applications. Primary areas of focus under Professional Electronics include Smart System Solutions, Medical Electronics, Agri-Electronics, Industrial Automation Systems, Advanced Wireless Communication Systems, Power Electronics, Strategic Electronics and Intelligent Transportation Systems.

Intelligent Traffic System

EmSerV – Emergency Service Vehicle Priority System

The Radio based Emergency Service Vehicle Priority System (EmSerV) developed by C-DAC is an electronic equipment that facilitates Emergency Service Vehicle (ESV) to pass through signalized traffic junctions without stoppage. EmSerV is implemented based on geo-fencing method using GPS coordinates. The EmSerV controller installed inside the traffic signal controller is always in the listening mode waiting for signal from the Vehicle Mount Unit (VMU) kept near the windshield of the ESV. Once it receives the coordinates of the ESV, the EmSerV controller identifies the direction and location of the ESV, based on the signal from the ESV. The traffic signal controller opens right-of-way for the ESV by terminating the currently running signal phase. The signal sequence is resumed once the ESV clears the junction. The system has been deployed at Kumarapuram Junction, Trivandrum.



EmServ – Emergency Service Vehicle Priority System

SAFEDRIVE - SAFEty alert systems using Dedicated short Range communication for on road Vehicles

Dedicated Short Range Communications (DSRC) systems are being deployed by many countries for providing vehicle-to-vehicle communication as well as vehicle-to-roadside communication. As part of the SAFEDRIVE project, On Board Unit (OBU) & Road Side Unit (RSU) hardware and DSRC stack are being developed for providing the requisite communication. These would enable two-way communication, which shall assist safe driving and shall also support various applications using secure vehicle to vehicle (V2V) communications and vehicle to roadside infrastructure (V2I) communications. The system has been deployed and tested near Hardware Park, Hyderabad.

On Board Unit (OBU)

Road Side Unit (RSU)

SAFEDRIVE

Smart Car Parking System (Indoor)

Smart Car Parking System continuously monitors and updates the car parking status in the indoor parking layout, communicating this information through Wi-Fi to the central server. Sensor unit which has ultrasound sensor, processor and Wi-Fi connectivity is mounted at the top of each vehicle. Central server collects the car parking status of each car parking slot of parking layout, processes the information and updates the car parking data to the front-end monitoring display as well as to user Android application. System also provides car parking status locally using an LED/Lamp indication for each car parking slot. The solution is currently deployed at C-DAC Innovation Park, Pune.

Smart Parking System

Smart System Solutions

Garb0 - Smart Garbage Bin

Garb0 is a garbage management sensor module that shall cater to the needs of the society. This is an IoT based waste management system where sensors are attached to each of the garbage bins. The sensors measure the level of garbage by an ultrasonic sensor and when the level crosses a specified threshold, or if the garbage is not collected for more than a specified duration, the sensors intimate the Central system deployed in cloud. This information shall be transferred from cloud to the garbage collector's mobile application. Optimized schedule and route for scheduling the collection of waste in the garbage bins shall be generated accordingly. The system has been deployed and tested at C-DAC Hyderabad campus.

Smart Garbage Bin (Garb0)

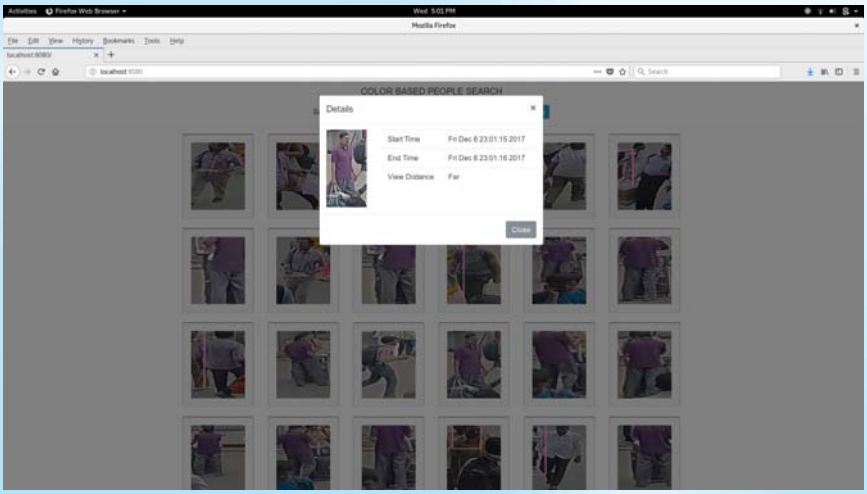
Climate Controlled Greenhouse

Research greenhouses with climate control system are an extremely effective tool in the hands of agricultural scientists to study the impact of various climatic parameters on the growth/response of plants. As part of the Digital India project DISC (Digitally Inclusive Smart Community), a Climate Controlled Greenhouse with facility for continuous monitoring of climatic parameters like Temperature, Humidity, Light and Carbon Dioxide was developed and handed over to Indian Institute of Wheat and Barley Research (IIWBR), Karnal.

Security & Surveillance

Color based people search

Color based people search is a technique used to track people in Real time video captured from any video camera. This video is processed for detecting and tracking multiple people using state-of-the-art object detection methods. Image of each person is stored when the person goes out of track. In addition to image copy, the start and end time of the person/object, where it is viewed (far, medium, rear), color and the image location are stored in a database. The web based user interface takes the time duration of the search and the color. It displays the images according to the user input. The UI provides option to move forward and backward. It also provides seven color options. Each image can be expanded to get details of when and where the person/object is viewed.

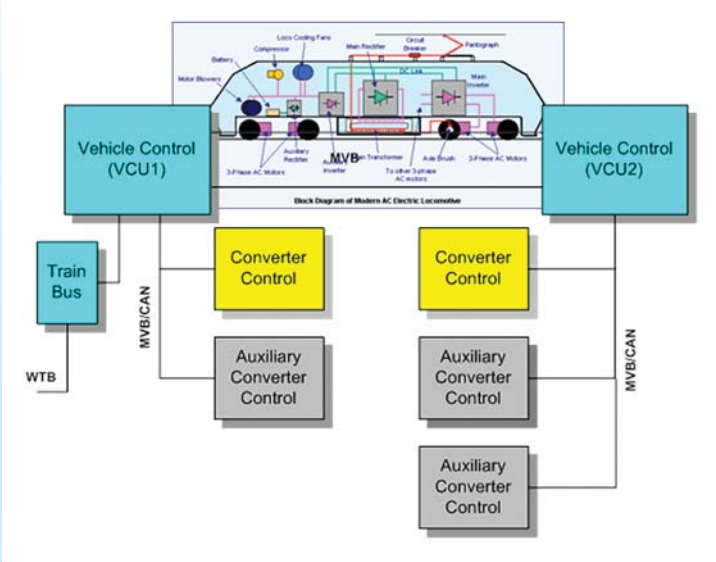


Retrieved person for purple color with time of appearance information

Power Electronics

Vehicle Control Unit (VCU) as per Train Communication Network (TCN) standard for Rolling-stock applications

C-DAC has developed the technology TCN VCU compatible for 3-phase loco provided with GTO/IGBT converters for Chittaranjan Locomotive Works (CLW). The first VCU proto developed by C-DAC is under continuous run on IGBT loco by M/s ABB and has completed operation of about 5,00,000 km based at Electric Loco shed, Tuklakabad New Delhi since February 2013. The second VCU proto started continuous trial based at Electric Loco shed, Visakhapatnam from December 2016. CLW has given approval of Transfer of Technology (ToT) for the TCN based VCU developed by C-DAC and M/s BHEL Bangalore, M/s Crompton Greaves Ltd., Mumbai, M/s ABB India Ltd., Bangalore and M/s Autometers Alliance Ltd., Noida have signed MoA. Around 130 VCU systems have been manufactured and commissioned by the ToT partners as of now. These are working in the passenger as well as Freight Locos.

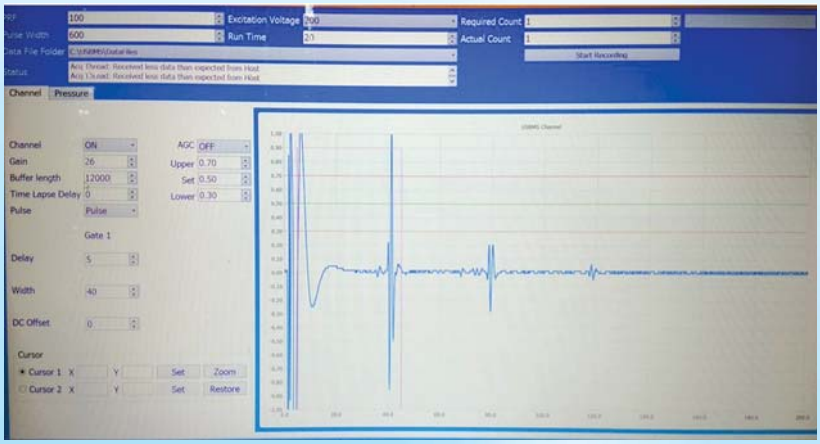


Vehicle Control Unit (VCU)

Strategic Electronics

Ultrasonic Solid propellant Burn rate Measurement System

Ultrasonic Solid propellant Burn rate Measurement System (USBMS) is an ultrasonic device for measurement of burning rate of solid propellant specimen of rocket motors. The features of the system include data acquisition at a sampling frequency of 1000Hz, graphical presentation, signal data storage, replay, offline analysis and a user friendly GUI. An independent channel for pressure is also provided for measuring pressure, used for computation of burn rate. The product has been developed and shall be deployed at user agency.



Ultrasonic Solid propellant Burn rate Measurement System

Medical Electronics

Thermal Sensor Based Monitoring System for the early detection and screening of breast cancer

Thermal Sensor Based Monitoring System for early detection of breast cancer uses temperature of skin surface for initial screening of women before referring potential patients for mammography. The system consists of a body worn device with thermistors, developed by C-MET, Thrissur and a data acquisition device which can monitor the breast temperature with an accuracy of + 0.01oC. It can detect breast cancer at a very early stage and involves no radiation exposure or breast compression. This is ideal for community testing as it has high degree of sensitivity and accuracy. Clinical trials, testing and evaluation of Thermography device has been carried out at Malabar Cancer Centre (MCC), Kannur with 42 breast cancer patients and the results have been comparable with that of standard Fluke device and Mammogram. Five units of Thermography device are handed over to Malabar Cancer Centre, Kannur.

Thermal Sensor Based Monitoring System for the early detection and screening of breast cancer

Automated Blood Cell Counter

C-DAC has initiated development of a dedicated embedded system for automated blood cell counting. The system is proposed to be based on well-established flow cytometry techniques. It shall be suitable for installation in large and medium scale pathology labs, capable of replacing the imported automated machines.

IOT Solutions and Sensing

Ultrasonic Level Sensor

Ultrasonic Level Sensor provides solution for level monitoring applications such as underground city sewers, unattended diesel tanks at remote sites, rivers, waterways / water reservoirs, irrigation channels etc. The sensor measures the level and communicates periodically to the Monitoring station for long term and on-line monitoring. Sensor also transmits real time alerts for events such as river flooding, sewer overflow conditions, empty or full diesel tank etc. Alerts are also transmitted on low power supply. The level sensor module is made up of ABS and is IP68 compatible. The sensor is suitable for using in chemically aggressive environments and can be part of IoT network. The Ultrasonic Level Sensor is deployed at Aruvikkara and Peppara reservoirs, Kerala for monitoring the water level for giving alerts on water levels to the authorities.

OCTO - Omni Channel Ticketing Option

OCTO is a smart phone application which helps railway passengers to make their journey comfortable. The application has the capability to ascertain passengers without/invalid ticket. The user/passenger can book the ticket any time before the travel using the mobile app, which generates a virtual ticket and get stored in the user's mobile phone on successful completion of ticket booking. When the user enters the railway station premises, the virtual ticket automatically gets activated and validated with the help of an on-site unit. This on-site unit is a multi-function device that also regularly validates available tickets within its range. The on-site unit communicates to the

server for ticket activation, validation and other services. The ticketing system is based on the Bluetooth beacon technology.

OCTO (Omni Channel Ticketing Option)

Image Processing-based Garbage-Can Management System

The smart waste bin management system computes the status of waste bin, which is periodically monitored. The system is also helpful in giving optimal route for the collection vehicle and planning optimal collection day and time. Smart waste management and monitoring system uses image processing through camera placed directly over-head the solid waste bin waste/ garbage bin. The percentage of change is measured and fed to the monitoring system.

Image Processing Based Smart Bin

Agri-Electronics

Annadarpan Dynamic – A conveyorised Machine Vision Multi-crop Quality Analysis System

Annadarpan Dynamic is a portable machine vision apparatus for multi-crop quality assessment that eliminates the problems of laborious and time consuming manual quality analysis of cereals and pulses. This system consists of a portable bench-top conveyor, a hopper, an automated mechanical spreading arrangement and an overhead scanner placed inside an enclosed cabinet. Quality analysis of different crops is done through digital image analysis. The same hardware architecture can be used for multiple applications of quality measurement for multiple crops. The system has been deployed at Agricultural Produce Market Committee (APMC), Gadag, Karnataka.

Annadarpan Dynamic

PesTSCAN - Uniform Illumination Imaging Bio-Sensing System (UnIBioSenS) for Pesticide residue detection in agri-produces

PesTSCAN is a field portable, user friendly instrument for pesticide residue detection. The instrument is an enzyme based biosensor that uses colorimetric measurement techniques, for sensitive detection of pesticides. Color is developed by an array of enzymes, and is analyzed by a Uniform Illumination Imaging System (UIIS) which is interfaced with the PC via USB cable. The analyzed data in a Report format can be shared with concerned stake-holders through internet or cloud. This method is highly affordable, and has been demonstrated for a few pesticides of Organophosphorus (OP) origin and can be extended for detection of other pesticides also. The product is under field trial.

PesTSCAN

Automated Hydroponics System

Hydroponics cultivation is a technology under which plants are grown in soilless media, where roots of the plant are exposed to the nutrient mix solution. The nutrients mixed with water are pumped through the gullies where plants are grown. Automated Hydroponics System is capable of real time monitoring of Electro-Conductivity (EC) and pH of solutions and is able to control the flow durations and has a user-friendly GUI. The system is deployed at Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (HP).

Automated Hydroponics System

Multi parameter smart sensor kit with automated process control systems for industrial IoT deployment in Spirulina food processing Industry

Spirulina is widely used as a food-nutraceutical supplement as it is a rich and dense source of multi-vitamins, wherein work on cost effective IoT based robust indigenous control panel for the same is underken thereby contributing to Make-in- India program. Industrial IoT based online control and monitoring of water quality and nutrients along with other parameters such as pH, CO2, dissolved oxygen and optical density in the form of sensor kits that are low cost, reliable and affordable, shall be developed. The industrial IoT based sensor kits would enable high desired product/biomass productivity, high safety and energy efficient process. Automation of Spirulina cultivation system in open raceway pond/photo bioreactor integrated with indigenous smart multi-parametric sensors and control system is being developed by C-DAC, IISc Bangalore and CFTRI Mysore.

Decision Support System for prediction of Gray Mold disease in Castor Crop

Wireless Sensor Network (WSN) is deployed in identified locations during the cropping period and microclimate data is aggregated using WSN, along with the disease incidence in these regions. This data is used to develop a prediction model for disease outbreak and farmers will be advised accordingly. WSN nodes with sensor devices are deployed in 4 locations in Telangana to acquire Micro climate data of Temperature, Relative Humidity and Leaf Wetness acquired from open field conditions during crop season.

Advanced Wireless Communication System

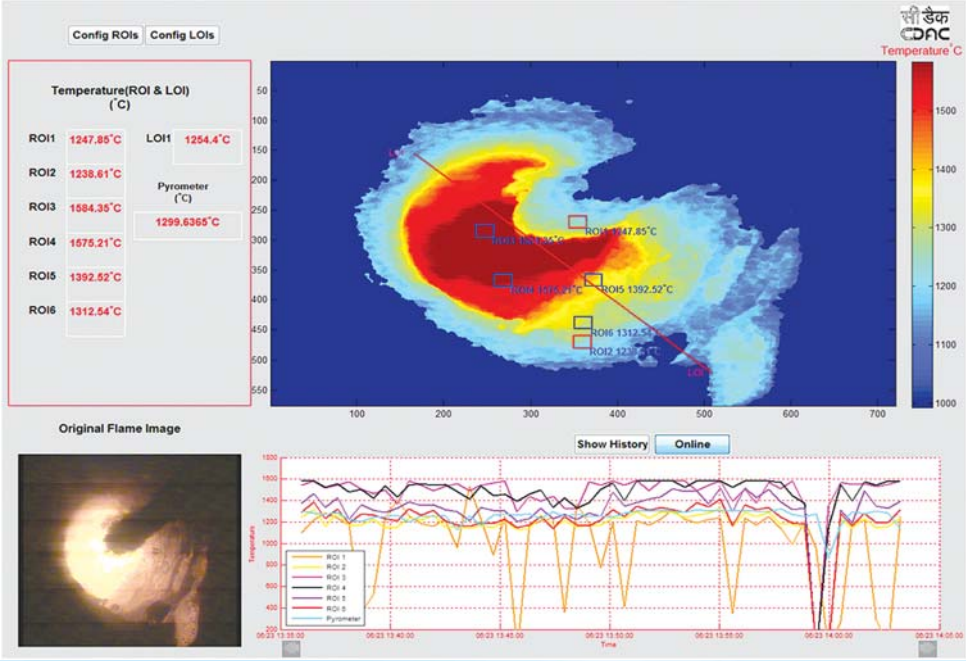
TETRA Communication Systems for Prisons and Correctional Services

TETRA is an open standard developed by the European Telecommunications Standards Institute (ETSI) for critical communication. It has a rich set of features ideally suited for managing emergency situations and havocs. TETRA supports individual, group and broadcast communication, dynamic group formation, priority and emergency calling, ambience listening, individual/group/broadcast messaging etc.It shall be implemented at the central prisions in Thiruvananthapuram, Viyyur and Kannur.

Industrial Automation

Advanced Automation and Process Optimization System

Process Optimization system has been developed using indigenously developed products of C-DAC as the basic building blocks. The system has been field validated and commissioned in the 1200 TPD Cement Plant at Malabar Cements Factory, Palakkad. Five subsystems have been developed: Fuzzy Logic based Kiln Control Optimization System, Image Processing based Kiln burning zone temperature Estimation System, Fuzzy Logic based Cement Mill optimization system, Cyclone Jamming Detection System and Wireless Sensor based Stacker-Reclaimer Monitoring System. The system has resulted in remarkable improvements in production and operational efficiencies. The technology developed can be used in other cement industries also.



Temperature Estimation System for Burning Zone of Rotary Kiln

Other Initiatives

MDP - Microprocessor Development Programme

The Microprocessor development initiative shall be implemented in two phases. Phase-I of the project is for one year duration, in which a 64-bit Quad core Processor shall be designed, developed and implemented on an FPGA platform and its performance is to be demonstrated. The full hardware-software ecosystem shall also be developed for proliferation of the indigenous microprocessor. During the year, Micro-architecture design of 64-bit Quad Core Processor and design implementation of processor pipeline has been completed.

COPS TARA - Transmission of Aggregated data for Real time Access

COPS TARA is a compact GSM/GPRS modem specifically designed to transfer MODBUS compatible device data to remote locations. COPS-TARA supports Standard Meter Communication Protocol (like MODBUS TCP/IP) for transmission of data over GSM/GPRS Network. The module can be extended for other communication protocols like DLMS, IEC 60870 101 and IEC 60870 104. COPS TARA is deployed in Meghalaya, Assam states and implementation across various states in 120 locations is in progress.

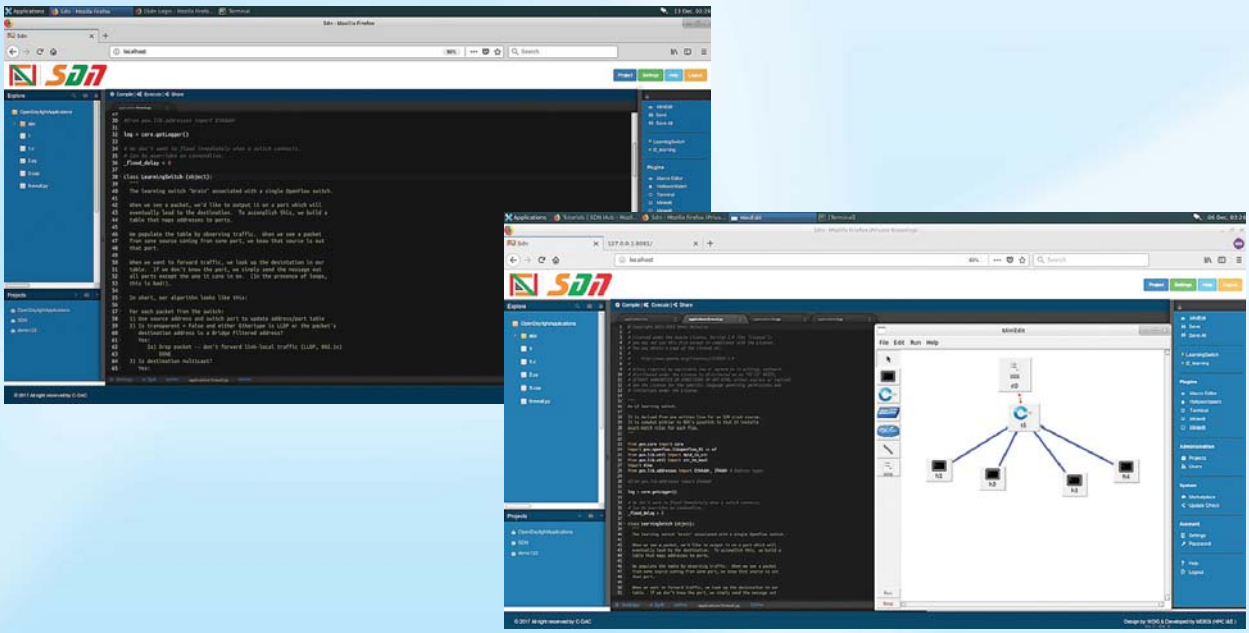
COPS TARA

NERS - Nationwide Emergency Response System

NERS is an initiative of Ministry of Home Affairs (MHA), Govt. of India to facilitate an integrated emergency response system to ensure a coordinated and effective emergency response service to citizens in distress. C-DAC as Total Solution Provider (TSP) for the implementation of NERS in all the States and Union Territories in the country. C-DAC has already initiated implementation in Andhra Pradesh, Himachal Pradesh, Uttarakhand, Mizoram and Nagaland.

SDN Online Lab - A web-based SDN application development platform

SDN Online Lab (SOL) is an open-source web-based integrated development environment (IDE) for developing SDN applications. SOL provides a platform for experimentation, development, debugging, emulation, testing, verification, and execution of SDN applications. It is a one-stop solution for developing network applications. SOL shall make it easy for the users to get started with SDN and enable the beginners for advanced level experimentations. The main components of the platform are Network Emulator and IDE that support full development lifecycle for SDN Applications. The cloud base SOL backend is managed using containers.



SDN Online Lab

Online ABT Meter Based System

Online Availability Based Tariff (ABT) Meter based System extracts the data from various ABT meters (open access consumer meters) that are located at different locations and integrates with the Scheduling software at State Load Dispatch Centre (SLDC). The system is deployed in Meghalaya State.

Software Technologies including FOSS

C-DAC continued to carry out development and deployment of various software solutions in the areas of e-Governance, Free and Open Source Software (FOSS), Social Development and eLearning etc. under Software Technologies Including FOSS thematic area. Details of 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 along with Aadhaar

e-Pramaan (https://epramaan.gov.in/) 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. It provides various authentication mechanisms such as password based authentication, OTP based authentication, digital certificate based authentication and biometric (fingerprint) based authentication. Another major component of e-Pramaan is Aadhaar Ecosystem. C-DAC is ASA – AUA/KUA of UIDAI to provide Aadhaar services and is compliant to UIDAI's latest API and specifications. During the year, 79 departments were integrated and 4.52 Crores transactions were completed using e-Pramaan. A total of 171 departments have been integrated and 6.23 Crores transactions have been completed using e-Pramaan till March, 2018.

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) is a Mission Mode Project under NeGP and is currently in its second phase that started on July 7, 2015 for five year duration. eSangam being a middleware, facilitates service integrations 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 launched 9 Services of Jammu and Kashmir and 3 services for eBiz. Gujarat SSDG has gone live with 100 services.

Mobile Seva: A National Mobile Governance Platform

Mobile Seva is a centralized infrastructure platform for enabling Government Departments to offer the public services through mobile devices across various mobile-based delivery channels such as Short Message Services (SMS), Voice / Interactive Voice Response System (IVRS), Unstructured Supplementary Service Data (USSD), mobile applications (m-Apps) and AppStore (https://apps.mgov.gov.in/) for hosting Mobile applications. Government departments can develop and deploy mobile applications for providing their services through mobile devices. 436 departments and agencies were integrated during the year using Mobile Seva platform and a total of 3799 departments and agencies have been integrated using this platform as on March 31, 2018.

Field Testing and Device Certification of Biometric Devices for Aadhaar Authentication

C-DAC in collaboration with STQC has been carrying out Field Testing of Biometric devices for Aadhaar authentication. As part of the certification procedure of biometric devices for Aadhaar aunthetication, all participating devices need to prove acceptable False Reject Rate (FRR) under field conditions. Three rounds of Field Testing have been done on 5000 live Aadhaar holders per round with over 75 biometric devices (Fingerprint and Iris). The Fourth round has been initiated and around 50 biometric device vendors have shown their interest. C-DAC is also carrying out FRR testing of the biometric devices under the "Provisional Certification of Biometric devices Scheme of STQC". The testing of three devices has already been completed at C-DAC Mumbai premises under the supervision of STQC officials over a human test population of size 100.

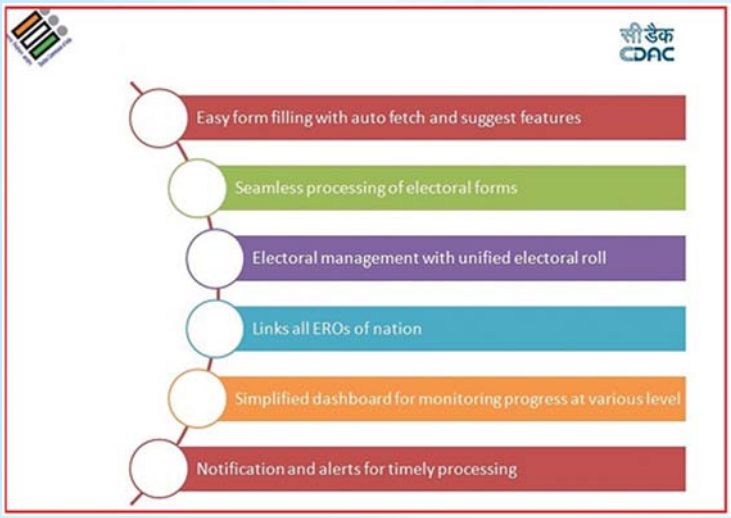
Centralized AUA/KUA development for CeG KRDH

C-DAC had signed an MoU with Center for e-Governance (CeG) Karnataka Resident Data Hub (KRDH) in November 2017 to become a Managed Service Provider (MSP) to design, architect and implement Centralized Aadhaar Services platform for CeG. Centralized ASA-AUA platform of CeG KRDH provides Aadhaar services to their various Government departments. Benefit of centralized solution for departments is reduction of cost due to changes based upon the guidelines issued by UIDAI from time to time. CeG KRDH Centralized AUA-ASA solution is also likely to reduce the maintainability, scalability cost. The solution is hosted in the State Data Center (SDC) and was made live on February 20, 2018. Post go-live, more than 88 lakhs transactions have been performed through this platform.

e-Governance Applications and Services

National Roll out of e-Services of Election Commission of India (ECI)

Building on success of citizen centric services of Electoral Search (www.electoralsearch.in) and National Voters Services Portal (www.nvsp.in), C-DAC has further participated in National e-roll Purification (NERP) exercise. ERO-Net caters to various Forms filled by citizens either online or offline and provides a decision support workflow and system for ECI officials. Development, testing, deployment and launch of ERO-Net for several states has been initiated. The system is aimed at streamlining the day-to-day work of officials. There are a total of nearly 10 Lakh officials who will be using ERO-Net / BLONet in various ways (online / offline / desktop /mobile). Various roles have been incorporated in the system based on inputs from ECI and various stakeholders at State, Assembly, District and Block levels The Architecture caters to storage of 84 Crore+ Electors data and so far more than 1.2 billion hits have been received for citizen services.



ERO-Net Features

e-Hastakshar – C-DAC's eSign Service

As part of Government's Digital India Initiative, 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 eSign service was migrated to newer version of software as per Controller of Certifying Authority (CCA) and UIDAI specifications. The integration was carried out with various Government and private agencies for leveraging eSign service. As on March 31, 2018, more than twenty nine lakh signatures have been offered for 44 agencies.

PMGSY National GIS: National implementation of Web based Geographic Information System for Pradhan Mantri Gram Sadak Yojana

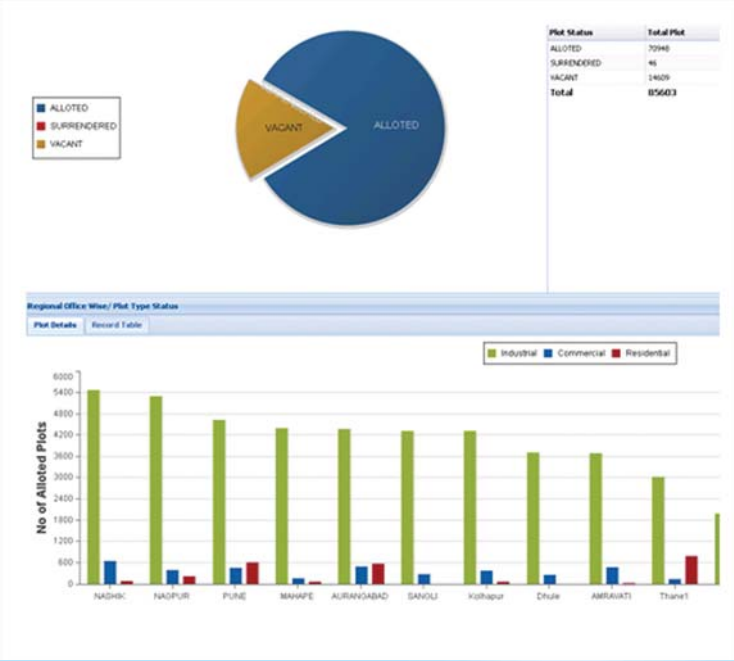
Sponsored by National Rural Roads Development Agency (NRRDA), PMGSY National GIS is for the entire country, emphasizing on improvement of positional accuracy of features on the map and utilizing national level infrastructure information captured in Online Management, Monitoring and Accounting System (OMMAS) (http://www.omms.nic.in). Web GIS application developed by C-DAC is used for management and monitoring of PMGSY, which is open to the public at (http://www.pmgsy-grris.nic.in) and is hosted at NIC Data Centre, New Delhi.

Online Firm Registration

Under the Ease of Doing Business initiative, C-DAC has developed an Online Firm Registration web application for facilitating online registration of Partnership firms, without the need to visit any District Registrar (DR) Office. It allows the applicant /user to submit the necessary details and upload relevant documents required to register the firm via online application. DR verifies the details and documents. The application is approved on successful verification and payment option gets enabled for the end user for registration fee. After successful payment, the DR certifies the firm and the end user can download the digitally signed firm registration certificate. The certificates of all registered firms are also available on the website for the public to view. During the year, the application was deployed at Karnataka State Data Centre, Vidhana Soudha, Bengaluru (Karnataka) (http://kaverionlinefirm.karnataka.gov.in/).

Maintenance and Enhancement of Land Management System (LMS) for MIDC

C-DAC has designed, developed and implemented a Web based LMS for Maharashtra Industrial Development Corporation (MIDC), Government of Maharashtra. LMS automates complete Land transactions related to property inside the Industrial areas across Maharashtra. Transactions such as Allotment of Land, Transfer of a plot from one person to another, Mortgage of a plot, Subdivision of a plot, Amalgamation of two or more plots, Subletting of portion of the built up area to another person and Surrender of a plot to MIDC are supported by the system. Application supports Land Statements, Monthly, Quarterly and Annual reports at Head Office (HO) level and Regional Offices (ROs) Level. During the year, the system was integrated with IFMS (Integrated File Movement System), GIS and SWC (Single Window clearance) system and is currently in use in the state of Maharashtra for 16 Regional Offices.



LMS Dashboard

SUGAM Portal for Central Drugs Standard Control Organization

SUGAM is a web-based system for Central Drugs Standard Control Organization (CDSCO) developed by C-DAC which facilitates complete life-cycle of user application starting from application submission to CDSCO till grant of licenses and approvals from CDSCO. During the year, module to build national database of pharmaceutical manufacturers, manufacturing units and Formulations was launched and rolled out for all manufacturers and State Drug Controllers in India. Module for reporting of serious adverse events caused during Clinical Trials across India has also been launched.

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, Visiting Advanced Joint Research Faculty (VAJRA) and Teachers Associateship for Research Excellence (TARE) schemes were launched by Dr. Harsh Vardhan, Hon'ble Union Minister of Science and Technology. International Travel Support (ITS), Overseas Visiting Doctoral Fellowship (OVDF) and Distinguished Investigator Award (DIA) Schemes were also made operational.

Works and Accounts Management Information System (WAMIS)

WAMIS is a workflow enabled software application designed and developed by C-DAC which is aimed at departments engaged in planning, designing and monitoring of construction activities. This application presents an efficient workflow of a typical infrastructure project execution and management activities and allows officials at various levels in the government setup to track and monitor various aspects of a project right from its inception to its final completion. WAMIS is currently being implemented in 15 engineering departments covering 4 states namely Odisha, Jharkhand, Maharashtra and Tripura with over 1000 user offices. The current implementations have serviced over 2 crores financial accounting transactions amounting to Rs. 2.6 lakh crores, generated more than 2 lac contractors bills amounting to Rs. 33,000 Cr and captured over 22,000 geo-tagged photographs of ongoing works. Latest version of WAMIS with the addition of 2 major functionalities namely the eMeasurement Book and the Preparation of Works Estimates is under piloting in the state of Maharashtra.

Client Portal for Export Credit Guarantee Corporation of India (ECGC)

C-DAC is engaged in upgrading the existing portal of ECGC by providing the web-based registration facility to the Exporters and the Banks as well as to facilitate basic web-based activities in support of ECGC's mission of providing the cost-effective insurance and trade-related services to the Indian Export Industry with optimal utilization of available resources. The objective of developing a web portal is to publish information about various schemes and initiatives of the ECGC through the web portal to the main end-users – Exporters and Banks for their maximum benefits in a most transparent and user-friendly manner.

Portal went live in November 2017. User manuals were documented for different types of the end user - Administrator, ECIB, and Exporter.

Wood Based Industries MIS

C-DAC has developed a Management Information System for the online process of issuance of wood based industry license for a new unit, Renewal of existing unit, Change of ownership and Relocation of unit to applicant. It enables the relevant authorities to keep the track of applications received, processed, verified, approved and rejected. Applicants can also keep track and check status of the application. The payment can be made online through the integrated payment gateway. During the year, the system has been deployed at Forest Department, Haryana and Forest Department, Uttar Pradesh.

URL Shortener service

C-DAC has developed and hosted URL shortener service for TamilNadu e - Governance Agency (TNeGA). Some of the key features of URL shortener service include generation of a short and unique URL for every given URL, redirection to the original link on accessing the shorter URL, automatic links expiry after specific timespan, accessibility through secure REST APIs, Provision of admin console to manage the links, Option for resetting API key and Whitelisting of domain etc. The TinyURL server has been deployed at C-DAC Chennai and the API services have been integrated with TamilNadu e - Governance Agency (TNeGA) applications. This facilitates TNeGA deliver status/ notification of the applications submitted by the citizens via SMS, which include URL links which are to be shortened in order to comply with the limitations of the SMS i.e., 145 characters.

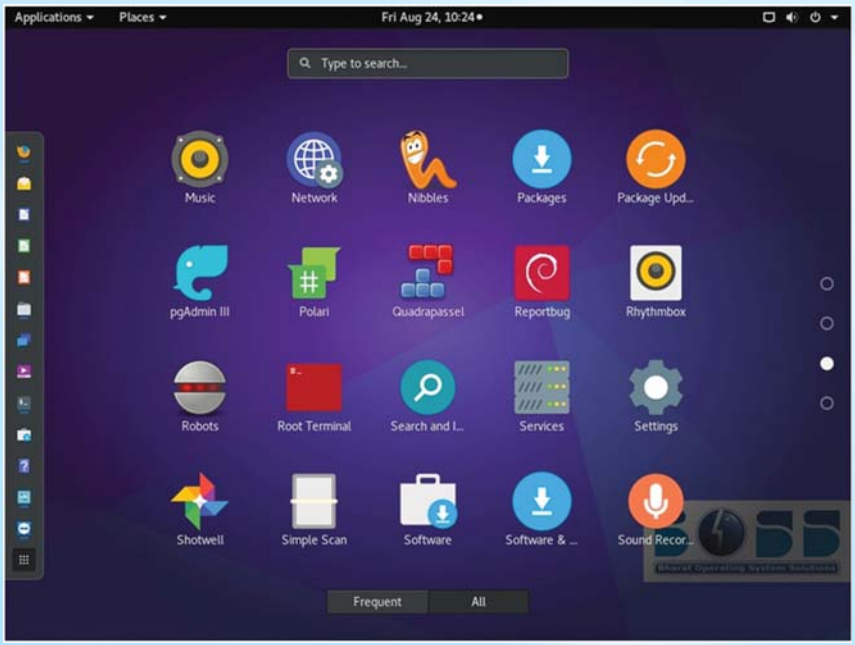
Electronic Standards of India (ESI) for MeitY

ESI is a system developed by C-DAC in collaboration with MeitY and this supports online submission of Application for Registration by manufacturers from all over world and automates all the stages of issuance of Registration Certificate by BIS. It supports processes such as Random Sampling, Surveillance, Renewal, Suspension and Cancellation of registration. The system has been delivered and is in use by internal and external members of the Meity/BIS. More than 3000 manufacturers from all over the world have been registered and more than 2500 applications have been filed.

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. A total of around 3.5 million deployments of BOSS have been carried out as on March 31, 2018 across India. During the year, C-DAC completed the development of new version of BOSS 7.0 codenamed as Drishti (Vision) to enhance user experience in desktops and laptops. It is coupled with GNOME Desktop Environment 3.22 version with wide Indian language support and packages relevant to the Government domain. The major updates in this version include updation of Kernel from 3.16 to 4.9 with Support for more hardware peripherals and updation of Libreoffice from 4.3 to 5.2 with improved XML support. The release aims at building up on the efforts for developing an e-Gov Stack on FOSS and Solutions, which seeks to build up a FOSS community across industry, government and academia.



BOSS Linux 7.0

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. Helpdesk is hosted at http://support.olabs.co.in/. Email id provided for helpdesk is support@olabs.co.in and helpline Number is provided on website. OLabs website is fully setup at NKN. During the year, C-DAC conducted 71 workshops and trained 2592 teachers from 811 schools covering 11 states. A total of around 22,120 teachers covering around 6899 schools have been trained by both C-DAC and Amrita University.

e-Basta: School Books to eBooks

C-DAC has developed a framework named “eBasta” as part of its ongoing project titled “Digitally Inclusive Smart Community” (DISC) In line with the government’s Digital India initiative to make the school books accessible in digital form as e-books. The framework is aimed at reducing the burden of school books for the students, enabling the schools and teachers to overcome the logistic problems of book publishing, transport and delivery, especially at remote locations, and significantly shortening the cycle of editing or changing the book content, which today is limited to a yearly cycle at best. The eBasta App, freely downloadable from the portal, Google Play Store and Mobile Seva Appstore, runs on any Android device. A total of 2781 books [2397 pdf + 359 ePub + 25 mp4] have been published on the portal by CBSE, State Boards and private publishers and 122 workshops have been conducted, training over 4173 number of teachers from 1521 schools on technologies including e-Basta. During the year, training on eBasta was provided to 2327 teachers from 749 schools.

Customization of Megh-Sikshak for NIRD&PR

MeghSikshak is an advanced Learning Management System (LMS) which provides flexibility for customisation, scalability and high availability for offering various e-learning services without the need for hardware and software resources at end user premises. During the year, MeghSikshak was customised for National Institute of Rural Development and Panchayati Raj (NIRD&PR) for offering online courses on Social Empowerment and Inclusive Development, Panchayati Management, Democratic Decentralisation and Local Governance and was deployed at NIRD & DR servers. At present NIRD&PR is working on content for these courses which are expected to be launched in collaboration with C-DAC.

An e-Learning Platform for Empowering and Enabling Rural Development and Panchayati Raj System in India

ICT for Social Development

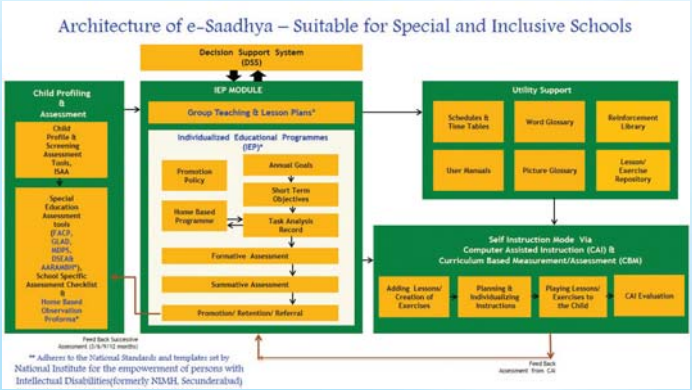
Vikaspedia

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 county, besides English. During the year, “E-CHARAK” – an e-Channel for Herbs, Aromatic, Raw material and Knowledge platform and its mobile app was also made available in Assamese, Marathi, Tamil and Telugu. “MOTHER” was launched in the states of Kerala and Assam to deliver mobile based voice alerts to MCTS beneficiaries. Knowledge Sharing Platform was deployed for 4000+ Akshaya Kendra entrepreneurs of Kerala. “Nutrifit” – a Health and Dietary plan based mobile app was deployed for a start-up incubate of ICAR-National Academy of Agricultural Research Management (NAARM) and “Ayurdavan” - health alert system supporting voice calls in Telugu for AIDS patients who are on Anti Retroviral Treatment was developed. 499 outreach workshops were held at various levels (block/district/state) across 20 states/UTs during the year. About 40,923 first level service providers were trained on digital information access and sharing in regional languages with support from various partnering institutions and about 56 lakh citizens were reached through various ICT media to promote Government schemes.

Vikaspedia Portal

Proliferation of e-Saadhya in NE schools

C-DAC has developed e-Saadhya, an interactive e-Learning web based learning System for Mild Autistic and mild mentally retarded children. It has special educator environment, where teacher/parent can create and personalize different types of lessons, quizzes, Songs, videos, Games etc. based on child's interest. C-DAC is working on deployment of e-Saadhya in NE schools. During the year, an MoU was signed with RAISE-NE, a Shillong based organization for coordinating with schools in NE states for autistic children. A total of eight schools across 5 states (Assam, Meghalaya, Nagaland, Manipur and Tripura) were identified, and teachers from these schools were given training on e-Saadhya. The special educators were also given training on content creation for e-Saadhya.



Architecture of e-Saadhya

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

C-DAC has engaged in an initiative to create a pool of master trainers who would in turn give training to other weavers/artisans. As part of this initiative, C-DAC in collaboration with Directorate of Handloom and Textile, Cachar, Silchar, Government of Assam, imparted training to 36 Master trainers so as to upgrade skills of Weavers / Artisans of Silchar, Assam and to create innovative designs using state-of-the art IT-based tools and techniques. A total of around 475 designs and 188 Motifs have been developed.

Citizen Facilitation Services

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

C-DAC is engaged in an initiative for the state of Jammu and Kashmir that enables citizens to download forms and submit applications electronically through a common gateway. The e-forms are 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. During the year, Post-Matric Services Scholarship Schemes for OBC/SC/EBC/DNT category and Post-Matric Scholarship Scheme for Pahari Speaking population for Social Welfare Department and Application for Fishing permits for Fisheries Depatment were launched.

Centralized e-Auction Portal for North Eastern States

C-DAC had deployed Centralized e-Auction Portal for NE states (https://eauction-neramac.in) 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. During the year, live e-Auctioning of Aromatic Black Rice of Manipur and a Workshop was conducted on December 27, 2017 at the Auction Centre, Singtam, Sikkim. Live e-Auctioning for Large Cardamom has also been initiated by NERAMAC (DONER) with the support of C-DAC.

Others

Web based integrated Office Automation System and CARICOM Web Portal

C-DAC has designed and developed a web based integrated office automation system also known as Integrated Workflow System (IWS) and a Web Portal for CARICOM. IWS is a tailor-made, low cost workflow solution integrating the departments following the rules and norms of CARICOM in order to achieve automated office environment. The Web Portal for CARIBBEAN COMMUNITY is a common platform to showcase the community related works done under various programmes. The software, funded by MEA, Government of India, was deployed at CARICOM Secretariat, Georgetown, Guyana as a part of the programme "Up-gradation of existing IT Infrastructure and Development and Deployment of Web based Integrated Office Automation System and CARICOM Web Portal Software for CARICOM Secretariat."

Office Automation System for Raja Rammohun Roy Library Foundation

C-DAC has been carrying out maintenance and upgradation of the running ERP solution on Office Automation for Raja Rammohun Roy Library Foundation (RRRLF), Ministry of Culture, Government of India. During the year, the existing library of funding applications under various schemes was made online.

Cyber Security and Cyber Forensics

Advancement in High-Speed Communication, compute and storage infrastructure is enabling wider Adoption of ICTE by various sectors like Finance, Power, Health, Agriculture, Transportation, Manufacturing and Government enabling ease of access and quicker decision making. However, there is growing concern with respect to the increasing cyber attacks.C-DAC has advanced its R&D in Cyber Security and Cyber Forensics towards development of indigenous technologies &solutions, offering security assessment & audit services, skill based training and national-wide awareness generation. Focus areas of C-DAC are Network Security, Endpoint and System Security, Advanced Cyber Forensics, Identity and Access Management, Cryptography and Cryptanalysis, Application Security, Steganography, Security Testing & Validation and Security analysis. Activities carried out during 2017-18 are summarized below.

Endpoint and System Security

Application and Device Control (ADC)

Application and Device Control is a security solution with centralized management to enforce application whitelisting and USB mass storage device control at endpoints in a network. This solution is integrated with Windows Active Directory (AD) environment. Transfer of Technology for ADC was carried out on 17th April 2017.

M-Kavach

M-Kavach is an indigenous mobile security solution for Android phones developed by C-DAC. It is a comprehensive mobile device security solution for android devices addressing various threats related to mobile phones, available on google and playstore. Number of downloads exceeds 2.80 Lakhs.

Network Security

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 for various organizations.

SARAN Ticketing System

'SARAN' is an ITIL compliant service desk software with the Issue Creation, Update and tracking, Work flow based ticket management system, Configure SLAs based on the ticket priority, Auto escalations when SLA gets breached, Manage email templates for various ticket actions, Custom issue categories and types, DARPAN NMS alarm based issue reporting, User management, Role based access management, User specific Dashboards, Email Notification and Reporting features. SARAN was deployed in various organizations.

Identity and Access Management

Online Signature Verification System for Biometric Authentication for Access Control Scenario

A complete behavioral biometric based access control solution for restricted zones has been developed for enabling authentication& access control, which can be usedin various domains and applications such as attendance monitoring, vault operations, banking, exam controller section in universities, retail chain (jewelry etc.), and critical entry points (e.g. hospitals & power plant).

Secured Smart Card ICT Solution for campuses with integrated multilayer Leave Management

A multilayer integrated leave management operational system is implemented covering students, faculty members, researchers, administration staffs and outside agencies who are engaged in different types of activities within the college campus.

B-SID (Biometric Seafarer Identity Document)

Seafarers' Identity Documents (also known as "seafarers' IDs" or "SIDs") is an essential travel document for all Indian seafarers similar to passport for those who wants to travel abroad. Efforts are made towards development of "SID issuance system". The new SID cards are based on contactless smart card technology and include Facial biometrics.

SCADA Security & Security Analysis

SCADA Security Solutions – Secure update and Monitoring of 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 Control and Instrumentation, any attack on SCADA systems will have a cascading effect. Solutions for reliable operation, secure update and patch management of Remote Terminal Unit (RTU) are being developed. This includes solutions for RTU security include Security monitoring unit (SMU) to monitor and analyze RTU events for any abnormalities with field devices/ master station, and Secure update module to provide a unique approach to update the configuration and patch management of RTU.

Honeyport

C-DAC developed Honeyport a Windows OS based single threaded light weight application which monitors the unused ports on the windows system and captures the attacks on these ports using Finite State Machine based emulation. The Honeyport application runs in the backend using minimal resources and performing minimal changes on the user's system.

CyberView - Cyber Threat Monitoring System

CyberView Framework contributes in creating a secure cyber ecosystem by cyber threat neutralization through cyber security education and awareness. This framework provides India Specific cyber threat intelligence in the form of attack data feeds and datasets to researchers. It was deployed at various academic institutions.

CyberView - Threat Monitoring System

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. 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 including MobileCheck, a forensics solution for Smart phones, Basic phones, PDAs and GPS Devices. The tool supports acquisition, analysis and reporting of evidence from mobile devices.

TrueTraveller v3.1

C-DAC carried out about 100 deployments of various Cyber Forensics solutions including CyberCheck suite, MobileCheck, Advik CDR Analyser, Netforce Suite, Win-LiFT, SIMAnalyzer, True and True Imager3.0.

Security Testing

Development of Technologies for Security Testing and Validation Methodologies for Cryptographic Module

The validation of cryptosystems as per the specification is one of the important requirement to meet the desired grading, correct implementation of the crypto algorithms used, compliance of the hardware/software with the design, compliance of the protocols used for communication, key management etc. A well-equipped lab is set up with all requisite infrastructures for testing and validation against FIPS 140-2 (up to Security Level 2). A web portal has been developed for public/vendor interaction.

Information Security Services

As a CERT-In empanelled 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 200 organizations across the country.

Information Security Education & Awareness (ISEA)

Information Security Education & Awareness (ISEA) Project Phase II - National Level Awareness Campaign

The Campaign is being implemented through 52 institutes / Technical universities divided into three categories for academic activities viz. Information Security Research & Development Centre (ISRDCS-4), Resource Centre (RC-7) and Participating Institutes (PI – 41). Under Government Officers training 1158 members were trained in Cyber Security Cyber Law and Cyber Acts, Information& Network Security, Network & Web Application Security, Deploying Virtual Training Environment, Computer Security and Viruses, Cyber Security & Cyber Forensics, Advanced Cyber Forensics, Computer Malware Viruses and Hacking, Secure Coding Practices in Java JEE & Android, Android Security & Hacking, Information Security etc. Total 52 workshops were conducted.

Health Informatics

Healthcare Informatics Technology help to improve quality of healthcare, reduce medical errors, reduce healthcare costs, increase administrative efficiency, and expand access to affordable healthcare. Being a core competency area, C-DAC has developed several required tools, technologies, and healthcare solutions for use of medical practitioners, hospitals, vendors, and ultimately - the citizens of India. The activities carried out by C-DAC during the year in this thematic area are briefly covered below.

Health Information Systems

e-Aushadhi (Drugs & Vaccine Distribution Management System – DVDMS)

The solution is a web based Supply Chain Management System that deals in purchase, supply, distribution and inventory management of various drugs, sutures, surgical and consumable items by linking various Regional / District Drug warehouses (DWH), District Hospitals (DH), their sub stores like Community Health Centre (CHC), Primary Health Centre (PHC) and Sub Centers. The system also has the functionality for distribution of drugs to patients, thus enabling tracking of consumption till last mile. This solution has brought about a great impact in the area of public health, which has aided in analyzing disease patterns and tracking disease outbreaks and transmission to improve public health surveillance and speed of response.

Nation-wide implementation of e-Aushadhi

As per the mandate from Ministry of Health and Family Welfare (MoHFW), Government of India (GoI), C-DAC's e-Aushadhi is in the process of nationwide rollout. In line with this initiative, e-Aushadhi application is already operational in 16 States of the Country.

During the year 2017-18, the e-Aushadhi solution has been selected for deployment at State of Sikkim. The solution was previously selected by other States like Bihar, Manipur, Meghalaya, Jharkhand, Himachal Pradesh, and Uttar Pradesh and is being deployed at these states. Nationwide implementation of e-Aushadhi is under way for National Programs of MoHFW, GoI like the Central Dashboard for DVDMS, DVDMS for Family Planning Division and DVDMS for Centre for Tuberculosis. In addition, Government of Madhya Pradesh awarded the work order for implementation of Equipment Maintenance and Management System (EMMS) solution for upkeep of biomedical equipment in the State. The major outcome is to ease the management, monitoring and functioning of the drug procurement, testing and distribution together as a supply chain from district/ corporation level to local level.

e-Sushrut (Hospital Management Information System – HMIS)

C-DAC's Hospital Management Information System (HMIS) is a major step towards adapting technology to improve healthcare in the Country. e-Sushrut streamlines the process of patient care delivery by incorporating and integrating computerized clinical information for improved hospital administration and patient healthcare. It not only provides an accurate, electronically stored medical record of the patient but also targets compliance with EHR-2016 standards released by Ministry of Health and Family Welfare, Government of India.

C-DAC completed project for deployment of Hospital Management Information System at Guru Gobind Singh Government Hospital (GGSGH), New Delhi which was funded by Government of National Capital Territory of Delhi.

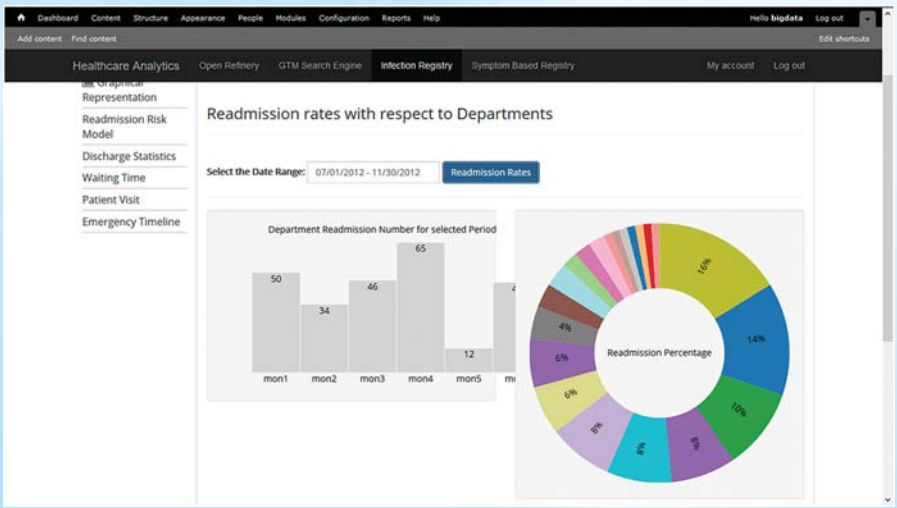
The proposal for statewide rollout of e-Sushrut is under consideration by various state governments. During the year 2017, C-DAC signed a MoU with the Government of Odisha for implementation of e-Sushrut at SCB Medical College & Hospital, Cuttack and Capital Hospital, Bhubaneswar as part of its pilot initiative before proceeding towards state wide rollout of the solution. Currently, the solution has statewide presence in Rajasthan and pilot initiatives are underway in the states of Maharashtra, Andhra Pradesh and Telangana.

MyHealthRecord - Personal Health Records Management System (PHRMS)

MyHealthRecord is an integrated, interconnected and a networked Personal Health Records system for use by individuals. User can typically create and maintain personal health profile (including allergies), medical records and images, medications list, laboratory test reports, data from fitness trackers (lifestyle behaviors) and sleep monitoring applications, etc. MyHealthRecord is integrated with Aadhaar and Digilocker, and can integrate with third party healthcare IT systems such as hospital information systems or laboratory information systems. The system can generate alerts based on national immunization schedule of Govt. of India. User can create records of family members and share records with others including printing of reports and records. The application is available for use at https://myhealthrecord.nhp.gov.in/

Healthcare Analytics

Analytic Big Data framework uses multiple inputs of healthcare data to derive metric based insights. Such insights should enable healthcare providers (hospitals, doctors) and monitoring agencies to standardize best practices on medication, improve the patients' experience and institute preventive and corrective measures in the field of healthcare. Ensuring focus of effort and monetary resources on key result areas will enhance the patient care with reduction of cost. The features include; Infection Control Registry, Heat Map, Readmission Risk Model, Symptom Based Registry, and GTM Query Provider. The project was funded by Ministry of Electronics and Information Technology (MeitY), Government of India.



Software Screen shot of Healthcare Analytics

Healthcare Solutions

Indigenous Magnetic Resonance Imaging (IMRI)-A National Mission (Swadeshi Chumbakiya Anunaad Chitran – Ek Rashtriya Abhiyaan) (SCAN - ERA)

Ministry of Electronics and Information Technology (MeitY), Govt. of India launched a National Mission programme on technology development for a low cost, affordable and state-of-art 1.5 Tesla MRI Machine to meet the large requirements of such machines in the country. As a major partner in the national consortium (SAMEER, C-DAC, IUAC, DSI-MIRC) for the MRI scanner development, C-DAC is focusing on the research and development of the software components for the IMRI system which includes

1. Pulse Sequence Design
2. MR Image Reconstruction
3. Graphical User Interfaces for the Operator Console and Imaging Workstation
4. Advanced clinical MR Image Visualization

IMRI Software

IMRI Team with Collaborators and International Experts

- C-DAC developed the first version of the scalable and standards compliant IMRI Imaging Software and released for validation and integration testing with hardware platform.
- Evaluation of the IMRI Imaging & Visualization Software has been carried out by experts from the reputed international universities/R&D institutions in the Magnetic Resonance Technology area

Medical Imaging Workstation for Virtual Endoscopy

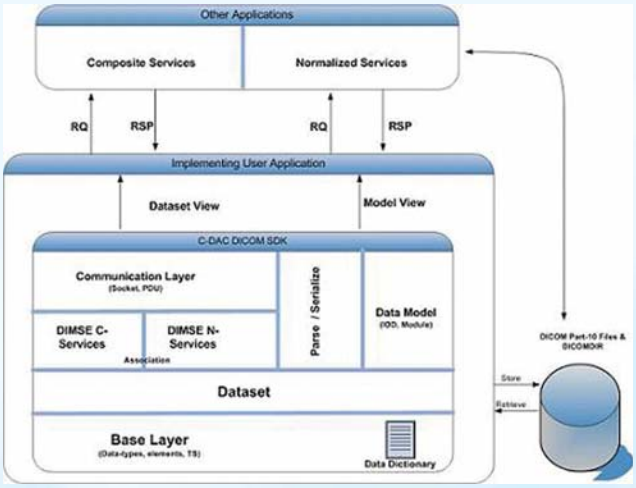
C-DAC developed a Medical Imaging Workstation providing an indigenous virtual endoscopy software system that is built around standard off the shelf computer hardware and operating system. Virtual endoscopy methods combine the features of endoscopic viewing and cross-sectional volumetric imaging using conventional non-invasive CT and MRI images. The reconstructed 3D model allows the surgeons to virtually navigate through tubular structures like colon, “Fly through” the 3D anatomy, traveling in any direction or any position in the hollow cavity, assists investigators in detection of polyps from the CT data and locate the position of suspicious polyps for analysis by radiologists. The project was funded by Kerala State Council for Science, Technology and Environment (KSCSTE).

Healthcare Standards

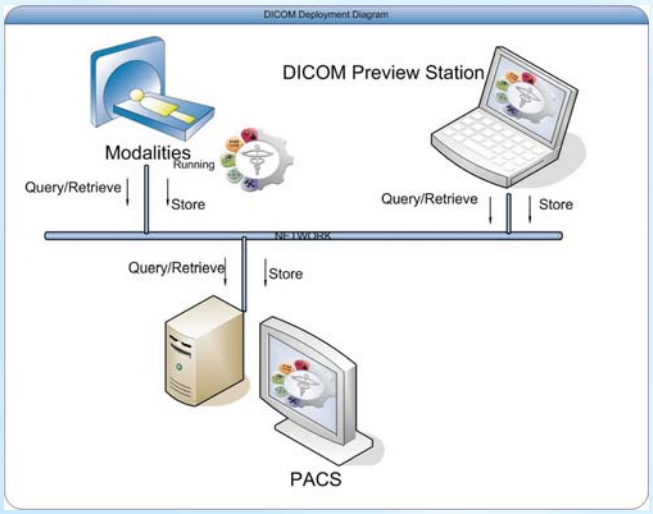
C-DAC's Medical Informatics Software Development Kit (SDK) for DICOM PS3.0-2015 and ANSI/HL7 v2.8.2-2015

C-DAC has developed and released Medical Informatics Software Development Kit (SDK) for DICOM PS3.0-2015 and ANSI/HL7 v2.8.2-2015. These SDK’s are implementation of NEMA’s (National Electrical Manufacturers Association’s) Digital Imaging and Communications in Medicine (DICOM) PS3.0-2015c standard and ANSI/HL7 v2.8.2-2015 standard respectively. These SDK’s are Free and Open-Source Software (FOSS) which facilitate incorporation of these standards in any healthcare application. The object-oriented API library can be used by Medical device manufacturers, application developers, system integrators, and researchers for medical IT standards compliance, interaction, or handling of waveform / imagery / radiological files/data. The SDK’s are distributed as free

and open source software under Apache v2.0 License and are available for download through C-DAC website (www.cdac.in email: sdk-enq@cdac.in).



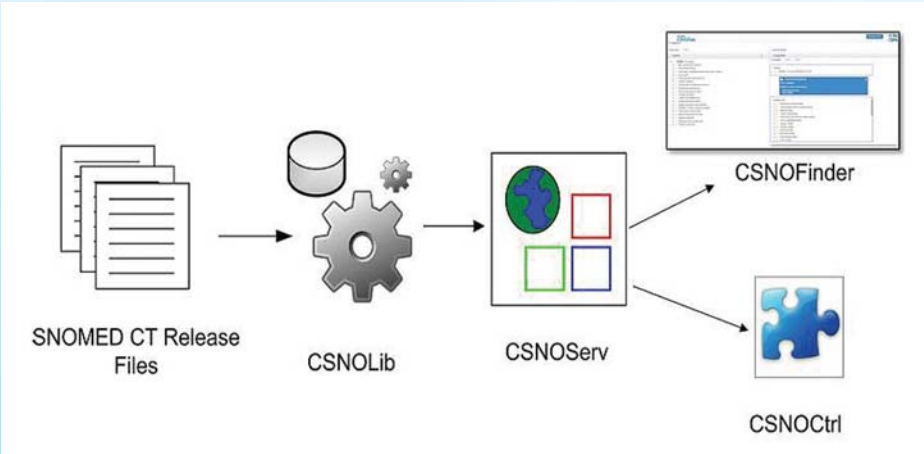
Architecture of DICOM PS3.0-2015SDK



Usage Scenario of DICOM PS3.0-2015SDK

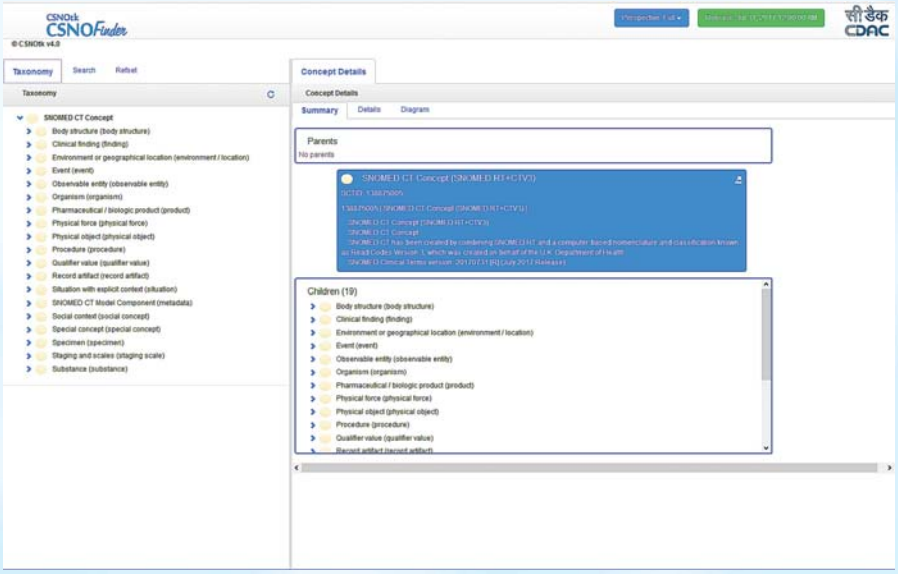
C-DAC's SNOMED CT Toolkit (CSNOtk) v4.0

An Open-Source, free-to-use, specially designed toolkit for easy access and rapid integration of SNOMED CT® in health care applications. This toolkit incorporates five different tools including; object oriented terminology search and lookup API library, jQuery based custom control, JSON based web-service over terminology, a UI based browser, and SNOMED CT to ICD-10 Mapping API.



CSNOtk Tools

The browser enables clinicians and researchers to find out relevant SNOMED CT® codes with their synonyms, fully specified names and different types of relationship between concepts.



CSNOfinder Package

The latest version incorporates indexed fast full-text search, multiple semantic tags filter, removes need of RDBMS as pre-requisite, support for Refsets and Extensions, among other enhancements. The CSNOtk is available from C-DAC (www.cdac.in email: sdk-enq@cdac.in) under Apache License v2.0 as free and open source software.

Education and Training

C-DAC's Education and Training group has been developing the skilled resources as part of Skill India initiative through its Post Graduate Diploma as well as Post Graduate Degree awarding programmes for its internal human resources needs of Research and Development activities as well as IT industry. These skill enhancement ICT training courses are imparted by C-DAC 11 training centres as well as 17 Authorised Training Centres spread across India.

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

1. Industry Specific Post Graduate Diploma programmes
2. Industry - Academia Collaborative formal education programmes
3. Corporate training programmes
4. TechSangam – Industry Academia Collaborative programme
5. IT Skill Development Programmes
6. International initiatives
7. Development and deployment of technologies for Education and Training

Industry Specific Post Graduate Diploma Programmes

C-DAC Advanced Computing Training School (ACTS) has inducted the 50th batch (Golden batch) of its Post Graduate Diploma courses during the February 2018 into the Post Graduate diploma courses.

C-DAC offers eleven Post Graduate diploma courses in the following domains:

1. Post Graduate Diploma in Advanced Computing (PG-DAC)
2. Post Graduate Diploma in Big Data Analytics (PG-DBDA)

Inauguration of 50th batch of Post Graduate Diploma Courses by Mr. Jagatpal Singh, Chief Technology Officer, Cybage, India, Dr. Hemant Darbari, Director General C-DAC and Col. Asheet Kumar Nath (Retd.), Executive Director, C-DAC, Pune.

3. Post Graduate Diploma in Biomedical Instrumentation and Health Informatics (PG-DBIHI)
4. Post Graduate Diploma in Embedded System Design (PG-DESD)
5. Post Graduate Diploma in Geo-informatics (PG-DGi)
6. Post Graduate Diploma in High Performance Computing System Administration (PG-DHPCSA)
7. Post Graduate Diploma in Internet of Things (PG-DIoT)
8. Post Graduate Diploma in IT Infrastructure System and Security (PG-DITISS)
9. Post Graduate Diploma in Mobile Computing (PG-DMC)
10. Post Graduate Diploma in System Software development (PG-DSSD)
11. Post Graduate Diploma in VLSI Design (PG-DVLSI)

During the year, C-DAC has trained 5,644 students in Post Graduate Diploma courses inducted through the national level C-DAC Common Admission Test (CCAT). Over 80% of these successfully trained and certified students are placed in the leading IT and Electronics companies through the National Common Campus Placement Programmes (NCCPP).

Formal Education Programmes in Collaboration with Universities

C-DAC collaborated with Maulana Abul Kalam Azad University of Technology, Kolkata; Sandip University, Nasik and Sathyabama University, Chennai for jointly conducting Masters programme in Information Security, Advanced Computing & Data Science, Embedded Design & Internet of Things (IoT).

C-DAC collaboration with Sandip University, Nasik

IT Skill Development Programmes

- **IT Training Programme for candidates belonging to North Eastern States of India**
  C-DAC set up computing infrastructure for IT training with capacities of 60 participants and created two competent faculties. C-DAC conducted Diploma in Advanced Software Development Methodologies course to help the North Eastern region students acquire IT skills and enhance their employability opportunities in IT industries.

- **Free Coaching Scheme for SC and ST candidates**
  C-DAC conducted Certificate Courses in the areas of Android Programming, Java Programming and Multimedia Web Programming for the duration of four months for 129 number of SC and ST students from Jharkhand. AC conducted six months duration Post Graduate Diploma in Advanced Computing (PG-DAC) for 38 number of SC, ST and OBC students in Patna.
  Training and Proficiency in Computer Application and Allied activities to the candidates belonging to Scheduled Castes/ Scheduled Tribes/Others Backward Classes & Minorities of Himachal Pradesh
  The courses offered were Post Graduate Diploma in multilingual computer application and Diploma in multilingual computer application. Overall the training has helped over 1200 SC, ST, OBC & Minority candidates to improve their IT skills as well as their job prospects.

- **PMGDISHA**
  C-DAC is participating in PMGDISHA as assessment & certifying agency. PMGDISHA is a central government's initiative of digital literacy program in the country. The aim of the project is to make at least one person in each

household digitally literate to interact with digital world such as digital payment and e-government services. C-DAC conducted online remotely proctored examination in PMGDISHA scheme and issued the certificate to the successful candidates.

C-DAC centres have started this operation since November, 2017 and successfully examined more than 1 lakh citizens across the country till March, 2018.

C-DAC has an agreement with CSC eGov in order to set up assessment centres for online proctoring.

- C-DAC centres are providing opportunities to candidates to appear in digital literacy exam in their own regional languages.
- C-DAC is presently offering assessment questions in 15 scheduled languages (Manipuri, Gujarati, Malyalam, Punjabi, Konkani, Marathi, Hindi, Telugu, Odia, Tamil, Santhali, Kannada, Nepali, Maithili & Bengali) and is committed to providing assessment questions in all 22 schedule languages by Sept' 2018.

Development and Deployment of Technologies for Education and Training

Indian Air Force (IAF) Online Examination System

C-DAC has been entrusted by Indian Air Force (IAF) to automate their recruitment process for officers and airmen inducted through Air Force Common Admission Test (AFCAT) and Scheduled Test for Airmen Recruitment (STAR) examination and Sashastra Seema Bal (SSB) interviews stages.

C-DAC is carrying out multitude of activities consisting of design, development & deployment of exam system; operations, standard operating procedures, deliverables, rights and responsibilities, time frame, guidelines, risks and mitigation plan monitoring and control of examination; conduction of AFCAT and STAR exams. C-DAC developed and deployed the comprehensive system for the entire recruitment process.

C-DAC conducted the online exam for AFCAT on February 25, 2018 at 108 cities for over 1.39 lac candidates

Process Automation for Competitive Exams (PACE)

PACE focuses on various competitive exams such as GATE, JAM and AIIMS. It carries outautomation of various stages such as candidate registration, online application filling, application scrutiny, exam centre allocation, admit card generation, result processing (answer-key verification, answer-key challenge, Question complexity identification and various statistical information), scorecard generation, choice filling, application scrutiny for admission, seat counseling. The system handles approximately 13 lakh applicants every year. PACE has been used for GATE (past 5 years), JAM (past 4 years) and AIIMS has been initiated this year.

PACE System carried out the following activities for 2017- 2018:

1. Automation of GATE/JAM 2018 for IITs and IISc
2. Post Graduation, MBBS and Nursing seat counselling for All India Institute Of Medical Science (AIIMS)

Online Registration for admission in Class IX in Jawahar Navodaya Vidyalayas JNV Schools

Navodaya Vidyalaya Samiti (NVS) has collaborated with C-DAC to design and develop an application which facilitates online registration and admit card generation. Over 1 lac registrations are expected on the portal. Jawahar Navodaya Vidyalayas (JNVs) are governed by NVS, New Delhi, an autonomous organisation of Ministry of Human Resource Development, Department of School Education and Literacy, Government of India. JNVs are residential and co-educational schools affiliated to Central Board of Secondary Education (CBSE), New Delhi, with classes from VI to XII standard.

Online Registration for Recruitment of various post for NTRO

National Technical Research Organization (NTRO) entrusted C-DAC with development of online registration, admit card generation and online examination for the recruitment of various technical posts such as Technical Assistant and Scientist 'B' post. NTRO is a technical intelligence agency under the National Security Advisor in the Prime Minister's Office, India. Over 63,050 registrations have been recorded, admit cards of 7,200 candidates have been generated and exams of 5,000 candidates have been conducted by C-DAC. Further cycle of recruitments are proposed for Scientist 'B' post wherein 3,000 candidates have registered for the position on the portal.

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. Completed all activities under project titled “India – Kazakhstan Centre of Excellence in ICT at Eurasian National University (ENU) in Astana”. As part of this project, C-DAC has created IT infrastructure (IT hardware/ software, computer peripherals, networking equipment, classroom equipment and Data Centre Infrastructure) in the centre.

2. Completed all activities under project titled “Setting up of Computer Labs in 37 Schools of Tajikistan” and handed over the same to Tajikistan collaborative agency. As part of this project, C-DAC provided consultancy for designing the turnkey solution for setting up of computer labs in 37 schools of Tajikistan.

3. Completed all activities under project titled “Setting up of Computer Labs in 50 Schools of Vayots Dzor Region of Armenia”. As part of this project, C-DAC provided consultancy for designing the turnkey solution for setting up of computer labs in 50 schools of Vayots Dzor Region of Armenia.

4. Completed six months advanced level IT Training for second batch of remaining 6 Lao PDR trainers at C-DAC ACTS Pune as part of the project titled "Setting up of Centre of Excellence in Software Development and Training (CESDT) in Cambodia, Lao PDR, Myanmar & Vietnam and appropriate accreditation to training courses by CDAC” .

5. Deployed C-DAC web based Integrated Office Automation System (IOAS) and Web Portal at CARICOM Secretariat in Gyana as part of the collaborative project titled “Upgrading the existing IT Infrastructure and associated software at the CARICOM Secretariat, Guyana and its associated offices in Barbados & Jamaica”.

6. Completed delivery of C-DAC proprietary products, i.e., LILA and e-Mentor to CEIT Papua New Guinea (PNG) and completion of first batch of Advanced IT Training for three Master Trainers from PNG at C-DAC ACTS Pune as part of the project titled “India – Papua New Guinea Centre of Excellence in IT (CEIT) at Port Moresby”.

7. Completed delivery of C-DAC proprietary products, i.e., LILA and e-Mentor to CEIT Vanautu and completion of first batch of Advanced IT Training for three Master Trainers from Vanautu at C-DAC ACTS Pune as part of the project titled “India – Vanuatu Centre of Excellence in IT (CEIT) at Port Vila”.

Patents

Patents Awarded

1. “Aroma based tea quality testing apparatus and a method thereof”, Inventor(s): Nabarun Bhattacharyya, R.Ravindra Kumar, Rajib Bandyopadhyay, Indian Patent No 288673.

2. "Phonological Rules for Grapheme to Phoneme conversion of Bangla Language (Official Dialect of West Bengal)", Inventor(s): Arup Saha, Tulika Basu, Indian Patent No SW-9048/2017.

Patents Filed

1. "An Apparatus for and a Method of Non-Invasibly determining Metabolic Disorder through Characterization of Data combined in Human Breath", Inventor(s): Hena Ray, Alokesh Ghosh, Arunansu Talukdar, Angshuman Chakraborty, Tarun Kanti Ghosh, Parthasarathi Biswas, Rabindranath Kanjilal, Nabarun Bhattacharyya.
2. "A Field Portable Uniform Illumination Imaging Biosensory System (UIIS) for Remotely Screening Chemical Contaminants in Agri based Setup", Inventor(s): Nabarun Bhattacharyya, Sunil Bhand, A K Barooah, Subhankar Mukherjee, Abhra Pal, Souvik Pal, Devdulal Ghosh, Subrata Sarkar, Arun Jana, Ravi Sankar, Raktim Pal, Sangeeta Brochetia
3. "Moving Bed Visual Quality Inspection System for Dry Chilli and a Method thereof", Inventor(s): Abhra Pal, Tamal Dey, Amitava Akuli, Gopinath Bej, Jayanta Kumar Roy, Nabarun Bhattacharyya.
4. "A Process for forming a Molecular Imprinted Polymer (MIP) based Electrode for Accurate Quantitative Detection of Total Thea Flavin (TF) in Black Tea", Inventor(s): Nabarun Bhattacharyya, Trisita Nandy Chatterjee, Runu Banerjee Roy, Bipan Tudu, Panchanan Pramanik, Pradip Tamuly, Rajib Bandyopadhyay, Devdulal Ghosh.
5. "Method and System for generic weighted LRU based group adaptive routing", Inventor(s): Atul Chandra Bodas.
6. "A Low Votage Direct Current (LVDC) Power Distribution System For Effective Power Management In Smart Homes", Inventor(s): Sigi C Joseph, Dhanesh P R, Mohammed Ajlif A, Sudeep Kumar R, Z V Lakaparampil.
7. "An Early Warning System to Detect Approaching Trains and Method thereof", Inventor(s): Haneesh Sankar, James Varghese, Dayakar, Sindhu Rajan, Satheesh Prabhu.
8. "A Method for Detecting Presence of a Moving Train Approaching or Receding from a Cross-road Junction using an Early Warning System", Inventor(s): Haneesh Sankar , James Varghese, Dayakar, Sindhu Rajan, Satheesh Prabhu, 2017.
9. "A Voltage Sensing and Measurement System", Inventor(s): Sreekumari, Jiju K, Arun Krishnan, Sreedevi Vijayan, Stanley R M.
10. "White Box Controller for Providing Connectivity to Smart Energy Meter", Inventor(s): Sreekumari B, Jiju K, Reshma SL, Ajin A.
11. "Smart Meter for Advanced Metering Infrastructure as per Indian Standard", Inventor(s): Sreekumari B, Jiju K, Reshma S L, Sreedevi V S, Stanley Regis Muthuswamy, Dhanesh P R.
12. "Biomedical Signal Analyzer for Seizure Prediction by Analysis of EEG signals", Inventor(s): Elizabeth Thomas, Devanand, Sudalaimani, Asha Vijayam, Parvathy K, Sasi P M, Ramshekher Menon, Ashalatha R, Sanjeev Varghese T.
13. "A Novel Biomedical Signal Analyzer for Seizure Prediction system using Overlapped Windowing and Multiclass post processing", Inventor(s): Elizabeth Thomas, Devanand, Sudalaimani, Asha Vijayam, Parvathy K, Sasi P M, Ramshekher Menon, Ashalatha R, Sanjeev Varghese T.
14. "A Low Votage Direct Current (Lvdc) Power Distribution System For Effective Power Management In Smart Homes", Inventor(s): Sigi C Joseph, Dhanesh P R, Mohammed Ajlif A, Sudeep Kumar R, Z V Lakaparampil.
15. "An Early Warning System to Detect Approaching Trains and Method thereof (EWT)", Inventor(s): Haneesh Sankar, James Varghese, Dayakar, Sindhu Rajan, Satheesh Prabhu.
16. "A Method For Detecting Presence Of A Moving Train Approaching Or Receding From A Cross-Road Junction Using An Early Warning System (Dart)", Inventor(s): Haneesh Sankar , James Varghese, Dayakar, Sindhu Rajan, Satheesh Prabhu.

Copyrights

Copyrights Awarded

1. "Phonological Rules for Grapheme to Phoneme conversion of Bangla Language (Official Dialect of West Bengal)", Inventor(s): Arup Saha, Tulika Basu, Copyright registration no SW-9048/2017.
2. "Ebidding & Elinkage Eauction System", Goutam Kumar Saha, Debdulal Basak, Raja Gupta, Manas Chakraborty, Samaresh Das, Copyright registration no SW-9807/2017.
3. "Earchive", Goutam Kumar Saha, Mina H.K. Desai, Utpal Kumar Saha, Sankha Nath Ghosh, Arghya Ghosh, Copyright registration no SW-9900/2017.
4. "Eabhilekh", Goutam Kumar Saha, Mina H.K. Desai, Utpal Kumar Saha, Sankha Nath Ghosh, Arghya Ghosh, Copyright registration no. SW-9899/2017.
5. "Ne-Fresh Online Auction System", Goutam Kumar Saha, Debdulal Basak, Samaresh Das, Manas Chakraborty, Raja Gupta, Manish Kumar Saha, Copyright registration no SW-10142/ 2018.
3. "Algorithm for Universal Health Identifier Generation", Inventor(s): Sumit Soman, Praveen K Srivastava, Dr. B. K. Murthy, Copyright registration no SW-9407/2017.
4. "MoSQuIT Mobile based Surveillance Quest using IT ver 2.0", Inventor(s): Anuradha Lele, Lakshmi Panat, Nigod Dhurke, Ganesh Karajkhede, Snehal Sapkale, Rachana Kulkarni, Abha Deshmukh, Copyright registration no SW9345/2017.
5. "ViEW – Virtual Endoscopy Workstation", Inventor(s): Rajesh Kumar R, Vidya P V, Jinu Joseph, Pournami S Chandran, Copyright registration no SW-9362/2017.
6. "Automated Real Time Retinal Image Quality Notifier", Athulya K Das, Deepak R U, Sharath Kumar P N, Sasi P M, Rajesh Kumar R, Copyright registration no SW-9180 / 2017.
7. "Bio Medical Signal Analyzer for Seizure Prediction", Inventor(s): Sudalaimani C, Asha S A, Parvathy K, Devanand P, Elizabeth Thomas T, Sasi P M, Copyright registration no SW-9237 / 2017.
8. "Automated Feature Extractor for Biomedical Signals", Inventor(s): Parvathy K, Asha S A, Sudalaimani C, Elizabeth Thomas T, Sasi P M, Copyright registration no SW-9222 / 2017.
9. "EEG Analyser for Seizure Detection", Inventor(s): Asha S A, Sudalaimani C, Devanand P, Elizabeth Thomas T, Copyright registration no SW-9269 / 2017.
10. "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, Copyright registration no SW-9540 / 2017.
11. "DLMS Protocol Stack for AMI Smart Meter", Inventor(s): Reshma S L, Sreekumari B, Jiju K, Ajin A, Sreedevi V S, Copyright registration no SW-9733 / 2017.

Copyrights Filed

1. "Dhavanik Software", Inventor(s): Rajesh K R, Nimmy Mathew, Rakhi S, Nimmy Pathrose, Vishnu S.

Awards/Recognitions

1. Project titled "Online ABT Meter Based system for Meghalaya SLDC" received "SKOCH Silver Award" under Power Sector category at Forty Ninth Skoch Summit during September 8 – 9, 2017 at Constitution Club of India, New Delhi.

Skoch Silver Award for Online ABT Meter Based System for Meghalaya SLDC

2. Project titled **"Design and Development of Honeynet Sensors for Broadband Network" received "Skoch Award of Merit"** under Research and Development category at New Delhi on September 9, 2017.

3. Project titled **"Mobile Seva"** received following awards
   a. **"41 Gems of Digital India 2017"** award at Digital India Awards 2017 ceremony held on June 7, 2017 at Shangri La, New Delhi.
   b. **"MobileGov Honorable Mentions Awards"** at mobileGov World Summit 2017 held at Brighton, UK during May 7-9, 2017.

41 Gems of Digital India 2017 award

MobileGov Honorable Mentions Awards

4. Project titled **"e-Aushadhi"** received **"SKOCH Smart Governance Award 2017"** under social – health category at Forty Ninth Skoch Summit during September 8 – 9, 2017 at Constitution Club of India, New Delhi.

5. Following projects received **"Gems of Digital India Award 2017 (Analyst's Choice)"** for excellence in e-Governance in New Delhi.
   a. **"Online Management Monitoring and Accounting System (OMMAS)"** developed for Pradhan Mantri Gram Sadak Yojana (PMGSY), Ministry of Rural Development, Government of India
   b. **"MeriSadak App"** developed for Pradhan Mantri Gram Sadak Yojana (PMGSY), Ministry of Rural Development, Government of India
   c. **"National Voter Services Portal (NVSP)"** developed for Election Commission of India (ECI), Government of India.

6. Project titled **"Mobile based Surveillance Quest using IT (MoSQuiT)"** received **"President's award for Innovation and Excellence, The Open Group 2018"** in the category of Information and Communication Technology (ICT) for Social Development.

7. Paper titled **"North-Eastern Language and Speaker Identification from Conversational Speech Data"** received **"Best Technical Poster"** at 5th Global Conference On Cyber Space (GCCS) held during November 23 – 24, 2017.


Ministry of Electronics and Information Technology
Government of India

BEST TECHNICAL POSTER AWARD

GCCS 2017

This is to certify that

JOYANTA BASU
CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING (C-DAC), KOLKATA

Has been awarded 2nd Best Technical Poster Award for the poster titled "North-Eastern Language and Speaker Identification from Conversational Speech Data" with co-author/s Milton Samirakshma Bepari, Centre for Development of Advanced Computing (C-DAC), Kolkata, presented in the Global Conference on Cyber Space (GCCS), held on November 23-24, 2017 at New Delhi

Sanjeev Gupta IAS,
President & CEO,
Digital India Corporation
(Additional Secretary to the
Government of India)

Events/Conferences

1. Inauguration of PARAM Shavak HPC and DL GPU system by Hon'ble Governor of Odisha, Dr. S C Jamir in collaboration with Veer Surendra Sai University of Technology (VSSUT) at Raj Bhavan, Bhubaneswar, Odisha on October 24, 2017.

Inauguration of PARAM Shavak HPC and DL GPU system by Hon'ble Governor of Odisha, Dr. S C Jamir

2. Five days' workshop on "Think Parallel: Parallel Programming for Engineers & Scientists" to provide at C-DAC Knowledge Park, Bengaluru during July 17 – 21, 2017. The workshop provided the fundamental and advanced concepts and practical hands-on experience of the state-of-the-art parallel computing technologies.

3. Fifth Indo-European conference on "Creating a Robust IP Ecosystem for ICT in the 21st Century" in collaboration with MeitY & European Patent Office (EPO), European Business and Technology Centre (EBTC) at New Delhi on December 4, 2017.

Fifth Indo-European conference on "Creating a Robust IP Ecosystem for ICT in the 21st Century"

4. Event on visit of Hon'ble Minister of Tribal Affairs, Shri Jual Oram at C-DAC, Pune on February 25, 2018.

Visit of Hon'ble Minister of Tribal Affairs, Shri Jual Oram at C-DAC Pune

5. Launch of "Sindhi Language Software and eBooks" in collaboration with National Council for Promotion of Sindhi Language (NCPSL) at C-DAC, Pashan, Pune on April 10, 2017.

Launch of "Sindhi Language Software and eBooks"

6. Launch of “Universal Account Number (UAN) based Accounts Auto Transfer Process and Exempted Establishments Online Monitoring System Software” by Employees Provident Fund Organization (EPFO) at HYATT regency, Pune on May 27, 2017.

Launch of “UAN based Accounts Auto Transfer Process and Exempted Establishments Online Monitoring System Software”

7. Launch of “Web-based application ERONET for online electoral rolls management” by Shri Nasim Zaidi, Chief Election Commissioner, in collaboration with Election Commission of India (ECI) at ECI, New Delhi on June 30, 2017.

Launch of “Web-based application ERONET for online electoral rolls management”

8. Launch of MeriSadak mobile app for Pradhan Mantri Gram Sadak Yojana (PMGSY) at New Delhi on June 19, 2017.

Launch of MeriSadak mobile app for PMGS at New Delhi

9. Hand-over of software, technical documentation and manuals for two software of CARICOM Secretariat as well as User Acceptance Sign-off ceremony at Guyana on November 15, 2017.

Hand-over of software, technical documentation and manuals for two software of CARICOM Secretariat

10. Visit of President of the State of Palestine at C-DAC, Noida on May 15, 2017.

Visit of President of the State of Palestine at C-DAC, Noida

11. Visit of Permanent Representatives of Association of Southeast Asian Nations (ASEAN) at C-DAC, Noida on July 4, 2017.

Visit of Permanent Representatives of Association of Southeast Asian Nations (ASEAN) at C-DAC, Noida

12. Soft launch of "Geospatial Rural Road Information System (GRRIS)" of 10 states under Pradhan Mantri Gram Sadak Yojana (PMGSY) by Hon'ble Minister for Rural Development & Panchayati Raj Shree Narendra Singh Tomar at Vigyan Bhawan, New Delhi on December 15, 2017.

Soft launch of "Geospatial Rural Road Information System (GRRIS)" of 10 states under PMGSY

13. Workshop on "Applications of GIS & Remote Sensing in e-Governance" at Centre for e-Governance, MeitY on February 26, 2018. The focus of the workshop was to build awareness on applications of GIS & remote sensing in e-Governance.

Workshop on Applications of GIS & Remote Sensing in e-Governance

14. International conference on "Public Key Infrastructure and its Applications" in collaboration with Institute of Electrical and Electronics Engineers (IEEE) at The Chancery Pavilion, Bengaluru during November 14 – 15, 2017. The focus of the conference was to bring out the latest research and developments in across all stakeholders of the PKI Ecosystem.

International Conference on Public Key Infrastructure and its Applications

15. National seminar on “Trends & Applications of ICT in Agriculture (TRACT)” at Salt Lake City, Kolkata, West Bengal on March 13, 2018.

National seminar on “Trends & Applications of ICT in Agriculture (TRACT)”

16. Conference titled “Ubicomp India 2017” at The Chancery Pavilion, Bengaluru during October 6 – 7, 2017. The focus of the conference was to provide an overview of Security Requirements and Design of IoT with security as inherent feature.

Conference titled “Ubicomp India 2017” at The Chancery Pavilion, Bengaluru

17. Launch of “VAJRA Scheme in Electronic Project Proposal and Management System (ePPMS)” at Delhi on June 22, 2017.

18. Fifth National Conference on E-Learning & E-Learning Technologies (ELELTECH) in collaboration with Institute of Electrical and Electronics Engineers (IEEE) and Jawaharlal Nehru Technological University (JNTU), Hyderabad at Hyderabad during August 3 – 4, 2017.

Fifth national conference on ELELTECH

19 Presentation of DG C-DAC R&D Award for the year 2017 to the winner

Presentation of DG C-DAC R&D Award for the year 2017 to the winner

20 C-DAC 31st Foundation Day Event 2018

C-DAC 31st Foundation Day Event 2018

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119. Ranade, D.S., Shravage, B.V., Kumbhar, A.A., Sonawane, U.B., Jani, V.P., Joshi, R.R. and Kulkarni, P.P. “Thiosemicarbazone Moiety Assist in Interaction of Planar Aromatic Molecules with Amyloid Beta Peptide and Acetylcholinesterase”, Chemistry Select, Volume 2, Issue 13, Pp. 3911-3916, 2017.

120. T G Subash Joshi, Vinod John, “Design and Evaluation of Mounting Clamps for Crowbar Application”, IEEE Transactions Plasma Science, Volume 45, No. 11, Pp. 2994, 3000, 2017.

121. P Ravikumar, Hemant J. Magadum, “Traffic Counting and Classifier using Single Loop Method for Non-lane based, Mixed traffic flow condition”, International Association of Scientific Innovation and Research (IASIR), 2017.

122. Nimmy Mathew , Byju C, Subodh P S, “Time of flight computation with sub-sample accuracy using digital signal processing techniques in Ultrasound NDT”, 15th Asia Pacific Conference for Non-Destructive Testing (APCNDT2017), 2017.

123. Dija S, Dagma D Gonsalvez, Suma G S, “Forensic Reconstruction of Executable from Windows 7”, IEEE, 2017.

Invited Talks

1. B S Bindhumadhava, “Keynote on Cyber Physical Systems Security”, International Conference on Recent Trends in Electronics, Information & Communication Technology, Sri Venkateshwara College of Engineering, Bengaluru, May 19, 2017.
2. Rajesh Kalluri, “Deep Learning-Academic & Research Perspectives”, Workshop on Deep Learning- Academic & Research Perspectives, PSG College of Technology, Coimbatore
3. Annie Joyce V, Sumit Mishra, “Blockchain Technology – A Distributed Secure Database for IoT”, Ubicomp 2017, The Chancery Pavilion, Bengaluru, October 6 – 7, 2017.
4. Haribabu P, “Light Weight Key Exchange Protocols for IoT”, Ubicomp 2017, The Chancery Pavilion, Bengaluru, October 6 – 7, 2017.
5. Vaibhav Pratap Singh, “IoT Standards – National and International Efforts”, Ubicomp 2017, The Chancery Pavilion, Bangalore, October 6 – 7, 2017.
6. Mohanasundaram S V, “Air Pollution Monitoring System for Cities”, The India Advantate (TIA) Summit 2017, World Trade Centre, Bengaluru, September 21, 2017.
7. Mohanasundaram S V, “IoT Practical Deployments by CDAC”, Real Time Analytics Workshop, C-DAC Bengaluru, October 27, 2017.
8. Kaushik Nanda, “Indigenous IoT Applications”, IoT Workshop, Electronics Corporation of India Limited (ECIL), Hyderabad, October 28, 2017.
9. Kaushik Nanda, “IoT and Project Ideas on CDAC IoT Lab Kit”, Establishing Research Labs using CDAC Lab Kits in North-Eastern Region Educational Institutes, Gauhati University, Guwahati, November 14 – 15, 2017.
10. Balaji Rajendran, “Changing Landscapes of Trust: PKI & Blockchain”, ISC2 Annual Security Conference, Bengaluru, April 11, 2017.
11. Balaji Rajendran, “PKI for Trustable IoT”, Ubicomp 2017, The Chancery Pavilion, Bengaluru, October 6 – 7, 2017.
12. Balaji Rajendran, “Electronic Trust: Centralized and Decentralized Models”, Faculty Development Program, Pondicherry University, November 4, 2017.
13. Balaji Rajendran, “Certificate Validation in TLS: Challenges and Emerging Trends”, Connections – a Pre-IETF event, Infosys, Bengaluru, November 8, 2017.
14. Sakthi Saravanakumar, “Introduction to Cloud”, International Training Programme on Audit of e-Governance, International Centre for Information Systems and Audit (ICISA), Noida, April 25, 2017.
15. Asitkumar, “Assessing Security Issues in Cloud”, International Centre for Information Systems and Audit (ICISA), Noida, April 25, 2017.
16. L. R. Prakash, “Cyber Security”, Citizens of 2030 – Round Table, New Delhi, September 27, 2017.
17. Kailash S, “Cloud Technology for Governance 3.0”, National Seminar on Convergence of IoT, Big Data Analytics and Cloud Computing for Smart Governance, Sri Sivasubramaniya Nadar (SSN) College of Engineering, Chennai, November 25, 2017.
18. L. R. Prakash, “Open Source Awareness”, Navy TechConnect Event, New Delhi, February 18, 2018.
19. Sunil Kumar, “Implementation of e-Governance in India”, Workshop on e-Governance for Indian Technical and Economic Cooperation (ITEC) Participants, Centre for e-Governance (CeG), MeitY, April 24, 2017.
20. Sunil Kumar, “Applications of GIS and Remote Sensing in e-Governance”,Workshop on e-Governance for Indian Technical and Economic Cooperation (ITEC) participants, Centre for e-Governance (CeG), MeitY,

February 26, 2017.

21. Jyostna, "Why Software Security?", Cisco Women Rock IT, "Vardhaman College Of Engineering, Hyderabad, November 16, 2017.
22. Mahesh U Patil,"Mobile Security", Training programme for Army Signal Intelligence on Cryptanalysis, C-DAC, Noida, November 17, 2017.
23. Lakshmi Eswari,"Significance of Blockchain Technology in Cyber Security, International Conference on PKI, C-DAC, Bengaluru, November 14 2017.
24. Mahesh, "Mobile Security", Workshop on Information Security Education and Awareness (ISEA), NIT Nagpur, December 7 - 8, 2017.
25. Chaithanya, Vamsi, "Mobile security", Workshop on Advanced Android programming", CVR Engineering College, Hyderabad, January 13, 2018.
26. Jyostna, "End System Security", One Day Seminar on Cyber Security, CR Rao Advanced Institute of Mathematics,Statistics and Computer Science (AIMSCS), Hyderabad, February 9, 2018.
27. Chaithanya, "Android Security and Reverse Engineering", Seminar on Cyber Security, CR Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), Hyderabad, February 9, 2018.
28. P R Lakshmi Eswari, "Cyber Security and Blockchain", Symposium on Emerging Technologies, Jawaharlal Nehru Technological University (JNTU), Hyderabad, February 23, 2018.
29. P R Lakshmi Eswari, "Importance of Software Security", Cisco Women Rock IT, V R Siddhartha Engineering College, Vijayawada, Andhra Pradesh, March 15, 2018.
30. S V Srikanth, "IoT Architecture and Protocols", Training program on Emerging Technologies, CVR College of Engineering, Hyderabad, July 28, 2017.
31. S V Srikanth, "IoT for Defence Applications", Continuing Education Programme (CEP) course on IoT and its Application in Defense", Research Center Imarat (RCI), DRDO Labs, Hyderabad, August 6, 2017.
32. S V Srikanth, "IoT Architecture, Protocols and applications", Faculty Development Programme (FDP) workshop on IoT and big data, Jawaharlal Nehru Technological University (JNTU), Kakinada, December 1, 2017.
33. S V Srikanth, "IoT Architecture, Protocols and applications for agriculture", Workshop on IoT, Agricultural Research Institute (ARI), Rajendranagar, Hyderabad, November 21, 2017.
34. S V Srikanth, "Internet of Things (IOT) – Concepts and its application in agriculture", Information and communications technology (ICT) for effective knowledge and extension delivery, Extension Education Institute, Rajendranagar, Hyderabad, December 5, 2018.
35. S V Srikanth, "IoT Architecture, Protocols and case studies", Workshop on Computer Society of India (CSI) Internet of Things (IOT) Special Interest Group (SIG), CSI Hyderabad, July 1, 2017.
36. S V Srikanth, "A Walkthrough IoT: Architecture, Protocols and case studies", Faculty Development Program on IOT and Smart Applications", CVR College of Engineering, November 27, 2017.
37. S V Srikanth, "A Walkthrough IoT: Architecture, Protocols, Case Studies & Idea-Prototype-Product", Training program on emerging technologies, VNR Vignana Jyothi Institute of Engineering and Technology (VNRVJIET), Hyderabad, March 21, 2018.
38. S V Srikanth, "Introduction to IoT Architecture, Protocols and case studies", Two-Day National Seminar on Internet of Things (IOT) and Data Analytics, Osmania University, Hyderabad, March 23, 2018.
39. S V Srikanth, "IoT Research and Innovation to Market Deployment", Three weeks refresher course on Internet of Things", UGC – Human Resource Development Centre, Jawaharlal Nehru Technological University Hyderabad (JNTUH), October 30, 2017.

40. Vivek Nainwal, “Data Science and Advanced analytics”, One day national workshop on current trends in data analytics", Jawaharlal Nehru Technological University (JNTU), Kukatpally, Hyderabad, December 15, 2017.
41. Santosh Sam Koshy, "Smart Agriculture using WSN”, Workshop on IoT products, C-DAC, Bengaluru, July 25, 2017.
42. Santosh Sam Koshy, "HARITA PRIYA", Workshop on Innovative ICT initiatives for Rural Development, National Institute of Rural Development and Panchayati Raj (NIRD&PR), Hyderabad, September 1, 2017.
43. M Kumar, "Mobile Seva: M-Governance Initiative of Govt of India", Three day residential programme on mobile governance, Andhra Pradesh Human Resource Development Institute (APHRDI), Bapatla, April 19, 2017.
44. M Kumar, "Mobile Apps and e-learning”, First national conference on micro missions (National Police Mission), Vignan Bhavan, New Delhi, May 23, 2017.
45. Vijayalakshmi B, "Vikaspedia as a platform to fuel development", European Union workshop on strengthening access and delivery of Government schemes information and entitlements, Ranchi, Jharkhand, April 26, 2018.
46. Vijayalakshmi B, "Vikaspedia Harnessing Social Media in Agriculture and Allied Sectors", Extension Education Institute (EEI), Hyderabad, October 11, 2018.
47. Vijayalakshmi B, "Vikaspedia Emerging Tools and Techniques for Agricultural Knowledge Communication", National Academy of Agricultural Research Management (NAARM), Hyderabad, November 11, 2018.
48. Vijayalakshmi B, "IT interventions and networking for MAP sector", Meeting on national policy of medicinal plants, National Academy of Agriculture Science, New Delhi, November 22, 2017.
49. Vijayalakshmi B, "ICT in agriculture with special reference to Vikaspedia", National seminar on Information and Communication Technology (ICT) application in changing face of agriculture, Birsa Agricultural University (BAU), Ranchi, Jharkhand, January 20, 2018.
50. Sampath T, "Advanced Android Programming", Workshop on Advanced Android programming, CVR engineering college, Hyderabad, January 11 – 12, 2018.
51. Vijayalakshmi B, "e-CHARAK Communication and Management Skills for Agri Extension Professionals", National Academy of Agricultural Research Management, Hyderabad, February 22, 2018.
52. Siddharth Srivastava, “Deep Learning for Health Informatics”, International Conference on Advances in Computing, Communications and Informatics (ICACCI 2017), September 13, 2017.
53. Sumit Soman, “Perspectives on SNOMED CT Implementation in Indian HMIS”, SNOMED CT Expo 2017, October 19, 2017.
54. Rajmenakshi, Dipak Chaudhari, Gaurav Misra, "Big Data Analytics with Hadoop Workshop (NWBDAH-2017)", Shivaji University, Vidyanagar, Kolhapur, April 5, 2017.
55. Manish Kale, "New Tools and Techniques for Damage and Loss Assessment", Training workshop on disaster risk reduction and Natural heritage sites, (UNESCO Category-2 Centres (C2C), Wildlife Institute of India (WII) and Tata Institute of Social Sciences (TISS), Training Ship Rahman Campus, Mumbai, April 14, 2017.
56. Manoj Khare, "Role of GIS in security", Map the Future Conference (MapMyIndia), Kingdom of Dreams, Gurugram, Delhi, April 17, 2017.
57. Uddhavesh Sonavane, "Project Presentation of Studies of Antisense Molecules", Department of Biotechnology - North Eastern Region (DBT-NE) twinning program visit, Tezpur University, April 24, 2017.
58. Geetanjali Gadre, **तंत्रज्ञानाच्या नवीन वाटा,** Doordarshan Sahyadri, Mumbai, May 11, 2017.
59. Sandeep Malviya, Vivek Gavane, "Think Parallel - Scalable Software in Bioinformatics", Indian Symposium

on Computer Systems Research (INDOSYS) 2017, IIT, Mumbai, May 25, 2017.

60. Manoj Khare, "Generation and Application of Digital Elevation Models (DEM)", Application of GIS and remote sensing, Hotel Le Meridian, Pune, July 8, 2017.
61. Manish Kale, "Remote Sensing and Agriculture", Application of GIS and remote sensingHotel Le Meridian, Pune, July 8, 2017
62. Uddhavesh Sonavane, "Molecular Simulation Studies on Antisense Molecules", National Symposium on Breaking Barriers through Bioinformatics & Computational Biology, IIT Delhi, August 1, 2017.
63. Anil Gupta, "Brain Storming and Corporate Netiquettes", Government Polytechnic, Pune, August 4, 2017.
64. Pallavi Gavali, "Structural Engineering Applications using High Performance Computing", Technical Education Quality Improvement Program (TEQIP), All India Shri Shivaji Memorial Society's (AISSMS) College of Engineering, Pune, September 27, 2017.
65. Sunitha Manjari Kasibhatla, "Bioinformatics Activities at C-DAC", King Edward Memorial (KEM) Hospital and Research Centre, Pune, November 18, 2017.
66. Yogesh Sathe, "Introduction to United States Environmental Protection Agency (USEPA) American Meteorology Society / Environmental Protection Agency Regulatory Model (AERMOD) and its Applications", Training Program on Air Quality Management organized for Maharashtra Pollution Control Board (MPCB) by Ekonnect Knowledge Foundation in partnership with SDG Foundation, Mumbai, October 6, 2017.
67. Rajendra Joshi, "NSM Applications", NSM Conclave, Bengaluru, October 12, 2017.
68. Rajendra Joshi, "Bigdata& Bioinformatics", PSA meeting, New Delhi, October 24, 2017.
69. Pallavi Gavali, "Civil engineering Applications and High Performance Computing, challenges and opportunities", Civil Engineering Student Association (CESA) sponsored lecture series, College of Engineering (CoEP), Pune, November 6, 2017.
70. Gaur Sunder, "Moving towards Digital Health", 13th International Conference of Telemedicine Society of India (Telemedicon 2017), Pune, November 9, 2017.
71. Manisha Mantri, "EHR Standards for India & Telemedicine", Proceedings of 13th International Conference of Telemedicine Society of India (Telemedicon 2017), Pune, November 9, 2017.
72. Achyut Patil, "NRCeS – Your Partner in Standards Adoption", Proceedings of 13th International Conference of Telemedicine Society of India (Telemedicon 2017), Pune, November 9, 2017.
73. Sayali Pophalkar, "EHR Standards Implementation using Software Tool", Proceedings of 13th International Conference of Telemedicine Society of India (Telemedicon 2017), Pune, November 9, 2017.
74. Shailendra Singh Narwariyakar, "Mercury™ Nimbus – Standards based Telemedicine Solution", Proceedings of 13th International Conference of Telemedicine Society of India (Telemedicon 2017), Pune, November 09, 2017.
75. Hemant Darbari, Gaur Sunder, "Future Directions of Technology in Healthcare", Plenary Proceedings of 13th International Conference of Telemedicine Society of India (Telemedicon 2017), Pune, November 10, 2017.
76. Gaur Sunder, "eICU for the state of Odisha", Proceedings of 13th International Conference of Telemedicine Society of India (Telemedicon 2017), Pune, November 10, 2017.
77. Rajendra Joshi, "Drug Repurposing on RAS protein", Indo-US workshop on Radiation Sensitizers in cancer, Chennai, November 13, 2017.
78. Asima Mishra, "Introduction to GIS and integration with IoT", Faculty Development Program on "Designing for Internet of Things", Wadia College, Pune, November 20 - December 1, 2017.
79. Gaur Sunder, "National Resource Centre for EHR Standards and its role in dissemination of Standards in

India", Proceedings of 8th International Conference on Revolutionizing Healthcare with IT 2017 (RHIT 2017), Mumbai, December 01-02, 2017.

80. Shanmugam R, "Tamil Computing", Tamil Sangam, Colombo Srilanka, December 14, 2017.
81. Yogesh Singh, "Space Science and Remote Sensing", DST Sponsored Inspire Internship Camp Shanti Devi Arya Mahila College, Dinanagar, Gurdaspur, December 14 - 18, 2017.
82. Anil Gupta, "Tech talk on Potential R&D areas in HPC", Marathwada Mitra Mandal's College of Engineering (MMCOE), Pune, December 28, 2017.
83. Sayali Pophalkar, "NRCeS and its role in disseminating standards in India", Proceedings of HitconHealthtech Conference (HITCON 2018), Ahmedabad, January 7, 2018.
84. Sahidul Islam, "Micro level weather forecast for Jharkhand, India", National Seminar on ICT Application in Changing Face of Agriculture, Birsa Agriculture University (BAU), Ranchi, January 19, 2018.
85. Sunitha Manjari Kasibhatla, "Application of Bayesian Statistics in Comparative Genomics", National Conference for 'Women in Statistics and Analytics', Savitribai Phule Pune University, Pune, February 14-16, 2018.
86. Rajat Gupta, "Current Scenarios & Trends", IC3SE-18 International Conference on Communication, Computing, Storage & Energy, Pune, Zeal College of Engineering & Research, Pune, February 16, 2018.
87. Rajendra Joshi, "Accelerating Biology using Cloud, HPC Bigdata Technology", IISER, Bengaluru, March 11, 2018.
88. Akshara Kaginalkar, "ICT and Agri-meteorology", National Seminar on "Trends & Applications of ICT in Agriculture (TRACT)" in Changing Face of Agriculture, Hotel Monotel, Kolkata, March 13, 2018.
89. Sahidul Islam, "Real time weather forecast technology", National Seminar on "Trends & Applications of ICT in Agriculture (TRACT)" in Changing Face of Agriculture, Hotel Monotel, Kolkata, March 13, 2018.
90. Ruma Banerjee, "A Cyber infrastructure for Next Generation Biology", NABI Computational Biology Workshop 2018, National Agri-Food Biotechnology Institute (NABI), March 14, 2018.
91. Yumnam Kirani Singh, "Introduction to R Programming", TEQIP-III Program on Machine Learning and Its Applications,Dibrugarh University Institute of Engineering and Technology, Dibrugarh, Assam, March 18 – 22, 2018.
92. Yumnam Kirani Singh, "Image Processing and Pattern Recognition applications in Machine Learning", TEQIP-III Program on Machine Learning and Its Applications,Dibrugarh University Institute of Engineering and Technology, Dibrugarh, Assam, March 18, 2018.
93. Yumnam Kirani Singh, "Wavelet, ISITRA and YKSK Transforms and their Applications", ", TEQIP-III Program on Machine Learning and Its Applications,Dibrugarh University Institute of Engineering and Technology, Dibrugarh, Assam, March 19, 2018.
94. Yumnam Kirani Singh, "Wavelet, ISITRA and YKSK Transforms and their Applications", TEQIP-III Program on Machine Learning and Its Applications, Dibrugarh University Institute of Engineering and Technology, Dibrugarh, Assam, March 22, 2018.
95. Bhadran V K, "Fraud Prevention and Risk Governance", Master Class for Directors Programme, Kochi, April 28, 2017.
96. Sajini T, "Technological solutions for Training persons with disabilities", Disability Inclusive Disaster Risk Management, Mahatama Gandhi University, Kottayam, May 18, 2017.
97. Raja Singh B, "SCADA and Industrial Automation System", Recent Trends in SCADA, Smart Grid and Industrial Automation, Coimbatore Institute of Technology, Coimbatore, May 2 – 15, 2017.
98. Aby Joseph, Saravanakumar A, "Power Converter for Renewable energy grid interactive system", Advancements in power electronics, drives for Grid connected renewable energy systems, Mar Baselios

College of Engineering and Technology, Thiruvananthapuram, June 20, 2017.

99. Ajeesh A, “High Speed Power Electronics Controller and Realtime Digital Simulation with FSS”, Marian Engineering College, Kazhakoottam, July 6, 2017.

100. Saravana Kumar A, “Power Conditioning System for Grid Connected SPV Power Plants, Design and Challenges”, Motilal Nehru National Institute of Technology (MNNIT), Allahabad, July 21, 2017.

101. P Ravikumar, “Future of Mobility – Intelligent Transportation System to Intelligent Transportation Service”, 6th edition of Traffic Infratech Expo, Hyderabad, September 13, 2017.

102. Shibu R M, “Signal Processing and Wireless communication - Practical methods and testimonials”, Demo of PEARS (Programmable Platform for Experiments and Academic Research on SDR), Government Engineering College, Thrissur, November 21, 2017.

103. P Ganesan, “WBG Based converters for Power Electronics”, Faculty Development Programme, Mapco Engineering College, Sivakasi, November 16, 2017.

104. A Saravana Kumar, “Potential & Challenges for Integrating Renewable Energy for Smart City Implementation”, Faculty Development Programme, PSG College of Engineering, Coimbatore, December 7, 2017.

105. Hemant J Magadum, “Traffic Counting and Classifier using Single Loop Method for Non-lane based, Mixed traffic flow condition”, National Conference on Information Technology, Electronics and Management (NCITEM-2017), Noida, July 21, 2017.

106. Raja Singh B, “An industrial application of Evolutionary Computation Technique”, Workshop on Intelligence System Engineering, NIT Trichy, July 27, 2017.

107. Lijo Thomas, “IETF and related activities”, India School of Internet Governance (inSIG) 2017, October 24, 2017.

108. S Krishnakumar Rao, “A practical approach for migration from FPGA based design to ASIC: A case study on NAADA ASIC”, Continuous Education Programme on Mixed Signal ASIC Design, Naval Physical and Oceanographic Laboratory (NPOL), Cochin, October 11, 2017.

109. Gopan George, “Mixed signal IC design: A case study”, Continuous Education Programme on Mixed Signal ASIC Design, Naval Physical and Oceanographic Laboratory (NPOL), Cochin, October 11, 2017.

Human Resource Development

HRD partners the strategic advancement of C-DAC on human capital matters by formulating HR policies in line with the organization's vision. HRD has conceptualized and steered numerous sustainable HR initiatives to enthuse the morale and motivation of 2800 plus C-DAC's intellectual workforce. It has brought in transparency and timeliness in all its processes and also steered focused growth across C-DAC in line with the social and gender inclusive affirmations of the Government of India. Entire C-DAC workforce dedicated themselves for the excellent performance of the organization during the year.

Achievements:

1. The workforce intake strategy pursued by C-DAC caters to meeting the demands and maintaining a steady flow of talent, in an industry which is characterized as fast changing.
2. To keep morale of the employees high, C-DAC extends several welfare benefits to the employees and their families by way of comprehensive medical care, education and coverage under various social security schemes.
3. C-DAC believes that continuous development of its human resources fosters engagement and drives competitive advantage. Towards that end, C-DAC imparted 5137 man-days of training during the year.
4. In recognition of career progression of employees, 617 employees have been elevated to higher levels by way of promotion.

Best practices at various C-DAC centres:

1. Felicitation of employees on long service.
2. Monthly celebration of employees Birthday together with team building exercises and games.
3. Bidding Farewell to superannuated employees on the last day of their service.
4. Observance of Yoga session for members of the on the occasion of International Yoga Day.
5. Health Check-up and Dental Camps.

Plan ahead:

1. To make C-DAC an employer of choice.
2. To effectively lead Succession Planning, Change Management, Leadership Development, Competency Building, Organization Pulse Survey etc.
3. Establish good work practices, systems to nurture the talent.

In this direction, the following initiatives are on cards:

1. 2nd phase developments in iHRMS to automate APAR, Service Book, LTC, Attendance etc.
2. Skill Development through launching of online version of C-DAC Accelerated Knowledge enhancement Scheme (CAKES).

CAKES
C-DAC Accelerated Knowledge Enhancement Series

3. Knowledge Assimilation in Pieces in C-DAC Accelerated Knowledge Enhancement Scheme (KAP CAKES).

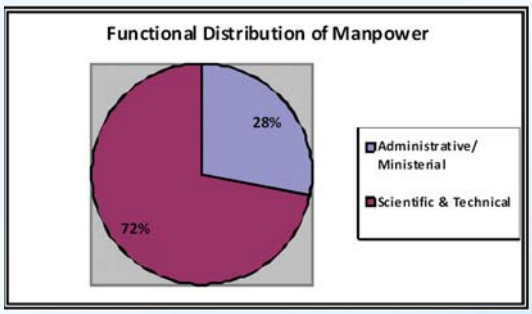
KAP
Knowledge Assimilation in Pieces

4. Comprehensive Induction Training Programme.

Manpower Distribution:

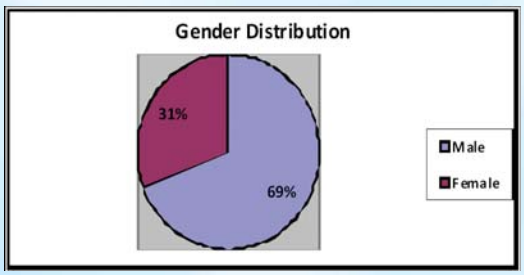
Functional Distribution:

C-DAC has 2809 employees as on March, 2018, spread across 11 centres and Corporate Office. The functional composition of the employees is as shown below:



Gender Distribution:

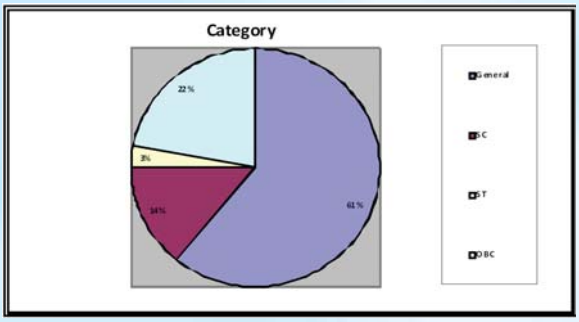
C-DAC has been paying due attention to gender equality and inclusion in employment. Their representation in overall manpower strength is as below:



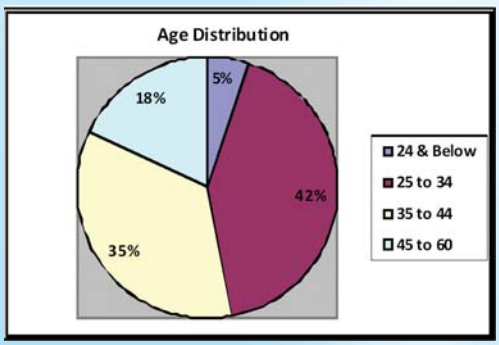
The female workforce in C-DAC is 31% as against the national average of 27%.

Category Distribution:

C-DAC in true spirit complies with the Government directives for Priority Section of the society. The percentage of Scheduled Casts (SC), Scheduled Tribe (ST) and Other Backward Class employees was 14 percent, 3 percent and 22 percent respectively as on 31st March, 2018.



Age Distribution:



The average age of C-DAC workforce is 36.

Legal

All Centres of C-DAC and Corporate Office have a Legal Cell, which take up all the Legal issues relating to employees of C-DAC, vendor and other parties.

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

1. During the financial year (April-2017 to Mar-2018), approx. 24 Court cases were dealt with filed at various CATs, High Courts, Tribunals, Courts, and Arbitrators etc. These cases are mostly related to service matters of C-DAC various Centres.
2. Legal Cell of Corporate Office also provides legal opinion on various Legal issues if warranted. During the financial year, more than 12 Legal Opinions were given to different Divisions/Centres of C-DAC.
3. In addition to above, Legal Cell also Draft/Vet various MOU/Agreements/ Templates to be signed with various stake holders. During this financial year, more than 76 MoUs documents were vetted/drafted by the Legal Cell.
4. Corporate Legal Cell coordinates with MeitY, Advocates and Centres for the court cases and provides valuable advice supported by relevant judgments pronounced by various courts of India.

Indo-European IPR Platform

This collaborative platform aims to provide linked access to various IPR services and resources available in Europe and India, e.g. online filing, patent information systems, IPR laws, filing procedures, case law, etc. in ICTE domain. It facilitates dissemination leading to commercialization of IPRs in both jurisdictions (India and Europe) through exchange of best practices for trading of IP assets. The IP online portal was officially launched on the 5th Indo-European Conference on Patents and ICT held at New Delhi during December 4-5, 2017.

Patent Analysis and Management System (PAMS) is a Single Window Interface for prior art search, invention analysis, IPR queries, patent alerts (Electronics and ICT Area) via email /sms based on published patent applications in Journal of Indian Patent Office, latest updates on news/happenings, case studies and related videos.

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 monthly.

During the financial year 2017-18, total 576 RTI applications were received, which were duly processed.

Details related to the Vigilance Cases

During the year 2017-18, 4 complaints have been disposed off. These complaints were mainly related to Service Book, misappropriation of public money using forged records and irregularities in recruitment and promotion. At present, investigation for one complaint is under process.

ISO Implementation

STQC conducted the surveillance audit for ISO 9001:2008 for Corporate Office of C-DAC on September 7-8, 2017 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, 2018, 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.

UDYEN JAIN & ASSOCIATES FRN NO. 116336W

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. 574 crores as at 31.03.2018 and total revenues of Rs. 180 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 Society has made provision of Rs 23.40 crores up to 31st March, 2018 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, 10, 11, 12 and 20, regarding Centre specific notes of Schedule 18 and significant accounting policy no. 4.2 of Schedule 17, 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 18

b) In the case of the consolidated Income & Expenditure, of the Deficit 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 Udyen Jain and Associate

Chartered Accountants

Firm Regn. No.: 116336W

Sushil Bajaj

Partner

M.No: 131144

Place: Pune

Date: 07.09.2018

CONSOLIDATED BALANCE SHEET AS AT 31st March 2018

Amount in ₹

Particulars	Schedule	2017-18	2016-17
CORPUS/CAPITAL FUND AND LIABILITIES			
Corpus/Capital Fund	1	3,05,81,43,692	3,23,72,70,211
Reserves and Surplus	2	2,29,63,44,138	1,89,45,86,521
Earmarked and Endowment Funds	3	1,89,45,26,908	2,12,11,10,190
Secured Loan from Bank		20,00,000	60,00,000
Current Liabilities and Provisions	4	1,75,36,92,140	1,08,89,36,238
Total		**9,00,47,06,878**	**8,34,79,03,160**
ASSETS			
Fixed Assets			
Acquired out of Own Funds	5	33,54,21,352	32,43,64,881
Acquired out of Grant in Aid	6	1,77,64,16,599	1,64,42,38,134
Acquired out of Project Grants	7	51,99,27,540	25,03,48,387
Current Assets, Loans & Advances	8	6,37,29,41,387	6,12,89,51,758
Total		**9,00,47,06,878**	**8,34,79,03,160**
		-	-

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

CA Raghu Bhargava
Director Finance

Sunil Misar
Registrar (I/C)

Dr. Hemant Darbari
Director General

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
M/S. UDYEN JAIN & ASSOCIATES (FRN: 116336W)
CHARTERED ACCOUNTANTS

CA Sushil Bajaj
Partner (Membership No. 131144)
Pune

Date : 07-Sept-2018

Consolidated Income and Expenditure Account for the year ending 31st March 2018

Amount in ₹

Particulars	Schedule	2017-18	2016-17
INCOME			
Income from Sales/Services	9	1,33,20,83,221	98,40,46,589
Grants/Subsidies	10	65,16,27,686	60,94,75,685
Fees/Subscription	11	87,82,57,455	68,50,63,733
Interest Earned	12	21,11,05,507	24,03,92,251
Other Income	13	1,87,04,276	1,21,35,692
Prior Period Income		35,597	1,25,36,350
Increase/(decrease) in stock of Finished Goods and Work-in-progress	14	(16,43,107)	(11,05,728)
TOTAL (A)		**3,09,01,70,635**	**2,54,25,44,572**
EXPENDITURE			
Establishment Expenses	15	2,09,18,22,070	1,39,89,48,667
Other Administrative Expenses	16	1,08,10,11,009	87,53,74,544
Prior Period Expenses		1,24,28,768	1,54,05,672
Depreciation (corresponding to Schedule 5)		3,40,35,307	4,20,52,160
TOTAL (B)		**3,21,92,97,154**	**2,33,17,81,043**
Transferred to / (from) Balance of Mission Grants		-	(10,77,768)
BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**(12,91,26,519)**	**21,18,41,297**
SIGNIFICANT ACCOUNTING POLICIES	17		
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

Sunil Misar
Registrar (I/C)

Dr. Hemant Darbari
Director General

AS PER OUR REPORT OF EVEN DATE
FOR AND ON BEHALF OF
M/S. UDYEN JAIN & ASSOCIATES (FRN: 116336W)
CHARTERED ACCOUNTANTS

CA Sushil Bajaj
Partner (Membership No. 131144)
Pune

Date : 07-Sept-2018

Centre for Development of Advanced Computing, Pune
CONSOLIDATED ANNUAL ACCOUNTS 2017-18

Amount in ₹

Particulars	2017-18	2016-17
Schedule 1 - Corpus/Capital Fund		
Balance as at the beginning of the year	3,23,72,70,211	3,18,35,13,088
Add: Surplus as per Income & Expenditure Account	(12,91,26,519)	21,18,41,297
Less : Own contribution to Core / Projects and Other Adjustments / Transfers	5,00,00,000	15,80,84,174
Balance as at the year - end	**3,05,81,43,692**	**3,23,72,70,211**
Schedule 2 - Reserves and Surplus		
1. Capital Reserve :		
As per last Account	1,89,45,86,521	1,62,53,33,674
Addition during the year	60,68,81,916	47,48,18,603
Less : Deductions during the year	20,51,24,299	20,55,65,756
Total	**2,29,63,44,138**	**1,89,45,86,521**
Schedule 3 - Earmarked/Endowment Funds		
1. Balance of Core Grants		
a) Opening balance of the funds	-	10,77,768
b) Additions to the Funds		
I) Donations/Grants	65,50,00,000	61,50,00,000
II) Income from Investments made on account of funds	-	-
III) Other additions (C-DAC Contribution and Other Income)	42,022	2,47,500
Total (b)	65,50,42,022	61,52,47,500
Total (a)+(b)	65,50,42,022	61,63,25,268
c) Utilization/Expenditure towards objectives of funds		
I) Capital Expenditure		
Fixed Assets	33,73,739	55,24,315
Others	-	-
Total I	33,73,739	55,24,315
II) Revenue Expenditure		
Salaries, Wages and Allowances etc.	57,67,91,581	51,00,29,227
Componants, Consumables and Other Direct Expenses	9,40,967	8,25,529
Travel	61,06,324	78,36,361
Contingencies, Overheads and Other Administrative Expenditure	6,78,29,411	9,21,09,836
Total II	65,16,68,283	61,08,00,953
Total (c)	65,50,42,022	61,63,25,268
Net Balance as at Year - End (a+b-c) Total 1	-	-
Projects wise Allocated Core Grant Projects (Details as per Annexure 1)		
d) Opening balance	(2,20,956)	16,94,79,431
e) Additions to the Funds		
I) Donations/Grants	26,50,00,000	25,00,00,000
II) Income from Investments made on account of	(1,82,998)	2,96,040
III) Other additions (C-DAC Contribution and Other	5,08,53,000	15,80,84,174
Total (e)	31,56,70,002	40,83,80,214
Total (d)+(e)	31,54,49,046	57,78,59,645

Amount in ₹

Particulars	2017-18	2016-17
f) Utilization/Expenditure towards objectives of		
I) Capital Expenditure		
Fixed Assets	17,43,98,212	34,05,66,376
Others	-	-
Total I	17,43,98,212	34,05,66,376
II) Revenue Expenditure	-	
Salaries, Wages and Allowances etc.	4,31,17,573	6,39,43,320
Componants, Consumables and Other Direct Expenses	1,44,47,684	11,29,81,947
Travel	70,31,776	78,69,581
Contingencies, Overheads and Other Administrative Expenditure	2,89,01,633	2,06,36,063
Total II	9,34,98,666	20,54,30,911
Total Expenditure (f)	26,78,96,878	54,59,97,287
g) Refund / Transfer and Other Adjustments	31,55,057	3,20,83,314
Net Balance as at Year - End (d+e-f-g) Total 2	4,43,97,112	(2,20,956)
Core Grant Balance as at Year - End (Total 1 + Total 2) Total 3	4,43,97,112	(2,20,956)
2. Grants for Funded Projects (Details as per Annexure 2)		
a) Opening balance of the funds	2,11,62,16,500	1,46,52,61,352
b) Additions to the Funds		
I) Donations/Grants	1,57,67,52,001	2,45,70,47,913
II) Income from Investments made on account of funds	7,53,72,211	5,94,79,373
III) Other additions (C-DAC Contribution and Other Income)	5,31,26,548	20,82,97,604
Total (b)	1,70,52,50,760	2,72,48,24,890
Total (a)+(b)	3,82,14,67,260	4,19,00,86,242
c) Utilization/Expenditure towards objectives of funds		
I) Capital Expenditure		
Fixed Assets	43,03,99,257	12,94,30,416
Others	-	-
Total I	43,03,99,257	12,94,30,416
II) Revenue Expenditure		
Salaries, Wages and Allowances etc.	73,84,63,711	93,51,87,089
Componants, Consumables and Other Direct Expenses	31,19,47,519	30,16,32,975
Travel	6,38,89,193	7,69,97,693
Contingencies, Overheads and Other Administrative Expenditure	32,51,55,373	50,76,37,065
Total II	1,43,94,55,796	1,82,14,54,822
Total (c)	1,86,98,55,053	1,95,08,85,238
d) Refund / Transfer and Other Adjustments	10,70,08,235	12,29,84,504
Net Balance as at Year - End (a+b-c-d) Total 4	1,84,46,03,972	2,11,62,16,500
3. Employee and Other Funds:		
As per last Account	51,14,647	48,68,292
Addition during the year	4,84,348	4,17,869
Less : Deductions during the year	73,171	1,71,515
Total (5)	55,25,824	51,14,646
Grand Total (Total 3+ Total 4+Total 5)	**1,89,45,26,908**	**2,12,11,10,190**

Annexure 1 of Schedule 3 **Projects wise Allocated Core Grant**

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

Amount in ₹

Sr.No.	Name of the Project	Opening Balance	Grants Received During the year	Interest Earned	Other Income & CDAC's Contribution During the year	Capital Expenditure	Salary, Wages Allowances etc.	Componants, Consumables and Other Direct Expenses	Travel	Contingencies, Overheads and Other Administrative Expenditure	Total Expenses	Refund / Transfer & Other Adjustments	Closing Balance
1	Building Fund	(9,90,32,371)	21,50,00,000	-	5,00,00,000	16,33,80,482	3,98,470	-	-	1,09,46,599	17,47,25,551	-	(87,57,922)
2	North East Projects	8,69,87,628	3,75,06,000	(1,82,998)	8,53,000	1,08,81,746	3,05,52,454	1,30,52,371	70,31,776	1,54,42,164	7,69,60,511	31,55,057	4,50,48,062
3	C-DAC Silchar	1,18,23,787	1,24,94,000	-	-	1,35,984	1,21,66,649	13,95,313	-	25,12,870	1,62,10,816	-	81,06,972
	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	**(2,20,956)**	**26,50,00,000**	**(1,82,998)**	**5,08,53,000**	**17,43,98,212**	**4,31,17,573**	**1,44,47,684**	**70,31,776**	**2,89,01,633**	**26,78,96,878**	**31,55,057**	**4,43,97,112**

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	2,24,22,632	5,11,13,720	11,57,490	1,68,749	1,96,67,598	3,81,06,130	90,62,400	43,91,770	1,13,46,010	8,25,73,908	14,80,557	(91,91,874)
	Other Agency Projects	6,59,225	38,22,600	1,16,665	-	-	6,94,350	8,08,822	42,797	2,44,500	17,90,469	-	28,08,021
	Total Bangalore Centre	2,30,81,857	5,49,36,320	12,74,155	1,68,749	1,96,67,598	3,88,00,480	98,71,222	44,34,567	1,15,90,510	8,43,64,377	14,80,557	(63,83,853)
2	**Chennai Centre**												
	MeitY Projects	(2,68,72,222)	31,60,000	-	-	-	1,32,49,970	7,19,954	4,93,991	4,70,099	1,49,34,014	3,54,414	(3,90,00,650)
	Other Agency Projects	-	-	-	-	-	-	-	-	-	-	-	-
	Total Chennai Centre	(2,68,72,222)	31,60,000	-	-	-	1,32,49,970	7,19,954	4,93,991	4,70,099	1,49,34,014	3,54,414	(3,90,00,650)
3	**Corporate Office**												
	MeitY Projects	(2,75,000)	-	-	-	-	-	-	-	-	-	-	(2,75,000)
	Other Agency Projects	-	-	-	-	-	-	-	-	-	-	-	-
	Total Corporate Office	(2,75,000)	-	-	-	-	-	-	-	-	-	-	(2,75,000)
4	**Delhi Centre**												
	MeitY Projects	88,18,602	17,95,000	-	-	-	45,04,392	11,11,370	-	6,91,000	63,06,762	16,69,173	26,37,667
	Other Agency Projects	4,12,34,825	12,85,95,339	-	-	-	66,54,334	4,56,26,344	43,18,689	1,83,421	5,67,82,788	-	11,30,47,376
	Total Delhi Centre	5,00,53,427	13,03,90,339	-	-	-	1,11,58,726	4,67,37,714	43,18,689	8,74,421	6,30,89,550	16,69,173	11,56,85,043
5	**Hyderabad Centre**												
	MeitY Projects	16,85,31,164	6,69,41,705	77,20,434	2,63,97,328	93,58,283	4,65,10,676	31,21,414	34,85,671	2,98,68,331	9,23,44,375	5,70,01,717	12,02,44,539
	Other Agency Projects	-	4,39,07,000	1,24,326	-	-	4,94,179	-	-	-	4,94,179	-	4,35,37,147
	Total Hyderabad Centre	16,85,31,164	11,08,48,705	78,44,760	2,63,97,328	93,58,283	4,70,04,855	31,21,414	34,85,671	2,98,68,331	9,28,38,554	5,70,01,717	16,37,81,686
6	**Kolkata Centre**												
	MeitY Projects	24,84,591	6,22,73,074	2,52,275	-	76,79,128	3,91,91,364	89,74,776	62,42,912	27,46,000	6,48,34,180	(21,58,598)	23,34,358
	Other Agency Projects	82,44,501	1,64,19,975	1,67,025	3,07,590	15,96,440	58,91,283	47,23,324	4,75,493	9,05,000	1,35,91,539	28,14,590	87,32,962
	Total Kolkata Centre	1,07,29,092	7,86,93,049	4,19,300	3,07,590	92,75,568	4,50,82,647	1,36,98,100	67,18,405	36,51,000	7,84,25,719	6,55,992	1,10,67,320
7	**Mohali Centre**												
	MeitY Projects	(58,93,061)	3,18,26,039	8,78,264	-	54,82,345	83,28,367	89,73,700	25,75,519	7,49,670	2,61,09,601	-	7,01,641
	Other Agency Projects	2,26,26,706	25,18,412	9,36,741	-	23,35,554	15,37,004	1,52,07,646	4,51,446	5,93,021	2,01,24,671	-	59,57,188
	Total Mohali Centre	1,67,33,645	3,43,44,451	18,15,005	-	78,17,899	98,65,371	2,41,81,346	30,26,965	13,42,691	4,62,34,272	-	66,58,829
8	**Mumbai Centre**												
	MeitY Projects	26,30,20,805	2,69,32,194	67,26,360	-	1,08,53,770	4,31,54,879	8,20,25,167	19,33,063	3,56,51,687	17,36,18,566	69,15,957	11,61,44,836
	Other Agency Projects	9,59,72,555	30,21,775	-	-	-	4,64,682	-	1,44,676	9,21,69,858	9,27,79,216	-	62,15,114
	Total Mumbai Centre	35,89,93,360	2,99,53,969	67,26,360	-	1,08,53,770	4,36,19,561	8,20,25,167	20,77,739	12,78,21,545	26,63,97,782	69,15,957	12,23,59,950
9	**Noida Centre**												
	MeitY Projects	13,20,780	2,07,20,000	1,32,188	-	14,31,109	1,25,21,893	39,01,025	16,40,435	29,71,385	2,24,65,847	2,09,782	(5,02,661)
	Other Agency Projects	62,82,806	5,52,66,282	4,85,892	-	10,30,080	2,44,68,569	1,19,81,997	26,87,740	2,04,81,922	6,06,50,307	17,766	13,66,907
	Total Noida Centre	76,03,586	7,59,86,282	6,18,080	-	24,61,189	3,69,90,462	1,58,83,022	43,28,175	2,34,53,307	8,31,16,154	2,27,548	8,64,246
10	**Pune Centre**												
	MeitY Projects	43,06,52,783	31,82,03,620	1,32,49,423	46,000	4,89,36,859	26,77,06,137	3,59,49,614	1,87,12,038	5,46,96,931	42,60,01,579	3,08,94,441	30,52,55,806
	Other Agency Projects	87,48,81,020	17,08,69,478	3,38,04,865	5,000	3,99,86,599	9,97,41,509	3,56,36,290	57,45,325	1,52,39,280	19,63,49,003	89,81,002	87,42,30,358
	Total Pune Centre	1,30,55,33,803	48,90,73,098	4,70,54,288	51,000	8,89,23,458	36,74,47,646	7,15,85,904	2,44,57,363	6,99,36,211	62,23,50,582	3,98,75,443	1,17,94,86,164
11	**Thiruvananthapuram Centre**												
	MeitY Projects	16,95,12,178	49,61,87,000	74,17,333	2,62,01,880	27,70,91,600	9,91,19,794	3,30,14,133	75,12,736	4,86,60,707	46,53,98,970	(11,72,567)	23,50,91,988
	Other Agency Projects	3,25,91,610	7,31,78,788	22,02,930	-	49,49,893	2,61,24,200	1,11,09,542	30,34,893	74,86,552	5,27,05,080	-	5,52,68,248
	Total Thiruvananthapuram Centre	20,21,03,788	56,93,65,788	96,20,263	2,62,01,880	28,20,41,493	12,52,43,994	4,41,23,675	1,05,47,629	5,61,47,259	51,81,04,050	(11,72,567)	29,03,60,236
	Total MeitY Projects	**1,03,37,23,252**	**1,07,91,52,352**	**3,75,33,767**	**5,28,13,958**	**38,05,00,691**	**57,23,93,602**	**18,68,53,554**	**4,69,88,134**	**18,78,51,820**	**1,37,45,87,801**	**9,51,94,877**	**73,34,40,651**
	Total Other Agency Projects	**1,08,24,93,248**	**49,75,99,649**	**3,78,38,444**	**3,12,590**	**4,98,98,566**	**16,60,70,109**	**12,50,93,965**	**1,69,01,059**	**13,73,03,553**	**49,52,67,252**	**1,18,13,358**	**1,11,11,63,321**
	Grand Total	**2,11,62,16,500**	**1,57,67,52,001**	**7,53,72,211**	**5,31,26,548**	**43,03,99,257**	**73,84,63,711**	**31,19,47,519**	**6,38,89,193**	**32,51,55,373**	**1,86,98,55,053**	**10,70,08,235**	**1,84,46,03,972**

Amount in ₹

Particulars	2017-18	2016-17
Schedule 4 - Current Liabilities and Provisions		
A. Current Liabilities		
1. Trade Payables (For Goods and Others)	52,69,41,952	35,90,55,309
2. Advances Received		
a) Advances Received from Parties	40,97,36,681	25,06,85,296
b) Fees Received in Advance	8,74,20,390	11,71,392
c) AMC Charges Received in Advance	-	-
d) Other Income Received in Advance	8,12,41,265	9,88,55,709
3. Statutory Liabilities		
a) Members CPF Recovery Payable	1,33,51,632	1,10,55,160
b) Members VPF Payable	16,30,053	14,97,921
c) Members CPF Loan Recovery Payable	3,311	3,311
d) Members Benevolent Fund Payable	12,63,904	11,10,504
e) Members CGEIS/Group Insurance Payable	29,133	37,444
f) Members Other Recoveries Payable	4,23,639	2,02,732
g) C-DAC's Contribution to CPF Payable	1,87,63,141	1,60,28,507
h) Gratuity Payable	7,01,43,845	84,59,776
i) Leave Salary and Pension Contribution Payable	22,71,09,665	5,51,69,071
j) Members Income Tax Payable	1,23,31,328	64,04,480
k) Tax Deducted at Source Payable	1,37,18,849	1,51,23,534
l) Profession Tax Payable	2,39,720	2,28,250
m) General Sales Tax / VAT Payable	-	12,70,084
n) Central Sales Tax Payable	-	5,13,336
o) Works Contract Tax Payable	-	2,12,801
p) Service Tax Payable	2,08,89,694	1,86,47,616
q) Local Body Tax Payable	-	-
r) CGST Payable	16,80,175	-
s) SGST Payable	16,80,175	-
t) IGST Payable	2,56,51,637	-
u) UTGST Payable	-	-
v) Reverse charge GST Payable	1,43,781	-
4. Other Current Liabilities		
a) Unpaid Salaries	52,86,276	31,95,207
b) Library Deposits Payable	2,49,450	2,71,150
c) Other Security Deposits Payable	2,11,91,877	2,01,04,767
d) Earnest Money Deposit Contractors Payable	1,45,57,260	1,19,88,967
e) Retention Deposit Contractors	1,07,61,201	1,19,47,182
f) Refund of Course Fees Due	12,70,615	31,015
g) ATC's & Others Share in Fees Payable	1,24,73,934	35,73,692
h) Other Current Liabilities	6,09,56,887	13,54,88,211
Total (A)	1,64,11,41,469	1,03,23,32,424
B. Provisions		
1. Others (Specify)		
a) Provisions / Accrued Liabilities for Expenses	11,25,50,671	5,66,03,814
Total (B)	11,25,50,671	5,66,03,814
Total (A)+(B)	**1,75,36,92,140**	**1,08,89,36,238**

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	17,10,53,896	3,80,909	-	**3,80,909**	-	**17,14,34,805**	1,88,28,215	-	0%	6,97,292	**1,95,25,507**	**15,19,09,298**	**15,22,25,681**
2	Building													
	a) On Freehold Land	90,74,426	43,851	-	**43,851**	-	**91,18,277**	45,12,302	-	10%	4,60,598	**49,72,900**	**41,45,377**	**45,62,124**
	b) On Leasehold Land	10,89,53,874	-	-	**-**	-	**10,89,53,874**	8,02,92,884	-	10%	28,66,099	**8,31,58,983**	**2,57,94,891**	**2,86,60,990**
	c) Ownership Flats/Premises	3,97,26,295	-	-	**-**	-	**3,97,26,295**	3,07,96,735	-	10%	8,92,956	**3,16,89,691**	**80,36,604**	**89,29,560**
	d) Superstructures on Land not belonging to the entity	1,47,34,869	-	-	**-**	-	**1,47,34,869**	1,29,48,502	-	10%	1,78,637	**1,31,27,139**	**16,07,730**	**17,86,367**
3	Plant, Machinery and Equipments	6,64,64,182	11,43,552	40,92,545	**52,36,097**	41,00,659	**6,75,99,620**	5,20,64,992	35,68,509	15%	28,65,470	**5,13,61,953**	**1,62,37,667**	**1,43,99,190**
4	Vehicles	1,32,64,833	-	32,97,923	**32,97,923**	-	**1,65,62,756**	93,26,266	-	15%	10,85,474	**1,04,11,740**	**61,51,016**	**39,38,567**
5	Furniture & Fixtures	9,32,20,407	4,06,879	7,64,467	**11,71,346**	5,75,631	**9,38,16,122**	6,64,01,472	4,39,164	10%	27,85,381	**6,87,47,689**	**2,50,68,432**	**2,68,18,935**
6	Office Equipments	3,53,68,192	2,92,720	40,10,203	**43,02,923**	3,22,391	**3,93,48,724**	2,42,52,015	3,01,408	15%	23,09,717	**2,62,60,324**	**1,30,88,400**	**1,11,16,177**
7	Air Conditioning Equipments	3,20,94,128	21,74,859	2,49,731	**24,24,590**	-	**3,45,18,718**	2,62,44,176	-	15%	12,41,181	**2,74,85,357**	**70,33,361**	**58,49,952**
8	Computer Peripherals	34,80,82,083	20,52,753	2,32,43,775	**2,52,96,528**	2,29,47,979	**35,04,30,632**	33,14,99,721	2,26,31,675	40%	1,66,25,034	**32,54,93,080**	**2,49,37,552**	**1,65,82,362**
9	Electrical Installations	5,50,36,046	5,71,176	2,44,226	**8,15,402**	27,338	**5,58,24,110**	4,35,49,330	25,459	10%	12,30,026	**4,47,53,897**	**1,10,70,213**	**1,14,86,716**
10	Electronic Tools & Lab Equipments	79,62,723	54,798	2,02,767	**2,57,565**	-	**82,20,288**	57,49,040	-	15%	3,70,689	**61,19,729**	**21,00,559**	**22,13,683**
11	Library Books	1,54,56,199	46,957	1,62,874	**2,09,831**	350	**1,56,65,680**	1,51,42,960	348	40%	2,09,228	**1,53,51,840**	**3,13,840**	**3,13,239**
12	Copyright Know-how	66,950	-	-	**-**	-	**66,950**	64,150	-	25%	700	**64,850**	**2,100**	**2,800**
13	Other Fixed Assets	62,94,867	14,072	6,883	**20,955**	1,505	**63,14,317**	48,69,750	937	15%	2,16,825	**50,85,638**	**12,28,679**	**14,25,117**
	Total	**1,04,90,21,445**	**71,82,526**	**3,62,75,394**	**4,34,57,920**	**2,79,75,853**	**1,06,45,03,512**	**72,65,42,510**	**2,69,67,500**		**3,40,35,307**	**73,36,10,317**	**33,08,93,194**	**32,24,78,935**
	Capital Work-in-progress	18,85,946	18,90,362	26,37,796	45,28,158	18,85,946	**45,28,158**	-	-		-	-	45,28,158	18,85,946
	Grand Total	**1,05,09,07,391**	**90,72,888**	**3,89,13,190**	**4,79,86,078**	**2,98,61,799**	**1,06,90,31,670**	**72,65,42,510**	**2,69,67,500**		**3,40,35,307**	**73,36,10,317**	**33,54,21,352**	**32,43,64,881**
	Previous Year	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		4,20,52,160	**72,65,42,510**	**32,43,64,881**	**33,14,55,351**

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**	23,25,858	-	0%	1,59,103	**24,84,961**	**1,42,60,750**	**1,44,19,853**
2	Building													
	a) On Freehold Land	22,23,41,653	2,94,062	-	**2,94,062**	-	**22,26,35,715**	8,62,96,316	-	10%	1,36,33,940	**9,99,30,256**	**12,27,05,459**	**13,60,45,337**
	b) On Leasehold Land	13,08,85,997	-	18,15,187	**18,15,187**	-	**13,27,01,184**	9,72,72,052	-	10%	35,42,913	**10,08,14,965**	**3,18,86,219**	**3,36,13,945**
	c) Ownership Flats/Premises	33,41,269	-	-	-	-	**33,41,269**	28,87,175	-	10%	45,410	**29,32,585**	**4,08,684**	**4,54,094**
	d) Superstructures on Land not belonging to the entity	-	-	-	-	-	-	-	-	10%	-	-	-	-
3	Plant, Machinery and Equipments	9,21,93,506	-	17,26,895	**17,26,895**	8,58,353	**9,30,62,048**	7,43,48,509	8,09,886	15%	29,28,514	**7,64,67,137**	**1,65,94,911**	**1,78,44,997**
4	Vehicles	1,05,60,869	-	-	-	-	**1,05,60,869**	91,41,127	-	15%	2,12,962	**93,54,089**	**12,06,780**	**14,19,742**
5	Furniture & Fixtures	12,85,98,193	3,27,035	26,98,503	**30,25,538**	-	**13,16,23,731**	8,24,98,381	-	10%	49,12,535	**8,74,10,916**	**4,42,12,815**	**4,60,99,812**
6	Office Equipments	5,39,00,194	42,220	36,655	**78,875**	-	**5,39,79,069**	4,17,29,792	-	15%	18,37,392	**4,35,67,184**	**1,04,11,885**	**1,21,70,402**
7	Air Conditioning Equipments	5,32,61,080	-	-	-	45,28,315	**4,87,32,765**	4,37,65,708	44,42,336	15%	14,11,410	**4,07,34,782**	**79,97,983**	**94,95,372**
8	Computer Peripherals	1,26,34,58,321	90,99,215	29,83,430	**1,20,82,645**	30,42,308	**1,27,24,98,658**	1,24,93,28,720	30,39,129	40%	1,07,93,208	**1,25,70,82,799**	**1,54,15,859**	**1,41,29,601**
9	Electrical Installations	7,49,49,674	67,260	10,24,805	**10,92,065**	3,58,785	**7,56,82,954**	4,68,60,081	97,231	10%	28,92,011	**4,96,54,861**	**2,60,28,093**	**2,80,89,593**
10	Electronic Tools & Lab Equipments	10,05,79,226	1,42,206	4,04,286	**5,46,492**	-	**10,11,25,718**	8,13,60,162	-	15%	29,64,832	**8,43,24,994**	**1,68,00,724**	**1,92,19,064**
11	Library Books	3,98,94,773	24,612	1,249	**25,861**	2,958	**3,99,17,676**	3,97,91,011	2,954	40%	51,848	**3,98,39,905**	**77,771**	**1,03,762**
12	Copyright Know-how	4,40,660	-	-	-	-	**4,40,660**	4,40,625	-	25%	9	**4,40,634**	**26**	**35**
13	Other Fixed Assets	71,50,128	-	-	-	-	**71,50,128**	57,67,458	-	15%	2,07,400	**59,74,858**	**11,75,270**	**13,82,670**
	Total	**2,20,32,06,104**	**99,96,610**	**1,06,91,010**	**2,06,87,620**	**87,90,719**	**2,21,51,03,005**	**1,86,38,12,975**	**83,91,536**		**4,55,93,487**	**1,90,10,14,926**	**31,40,88,079**	**33,93,93,129**
	Capital Work-in-progress	1,30,48,45,005	4,92,17,014	11,68,32,291	16,60,49,305	85,65,790	**1,46,23,28,520**	-	-		-	-	1,46,23,28,520	1,30,48,45,005
	Grand Total	**3,50,80,51,109**	**5,92,13,624**	**12,75,23,301**	**18,67,36,925**	**1,73,56,509**	**3,67,74,31,525**	**1,86,38,12,975**	**83,91,536**		**4,55,93,487**	**1,90,10,14,926**	**1,77,64,16,599**	**1,64,42,38,134**
	Previous Year	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**

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	30,28,93,194	73,33,070	1,23,34,528	1,96,67,598	-	32,25,60,792	27,27,56,431	-		1,37,21,775	28,64,78,206	3,60,82,586	3,01,36,763
2	Chennai Centre Project Assets	9,16,33,737	-	-	-	-	9,16,33,737	7,57,94,575	-		33,38,211	7,91,32,786	1,25,00,951	1,58,39,162
3	Corporate Project Assets	-	-	-	-	-	-	-	-		-	-	-	-
4	Delhi Centre Project Assets	15,72,623	-	-	-	-	15,72,623	15,64,203	-		1,418	15,65,621	7,002	8,420
5	Hyderabad Centre Project Assets	18,15,18,587	17,01,424	76,56,859	93,58,283	-	19,08,76,870	16,96,76,116	-		78,67,505	17,75,43,621	1,33,33,249	1,18,42,471
6	Kolkata Centre Project Assets	1,49,24,130	17,89,102	74,86,466	92,75,568	-	2,41,99,698	1,03,76,876	-		82,93,693	1,86,70,569	55,29,129	45,47,254
7	Mohali Centre Project Assets	8,87,17,700	13,36,938	64,80,961	78,17,899	55,650	9,64,79,949	7,77,19,853	54,225		52,12,005	8,28,77,633	1,36,02,316	1,09,97,847
8	Mumbai Centre Project Assets	29,48,73,697	91,59,396	16,94,374	1,08,53,770	-	30,57,27,467	26,35,17,496	-		1,18,31,263	27,53,48,759	3,03,78,708	3,13,56,201
9	Noida Centre Project Assets	9,54,26,600	-	24,61,189	24,61,189	31,69,129	9,47,18,660	7,18,52,921	29,20,919		49,47,491	7,38,79,493	2,08,39,167	2,35,73,679
10	Pune Centre Project Assets	46,41,51,466	3,97,17,032	4,92,06,425	8,89,23,457	-	55,30,74,923	43,83,48,296	-		4,49,74,249	48,33,22,545	6,97,52,379	2,58,03,170
11	Thiruvananthapuram Centre Project Assets	32,22,53,560	26,58,83,072	1,61,58,421	28,20,41,493	12,55,965	60,30,39,088	22,60,10,140	2,16,307		5,93,43,202	28,51,37,035	31,79,02,053	9,62,43,420
	Total	**1,85,79,65,294**	**32,69,20,034**	**10,34,79,223**	**43,03,99,257**	**44,80,744**	**2,28,38,83,807**	**1,60,76,16,907**	**31,91,451**		**15,95,30,812**	**1,76,39,56,268**	**51,99,27,540**	**25,03,48,387**
	Capital Work-in-progress	-	-	-	-	-	-	-	-		-	-	-	-
	Grand Total	**1,85,79,65,294**	**32,69,20,034**	**10,34,79,223**	**43,03,99,257**	**44,80,744**	**2,28,38,83,807**	**1,60,76,16,907**	**31,91,451**		**15,95,30,812**	**1,76,39,56,268**	**51,99,27,540**	**25,03,48,387**
	Previous Year	**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**

Amount in ₹

Particulars		2017-18	2016-17

Schedule 8 - Current Assets, Loans and Advances

A. Current Assets			
1. Inventories :			
a) Stock in trade			
Finished Goods		24,46,760	26,88,960
Work-in-progress		1,50,440	52,970
Raw Material		17,15,677	21,93,075
b) Stock of Course Material		5,18,305	15,39,284
2. Sundry Debtors			
Trade Receivables		1,00,03,98,432	79,96,88,789
Less: Provision for Bad and Doubtful Debts		23,40,16,713	20,64,52,942
		76,63,81,719	59,32,35,847
3. Cash balances in hand (including cheques/drafts and imprest)		1,28,121	4,14,006
4. Bank Balances			
a) With Scheduled Banks			
On Deposit Accounts (includes margin money)		3,71,01,48,566	3,68,29,81,146
On Savings/Current Account		1,44,26,85,999	1,43,40,21,095
b) Funds/Goods in Transit		86,071	51,87,272
5. Post Office-Savings Accounts		5,722	4,849
Total (A)		5,92,42,67,380	5,72,23,18,504
B. Loans, Advances and Other Assets			
1. Loans			
a) Staff	82,16,364		91,70,556
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		3,59,24,000	2,59,24,000
b) Prepayments (Advances to Suppliers)		8,30,23,674	2,89,51,132
c) To Employees		64,00,995	1,12,72,049
d) To Others		59,22,637	96,36,684
3. Income Accrued			
a) On Investments from Earmarked/Endowment Funds		-	-
b) On Bank Deposits		7,43,87,819	7,78,41,927
c) Others			
I) Course Fee Receivable		8,38,688	20,22,030
ii) Receivable from Guest House Receipts		7,540	-
iii) Other Grants Receivables		-	11,99,608
4. Claims Receivable			
a) Insurance Claims Lodged but not received		-	-
b) Cliams due but not received		6,25,354	6,25,354
c) Excise Duty paid under Protest		-	-
d) Income Tax Deducted at Source		7,64,32,468	8,39,26,201
e) Sales Tax / VAT Paid Under Protest		-	-
f) Sales Tax / VAT Refund Due		2,61,790	4,51,928
g) CGST Receivable		11,12,106	-
h) SGST Receivable		13,47,487	-
i) IGST Receivable		48,17,404	-
j) UTGST Receivable	-		-
k) Reverse Charge GST Receivable		-	-
l) Input Tax Credit GST Receivable		32,680	-
m) GST Paid on Advance Receipt		1,78,31,143	-
n) Receivable from PF Trust		-	600
o) Other Receivables		69,44,453	2,96,04,526
5. Prepaid Expenses			
a) Insurance	4,70,727		4,49,496
b) Other Expenses		74,20,047	36,66,614

Amount in ₹

Particulars		2017-18	2016-17
6. Deposits (Assets)			
a) Telephone Deposit		12,10,913	12,07,634
b) Lease Rent Deposit		4,28,20,028	4,30,10,670
c) Other Deposits		2,58,18,453	2,44,73,791
d) Security Deposit	4,31,31,557		4,33,23,344
e) Excise PLA Deposit		-	3,55,136
f) Excise Under D3 and 57F3		-	-
g) EMD / Tender Deposit		32,39,831	31,76,315
7. Differed Expenses			
a) Unutilised Modvat / Cenvat		4,35,849	63,43,565
b) Differed Expenses on Projects		-	-
Total (B)		44,86,74,007	40,66,33,254
Total (A+B)		**6,37,29,41,387**	**6,12,89,51,758**

Schedule 9 - Income from Sales/Services

1. Income from Sales			
a) Sale of Finished Goods		23,09,22,741	21,36,44,023
b) Sale of Raw Material		-	-
c) Sale of Scraps		5,53,195	27,14,130
2. Income from Services			
a) Software Development Charges		41,54,29,333	25,48,73,985
b) Others (Specify)		-	-
AMC Charges Received		3,18,94,863	1,55,23,626
Consultancy Charges / Service Charges		58,76,38,248	45,48,14,040
TOT Fees Received		79,26,800	1,48,03,000
Royalty Received		1,33,00,736	32,94,864
Data Charges		4,43,56,555	2,43,78,921
3. Inter Unit / Inter Branch Sales / (Purchases)		60,750	-
Total		**1,33,20,83,221**	**98,40,46,589**

Schedule 10 - Grants/Subsdies

(Irrevocable Grants & Subsdies Received)

1. Central Government	65,50,00,000	61,50,00,000
2. Others (Specify)		
a) C-DAC's own Contribution and Other Adjustments	1,425	-
3. Less : Amount utilised for Capital Expenditure in the current year transferred to Capital Reserve	33,73,739	55,24,315
Total	**65,16,27,686**	**60,94,75,685**

Schedule 11 - Fees/Subscriptions

(Accounting Policies towards each item are to be disclosed)

1. Entrance Fees		-	-
2. Course Fees	75,34,10,019		63,98,92,274
3. Corporate Training Fees		63,72,352	4,42,000
4. Annual Fees/Subscriptions		51,81,746	42,10,000
5. Authorization Fees	-		-
6. Others (Specify)		-	-
a) Virtual Centre Processing Fees		-	-
b) Admission Cancellation Fees		32,02,059	42,85,461
c) Examination Fees		9,65,44,078	2,30,55,300
d) Late Fee		44,447	44,437
e) Registration Fees / Project Fee		14,31,799	9,22,946
f) Students Hostel Fees		1,20,70,955	1,22,11,315
TOTAL		**87,82,57,455**	**68,50,63,733**

Amount in ₹

Particulars	2017-18	2016-17

Schedule 12 - Interest Received

1. On Term Deposits		
a) With Scheduled Banks	19,30,98,708	22,90,17,477
2. On Savings Accounts		
a) With Scheduled Banks	1,70,65,472	1,04,39,861
3. On Loans		
a) Employees/Staff	9,41,327	9,34,913
Total	**21,11,05,507**	**24,03,92,251**

Schedule 13 - Other Income

1. Profit on Sale/Disposal of Assets		
a) Owned Assets	(4,33,054)	72,639
b) Assets acquired out of grants, or received free of cost	-	(11,705)
2. Exports Incentives Realized	-	-
3. Fees for Miscellaneous Services	47,27,611	15,63,182
4. Miscellaneous Income	1,44,09,719	1,05,11,576
Total	**1,87,04,276**	**1,21,35,692**

Schedule 14 - Increase/(Decrease) In Stock of Finished Goods & Work-In-Progress

a) Closing Stock		
Finished Goods	24,46,760	26,88,960
Work-in-progress	1,50,440	52,970
Raw Material	17,15,677	21,93,075
Loose Tools	-	-
Course Material Stock	5,18,305	15,39,284
b) Less : Opening 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
Total (a-b)	**(16,43,107)**	**(11,05,728)**

Amount in ₹

Particulars		2017-18	2016-17
Schedule 15 - Establishment Expenses			
a) Salaries & Wages		1,47,06,63,841	98,87,33,632
b) Allowances & Bonus			
Awards & Prizes		2,69,323	1,18,022
Bonus		37,14,281	62,32,112
Canteen Facility	3,45,22,466		2,91,78,521
Hire Charges - Contractual Services		6,60,01,197	5,40,44,616
Lease Rent for Employees Quarters		1,24,89,263	4,28,52,221
Leave Travel Concession		63,19,321	56,87,203
Medical Reimbursement		8,08,31,277	5,96,01,784
Members Medical & Accident Insurance Expenses		3,16,952	2,41,281
Misc. Allowances and Other Reimbursements		1,47,11,552	1,37,96,000
Staff Recruitment Expenses		26,84,969	32,19,768
Staff Training Expenses		8,52,991	10,87,328
Transfer & Relocation Expenses		1,80,589	1,01,384
c) Contribution to Provident Fund		13,25,48,852	9,70,25,306
d) Staff Welfare Expenses		47,29,060	47,35,444
e) Expenses on Employees Retirement and Terminal Benefits			
Gratuity		7,64,99,934	1,82,91,343
Leave Encashment		13,35,84,866	5,34,83,409
Leave Salary & Pension Contribution		5,00,00,000	2,04,55,182
f) Others		9,01,336	64,111
Total		**2,09,18,22,070**	**1,39,89,48,667**
Schedule 16 - Other Administrative Expenses			
a) Purchases		12,59,22,967	13,01,97,477
b) Direct Expenses		-	-
Consumables	1,77,77,847		2,28,51,149
Design and Development Charges		2,51,800	-
Excise/Custom Duty/Service Tax Paid		8,51,001	34,80,478
Freight and Handling Expenses		1,25,287	2,87,259
Labour Charges		66,03,819	47,350
Liquidated Damages		-	2,13,750
Material Insurance Expenses		23,621	57,521
Octroi	-		-
Other Packing Charges		49,056	3,094
Royalty and Support Fees		-	-
Software Development Consultancy Charges		39,33,673	4,37,855
Technical Service Charges		1,48,18,421	10,33,549
Warehouse Charges	3,18,400		3,09,600
c) Expenses on Courses		-	-
Advertisement Expenses		70,06,999	90,31,566
ATC's Share in Fees		19,73,45,570	18,29,10,759
Awards & Prizes		1,01,491	25,000
Campus Interview Expenses		40,20,173	8,90,313
Course Material Production Expenses		2,87,02,750	2,86,74,959
Data Entry & Scanning Expenses		-	-
Examination Expenses		7,02,94,052	18,85,249
Faculty Members Expenses		2,15,69,424	1,99,19,114
Other Course Related Expenses		9,41,73,161	83,53,817
Printing of Forms & Prospectus		-	21,000
Students Hostel Expenses		2,11,930	1,84,040

Amount in ₹

Particulars		2017-18	2016-17
d) Administrative Expenses		-	-
Administrative Charges on Provident Fund		54,68,603	45,23,185
Asset Hire Charges		8,38,313	11,21,388
Auditors Remuneration		16,90,138	12,18,395
Bank Charges and Commission		17,14,999	16,35,093
C-DAC's Contribution to Funded Projects		1,67,598	1,32,000
Cultural Program Expenses		6,70,314	11,96,072
Development Contracts and Spon. Project Expenses		47,58,087	2,35,603
Electricity, Power and Water Charges		11,00,46,135	9,30,41,279
Entertainment/Hospitality Expenses		69,95,580	26,14,644
Foreign Exchange Fluctuation		1,84,249	(91,166)
Gifts and Presentation		6,08,093	6,01,881
Insurance		14,86,897	11,67,212
Interest Paid	35,55,036		78,61,818
Irrecoverable Balances Written-off/(Written-back)		11,76,278	2,39,068
Legal & Professional Charges		1,15,61,123	1,12,47,137
Miscellaneous Expenses		58,29,118	16,75,824
Office Expenses		1,36,47,367	57,61,442
Postage, Telephone & Communication Charges		1,73,48,772	1,70,34,210
Printing and Stationery	77,92,237		92,28,376
Provision for Bad and Doubtful Debts/Advances		2,76,48,653	3,16,84,173
Rent, Rates and Taxes		4,12,63,518	7,38,85,335
Sales Tax		21,18,958	44,37,360
CGST Paid		1,92,917	-
SGST Paid		1,92,917	-
IGST Paid		11,11,429	-
UTGST Paid		-	-
Reverse Charge GST Paid		91,618	-
Service Hire Charges		9,14,45,525	7,60,73,796
Subscription of Periodicals & Newspapers		16,99,009	15,49,736
Tender Expenses	1,31,501		3,26,497
Training Expenses	24,21,709		5,10,980
Transit Quarter & Guest House Expenses		31,09,241	31,63,234
Transportation Charges		83,260	10,33,525
Vehicles Hire, Running and Maintenance		1,12,26,748	1,50,60,633
e) Repairs and Maintenance		-	-
Air Conditioning Equipments		47,84,362	54,41,876
Building	73,92,211		1,04,09,222
Computers		58,54,555	80,05,346
Electrical Fittings	1,50,42,196		1,80,54,467
Furniture and Fixtures	13,66,955		16,14,342
Garden Maintenance		14,88,574	8,40,780
Lab Equipments		9,85,589	7,91,955
Office Equipments		12,67,694	11,65,141
Other Assets		27,26,903	33,24,440
f) Travelling and Conveyance Expenses		-	-
Inland Travel Expenses		-	-
Director		24,26,242	41,89,569
Members		5,15,03,731	2,75,51,578
Others		20,55,753	23,52,413
Foreign Travel Expenses		-	-
Director		-	4,71,608
Members		46,41,114	14,86,058
Others		-	3,64,611
Conveyance Expenses		-	-
g) Selling Distribution and Business Promotion Expenses		-	-
Advertisement Expenses		20,58,018	26,61,478
Expenses on Exhibition, Seminars/Workshops		36,61,628	52,56,945
Distribution Expenses		8,65,258	17,54,670
Product Literature & Brochures Expenses		-	-
Other Sales Promotion Expenses		5,12,844	6,54,416
h) Corporate Office Expenses		-	-
i) Other Expenses		-	-
Total Other Administrative Expenses		**1,08,10,11,009**	**87,53,74,544**

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 & GST.

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	**Sunil Misar**	**Dr. Hemant Darbari**
Director Finance	Registrar (I/C)	Director General

For
M/S. UDYEN JAIN & ASSOCIATES (FRN: 116336W)
CHARTERED ACCOUNTANTS

CA Sushil Bajaj
Partner (Membership No. 131144)
Pune Date : 07-Sep-2018

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 ₹ 2,793.77 Lacs not provided for. (Previous year ₹5,266.21 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 ₹531.55 Lacs and ₹87.58 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 ₹ 21,655.79 Lacs and ₹ 3,209.73 Lacs grants receivable on account of expenditure incurred in anticipation of release of grants on projects.

4. Contingent Liabilities

4.1. Against Bank Guarantees: ₹1,884.24 Lacs. (Previous year ₹701.12 Lacs)

4.2. Against Letter of Credit ₹0.00 Lacs. (Previous year ₹6.33 Lacs)

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

4.4. Against Sales Tax: ₹77.69 Lacs (Previous year ₹71.73 Lacs)

4.5. Sales Tax / VAT Assessments are completed up to financial year 2013-14 for Bangalore, Noida & Pune, 2016-17 for Chennai, Hyderabad, Mohali & Thiruvananthapuram. No assessment is pending for Corporate, Delhi, Kolkata & Mumbai centres.

4.6. Against disputed matters ₹0.00 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	352.69	380.85	733.54
Previous Year	1297.48	141.16	1438.64

6.2 **Expenditure in foreign currency for Travel:** ₹ 35.35 Lacs. (Previous Year ₹ 46.47 Lacs.)

6.3 **Other Expenditure in foreign currency**: ₹ 9.42 Lacs (Previous Year ₹ 9.39 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	9,250.00	44,960.26
Euro	0	11215.00
Total Value in ₹ (In Lacs)	5.91	38.44

7 Remuneration to Statutory Auditors (Including Branch Auditors)

(₹ in Lacs)

Particulars	Current Year	Previous Year
Audit Fees (Exclusive of Taxes)	3.56	3.40

8 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.

9 Fixed Assets: The depreciation on the assets purchased out of grants is debited to Capital Reserve.

10 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 ₹ 2,502.83 Lacs (P.Y. ₹ 2,365.59 Lacs) a provision of ₹ 2,340.16 Lacs (P.Y. ₹ 2,064.52 Lacs) has been made up to the current year. Provision for ₹ 162.68 Lacs has not been made (Mumbai ₹ 104.49, Noida ₹ 22.25 Lacs and Pune ₹ 35.94 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	16.44	0.28	6.65	0.07	164.12	187.56
Chennai	27.81	41.72	23.93	13.74	5.61	112.81
Delhi	65.85	19.1	12.67	0.3	120.15	218.07
Hyderabad	81.82	36.01	0.00	0.00	0.15	117.98
Kolkata	598.64	17.09	4.34	0	37.98	658.05
Mohali	73.71	231.8	108.54	158.11	9.63	581.79
Mumbai	32.39	606.21	138.04	153.76	344.51	1274.91
Noida	1284.24	521.72	382.4	467.07	648.70	3304.13
Pune	1461.44	170.59	132	71.59	1091.95	2927.57
Thiruvananthapuram	397.69	74.97	65.01	3.41	80.03	621.11
Total	4040.03	1719.49	873.58	868.05	2502.83	10003.98
Previous Year	2605.31	1116.54	1433.77	475.67	2365.59	7996.88

11. 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.

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 benefits with respect to Gratuity, Leave encashment and pension has been paid/provided as per provisions of Accounting Standard I5 and availability of fund

15. Lease Obligations

Lease rent of ₹ 433.72 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 ₹Nil Lacs as advances paid to Director General (Previous Year ₹1.67 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 filed by M/s IBILT Technology Ltd in DIPP's IPO Project with an outlay of ₹ 2340 Lacs, since the case is under examination with Hon'ble High Court, Delhi.

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 ₹2,300 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 pending in Hon'ble High Court, Delhi.

20.3.2 As per LIC the total liability for Pension Fund is ₹ 3,010/- Lacs including the past deficit, as on 31st March 2018, against which the fund value of ₹1,099 Lacs. Provision of ₹ 500 Lacs is made during the year against requirement of ₹ 1429 Lacs and an amount of ₹ 982 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 Noida Centre

Due to change in accounting of receipt and expenditure for reimbursement of accommodation and other charges from MEA, income and expenditure is increased by ₹ 791.92 Lacs and ₹ 834.75 Lacs respectively.

20.5 Pune Centre

20.5.1 Activities of ACTS, Pune are shifted from Bio-Informatics Building, Pune University Campus to Thube Park, Shivajinagar, Pune, in 2004-2005 and then to NSG-IT park, Aundh, Pune in 2008-09. Some of the fixed assets could not be shifted to this premises with WDV of ₹ 4.18 Lacs as on 31st March 2018 against Gross Value of ₹ 29.31 Lacs.

20.5.2 "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.

20.5.3 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.

20.5.4 No provision is made for the Advances to employees of ₹12.54 Lacs against various claims, which will be booked during the financial year 2018-19. Since most of the claims will directly be debited to the Projects / Grants.

20.6 Thiruvananthapuram Centre

20.6.1 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.

20.6.2 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	**Sunil Misar**	**Dr. Hemant Darbari**
Director Finance	Registrar (I/C)	Director General

For
M/S. UDYEN JAIN & ASSOCIATES (FRN: 116336W)
CHARTERED ACCOUNTANTS

CA Sushil Bajaj
Partner (Membership No. 131144)
Pune **Date : 07-Sep-2018**

Annexure 18(A): FINANCIAL PERFORMANCE OF C-DAC FOR THE FINANCIAL YEAR 2017-2018

(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: Core Grant Projects**	**-0.02**											
	GIA General	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	1.41	0.07	0.00	1.06	-3.29	0.97
(ii)	**Grant for Sponsored Projects**	**211.62**											
	MeitY	103.37	2.24	-2.68	-0.03	0.88	16.85	0.25	-0.59	26.30	0.13	43.07	16.95
	Other Agencies	108.25	0.07	0.00	0.00	4.12	0.00	0.82	2.26	9.60	0.63	87.49	3.26
B	**RECEIPTS & INCOME**												
(i)	**Grant -in- Aid**	**92.00**											
	GIA General	65.50	7.15	2.88	6.52	1.14	2.07	2.95	3.12	3.56	4.60	19.44	12.07
	Core Grant Projects	26.50	2.22	0.00	-0.01	5.51	1.00	2.70	0.51	0.00	-0.34	5.46	9.45
(ii)	**Grant for Sponsored Projects**	**157.68**											
	MeitY	107.92	5.11	0.32	0.00	0.19	6.69	6.23	3.18	2.69	2.07	31.82	49.62
	Other Agencies	49.76	0.38	0.00	0.00	12.86	4.39	1.64	0.25	0.30	5.53	17.09	7.32
(iii)	**Revenue Earnings**	**221.03**											
	Training	87.82	8.29	0.55	0.00	0.00	3.53	0.42	3.09	4.00	14.30	52.53	1.11
	Commercial	133.21	1.34	2.76	0.10	0.92	2.61	8.93	2.09	14.83	42.09	23.56	33.98
(iv)	**Interest, Other Income & C-DAC Contribution**	**5.07**											
	GIA General	0.00	-0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	Core Grant Projects	5.07	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.85	0.00
		12.84											
	MeitY Spon Projects	9.03	0.13	0.00	0.00	0.00	3.41	0.03	0.09	0.67	0.01	1.33	3.36
	Spon. By Other Agencies	3.81	0.01	0.00	0.00	0.00	0.01	0.05	0.09	0.00	0.05	3.38	0.22
		22.81											
	Training	12.69	1.95	0.03	0.23	0.00	1.60	0.01	2.46	0.08	2.96	2.14	1.23
	Commercial	10.12	0.10	0.00	0.48	1.68	0.00	1.12	0.33	0.41	2.58	0.92	2.50
	TOTAL (A+B)	**723.03**	**29.93**	**3.86**	**9.34**	**27.32**	**39.12**	**26.57**	**16.95**	**62.44**	**75.67**	**289.79**	**142.04**
C	**REVENUE Expenditure**												
(i)	**Expenditure from Grant-In-Aid**	**74.52**											
	GIA General	**65.17**											
	Establishment Expenses	57.68	6.27	2.88	4.83	1.15	1.12	2.53	2.97	1.11	4.60	18.15	12.07
	Other Administrative Expenses	7.49	0.89	0.00	1.65	0.00	0.95	0.14	0.15	2.42	0.00	1.29	0.00
	Core Grant Projects	**9.35**											
	Establishment Expenses	4.31	0.68	0.00	0.00	0.00	0.00	2.15	0.19	0.00	0.33	0.66	0.30
	Other Administrative Expenses	5.04	0.42	0.00	0.00	0.00	0.00	0.98	0.17	0.00	0.14	1.39	1.94
(ii)	**Expenditure on Sponsored Projects**	**143.95**											
	MeitY Total Expenses	**99.41**											
	Establishment Expenses	57.23	3.81	1.32	0.00	0.45	4.65	3.92	0.83	4.32	1.25	26.77	9.91
	Other Administrative Expenses	42.18	2.48	0.17	0.00	0.18	3.65	1.80	1.23	11.96	0.85	10.94	8.92
	Other Agencies Total Expenses	**44.54**											
	Establishment Expenses	16.61	0.07	0.00	0.00	0.67	0.05	0.59	0.15	0.05	2.45	9.97	2.61
	Other Administrative Expenses	27.93	0.11	0.00	0.00	5.01	0.00	0.61	1.63	9.23	3.52	5.66	2.16

Annexure 18(A): FINANCIAL PERFORMANCE OF C-DAC FOR THE FINANCIAL YEAR 2017-2018

(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**	**256.75**											
	Training Total Expenses	**104.57**											
	Establishment Expenses	47.67	7.49	0.14	0.00	0.00	2.63	0.07	8.57	10.05	5.82	8.43	4.48
	Other Administrative Expenses	56.90	3.73	0.43	-0.80	0.00	0.93	0.16	2.05	0.97	10.71	38.03	0.68
	Commercial Total Expenses	**152.18**											
	Establishment Expenses	103.83	0.37	5.29	0.00	1.84	2.33	5.76	3.99	9.59	25.68	25.80	23.18
	Other Administrative Expenses	48.35	0.94	3.29	-1.30	1.04	0.23	3.78	1.23	3.37	7.57	12.84	15.36
	TOTAL C	**475.22**	**27.26**	**13.52**	**4.38**	**10.34**	**16.54**	**22.49**	**23.16**	**53.07**	**62.92**	**159.93**	**81.61**
D	**CAPITAL Expenditure**												
(i)	**Expenditure from GIA for Core R&D**	**17.78**											
	GIA General	0.34	-0.02	0.00	0.04	0.00	0.00	0.29	0.00	0.03	0.00	0.00	0.00
	Core Grant Projects	17.44	0.63	0.00	0.00	8.02	0.03	0.02	0.00	0.00	0.24	7.72	0.78
(ii)	**Expenditure from GIA for Sponsored Proj.**	**43.04**											
	MeitY	38.06	1.97	0.00	0.00	0.00	0.94	0.77	0.55	1.09	0.14	4.89	27.71
	Other Agencies	4.98	0.00	0.00	0.00	0.00	0.00	0.16	0.23	0.00	0.10	4.00	0.49
(iii)	**Expenditure from Own Funds**	**4.80**											
	Training	1.25	0.14	0.01	0.00	0.00	0.01	0.00	0.41	0.00	0.06	0.62	0.00
	Commercial	3.55	0.00	0.00	0.00	0.06	0.00	1.05	0.27	0.33	1.27	0.36	0.21
	TOTAL D	**65.62**	**2.72**	**0.01**	**0.04**	**8.08**	**0.98**	**2.29**	**1.46**	**1.45**	**1.81**	**17.59**	**29.19**
E	**REFUND / TRANSFER OTHER ADJUSTMENTS**												
(i)	**From GIA for Core R&D**	**0.32**											
	GIA General	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	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00
(ii)	**From Sponsored Projects**	**10.70**											
	MeitY	9.52	0.15	0.04	0.00	0.17	5.70	-0.22	0.00	0.69	0.02	3.09	-0.12
	Other Agencies	1.18	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.90	0.00
	TOTAL (E)	**11.02**	**0.15**	**0.04**	**0.00**	**0.17**	**5.70**	**0.06**	**0.00**	**0.69**	**0.02**	**4.31**	**-0.12**
F	**TOTAL Expenditure (C+D+E)**	**551.86**	**30.13**	**13.57**	**4.42**	**18.59**	**23.22**	**24.84**	**24.62**	**55.21**	**64.75**	**181.83**	**110.68**
G	**Unspent Balance / Surplus / Deficit (A+B-F)**												
(i)	**Grant -in- Aid**	**4.44**											
	GIA General	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	4.44	1.44	0.00	2.04	-2.49	-2.07	0.96	0.22	0.00	0.01	-3.07	7.40
(ii)	**Sponsored Projects**	**184.46**											
	MeitY	73.34	-0.93	-3.89	-0.03	0.27	12.01	0.25	0.07	11.60	-0.05	30.53	23.51
	Other Agencies	111.12	0.28	0.00	0.00	11.30	4.35	0.87	0.59	0.62	0.14	87.43	5.54
(iii)	**Other**	**-12.91**											
	Training	-4.06	-0.98	0.01	1.03	0.00	1.58	0.20	-5.07	-6.94	0.73	8.21	-2.82
	Commercial	-8.85	0.13	-5.82	1.88	-0.28	0.05	0.51	-2.80	2.28	11.42	-14.16	-2.06

Annexure 18(B):

CENTRE WISE BALANCE SHEET AS AT 31st March 2018

(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	305.81	27.71	0.01	10.12	21.52	23.09	20.50	39.60	(9.34)	114.08	34.20	24.32
Reserves and Surplus	229.64	6.13	1.75	0.13	20.58	15.81	3.43	2.49	3.83	6.23	88.31	80.94
Earmarked and Endowment Funds	189.45	0.81	(3.90)	2.01	9.07	14.30	2.10	0.88	12.25	0.09	115.40	36.44
Secured / Unsecured Loan from Bank	0.20	-	-	-	-	-	0.20	-	-	-	-	-
Current Liabilities and Provisions	175.37	5.80	1.01	1.09	6.98	2.78	6.91	4.58	14.92	19.94	62.10	49.26
Branch & Divisions	(0.00)	6.33	4.93	(3.04)	0.49	(0.16)	(1.61)	(0.68)	0.83	(0.68)	(6.34)	(0.07)
Total	**900.47**	**46.78**	**3.80**	**10.31**	**58.64**	**55.82**	**31.53**	**46.87**	**22.49**	**139.66**	**293.67**	**190.89**
ASSETS	-	-	-	-	-	-	-	-	-	-	-	-
Fixed Assets												
Acquired out of Own Funds	33.55	4.96	0.11	-	2.25	0.60	1.53	1.61	0.47	10.30	10.50	1.22
Acquired out of Grant in Aid	177.64	2.52	0.50	0.13	20.58	14.48	2.87	1.13	0.79	4.15	81.34	49.15
Acquired out of Project Grants	51.99	3.61	1.25	-	-	1.33	0.55	1.36	3.04	2.08	6.98	31.79
Investments-from Earmarked/Endowment Funds	-	-	-	-	-	-	-	-	-	-	-	-
Investments-Others	-	-	-	-	-	-	-	-	-	-	-	-
Current Assets, Loans, Advances etc.	637.29	35.69	1.94	10.18	35.81	39.41	26.58	42.77	18.19	123.13	194.85	108.73
Miscellaneous Expenditure	-	-	-	-	-	-	-	-	-	-	-	-
Total	**900.47**	**46.78**	**3.80**	**10.31**	**58.64**	**55.82**	**31.53**	**46.87**	**22.49**	**139.66**	**293.67**	**190.89**

CENTRE WISE INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st March 2018

Amount in Crore ₹

Particulars	Total	Bangalore	Chennai	Corporate	Delhi	Hyderabad	Kolkata	Mohali	Mumbai	Noida	Pune	TVM
INCOME												
Income from Sales/Services	133.21	1.33	2.76	0.10	0.92	2.62	8.93	2.09	14.83	42.09	23.56	33.98
Grants/Subsdies	65.16	7.18	2.88	6.48	1.14	2.07	2.66	3.12	3.53	4.60	19.43	12.07
Fees/Subscription	87.83	8.29	0.55	-	-	3.53	0.42	3.09	4.00	14.31	52.53	1.11
Interest Earned	21.11	1.99	0.03	0.47	1.61	1.60	1.12	2.61	0.16	5.03	2.99	3.50
Other Income	1.87	0.14	-	0.25	0.07	-	0.01	0.12	0.20	0.51	0.35	0.22
Prior Period Income	-	-	-	-	-	-	-	0.06	0.12	-	(0.19)	0.01
Increase/(decrease) in stock of Finished Goods and Work-in-progress	(0.16)	(0.09)	-	-	-	-	-	-	-	-	(0.08)	0.01
Total	**309.02**	**18.84**	**6.22**	**7.30**	**3.74**	**9.82**	**13.14**	**11.09**	**22.84**	**66.54**	**98.59**	**50.90**
EXPENDITURE	-											
Establishment Expenses	209.18	14.13	8.31	4.83	2.99	6.08	8.37	15.53	20.74	36.10	52.37	39.73
Other Administrative Expenses	108.10	5.28	3.70	(0.52)	1.01	2.02	3.75	2.89	6.53	17.06	50.66	15.71
Prior Period Expenses	1.24	-	0.01	0.07	-	0.02	-	0.08	0.10	0.04	0.81	0.11
Depreciation (corresponding to Schedule 5)	3.41	0.28	0.02	-	0.02	0.07	0.33	0.47	0.13	1.17	0.69	0.23
Total	321.93	19.69	12.04	4.38	4.02	8.19	12.45	18.97	27.50	54.37	104.53	55.78
Transferred to / (from) Balance of Core Grants	-	-	-	-	-	-	-	-	-	-	-	-
SURPLUS / (DEFICIT)	**(12.91)**	**(0.85)**	**(5.82)**	**2.92**	**(0.28)**	**1.63**	**0.69**	**(7.88)**	**(4.66)**	**12.17**	**(5.94)**	**(4.88)**

Launch of mobile application "LILA-Rajbhasha" by Hon'ble President of India, Shri Ram Nath Kovind

Demonstrations of C-DAC solutions to H.E. Prime Minister of Cambodia at MeitY

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Bengaluru ◆ Chennai ◆ Hyderabad ◆ Kolkata ◆ Mohali ◆ Mumbai ◆ New Delhi ◆ Noida ◆ Pune (HQ) ◆ Silchar ◆ Thiruvananthapuram