Itamar Gal, Ph.D.

Software Developer and Data Engineer

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SKILLS

- **Mathematical Research** – abstract algebra, computational topology, and applied algebraic geometry and representation theory.
- **Programming and Software Development** – Python & Bash (~7 years), C & SQL (~3 years), JavaScript (~2 years)
- **Linux Systems and Network Administration** – GNU user-space, iproute2, OpenSSH and OpenSSL, Apache Web Server, etc.
- **DevOps and IT Automation** – Git and Gitlab, VirtualBox, Docker, etc.

EXPERIENCE

DXC Technology

Title: Data Engineer

October 2018 - PRESENT

- **Data Analysis** – Implemented HEDIS (Healthcare Effectiveness Data and Information Set) quality assessment metrics using SQL and Python with the Vertica relational database system.
- **Process Automation** – Wrote orchestration tool to coordinate generation of interdependent tables for Vertica in a production environment.
- **Text Processing** – Wrote a text-processing tool in Python to extract semi-structured data from PDF documents to import into Vertica.
- **Developer Support** – Helped with training and on-boarding of new developers, specifically in using Linux, Python, Git, and GitHub.
- **ETL** – Implemented custom data pipelines (using Python and SQL) taking data from text dumps, to relational databases, to XML files, to PDF generation.
- **DevOps** – Implemented continuous integration and continuous deployment using GitHub.

Applied Research Laboratories – Space and Geophysics Lab

Title: Engineering Scientist (Information Systems Engineering Specialist)

June 2017 - October 2018

- **Data Archiving Software** – wrote Python library to aggregate, process and support analysis of mission-critical, multi-terabyte HDF5-based data-lake.
- **Secure Sensor Networks** – employed OpenSSH and OpenSSL PKI infrastructure to secure networks of SBU-based data collection hardware.
- **Data Migration** – Wrote Python ETL tools to migrate several years of data from legacy internal databases into vendor-compatible systems.

Center for Transportation Research – Network Modeling Center

Title: Research Associate

May 2014 - June 2017

- **Traffic Simulation Software Development** – developed several components for a legacy traffic simulator which was written in C/C++, Java, and Python, and which used a heterogeneous data backend including custom binary data formats and a network-graph format implemented in PostgreSQL.
- **Systems Administration** – managed all in-house IT infrastructure for NMC (all running on Linux - CentOS and Ubuntu), including compute servers, storage servers, back-up servers, and PostgreSQL database servers.
- **DevOps and Application Support** – managed LXC containers for containerization, an in-house GitLab instance for version control, an Apache Web Server instance for web applications, and an R Shiny server for data dashboards.
- **Network Architecture** – spearheaded collaborative project with TACC (Texas Advanced Computing Center) and ATD (Austin Transportation Department) in order make live video from ATD available to TACC and the general public for use in computing traffic counts and related information using open-source software.
- **Smart City Challenge** – co-led the City of Austin's data architecture team in the design and presentation of a data-lake solution (branded the *Data Rodeo*) as part of the national Smart City Challenge sponsored by the United States Department of Transportation (USDOT).
- **Open Data** – initiated and co-led successful public outreach effort (ATX Hack the Traffic) in which real-time Bluetooth and WiFi traffic data was made available to the general public, and led teams of volunteer "hackers" on data-analysis projects.

Mathematics Department – University of Texas

Title: Graduate Research Assistant

September 2007 - May 2014

- **Abstract Algebra** – worked on applications of finite group theory to problems in algebraic number theory, including use of the GAP System for Computational Discrete Algebra and the Python-based SAGE computer algebra system.
- **Computational Topology** – developed experimental algorithms in the computation of persistent homology and implemented them in Python and C/C++.
- **Applied Math** – researched applications of algebraic geometry and representation theory to the problem of orientation determination in cryo-electron microscopy, including numerical methods for noise-reduction such as PCA for matrix operators.

EDUCATION

University of Texas, Austin - *Ph.D. in Mathematics*

Granted May 2016

University of Texas, Austin - *Masters in Mathematics*

Granted May 2015

State University of New York, Stony Brook - *B.S. with a Double-Major in Pure and Applied Mathematics*

Granted May 2007

RESEARCH PAPERS AND ACADEMIC PUBLICATIONS

D. Allcock, I. Gal, A. Mark, ***The Conway-Sloane calculus for 2-adic lattices***, (Published in Transactions of the American Mathematical Society).

A. Blumberg, I. Gal, M. Mandell, and M. Pancia, ***Persistent Homology for Metric Measure Spaces***, (Published in Foundations of Computational Mathematics).

I. Gal and B. Grizzard, ***On the compositum of all degree d extensions of a number field***, (Published in Journal de Theorie des Nombres de Bordeaux).

RESEARCH FELLOWSHIPS

Algorithms in Topological Data Analysis

September 2010 - January 2012

Advisor: A. Blumberg, UT Mathematics Department

Multivariate Factorization Algorithms Over Finite Fields

May 2010 - August 2010

Advisor: F. Voloch, UT Mathematics Department

RTG Research Fellowship in Geometry

September 2007 - August 2008

UT Mathematics Department