

# Prakash Linga

## Curriculum Vitæ

### Work Address:

Lead Software Engineer, moka5  
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### Present Address:

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Citizen of India  
Born December 25, 1979

## Research Interests

Systems and Networking

## Education

- Ph.D in Computer Science Aug 2001 - May 2007  
Cornell University  
Advisers: Jayavel Shanmugasundaram, Johannes Gehrke, Ken Birman
- MS in Computer Science Aug 2001 - Jan 2006  
Cornell University  
Adviser: Jayavel Shanmugasundaram
- Bachelor of Technology (BTech) in Computer Science and Engineering July 1997 - May 2001  
Indian Institute of Technology, Madras

## Research Experience

- **Peer-to-Peer (P2P) systems** Dec 2001 - May 2007  
Involved in building a database layer for p2p systems as part of the PEPPER project at Cornell. Working on indexing data items in a p2p system. In particular,
  - Developed a new distributed hash table (DHT) named *Kelips* using *gossip* as a building block. *Kelips* works well in a dynamic environment and lookups succeed with high probability in  $O(1)$  time. Designed and implemented a p2p webcaching scheme called *Kache* on top of *Kelips*.
  - Developed two new index structures (called *P-trees* and *PRing*) to answer range queries efficiently in a p2p setting.
  - Developed an indexing framework which helps instantiate many structured p2p indices.
  - Worked on formally stating consistency and availability requirements in answering range queries in a dynamic p2p system. Proposed techniques which provably guarantee these requirements.
  - Developed a probabilistic and very rapid p2p range index named *r-Kelips*.
- **Summer Internship at Bell Labs, India** June 2005 - August 2005  
Developed and implemented algorithms to minimize the average query lookup times for DHTs.
- **Summer Internship at IBM Almaden** May 2003 - August 2003  
Designed and implemented algorithms for efficient garbage collection in DBCache.
- **BTech Dissertation** July 2000 - May 2001  
Designed and analysed highly reliable fault tolerant real-time networks for Space Vehicle Launch Control. This project was sponsored by DRDO (Defense Research and Development Organization, India).

- **Research Assistant in Cybernet Software Services (CSS)** Nov 2000 - Jan 2001  
Designed and implemented a web traffic load generation and monitoring mechanism for massively parallel networks.
- **Summer Internship at Indian Institute of Science, India** May 2000 - July 2000  
Implemented an optimized generation of irreducible and primitive polynomials over finite fields.

## Publications

- Supratim Deb, Prakash Linga, Rajeev Rastogi, Anand Srinivasan, “Peer Caching For Faster Lookups In P2P Systems”, *To appear in International Conference on Data Engineering (ICDE 2008)*.
- Adina Crainiceanu, Prakash Linga, Johannes Gehrke, Jayavel Shanmugasundaram, “P-Ring: An Efficient and Robust P2P Range Index Structure”, *In Proceedings of the 2007 ACM SIGMOD International Conference on Management of Data (SIGMOD 2007)*.
- Prakash Linga, Adina Crainiceanu, Johannes Gehrke, Jayavel Shanmugasundaram, “Guaranteeing Correctness and Availability in P2P Range Indices”, *In Proceedings of the 2005 ACM SIGMOD International Conference on Management of Data (SIGMOD 2005)*.
- Adina Crainiceanu, Prakash Linga, Johannes Gehrke, Jayavel Shanmugasundaram, “Querying Peer-to-Peer Networks Using P-Trees”, *In Proceedings of the Seventh International Workshop on the Web and Databases (WebDB 2004)*.
- Adina Crainiceanu, Prakash Linga, Ashwin Machanavajjhala, Johannes Gehrke, Jayavel Shanmugasundaram, “P-Ring: An Index Structure for Peer-to-Peer Systems”, *Cornell University Computing and Information Science Technical Report TR2004-1946. July 2004*.
- Adina Crainiceanu, Prakash Linga, Johannes Gehrke, Jayavel Shanmugasundaram, “Querying Peer-To-Peer Networks Using P-Trees”, *Cornell University Computing and Information Science Technical Report TR2004-1926*.
- Adina Crainiceanu, Prakash Linga, Ashwin Machanavajjhala, Johannes Gehrke, Jayavel Shanmugasundaram, “An Indexing Framework for P2P Systems”, *In Proceedings of the 2004 ACM SIGMOD International Conference on Management of Data (SIGMOD 2004). Paris, France, June 2004. Demo*.
- Adina Crainiceanu, Prakash Linga, Johannes Gehrke, Jayavel Shanmugasundaram, “P-Tree: A P2P Index for Resource Discovery Applications”, *In Proceedings of the Thirteenth International World Wide Web Conference (WWW 2004). New York, NY, May 2004. Poster paper*.
- Adina Crainiceanu, Prakash Linga, Ashwin Machanavajjhala, Johannes Gehrke, Jayavel Shanmugasundaram, “A Storage and Indexing Framework for P2P Systems”. *In Proceedings of the Thirteenth International World Wide Web Conference (WWW 2004). New York, NY, May 2004. Poster paper*.
- Prakash Linga, Indranil Gupta, Ken Birman, “A Churn-Resistant Peer-to-Peer Web Caching System”, *In Proceedings of the ACM Workshop on Survivable and Self-Regenerative Systems (SSRS 2003)*.
- Indranil Gupta, Ken Birman, Prakash Linga, Al Demers, Robbert van Renesse, “Building an Efficient and Stable P2P DHT Through Increased Memory and Background Overhead”, *2<sup>nd</sup> International Workshop on Peer-to-Peer Systems (IPTPS 2003)*.

## Professional Skills

- Languages: C, C++, Java, L<sup>A</sup>T<sub>E</sub>X, LISP, Pascal, Perl, Prolog, Python, SML, SQL, Visual C++
- Operating Systems: BSD, Linux, Solaris, SunOS, Unix, Windows CE/NT/2K/XP

## Implementation Projects Undertaken

- Implemented an indexing framework which can be used to instantiate different structured p2p indexing algorithms, as part of the PEPPER project group. Instantiated Chord, P-Ring and SkipGraph indices. Demonstrated the P-Ring implementation at SIGMOD 2004 and also tested the same on PlanetLab.
- Built a simulator and a real distributed implementation of a DHT of our design named Kelips. Implemented a p2p webcaching scheme called *Kache* on top of Kelips. Currently building a probabilistic p2p range index named r-Kelips.
- Implemented P-trees, a p2p range index that we proposed, in C#.
- Implemented an optimized generation of irreducible and primitive polynomials over finite fields, among various other implementations which contributed to the GF2 Library developed at IISC Bangalore.

## Honors and Awards

- Ranked 52<sup>nd</sup> in the All India Joint Entrance Examination (JEE) for admission into the Indian Institutes of Technology (among the 100,000 candidates who appeared for the examination).
- Awarded the prestigious Summer Fellowship 2000, conferred upon around 30 outstanding undergraduate students from all over India by Jawaharlal Nehru Center for Advanced Scientific Research.
- Stood first in the Regional Maths Olympiad (A.P State - 1996 & 1997). Selected for National Maths Olympiad (1996 & 1997).

## Other Activities

- External reviewer 2001 - Present  
Refereed papers submitted to SIGMOD, VLDB, PODC, ICDE, WWW, WEBDB and XIME-P.
- Volunteered to cook 2001 - 2006  
Helped ASHA raise money to fund projects for underprivileged children in India.
- Brown Bag Czar, Dept. of Computer Science, Cornell 2002 - 2003
- Student member of ACM 2004 - Present
- Board member of Cornell India Association 2004 - 2005

## References

### Jayavel Shanmugasundaram

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### Ken Birman

Professor, Cornell University  
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### Johannes Gehrke

Associate Professor, Cornell University  
Computer Science Dept.  
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### Supratim Deb

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