Kumudha K N

Contact Information

Indian Institute Of Science,
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Education

Indian Institute Of Science, Bangalore, India (2015 - current)
M.Sc.(Engg), Computer Science and Automation - CGPA: 7.0/8.0

M S Ramaiah Institute of Technology, Bangalore, India (2008 - 2012)
B.E., Computer Science and Engineering - CGPA: 9.92/10 (Gold Medal)

Vidya Mandir Pre- University College, Bangalore, India (2006 - 2008)
Pre University Course, Karnataka (PUC) 12th - Percentage: 90.83 (PCM: 95.33)

B P Indian Public School, Bangalore, India (2006 batch)
ICSE 10th - Percentage: 90.16

Work Experience

Technology Analyst at Goldman Sachs, Bangalore, India June 2012 to July 2015
Application Infrastructure Team under Investment Banking Division (IBD) Technology
Focused on building and standardizing frameworks in C#, Java, .NET for applications developed in the division.

Intern at Goldman Sachs, Bangalore, India June 2011 to August 2011
Re-architected and enhanced the UI of a Reporting application.

Software Proficiency

- Languages: C / C++, Java, Hibernate Spring, C#, .NET, ASP.NET, WPF, WCF, Python, shell scripting
- Development Platforms: Vi, VIM, Eclipse, Visual Studio, Code::Blocks, TexMaker
- Web Technology: HTML5, CSS3, Angular JS, Ext JS, Javascript, XML
- Build Framework: Gradle, Maven
- Database: MySQL, Oracle, SQL Server
- C Libraries: OpenMP, CUDA, OpenGL
- Operating Systems: Linux, Windows
- Tools: Latex, git, svn, gdb, pudb, Intel VTune
- Architectural Simulator: gem5, gem5-gpu
- DNN Frameworks: Caffe, Latte
- Compiler Tools: isl, barvinok, Pluto

Hardware Proficiency

- Programming and Architecture of Accelerators
  - Intel MIC (XeonPhi KNC/KNL)
  - Google TPU
  - NVIDIA Fermi GPU
- Micro-Architecture and Efficient Programming for Modern x86 CPUs
  - Intel Xeon (SandyBridge, IvyBridge, Haswell)

Publications

- Optimizing Geometric Multigrid Method Computation using a DSL Approach
  Vinay Vasista, Kumudha K N, Siddharth Bhat, Uday Bondhugula. Supercomputing (SC), Nov 2017 (to appear)
- An Empirical Comparative Study and Optimization of the Hadoop Scheduler.
  Jayalakshmi D S, Kumudha K N, Tejala T, Veena Pilli. International Conference on Emerging Trends in Electrical, Electronics and Communication Technologies-ICECIT, 2012, pgs 350-356, 2012

Projects At Indian Institute of Science

- Optimizing Geometric Multigrid Method Computation using a DSL Approach [SC 2017]
  - The Geometric Multigrid (GMG) method is widely used in numerical analysis to accelerate the convergence of partial differential equations solvers using a hierarchy of grid discretizations. However, multiple grid sizes and recursive expression of multigrid cycles make the task of program optimization tedious. A high-level language that aids domain experts (productivity) for GMG with effective optimization and parallelization support (performance) is thus valuable.
- Optimizing Dense Linear Algebra Kernels for Scientific Applications [Work in progress]
  - Linear algebra kernels constitute an important part of the computation in domains like deep neural networks, scientific computing, media processing and many others. A Domain specific language which provides high performance and aids in productivity is thus very useful.
- Evaluating Performance Overheads in Program execution of Scripting Languages under Virtual Machine Environment
  - Scripting languages are widely used among statisticians and data miners for developing statistical software and data analysis. They are run on virtual machines which are either interpreted or compiled just-in-time during execution. This work evaluates the overheads associated with the execution of MATLAB scripting languages under McVM virtual machine environment.
- Parallelize and optimize the CAFFE DNN framework on a multicore CPU
  - CAFFE is one of the early frameworks for deep neural networks. CAFFE accepts a configuration containing the neural network topology and can perform both training, testing and inference. CAFFE has support for executing on both CPUs and GPUs hardware. We optimize the CPU version of Caffe to improve its performance using loop transforms for extracting parallelism.
- Optimizations for Image Processing Pipeline
  - Hand optimization of image processing pipelines like unsharp mask, harris corner detection, max_filter, etc on multi-core CPUs. These optimization included loop permutation, tiling for cache locality and parallelism.
- Integrated Heterogeneous System (IHS) Architecture with shared Die Stacked DRAM Cache
  - Modern processors chips integrate multi-core CPUs & general purpose accelerator GPUs on the same die. These IHS processors have high bandwidth requirement and large working sets.
  - Die-stacking technology allows high bandwidth and large capacity DRAM to be integrated close to the processor. Using this memory as shared cache brings novel challenges in resource sharing and request scheduling due to the architectural heterogeneity. This has has varied implications on performance of the latency sensitive CPUs vs throughput oriented GP GPUs

Projects At Goldman Sachs

- Re-architecting of resource discovery system
  - Technologies used: WPF, WCF, .NET 3.5, SQL Server, IIS7, VS2010
  - WPF for the front end with complete MVVM model
  - WCF service hosted on IIS7 to act as the model layer
  - Framework application to display, store and edit other application configuration data

- Entitlements Systems
  - Technologies used: .NET 3.5, Windows Form, WCF, Windows Service
  - Project followed strict OOP principle
  - Central system to store the entitlements information of the various applications
  - Multiple components including – Editor, Windows service and Reporting Tool

- AngularJS Customization
  - Technologies used: AngularJS, Jasmine, REST Service
  - Developed custom directives and providers which have a common use case across all the applications (like person lookup)
- Framework Library
  - Technologies used: Spring, jdk 1.7, Eclipse
  - POJO and Spring java client for the various REST services
- Inherited several C# projects and was responsible for all the sustenance and continued development / enhancements of the same

Projects At MSRIT

- "A comparative Study and Optimization of Hadoop Scheduler" under Prof. DS Jayalakshmi as final year project [ICECIT 2012]
  - Hadoop is a general-purpose system that enables high-performance processing of data over a set of distributed nodes. This work focuses on an empirical comparison of the default Hadoop scheduler with Fair scheduler and Capacity scheduler for data intensive applications. We determine suitable schedulers for different class of workloads. Further, we propose improvements over the above schedulers and evaluate the same.
- Mini project on "Walking Robot" in OpenGL under Prof. DS Jayalakshmi (2011)
- Mini project of "File Transfer in C#.NET" under Prof. Kavitha Jayaram (2010)
- Database project on "Tourism Information system" under Prof. Arul Kumar (2010)

Positions Held

- Teaching Assistant for Compiler Design (E0256) IISc Jan - Apr 2016
- Member of Department Curriculum Committee - 2016-2017
- Representative for Student Welfare COmmittee - 2016-2017
- Member of Women in Technology (WiT), Goldman Sachs
- Technology Analyst at Goldman Sachs Nov 2013 - Jul 2015
- New Analyst Technology Associate at Goldman Sachs Jun 2012 - Nov 2013

Achievements

- Secured distinction in Bharatanatyam Junior Exam
- Awarded the "First rank and Gold medal of 2012 batch" from the Department of Computer Science, M S Ramaiah Institute of Technology.
- Lead the Blood Donation Camp event at MSRIT which achieved the largest volume of blood collected in the Bangalore region
- Certificate course in Web Development conducted by IEEE
- Undertaken a course on "Supply Chain Management" from Mechanical Dept. of MSRIT

Co-curricular activities

- Routinely perform in several stage dance events including concerts at Bugle Rock Park Basavanagudi, Our School Auditorium, Banashankari Temple, Sripuram Golden Temple Vellore, Andal Temple Srivilliputhur
- Conducted technology and networking events for Interns at Goldman Sachs (2015)
- Routinely organized activities and events like Blood Donation, notebook drive, school camps for the underprivileged etc, as part of National Service Scheme (NSS) at MSRIT
- Delegated at various conferences and Workshops

Languages

English (fluent), Tamil (native), Kannada (native), Hindi (intermediate)

References

Dr. Uday Reddy
Assistant Professor, CSA Dept, IISc, Bangalore.
Mrs. DS Jayalakshmi
Associate Professor, CSE Dept, M S Ramaiah Institute Of Technology, Bangalore