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RESERACH INTERESTS
•
Parallel Systems & Programming Languages
•
Compilers, High Performance Computing
EDUCATION
Year
Degree
Institute
Performance
2011(Expected)
B.Tech./M.Tech. Dual Degree
IIT Kanpur
B.Tech. CPI 8.4/10.0
Computer Science & Engineering
M.Tech. CPI 9.2/10.0
2005
ISC (class XII)
CMS, Lucknow
95.75 %
2003
ICSE (Class X)
CMS, Lucknow
93.60 %
STANDRDIZED TEST SCORES
•
Graduate Record Examination:
Verbal: 660/800 Quantitative: 800/800 Analytical: 4.0/6.0
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TOEFL Score:
105 [Reading: 27, Listening: 25, Speaking: 24, Writing: 29]
WORKSHOPS/CONFERENCES
TiC'10: Third International School on Trends in Concurrency
23-30 May 2010
Description
:
IIIT Bangalore
I represented IIT Kanpur along with 2 other students. The school targeted at bringing together outstanding researchers
from academia, from industry & students to discuss current research and future trends in concurrent systems design
and implementation.
IWDS: Second International Workshop in Distributed Systems
27-29 November 2010
Description
:
IIT Kanpur
The abstract of the thesis work has been accepted for presentation in the workshop. I will be presenting the current
results & research work amongst other researchers and students working in the area.

RESEARCH EXPERIENCE

A flow-based programming language for Multi-core architecture

January 2010 - Till Date

Masters Thesis (Work in Progress)

Dept. of CSE, IITK

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Advisor:

Dr. R.K.Ghosh & Prof. Harish Karnick

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Description:

The thesis project is aimed at the design & development of a new shared-memory parallel pro-
gramming language for the current and future generations of many-core machines.
A programmer expresses problems inherently as an acyclic sequence of computations resulting in the
formation of a computation DAG. A DAG diffusion model explicitly exposes the available parallelism at runtime.
Recursive architecturing
& other proposed constructs achieve the construction rapidly & elegantly. A combination
of Cilk style programming, flow based execution and
promise
based approach is undertaken. The programmer
works with persistent stateful entities in a 2D space, whose structure is dynamic and which registers the results
to the outside world as
signals
. The multi-phase processing approach couples non-deterministic construction
with deterministic outcomes. The language looks promising for graph-based and non-deterministic problems.
Other flow-based problems are being studied. The work is still under progress.

Cholesky Factorization for Parallel Architectures

July 2010 - November 2010

CS738: Advanced Compiler Optimization

Dept. of CSE, IITK

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Advisor:

Prof. Sanjeev K. Aggarwal

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Description:

The project aimed to exploit the innate parallelism available in the algorithm for Cholesky Fac-
torization of a symmetric positive-definite matrix to achieve higher speedups. A blocked algorithm as available
in LAPACK has been implemented using Level-3 basic linear algebra operations in square blocked pack (SBP)
format & optimized using compiler optimization techniques. The performance was compared on multiple hard-
wares using CUDA (GPGPU) & Intel TBB (2,4,16,24 core). Results show that parallelizing a blocked algorithm
has no significant benefits over parallelizing the corresponding naıve sequential version.

A new digital watermarking scheme for 3D triangular mesh models

December 2009 - May 2010

CS698E: Digital Watermarking & Steganography

Dept. of CSE, IITK
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Advisor:
Prof. Phalguni Gupta
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Description:
The project was targeted to come up with a reversible watermark embedding scheme for 3D-
Triangular mesh models. The final scheme that was designed integrates a reversible watermarking scheme for 2D
Vector data together with a 3D watermarking scheme for mesh-models in a novel fashion resulting in increased
capacity at slight/acceptable visual distortion in terms of PSNR. The approach was to replicate watermarking
sequence into the range images of multiple Voronoi patches of the mesh.
Object Tracking Using SIFT features
June 2009 - Nov 2009
CS676: Computer Vision & Image Processing
Dept. of CSE, IITK
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Advisor:
Dr. Simant Dubey
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Description:
The project investigated the accuracy of using Scale Invariant Feature Transform(SIFT) features
as a similarity measure for object tracking of a previously unknown object. The proposed strategy outperforms
Camshift algorithm & Lucas-Kanade optical flow methods in most scenarios, however certain number of SIFT
features are required to be present. A Kalman filter was used for Gaussian noise-reduction.
OTHER COURSE PROJECTS
Compiler Design for a subset of C++ language
December 2008 - May 2009
CS335: Compiler Design
Dept. of CSE, IITK
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Advisor:
Prof. Sanjeev K. Aggarwal
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Description:
The aim of the project was to develop a compiler for a subset of C++ language. The final working
compiler could tackle primitive data types, dynamic scoping using hierarchical symbol table structure, pointer
arithmetic, type coercion, loops, conditionals, functions and recursion.
File Compressor & Archiver
December 2008 - May 2009
CS653: Functional Programming
Dept. of CSE, IITK
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Advisor:
Prof. Piyush P. Kurur
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Description:
The project implemented adaptive Huffman encoding(Vitter Algorithm), Burrrows-Wheeler trans-

form and LZ encoding schemes in a pipelined way to achieve high compression ratio for files. The project was built in the functional language Haskell. The project stands successfully completed with good compression ratios and performance.

Comparison of TCP performance over WLAN
December 2009 - May 2010
CS634: Mobile Computing
Dept. of CSE, IITK

- Advisor:
Dr. R.K.Ghosh
- Description:
The project compares and studies theoretically the behavior of various TCP protocols over wireless LAN. Simulations were done for a selected few protocols. Traffic conditions, packet error rates, transmissions rates were simulated for some WLAN protocols. SNOOP protocol was found to be the best performing among others.

Peer to Peer File sharing Client
July 2008 - November 2008
CS425: Computer Networks
Dept. of CSE, IITK

- Advisor:
Prof. Harish Karnick
- Description:
The project was aimed at implementing a bit-torrent like peer-to-peer client for LAN. The project implements some of the specifications mentioned in the original P2P protocol by Bram Cohem. The project successfully achieves fast and reliable file sharing using SHA-1 hash algorithm, handling congestion control.

FRUD: Framework for Distributed Computing of Unstructured Data
December 2009 - May 2010
CS455: Software Engineering
Dept. of CSE, IITK

- Advisor:
Prof. T.V. Prabhakar
- Description:
The project was about development, documentation and maintenance of a library for distributed computing of large quantities of data, akin to Hadoop and Map-Reduce. Java was chosen to develop the library.

File Sharing Search Engine
December 2008 - May 2009
CS315: Principles of Database Management
Dept. of CSE, IITK

- Advisor:
Dr. Arnab Bhattacharya.
- Description:

The project provides users an account-based access to a on online storage space. The web-based interface provides different levels of access to the resources on the server based on the class(paid/trial) of the user. A user can upload/download and search for desired files. A relational database is used for storing the account information.

INTERNSHIP/WORK EXPERIENCE

Microsoft India Development Center

May 2009 - July 2009

- Intern Position: : Program Manager + Software Development Engineer
- Mentor: Mr. Gautam Bajekal
- Description: : I worked with the Office Communicator team at MSIDC, working as a Program Manager. The task was to co-ordinate, propose, develop, finalize and implement a "Silverlight Based framework for Rapid Prototyping of web-based Office Communicator(OC)". Various In-meeting and Out-of-Meeting scenarios were developed, demonstrated and discussed amongst a team of senior program managers. The internship provided exposure to a healthy team-based work environment and insight of the industrial work-culture.

TALKS/LECTURES

Software Transactional Memory (STM)

July 2010 - November 2010

CS738: Advanced Compiler Optimizations

- I gave a lecture on Software Transactional Memory. The lecture covers the basics, optimistic vs. pessimistic execution modes, write-buffering vs in-place buffering, strong vs. weak isolation, and more.

High Dynamic Range Imaging (HDRI)

July 2009 - November 2009

CS76: Computer Vision & Image Processiong

- I gave a lecture explaining the HDRI approach covering the entire process of capturing multiple LDR images, creating HDR image from the set of these LDR images, storing them in HDR format and rendering these to a LDR display using tone mapping.

TEACHING EXPERIENCE

Fundamentals of Computing (ESC101)

July 2010 - November 2010

Description : I tutored a batch of 40 freshmen in the ESC101 course. A tutor designs problems for the lab tests and exams, teaches students and arranges tutorials to clear students doubts. I also provided students with additional weekly notes

, covering various topics spread across the duration of a semester, to assist them with the lecture materials
and provide them a richer, in-depth and a broader learning experience of the C programming language.

SCHOLASTIC ACHIEVEMENTS

- Secured All India Rank 373 in the Joint Entrance Examination 2006 conducted by IITs with a percentile close to 99.9
- Awarded scholarship through National Talent Search Examination(2003).
- Secured rank 1 in my branch & was in the top 3 students of my school (across 20 branches) in the ISC XII Examination held in 2005.
- Secured rank 3 amongst the students of CMS Mahanagar branch in the ICSE X Examination held in 2003.

SKILLS

- ProgrammingLanguages :C, C++, Java, Haskell, Oz, ML, Python, VHDL
- Platform : Windows, Linux
- Applications : Matlab, MS Office, Weka
- Tools / API : Intel TBB, CUDA programming, OpenMP, Intel Developer & Debugger tools

EXTRA CURRICULAR

- I performed as a rhythm guitarist in a band for 3 songs (western and Indian) in front of the Microsoft audience
at the ”Microsoft Intern Cultural Evening” during my internship
- Assisted organizing the Intern Cultural Evening at Microsoft
- Volunteer, Hindi Literary Society, Antaragni 2006
- Member, ID Cell, Counselling Service 2008
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