Harshit Gupta

CONTACT INFORMATION

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INTERESTS

Resource management in Fog and Cloud computing, **Real-time IoT applications for Fog**

EDUCATION

- **B.Tech + M.Tech. Dual Degree in Computer Science and Engineering**
  Indian Institute of Technology Kharagpur, India — July 2011 - May 2016
  CGPA : 9.30/10
- **All India Senior School Certificate Examination (Computer Science)**
  Delhi Public School, Bokaro Steel City, India — 2009 - 2011
  Percentage : 91.2 %
- **Indian Certificate of Secondary Education**
  De Nobili School, FRI, India — 2007 - 2009
  Percentage : 96.4 %

PUBLICATIONS

- **Harshit Gupta**, Sandip Chakraborty, Soumya K. Ghosh, Rajkumar Buyya, "**Fog Computing in 5G Networks: Application Perspective and Use Cases**" accepted in IET book "Cloud and Fog Computing in 5G Mobile Networks" edited by Evangelos Markakis, George Mastorakis, Constandinos Mavromoustakis, and Evangelos Pallis.
- Amir V. Dastjerdi, **Harshit Gupta**, Rodrigo N. Calheiros, Soumya K. Ghosh and Rajkumar Buyya, "**Fog Computing for the Internet of Things**" chapter accepted in book "Internet of Things: Principles and Paradigms" edited by Rajkumar Buyya and Amir V. Dastjerdi.
- **Harshit Gupta**, Sujeet Deshmukh and Soumya Kanti Ghosh. "**Realizing an IaaS Marketplace : a broker based approach.**" (position paper) accepted at **NSFCloud Workshop on Experimental Support for Cloud Computing 2014**.
- Satendra Sahu, **Harshit Gupta**, Sukhminder Singh, and Soumya Kanti Ghosh. "**A Demand Based Resource Provisioner for Cloud Infrastructure.**" In **Advanced Computing, Networking and Informatics**-Volume 2, pp. 425-432. Springer International Publishing, 2014.
- "**Understanding Data Traffic Behaviour for Smartphone Video and Audio Apps**" accepted at **8th International Conference on Communication, Systems and Networks 2016**.

PROJECTS

Forecast Database Migration, Amazon Development Centre, Hyderabad, India
Software Development Engineer (Intern) — **May, 2014 - July, 2014**
Under the guidance of Mr. Vikas Vishawanatham, I migrated the data store of Amazon's product forecasts to **AWS DynamoDB**. The new workflow uploads data to **S3** and then imports it into **DynamoDB** using **AWS Data Pipeline**. Code was written in using **Java**'s **Spring framework**.

Meghamala, the IIT Kharagpur Cloud, IIT Kharagpur, India — **May, 2013 - present**
Under the supervision of Prof. Soumya K. Ghosh and Prof. Shamik Sural, I deployed a proof-of-concept installation of a **Eucalyptus private cloud** in IIT Kharagpur and set up **IaaS and SaaS services** on top of it. Getting motivation from this proof-of-concept, we set up an institute-level private cloud based on **OpenStack** for providing **on-demand compute** and a **DropBox-like storage** services to the IIT Kharagpur community. I was involved in the entire process, right from procurement to installation, including configuration according to the institute's needs.

RESEARCH EXPERIENCE

iFogSim: A Toolkit for Modeling and Simulation of Resource Management Techniques in Internet of Things, Edge and Fog Computing Environments
Master's thesis, IIT Kharagpur, India — **April, 2015 - May, 2016**

Under the supervision of Prof. Soumya K. Ghosh (IIT Kharagpur) and Prof. Rajkumar Buyya (The University of Melbourne), I developed a **simulation toolkit** for **edge computing** and **internet-of-things** environments. The toolkit simulates devices distributed at different levels of the network hierarchy and hosts application components on them. The purpose of the toolkit is to provide application developers with a means of **quantifying the performance of an application** on edge computing environments. System administrators can use this toolkit as well to **estimate the performance of system management** policies in production systems. Quantification is done using metrics like **energy consumption, end-to-end delay, average execution time, network bandwidth consumption and monetary cost of execution**. Associated with the toolkit is an **application model** which is used to build applications to be run on such a distributed environment. The work presents two case studies about the usage of the simulator and shows that it performs satisfactorily even when the size of the simulated environment is huge. A paper on this work in under review for Journal of Software : Practice and Experience.

An arbitrator based marketplace for cloud services
Bachelor's thesis, IIT Kharagpur, India **April, 2014 - March, 2015**
Under the supervision of Prof. Soumya K. Ghosh, I designed a generic brokerage mechanism that acts as the **middle man between the customers and providers of a cloud service**. The broker used **fuzzy logic** for provider selection based on user's QoS requirements. The broker performs **dynamic change of provider** in case of **SLA violation** from the current provider. This decision is taken using fuzzy logic. The proposed framework is general-purpose and can be applied to any marketplace with changes in specifications.

Understanding Factors Affecting Nasopharyngeal Bacterial Colonization Using Hierarchical Clustering Of Inter Group Bipartite Networks
IIT Kharagpur, India **January, 2014 - April, 2014**
Under Prof. Tyll Krüger, I performed **exploratory analysis** of nasopharyngeal colonization data of 151 children infected with HIV. **Hierarchical agglomerative clustering** was done to discover relations between attributes of children. **K-means clustering** of attributes was also performed. Potential risk factors that are commonly reported in the medical literature were identified to be associated with colonization. The association between attributes found was tested using **null models**. The results of these techniques were found to be quite consistent with the clinically observed results, thus giving support to the use of network analysis to study epidemics. A paper on this project is in preparation.

An Energy and SLA aware VM Placement approach in Cloud
IIT Kharagpur, India **August, 2013 - December, 2013**
Advised by Prof. Soumya K. Ghosh, I developed a **VM placement policy** that **reduces power consumption** of datacenters and **reduces SLA violations** experienced by users - thus benefitting both users and the provider. I modeled the problem as a **multi-objective optimization problem** and formulated the objective functions. I implemented **Set-Based Multi Objective Simulated Annealing** to solve this problem. The policy performed better than other evolutionary and deterministic policies.

Resource Management in Cloud Infrastructure using Kanban Model
IIT Kharagpur, India **January, 2013 - April, 2013**
Under the supervision of Prof. Soumya K. Ghosh, I developed a **resource allocation scheme** based on **Kanban model** to allocate resources to starving virtual machines, owned by users belonging to multiple service classes. The resource allocation problem was modeled as a **0-1 optimization problem** and was solved using dynamic programming. A paper on this work has been accepted at ICACNI 2014.

Positions of Responsibility

Teaching Assistant
IIT Kharagpur, India **July, 2015 - April 2016**
Responsible for assisting professor in conducting lectures, tutorial classes and class tests and in assignment and test paper assessment for the course on Theory of Computation and Algorithms-I.

General Secretary, Technology Affairs, Rajendra Pradad Hall of Residence

IIT Kharagpur, India **July, 2013 - May, 2014**

Member of the executive hall council of Rajendra Prasad Hall of Residence, responsible for inter hall Technology general championship events, and harmonizing the spirit of technology in hall boarders across all departments.

Dramatics Secretary, Rajendra Prasad Hall of Residence

IIT Kharagpur, India **July, 2012 - May, 2013**

Responsible for organizing freshers events, practices for Open IIT and Inter Hall dramatics events, and workshops, along with procurement of costumes and sets within the allotted budget.

National Service Scheme **July, 2011 - May, 2013**

Awarded Best Volunteer certificate for commendable work.

Computer Skills

- Cloud Computing : **OpenStack**, **Eucalyptus**, AWS API, Google App Engine
- Programming : C, C++, **Java**, Python
- SDKs : Qt, Android
- Tools : **MongoDB**, MySQL, SQLite