

Centre for Performance Modelling of Computing Systems (CPMCS)

Centre for Performance Modeling of Computing Systems (CPMCS) is housed in CL-46 in ABB-I, IIIT Noida. This centre was initiated to provide a platform to researchers to share their experiences, insights, and challenges regarding modelling, simulation and performance evaluation in all areas of computer science engineering and information technology. Specifically, the research activities of this centre are focused on modelling and simulation of computer networks (wired & wireless), wireless sensor networks, distributed systems, multimedia systems and techniques, databases & data mining techniques, computer architectures and processors, algorithms, social networks, software & information systems, etc. It now caters to research activities undertaken by PhD scholars of CSE and other departments. The centre provides an apt platform and conducive environment to innovate through independent research, gain hands-on experience and upgrade their computing skills.

Ten state-of-art desktop computers and a printer have been installed to facilitate round the clock experimentation work. A common server is also accessible remotely and high-performance experiments could be executed.

For undertaking these activities, the centre is equipped with following resources:

Hardware:

Serial No.	Make	Model	Configuration	Quantity
1	Lenovo	Lenovo S510	CPU - I5, 2.7 GHz RAM - 8GB,HDD - 500 GB, MONITOR KEYBOARD, MOUSE	10
2	IBM	2x Intel Octa core 2.4GhZ, 64 GB DDR3	CPU-Intel Xeon2.27GHz RAM-16GB,HDD-1TB	1
3	HP	HP LASER JET 1020 PLUS		1

Software:

Serial No.	System Name	Operating system	Software
1	Copax1	Window 7 & Ubuntu	Codeblocks, Java, Notepad++,WAMP server,Orange, Editors (ms-word2007 & openoffice writer)
2	Copax2	Window 7 & Ubuntu	Java, Wireshark, weka, Jmeter, sumo
3	Copax3	Window 7 & Ubuntu	Git,Java, JetBrains, Node.js, weka, Wirshark, Editors (ms-word2007 & openoffice writer)
4	Copax4	Window 7 & Ubuntu	Private cloud, Setup on cloudstack - for SAAS & IAAS

5	Copax5	Window 7 & Ubuntu	Java, Microsoft SDK, Nvidia Cuda, Python, Editors (Ms-word2007 & Open Office writer)
6	Copax6	Window 7 & Ubuntu	Notepad++, Java, Ns2, Chrome web developer tool plugin, Editors (Ms-word 2007 & open office writer)
7	Copax7	Window 7 & Ubuntu	Wireshark, weka, Codeblocks, Java, Anaconda(Ubuntu), Theano, Tensor, Keras, Ns2, Hadoop Node, Editors (Ms-word 2007 & open office writer)
8	Copax8	Window 7 & Ubuntu	Wireshark, Weka, NS2, Anaconda(windows), R studio, Editors (Ms-word 2007 & open office writer)
9	Copax9	Window 7 & Ubuntu	Wireshark, Weka, Hadoop Node, Sumo, Chrome web developer tool plugin, Editors (Ms-word 2007 & open office writer)
10	Copax10	Window 7 & Ubuntu	Wireshark, Hadoop Node, Jmeter, Notepad++,Codeblocks, Chrome web developer tool plugin, Editors (Ms-word 2007 & open office writer)
11	IBM Server 2xIntel Xeon, 64 GB RAM	Live OS	Works with bootable pen drive

- Current Activities:

- Lab PCs are usable by Research scholars of CSE as well as Biotechnology department
- Many under graduate and graduate students work in the centre as they get flexibility of installing any software in the lab and can keep their programs running even for several days.
- The server can be accessed remotely from other institute machines using Secure Shell.

Software in Lab CL-46 (CPMCS Lab)

- **Operating system:** Window 7 & Ubuntu
- **Application Software:** Codeblocks, Java, Notepad++,WAMP server, Orange, Wireshark, Weka, Jmeter, sumo , Git, JetBrains, Node.js, Cloudstack , Microsoft SDK, Nvidia Cuda, Python, Notepad++, NS2, Chrome web developer tool plugin, Anaconda(Ubuntu), Theano, Tensor, Keras, Hadoop Node and R studio

Report on 1st June, 2021

Corpus for Performance Assessment of Computing Systems (CoPACS) project was initiated to provide a platform to researchers to share their experiences, insights, and challenges regarding modelling, simulation and performance evaluation in all areas of computer science & engineering and information technology. However, due to some unavoidable discontinuities the project couldn't reach a fruitful conclusion.

Although the objectives, initially planned under CoPACS, are now being undertaken by the Centre for Performance Modeling of Computing Systems (CPMCS). Centre for Performance Modeling of Computing Systems (CPMCS) is housed in CL-46 in ABB-I, IIIT Noida.

- Activities done in AY 2020-21:

- Many under graduate and graduate students work in the centre as they get flexibility of installing any software in the lab and can keep their programs running even for several days.
- The server can be accessed remotely from other institute machines using Secure Shell.

Apart from this some faculty contributors are also contributing to the CPMCS activities.

- Under the aegis of the centre, Dr. Sangeeta Mittal, delivered a lecture on "Performance Evaluation of Computer Based Systems: Significance and Techniques" for MTech final year students on 28 Sep, 2019 to make them aware about the importance of performance evaluation and its types.
- Dr. Neetu Sardana guided a MTech dissertation on *Link Prediction in Social Network* where the student, Udhhbhav Singhal worked on performance issues of prediction.
- Dr. Kavita Pandey guided a MTech dissertation on *Comparative Analysis of clustering techniques for roadside unit deployment* done by Kumar Satyajit.
- Dr. Gagandeep Kaur guided her MTech dissertation student, Mansora Qaderi, to emphasize on performance aspects while working on *a concept drift based machine learning approach for detection of application layer attacks in the network traffic*.
- Dr Sangeeta Mittal mentored MTech student, Himanshu Nailwal, during dissertation to do Implementation of anonymization techniques and evaluate them using performance metrics.

- Future Plans

- Organize workshops/seminars to update the knowledge of researchers and faculty in performance evaluation aspects.
- To systematically introduce performance assessment studies and broad scope of this project as a major project and dissertation domain

Activities in AY 2017-2020

Faculty Contributors to the centre were:

- Dr Sangeeta Mittal
- Dr Gagandeep Kaur
- Mr Prashant Kaushik
- Dr Neetu Sardana
- Dr Kavita Pandey
- Dr Aparajita Nanda

Following Activities have been undertaken till now:-

- Student Projects
 - M.Tech Dissertation On Performance Evaluation of Data Balancing Techniques July 2018- May 2019 resulting in two research publications in International Conferences
 - Minor Projects with focus on performance evaluation and dataset creation were undertaken in following areas (Jan 2017- April 2019)
 - Blockchain based Stock Exchange and its Evaluation against Traditional one
 - Comparative Analysis of Various Classifiers for Gesture Recognition
 - Convolutional Neural Network Classification for Self-Flying Aircraft using TensorFlow
 - Comparative analysis of word embedding models
 - sense based word embedding model
 - Evaluation of Micro Activity Recognition of Mobile Phone Users Using Inbuilt Sensors
 - Content Analysis Using Word-Cloud
 - Music Information Retrieval (MIR)
 - LIPSYNC-Automated Lip Reading using Deep Learning
 - Performance Analysis of No-Escape Search
 - HeartBeat based Health Prediction
 - Image Colorization using CNN
 - Video Quality Enhancement
 - Typing tutor
 - Image Style Transfer
 - Dual Degree Summer Projects (June 2016)
 - Performance evaluation of mongodb vs cassandra
 - Topic Modelling of Tweets using MONGODB
 - Performance Evaluation of NOSQL Databases
 - TCP/IP Networks Performance Evaluation
 - Taxonomy of Performance Metrics for Computer Networks
 - Performance Evaluation of RESTful API Scaling

- Organizing FDP
 - Performance Assessment of Computing Systems from 10th July –15th July 2017
- Courses Enrichment
 - Theory Courses
 - Performance Evaluation of Computing Systems (Even Semesters, upto July 2017)
 - High performance Data Analysis (July 2016)
 - High Performance Web & mobile Applications (July 2016, July 2017)
 - High Performance Software Engineering (Odd Semesters , up to July 2016)
 - Labs
 - High Performance Programming Lab Summer Sem 2016
 - Lab exercises for performance related experimental studies were done on following topics:-
 - Network Security
 - Computer Networks
 - Web Applications
 - Data Mining
 - Computer Architecture
 - Seminar and Term Paper
 - Performance Related Work and Studies (July – Dec. 2016)
 - 5G Communication
 - Software Defined Networks
 - Performance Evaluation of Clustering Algorithms
 - Performance Evaluation of MongoDB vs Cassandra
- Research Activities
 - Distributed System for Big Data Management: Hadoop environment to handle Big Data for data analysis was developed. Some of the applications like clustering of millions of tweets and clustering of web-pages etc. were executed in this environment.
 - Deep Learning based framework: Three popular deep learning frameworks namely Caffe, Torch and Theano were deployed. Due to the complexity issue we were able to run only small applications on the lab systems. Further, in order to overcome this issue, we configured a server remotely from this lab. All the required packages were deployed to this server. Some of the applications like video colouring, Video summarization and Driver-less cars were simulated on this server. Each of these applications required many hours to complete the task.
 - Projects related to Machine Translation and Document summarization for large datasets were also implemented.
- PhDs
 - Completed

- Adarsh Kumar – A secure and light weight hierarchical Mobile Adhoc Network – Sep, 2016
- K Rajalakshmi – Towards Cost Effective Survivable Mobile Access Network, Sep, 2016
- Prakash Kumar - Virtualization Based Resource Allocation Strategies for Cloud IaaS Environment, Dec 2016
- Payal Khurana - Development of Energy Efficient Clustering and Routing Algorithms for Wireless Sensor Networks , May -2017
- Ongoing
 - Priyanka Chandani - Improving Software Quality with Effective Defect Prevention
 - Madhu Khurana – Change Detection in Remotely Sensed Images
 - Sakshi - Optimization of shortest path algorithm with label constraints
 - Avinash C Pandey - Efficient Data Mining Using Nature Inspired Algorithm
- A. Kaur, G. P. Gupta, and P. Kumar, “A survey of recent developments in DV-hop localization techniques for wireless sensor network,” *J. Telecommun. Electron. Comput. Eng.*, vol. 9, no. 2, pp. 61–71, 2017.
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- Future Plans
 - To systematically introduce performance assessment studies and broad scope of this project as a major project and dissertation domain
 - If students join the project then few typical problems as follows will be introduced

- Application of deep learning algorithms for unsupervised anomaly detection in Big Data
- Cryptographic solutions for security in distributed systems
- Measurement of Performance evaluation metrics in wireless networks and security
- Performance evaluation of databases / optimization techniques / networks
- IOT based application of Smart cities
- High performance web applications which will target the IOT based applications that may involve IBM Bluemix and related technologies with stream AI capabilities
- Measuring user influence in online social networks
- Analyzing and evaluating developers contribution in Q&A sites
- Visualizing and analyzing the user web logs for recommendation
- Deep learning for medical image processing
- Application of CNN in image classification
- Performance Evaluation of Supervised/unsupervised classifiers in object recognition

Report for 2018

CPMCS

[CENTRE FOR PERFORMANCE EVALUATION OF COMPUTING SYSTEMS]

Action Plan for October 2019-June 2020

1. Talks to be conducted to encourage students, especially PG, to seriously include performance evaluation aspects in their chosen area of work.
2. Organize expert sessions involving internal and external experts to apprise students about recent trends in performance engineering
3. Engage students in hands-on sessions on tools for performance assessment of web applications, network applications and image processing.
4. Continue with the PhDs related to sustainability (mentioned below).
5. To apply for grant on a project target towards developing a corpus for performance assessment of computing systems.

Ongoing PhDs

- Ruchin Gupta- Software Code Quality
- Amanpreet Kaur-Efficient Node Localization Schemes for Wireless Sensor Networks
- Priyanka Chandani - Improving Software Quality with Effective Defect Prevention
- Madhu Khurana – Change Detection in Remotely Sensed Images
- Sakshi - Optimization of shortest path algorithm with label constraints
- Avinash C Pandey - Efficient Data Mining Using Nature Inspired Algorithm
- Neerja Negi - Efficient Web Service selection using QoS parameters
- Saurabh Kumar Srivastava - A Robust Performance Evaluation Model for Text Classification Based on Input Characterization and Feature Selection