Gustavo Gómez

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Professional Summary

Senior software engineer and distributed systems specialist with deep expertise in high-performance computing, large-scale data systems, and AI-driven applications. Ph.D. in Computer Science with a focus on automatic performance analysis and optimization of programs. Passionate about building efficient, scalable infrastructure for deep learning and intelligent systems. Experienced across the full stack — from systems-level design and distributed computing to cloud-native pipelines and large-scale data processing frameworks.

Education

Indiana University **Bloomington, IN**
Ph.D. — Computer Science, Programming Languages, Artificial Intelligence *2006*

- Dissertation Topic: Automatic worst-case execution-time analysis for programs written in high-level languages. A system of source-code analysis and transformations to automatically compute the worst-case execution time, given a program and the input size.
- Designed and implemented a distributed Java application for automatic dynamic load balancing. Agents periodically look for the least loaded computer in the network and through RMI move from computer to computer. (Individual project for the Languages for Programming the World Wide Web class.)
- Implemented a Stop & Copy Precise Garbage Collector for the Scheme implementation of the Reference Counting Machine. (Individual project for the Memory Management class.)
- Implemented an interpreter for a substantial subset of Objective-C. (Individual project for the Efficient Compilation of Object Oriented Languages class.)
- Implemented a Java to byte-code compiler for a significant subset of Java, and a Scheme compiler for the Alpha MIPS processor. (Individual projects for the Compilers class.)
- Designed and developed a Genetic Programming System to solve a search problem. The system consists of 5KLOC written in C++. (Team project for the Artificial Intelligence class.)

Monterrey Institute of Technology (ITESM) **Monterrey, Mexico**
M.Sc. — Computer Science, Artificial Intelligence *1994*

- Thesis Topic: Proof of correctness and completeness for an intermediate knowledge representation model used in the implementation of Expert Systems.

Monterrey Institute of Technology (ITESM) **Monterrey, Mexico**
B.Sc. — Computer Science *1991*

Experience

Oracle **Boulder, CO**
Principal Applications Engineer *Oct'13 – Sep'25*

- Lead engineer for distributed data services processing 1B+ daily events, optimizing for scalability, reliability, and performance.
- Owned the operation and maintenance of production and development Hadoop clusters, building large-scale MapReduce pipelines in Scala and data workflows using Hive and Bash.
- Architected and delivered a complete redesign of core services using Scala, Java, Kafka, Docker, Kubernetes, and Oracle OCI.
- Designed fault-tolerant, high-availability systems for mission-critical infrastructure.
- Partnered cross-functionally to ensure end-to-end reliability and observability of services.

Rosetta Stone **Harrisonburg, VA – Boulder, CO**
Software Developer *Mar'09 – Jun'13*

- Architected and implemented data collection and analytics pipelines for learner interaction data across millions of users.
- Developed distributed RESTful APIs and media management systems handling large-scale concurrent access.
- Built big-data integrations using Hadoop, HBase, Hive, and MapReduce.
- Led CI/CD practices for multiple teams (Jenkins, Maven, Agile).

Amazon.com **Seattle, WA**
Software Developer Engineer *Jan'08 – Jan'09*

- Designed and implemented real-time distributed systems for analyzing logs from thousands of servers (~2 TB/hour throughput).
- Built tools to aggregate and suppress millions of system alarms across Amazon's compute fleet.
- Contributed to low-latency, high-reliability systems foundational for large-scale ML and monitoring frameworks.

University of Colorado. Psychology Department **Boulder, CO**
Software Developer *Jun'13 – Sep'14*

- Built mobile data collection apps (iOS/Android) with real-time sync and offline caching.
- Delivered cross-platform Ruby/Rails back-end services for large-scale behavioral studies.

Indiana University, Ph.D. **Bloomington, IN**
Research Assistant/Instructor *Aug'99 – May'05*

- Designed and built interpreters and compilers, plus systems for automatic worst-case execution time (WCET) analysis.
- Performed deep performance modeling and optimization, analyzing memory, concurrency, and execution-time bounds.
- Worked on programming-language research, contributing to high-assurance and real-time system performance.

Gambro BCT **Lakewood, CO**
Software Developer *May'07 – Nov'07*

- Developed a tool to aid in the localization efforts of an embedded application. Tool and application written in C++ with small bash scripts, running on the VxWorks operating system.

University of Colorado. Psychology Department **Boulder, CO**
Web Application Developer *Jan'05 – Apr'07*

- Designed and implemented a web application to manage laboratories, personnel, participants, experiments, scheduling, appointments, and equipments. The application is 10 times faster for scheduling than the previous system (very important since scheduling is done while the participant is on the phone), 2 times faster for other operations, and according to the users "a whole lot" easier to use.
- Technology/methodologies: Tomcat, MySQL, Kawa, Java, JDBC, Perl, Mac OS X.

Indiana University. School of Continuing Studies **Bloomington, IN**
Instructor *Jun'98 – Jun'04*

- Instructor for the course CSCI C211 "Introduction to Computer Science" for the Independent Studies Program. The material is available on the web, and students consult and receive feedback over phone or e-mail, and send their assignments via e-mail. Debugged and extended the automatic grading system, which lets students receive immediate feedback on their work.

Indiana University. Psychology Department **Bloomington, IN**
Web Application Developer *Jul'03 – Oct'03*

- Designed and implemented a web application to collect data using a well-known developmental inventory in English, Japanese and Spanish. This application generates Excel documents suitable for data analysis. It used the PLT web server in Mac OS X. The application saves about 1.5 person-hours every time it is used.

Indiana University. Computer Science Department **Bloomington, IN**
Assistant Instructor *Aug'95 – Dec'97, Aug'01 – May'03*

- Assistant Instructor in charge of lab and discussion sessions for courses Introduction to Computer Science, Introduction to Computers and Computing, Programming Languages, and Advanced Operating Systems.
- Modified and extended an operating system implemented in C++ (11 KLOC) to illustrate operating system concepts for students.
- Designed and implemented an attribute grammar based structured editor for the Scheme language with automatic CPS conversion facilities for the Programming Languages course.
- Implemented many interpreters to show students different language constructs and paradigms, including Call-By-Value, Call-By-Name, Call-By-Need, Static Scope, Dynamic Scope, Continuation Passing Style, Storage Passing Style, Object-Oriented Programming, Logic Programming, and Functional Programming.

Knee-High Cooperative Daycare **Bloomington, IN**
Website Developer *Apr'02 – Jun'02*

- Designed and implemented the website for Knee-High Daycare Cooperative. The website includes three small web applications written in Perl.

Indiana University. Computer Science Department **Bloomington, IN**
Research Assistant *Jan'98 – Jun'01*

- Research Assistant in charge of the design and development of a general approach for automatic and accurate time-bound analysis for high-level languages. The approach consists of transformations for building time-bound functions in the presence of partially known input structures, symbolic evaluation of the time-bound function based on input parameters, optimizations to make the analysis efficient as well as accurate, and measurements of primitive parameters, all at the source-language level. The implementation shows measured worst-case times closely bounded by the calculated bounds.

Monterrey Institute of Technology – ITESM **Monterrey, Mexico**
Research Assistant *Aug'88 – May'94*

- Designed and implemented a database system for automatic scheduling of work-study students and task assignments for the Scholarship Department at ITESM. The database was developed in Oracle. Before this application, the assignment was done manually in a process that used to take 3 months. With this application the assignments were ready in a couple of hours.
- Designed and implemented an application to assign classes to classrooms. The main part was written in Prolog. This application improved the speed of the previous algorithm by an order of magnitude.
- Designed and implemented distributed systems services (mail server, fax server and on-line help tool/server) for the local network. Applications were written in C. The mail server was used by the entire university.
- Designed and implemented a testing system to systematically run a battery of tests on different computers in the network and collect the results in a single computer. Use of shell scripts and ssh.

Celulosa y Derivados SA – CyDSA **Monterrey, Mexico**
Knowledge Based Systems Developer *Jan'91 – Dec'93*

- Designed and implemented several Knowledge-Based Systems for the diagnosis and solution of problems in the Celorey and Tultitlán plants of CyDSA.
- Implemented an expert systems prototype generator. The input is knowledge in intermediate representation.
- Designed and implemented an intelligent tutor for employee training in the KMK tubing machine.
- Designed and implemented a high-level language for the definition of intelligent tutors.

Sanilock de Monterrey **Monterrey, Mexico**
Software Developer *Jan'92 – May'92*

- Designed and implemented a database system to manage quotations, invoices, inventory, and customers.

Additional Projects **Bloomington, IN**
Developer

- Developed three applications to help collect data for psychology research experiments. The applications repeatedly present the subject with different stimuli (sounds and/or pictures), and then record the subject's answer and/or reaction time. These applications were written in Java with Swing.
- Developed a simple iPhone application that makes use of the location service to help you find a desired location. Use of Cocoa and XCode.

Languages

Spanish: Native language

English: Bilingual proficiency

Skills

Core Competencies: Distributed Systems, High-Performance Computing, Fault-Tolerance, Scalable Infrastructure

Programming Languages: Scala, Python, C++, Java, C, Ruby, JavaScript, Scheme

ML/AI Tools: PyTorch (familiar), TensorFlow (familiar), CUDA (learning), Dataflow systems

Cloud/Infra: Docker, Kubernetes, Kafka, Hadoop, Hive, MapReduce, Jenkins, Linux

Performance Expertise: Profiling, Optimization, Concurrency, Load Balancing, Memory Management

Soft Skills: Collaborative communicator, analytical thinker, innovative problem-solver, continuous learner

Grants

- Indiana University Travel Grant. Computer Science. June 1998
- Conacyt Scholarship. Ph.D. Program. 1994–1997
- Conacyt Scholarship. M.Sc. Program. 1992–1994
- ITESM Scholarship. B.S. Program. 1987–1991