

**GAURANG KHETAN**  
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**Objective:**

Technical Leadership and people management in an intellectually challenging work environment involving interesting technology with potential for great impact.

**Skills:**

- More than a decade of intense experience in top technology companies, including architecting, designing, implementing several dozen modules in a wide variety of technology areas.
- Providing technical leadership to teams for many years, and successfully delivering dozens of complex products and features from development to launch.
- Development languages: Expertise in C, Skilled at Java, C++, Python, Groovy. Working knowledge of Perl, Assembly, Ruby on Rails, SQL, bash, PHP, etc.
- Map/GIS domain: knowledge of map data, distributed processing of map data, addresses, POI data generation, routing, geohash, data processing/transformation pipelines, GIS tools, map matching, route encoding, ingest of vendor data, data conflation, etc. An early engineer in two mapping teams Apple and Uber, and led key mapping products from scratch to launch.
- Server/Cloud/BigData programming: multi-threaded/multi-process servers, communication between client/server, inter-process communication, high performance web service, Hadoop, MapReduce, Hive, etc. Obtained a Cloudera Certified Developer for Apache Hadoop (CCDH) certificate in Mar 2013.
- Embedded Systems Experience in: Multi-threaded Multi-Core Network Processor programming, Linux/FreeBSD/Cisco-IOS kernel programming, device drivers, new hardware board bring-up, platform level software, file-systems, operating systems, embedded systems.
- Network Programming: Network processor programming, Ethernet driver, Socket programming, Client-Server, various networking protocols like TCP, IP, UDP, Ethernet, ARP, etc, file sharing systems, ad-hoc networks
- Web: Perl, PHP, Ruby on Rails, HTML, CSS, JavaScript, XML, Web Services (SOAP, WSDL), SQL, Oracle.

**Work Experience:**

*Senior Software Engineer 2*      **Uber Inc, San Francisco, CA**      Apr '15-present

Working as a Senior Tech Lead in Uber Maps group. Key contributor, DRI (directly responsible individual) and tech lead for developing a Uber POI dataset from scratch to launching in production, which was one of the key goals of the group. Helped grow the team from 2 to 20+ people. Led sub-teams of 6+ people, mentored many junior engineers, point of contact with multiple other teams.

Built a single and multi-channel editing framework and data management system for ingesting, conflation, processing and merging POI data and for tracking provenance. Built a service for serving places data as well as providing foundational frameworks for running mapping tools for hundreds of operators to work on POI data, providing task workflow management and a curation pipeline.

*Senior Software Engineer*      **Google Inc, Mountain View, CA**      Aug '14-Apr '15

In Google Shopping Express, worked on shipping optimization, including route planning, driver management, on-demand driver system, other shipping logistics, etc. Development language was Java.

*Technical Leader, Maps (Server)*      **Apple Inc, Cupertino, CA**      May'11-Jul '14

Worked on the server side components of Apple Maps. Joined the team in its infancy, and played an important part in developing the product from scratch to launch into the hands of hundreds of millions of

customers. Role included core design and development, and providing technical leadership for various modules and bigger picture view across teams.

Work spanned several areas across the product. Technologies used included C++, Java, Groovy, python, SQL, spatial database like PostgreSQL, Hadoop, MapReduce, hive, big data, map domain knowledge, etc.

Projects included:

- Wrote single-handedly a scalable C++ process-based server which is used by the Maps Directions service, capable of receiving and processing many requests in parallel.
- Worked on turn-by-turn navigation experience, including generating maneuvers, announcements, signs, names, etc. and interfacing with the client on the phone. Handled ETA and ReRoute requests.
- Worked on several features including regression framework for route quality, traffic along route, chains, lane guidance, etc.
- Contributed significantly to increasing the performance of Maps Directions service. Managed to achieve 200% of the desired performance goals in terms of request processing times.
- Designed and implemented a patent pending technology, along with 2 others, for transferring geometry of routes over the air between server and client consuming very little bandwidth, with the additional benefit of the format being resilient to small map data changes.
- Wrote a new fast, distributed MapReduce-based system (in Java), along with 2 others, to ingest complex, large map data from vendors like Tomtom, etc. This required understanding the data and processing it to an in-house format and representation (ETL). This new system completes the task in 4-5 hours which used to take 2 weeks in the old sequential SQL-based process.
- Developed a map-reduce based system for automatically stitching roads on edges of countries.
- Worked on error-proofing address point processing, entry points, etc across all modules of the product.
- Designed and developed the feed-in workflow/pipeline of vendor map data (in Java mapreduce) into an in-house database, which includes data conflation (identifying same address, AOIs, etc).

*Cofounder*

**iNumbr**

Jan '08-Dec '08

Developed a website, in part-time, with a friend in the area of consumer VOIP telephony, which managed to reach 400,000 users. The website allowed consumers to obtain free, disposable phone numbers that route calls to their personal phone, and thus allow them to maintain privacy when needing to provide phone numbers in public settings like craigslist, ebay, matrimonial/dating websites, etc. Functionality had a significant overlap with Google Voice. We also sold our solution to a few businesses, earning annual revenues of about \$100,000.

*Sr Software Engineer IV*

**Cisco Systems, San Jose, CA**

Feb '05-Apr'11

Worked on several complex systems projects in the general area of Platform Software in a business unit dedicated to making Mobile Internet gateways like GGSN, PDSN, LTE, Wimax, etc. The role involved intricate system design and development (often at product architectural level), complicated debugging through a large codebase, in an important role while showing leadership in several technical areas in the team. Received more than half a dozen spot bonuses (CAP awards). The main language used was C, and some assembly. Work included:

- Development of software running on Intel IXP network processor in the data plane of the product to process packets optimally at high speeds in a multi-core and multi-threaded architecture with both parallel and pipeline designs, requiring low-level coding that extracted most computing power off the processor architecture.
- Worked on porting and bringing up Cisco IOS and Linux operating systems on a new hardware platform, a complex system involving several processors (Intel IXP, MIPS, PowerPC, Xscale ARM, Nitrox, etc) and several custom FPGAs/CPLDs. This provided experience in kernel bringup, hardware/processor initialization/configuration/architecture, Linux kernel powerpc platform code, device drivers including Ethernet driver, bootloaders, networking protocols, etc. Also developed offline diagnostics software for the board.
- Developed numerous platform features for our product, including linux user-space device driver infrastructure, multi-threaded health-monitoring software, statistics and control protocol software on QNX operating system, control packet prioritization in linux network driver, etc.

- Provided leadership in “all things Linux” in the team, and assisted in bigger picture work – like analyzing linux operating systems within cisco to identify useful components, evaluating software architecture options for next platform (virtualization of IOS on Linux, etc)

## *Software Engineer*

**Paypal (eBay Inc), San Jose, CA**

Mar '04-Oct '04

- Worked on implementing new product features in C++ and SQL in a Apache/Oracle/Linux environment within an industrial-strength code base of a scalable, reliable, multi-tiered, multi-component website that impacts more than 50 million customers.
  - Worked on Paypal's industry-leading anti-fraud system with features like implementing anti-fraud card models, address authentications, third party communication in XML, client-servers, etc. which required understanding of web protocols and skills in programming at application, database and network levels; and involved working closely with other engineering, product, content, design, QE and other groups in the product development lifecycle.

## *Software Developer (Internship)*

## **Lightline Software Inc, Palo Alto, CA**

Aug '03-Dec '03

In an exciting fast-paced Storage Security startup, worked on storage system software involving kernel programming in FreeBSD UNIX, with major features being:

- Designed and implemented non-volatile caching in FreeBSD UNIX ATA/IDE disk device driver.
  - Wrote a simple volume manager used to form a higher capacity logical volume by doing software RAID Level 0 over existing hardware RAID Controller (3ware Escalade) storage units.
  - Developed a configuration system consisting of a Java Applet front-end and Perl back-end.
  - Developed a client-server system with a simple communication protocol.
  - Assisted creation of a stack of pre-allocated inodes in the file system.

### *Research Assistant (Part-time)*

Prof. Massoud Pedram, EE Dept, USC

Jun '02-Aug '03

- In a team of two, ported Linux kernel to an XScale-based embedded system, which involved modifying low-level details like configuration of memory controller, PCI bridges, interrupt routing, and device drivers of PCMCIA, etc.
  - Implemented a power manager in Linux kernel for an embedded system, using a dynamic power management algorithm to shut down devices. Modified device drivers of PCMCIA and IDE.

### **Patents:**

- *Encoded Representation of Route Data* [Publication # US20130332077 A1]  
Filed in 2012 while at Apple, along with 3 other co-authors.
  - *Vehicle Routing Guidance to an Authoritative Location for a Point of Interest* [Pending #15/396,445]  
Filed in 2016 while at Uber, along with 3 other co-authors.

#### **Education:**

*Master of Science in Computer Science*  
University of Southern California (USC), Los Angeles, CA.

May 2004

*Bachelor of Engineering in Electronics*  
University of Pune, India.

July 2001

#### **Personal Programming Projects:** (done in part-time)

- *iOS News Reader App*: Developed a prototype of an iOS mobile app that converted from text to speech for listening to news from RSS reader while driving. (2009)
  - *Facebook Power News Feed*: Developed a prototype Facebook News Feed customizer for power users in python. (2011)

- *Nephos Systems*: Worked part-time with 3 other folks, developing a cloud security appliance which would encrypt the traffic from enterprise network to cloud, provide an easy way for creating virtualized images for Amazon EC2, provide seamless multi-cloud support, etc. We had a proof-of-concept at an enterprise customer, but were unable to secure funding. (2009)
- *Computer Virus in MS-DOS*: Developed a self-encrypted, polymorphic computer virus that self-replicates by infecting MSDOS executable files. Used x86 assembly language. (1999)
- *Othello-playing computer program*: Developed a program that plays Othello, a strategy board game. Uses Artificial Intelligence Game Playing algorithms. Used VC++ on MS Windows. (2000)
- *Genetic Algorithms*: Developed a program that makes simulated ants learn trail traversal using genetic algorithms, an AI programming technique.(1999)

#### **School Projects and Activities (2001-2003):**

- Presented Apollo Testbed 2 research project with Prof. Massoud Pedram at Design Automation Conference 2003, Anaheim, CA.
- Represented USC in the regional ACM International Collegiate Programming Contest held on November 10, 2001. Competition tests problem solving and programming skills.
- *Implemented an ad-hoc wireless network of embedded systems*: Implemented Ad-hoc Positioning System which involved forming an ad-hoc network of embedded Berkeley motes and implementing a communication protocol so as to perform localization using hop-based distance estimation. Used C on TinyOS embedded operating system with resource constraints and low wireless network reliability.
- *Parts of Nachos Operating System*: Implemented core parts of Nachos Operating System, an instructional operating system - thread synchronization, virtual memory, file systems, and multiprogramming. Used C++ on UNIX.
- *Built a Peer-to-Peer Network File System*: Developed a distributed file sharing system using peer-to-peer mechanism (like Kazaa). Used C++ on UNIX.
- *Retail Website*: Developed a retail website with frontend in Perl/PHP and backend in Java/MySQL
- Term paper: *Comparison of Memory Management Systems of BSD, Windows and Linux* May 2002
- Worked as Contributing Writer to Daily Trojan, the USC student newspaper.

#### **Other:**

- Came 1st out of several hundred participants in a city-wide IQ and Aptitude test in Pune, India, conducted by DataPro in 2000, and was awarded a first prize worth Rs 20,000.
- Scored in Graduate school entrance tests: GRE 2290/2400(97-99%), GMAT 740/800(97-99%)
- Member of Glia Society, society of people with IQ higher than 99.9% of human population.
- Country of Citizenship: US