Sasha Krassovsky

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I'm an engineer passionate in designing and applying novel approaches to make programs run faster. I am interested in any of low-level optimization, heterogeneous computing, compilers, and distributed systems.

SingleStore
Seattle, WA
Software Engineer: Query Execution
June 2020 - Present

- **AVX-512 Prototype:** Designed and implemented a prototype of AVX-512-based query execution in SingleStore, a natively-distributed database engine used for both transactions and analytics. The prototype achieved up to 20% improvement on TPCH benchmark queries. Details regarding my experience can be found on my blog post.
- **GPU-based Query Execution:** Proposed and drafted a design for GPU-based query execution, winning an internal contest for so-called "moonshot ideas". Prototyped aggregation on GPUs in an internal hackathon achieving a 2.5x speedup over CPU execution, demonstrating the promise of this approach.
- **Regression Hunting:** Compared assembly code between old and new compilers, and provided necessary compiler hints (such as forcing inlining) to fix performance regressions.
- **Streamlined Columnstore Query Execution Codebase:** Proposed, designed, and implemented a significant refactor of core columnstore code, dramatically increasing maintanability and understandability.
- **Reading Group Lead:** Led discussions of cutting-edge academic papers on a variety of topics including GPU-based query execution, learned indices, and E-graphs.
- **Intern Mentor:** Mentored a summer intern who developed heuristics for various runtime decisions during query execution.
- **Interviewer:** Interviewed intern and new-grad candidates.

Facebook
Menlo Park, CA
Software Engineering Intern: Oculus Application Platform Team
June 2019 - September 2019

- **Swift Playgrounds on Windows:** Implemented an interactive programming environment on Windows mimicking Apple's Playgrounds. The program compiles and executes the input Swift code, and exposes an interface to develop UIs. Submitted patches to both the Swift compiler and LLVM. Source Code at github.com/save-buffer/swift-repl.

Bespoke Silicon Group
Seattle, WA
Undergraduate Researcher
March 2019 - June 2020

- **Hammerblade Manycore:** Created APIs for and tested a RISC-V Manycore CPU. Further, created highly optimized kernels for machine learning on the Manycore. Worked on compiler optimization to issue remote loads earlier.
- **Thesis: Exploring Single-Core Optimizations for Manycore Architectures:** Explored how I optimized kernels and details regarding my compiler optimization.

Husky Robotics
Seattle, WA
Software Team Lead
June 2018 - October 2019

- **Husky Robotics Software Team Lead:** Helped design and implement the software for a mars rover. Implemented a wide range of software from sensors to networking to inverse kinematics to computer vision. The team won 2nd place at the 2019 Canadian Rover Challenge.

MemSQL (now known as SingleStore)
Seattle, WA
Software Engineering Intern
Summer 2017 and 2018

- **Graphical Explain:** Created a browser-based visualizer of query plans generated by MemSQL, aiding engineers in understanding query plans and its bottlenecks, ultimately allowing for more efficient query tuning.
- **Vectorized Aggregation:** Designed and implemented algorithms for vectorized summation using AVX2. Achieved 1.8x speedup of queries involving summations, improving runtime of internal components by up to 20x.
- **Hash Join Optimization:** Implemented an optimization to improve performance of hash joins involving integer keys by 2x, a key usecase for star-schema workloads.

Microsoft
Redmond, WA
High School Intern
June 2016 - August 2016

University of Washington
Overall GPA: 3.70
Seattle, WA
BS Computer Science with Honors
In-Major GPA: 3.76
June 2020
BS Discrete Mathematics
In-Major GPA: 3.62
June 2020

Coursework

- **Algorithms:** Proof-based class focusing on using existing techniques to create and prove new algorithms.
- **Digital Circuit Design:** Project-based clsas focusing on introducing the basics of Verilog and FPGAs. Created a clone of Dance Dance Revolution on an FPGA using an LED matrix and four pushbuttons.
- **Deep Learning on Coursera:** Introductory online machine learning course taught by Andrew Ng. Homework done in Python, with a combination of hand-written and premade machine learning software.
- **Embedded Systems:** Project-based class focusing on the creation of an embedded operating system. Created a medical device using Arduino running a custom scheduler and task queue system.
- **Stanford Compilers on Coursera:** Introductory online compilers course taught by Prof. Alex Aiken. Implemented a compiler for COOL (Classroom Object-Oriented Language) targetting MIPS.
- **3D Graphics at DigiPen Institute of Technology:** Summer class introducing 3D Graphics, first algebraically and then using linear algebra. Implemented a 3D Graphics pipeline from scratch in C (starting only with a SetPixel function) which draws colorful cubes, and allows the user to rotate the camera.

Accomplishments

- **2017 ACM ICPC Regionals Qualifier:** Won 6th place at the UW ACM ICPC competition on team MATLAB Indexers, qualifying for regionals.
- **Hunt the Wumpus Alumni Challenge 2016 Winner:** Programmed a game in C# from scratch and was selected by a panel of judges as the winner for having the most polished and most entertaining game. Available at github.com/save-buffer/ShooterGame

Projects

- **Robotics Algorithms:** Computer vision and inverse kinematics algorithms written for use by the Husky Robotics team. Computer vision can locate tennis balls in an image and segment a keyboard into keys. The inverse kinematics algorithm was created by myself and another member of the team and implemented by me. Available at github.com/save-buffer/robot_cv, github.com/save-buffer/UseArm
- **Slang:** Compiler for a low-level functional declarative language (like Erlang) written in C. Available at github.com/save-buffer/slang
- **SashCopter:** An attempt at controlling a drone using an EEG Headset. Main drone control software is written. Mind-controlled aspect deemed unsuccessful due to the lack of resolution on the headset. github.com/save-buffer/SashCopter