

Centre for Performance Modelling of Computing Systems (CPMCS)

The centre for performance modelling caters to research activities undertaken by PhD scholars and other researchers at IIIT. Focused work on modelling, simulation and performance evaluation of all areas related to computer science and information technology is encouraged through facilities provided in this centre. 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 highly resourceful common server is also accessible remotely and high performance experiments could be executed.

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	System X 3400 M3	CPU-Intel Xeon 2.27 GHz RAM-16GB,HDD-1TB	1
3	HP	HP LASER JET 1020 PLUS		1

Current Software (Software configuration is frequently changed as per requirements of researchers):

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, Wireshark, 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	Live OS	Works with bootable pen drive

Some activities that have been done in centre till now:-

- 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.
- Some PhD Scholars who have worked using facilities of CPMCS Lab
 - Completed

- Archana Purwar- Design of Improved Approaches for Handling Missing Values, Attribute Noise and Imbalanced Classes - 2018
 - Payal Khurana - Development of Energy Efficient Clustering and Routing Algorithms for Wireless Sensor Networks , 2017
 - K Rajalakshmi – Towards Cost Effective Survivable Mobile Access Network, 2016
 - Prakash Kumar - Virtualization Based Resource Allocation Strategies for Cloud IaaS Environment, 2016
- Ongoing
 - Neetika Jain - Energy latency trade-off for real time wireless sensor systems.
 - 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
 - Amanpreet Kaur - Efficient Node Localization Schemes for Wireless Sensor Networks
 - Ankita - Evolutionary Algorithms
 - Mradula Sharma- Information Security in Big Data
 - Meenal Jain - Network Security Using Machine Learning
 - Purtee Jethi - Effort Estimation in Software
- M.Tech Dissertation July 2017- May 2019
 - Performance Evaluation of Data balancing techniques resulting in two research publications in International Conferences
 - Analysis of data communications protocols with algorithms
 - Comparative analysis of algorithm for management of traffic
 - Comparison of Deep Learning & Machine Learning Techniques for prediction of Air & Water pollutants concentration using selected parameters
 - Comparative Analysis of Spam Detection using Machine Learning and Deep Learning
 - Comparative analysis of Feature Selection methods for Big Data Analytics
 - Performance analysis in Big Data Technologies
 - Tuning Hadoop Mapreduce Performance by using ETL Tool ,combiner and increasing Input split size
 - Big Data Large Graph Evaluation for finding communities
 - Analysis of LDA Model

- 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

These activities resulted in several research publications in international journals and conferences.

A project named “***Corpus for Performance Assessment of Computing Systems (CoPACS)***” has been initiated in the centre. This project intends to focus on following artifacts:

1. A unified and contemporary ontology on performance evaluation by integrating the contemporary research of various sub-fields of CSE/IT
2. Compilation of existing tools, methods, datasets, test benches, test instruments for measurement and modelling of performance evaluation of computing systems.
3. New tools, methods, datasets, test benches, test instruments for measurement and modelling performance wrt various sub-fields of CSE/IT.

- Faculty Contributors of the Project
 - Dr. Sangeeta Mittal
 - Dr. Gagandeep Kaur
 - Mr. Prashant Kaushik
 - Dr. Neetu Sardana
 - Dr. Kavita Pandey
 - Dr. Aparajita Nanda

Some activities that were done to enrich the project are as follows

- 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 of MTech Students
 - Performance Related Work and Studies (July – Dec. 2016)
 - 5G Communication
 - Software Defined Networks
 - Performance Evaluation of Clustering Algorithms
 - Performance Evaluation of MongoDB vs Cassandra
- Future Plans
 - To systematically introduce performance assessment studies and broad scope of this project as a major project and dissertation domain
 - With respect to chosen area of work, learning outcomes of projects under CoPACS would be as follows:
 - Explain the performance evaluation terminology and techniques
 - Specify performance requirements
 - Select appropriate performance evaluation metrics
 - Generate benchmark datasets for performance evaluation
 - Evaluate performance of existing tools, systems or approaches on chosen metrics

- Find and tune parameters causing performance bottleneck
 - Design new approaches for enhancing performance
 - Design performance models to analytically predict performance in longer runs of solution
- 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