Daniel M. Drucker, Ph.D. <dmd@3e.org>

Unix, Python, DevOps, ETL, human factors, neuroimaging, robots, data analysis. Boston.

SKILLS AND KNOWLEDGE

Operating systems: Linux (primarily Debian/Ubuntu and Red Hat/CentOS) MacOS X, and Windows – as a user, developer, and administrator. Some experience with Solaris and AIX.

Programming languages: Strongest in Python and Unix shell scripting (bash, ksh), and the standard Unix toolchain in general; I have no trouble picking up new languages. I have in the past written in Matlab, Tcl/Tk, Perl, PHP, and C; I have contributed fixes to open source software in other languages as needed.

Databases: RDBMSs such as SQLite, Postgres and MySQL; some experience with NoSQL.

Infrastructure: AWS (EC2, S3), GCS, Azure. Docker and other containerization solutions. Git, Subversion, Jenkins, Travis CI.

EMPLOYMENT

McLean Hospital Belmont, MA 2019 –
Harvard Medical School / Mass General Brigham
Director of IT – McLean Imaging Center
Associate in Psychiatry – Harvard Medical School

- Manage and monitor the MIC Core and Clinical Services common IT infrastructure, including storage, backup, and networking.
- Manage and monitor the MIC Clinical infrastructure, including OsiriX, PACS, and legacy RIS.
- Manage and monitor research computing including the Red Hat and Bright/SGE based HPC cluster.
- Oversee desktop support staff.
- Assist researchers with data analysis and software toolchain development.
- Study researchers' workflows and suggest and implement improvements.

At McLean, I have:

- Implemented robust enterprise-grade backup systems using Bacula, Veeam, and ZFS on disk and tape backends which are capable of recovering from disk, machine, and whole-site failures via on- and off-site replication.
- Implemented Zabbix-based server and process monitoring, enabling observability and real-time notification of hardware and software failures, including automated prediction of future problems using predictive models on trend data.
- Designed and delivered automated analysis pipelines for fMRIPrep, allowing researchers to describe their analysis needs in a declarative YAML file, creating reproducible analysis runs over multiple participants.
- Kept our research computing cluster updated with the latest imaging software and system software.
- Greatly reduced hardware inventory by virtualizing most services.
- Managed the transfer of our local imaging storage from proprietary and non-scalable OsiriX to open-source XNAT and Orthanc, including creating reproducible Docker Compose files for all infrastructure, and implementation on TrueNAS and ProxMox backends. Implemented the ETL pipeline for the lossless transfer of existing images, metadata, and user records to the new system.

Ab Initio Software Lexington, MA 2016 – 2018
Internal Consultant

- Supported clients, including many of the Fortune 50, in their use of the Ab Initio ETL software including the GDE, Co>Operating System, Control Center, Metadata Hub, and underlying systems.
- Built software solutions on Linux, Solaris, and AIX ranging from low-level system utilities to high-performance data processing engines operating over data warehouse systems spanning tens of thousands of database tables and hundreds of petabytes of data.
- Implemented systems to provide data lineage traceability and provide build systems that supply reproducible reporting to end users.
- Taught internal classes in the use of our technologies and developed additional teaching materials to enhance existing classes.

- Managed and helped develop the internal proprietary Help system as well as its open source (nginx and Tomcat) components.
- Developed and maintained internal-facing dashboards, both web-based and using custom designed hardware based on the Raspberry Pi and Arduino platforms, which helped teams visualize the current support workload and notify responsible parties of new work.
- Started and managed a lecture series, "Brainfood", wherein my coworkers presented interesting scientific concepts, their thesis work, or anything else they find fascinating. There have been 14 lectures to date, including topics ranging from "General Anesthesia Makes No Sense" and "Nuclear Research Reactors" to "Universal Categories and Sign Theory" and "Galaxy Cluster Mergers".

Interactive Motion Technologies Watertown, MA 2012 – 2016
Scientist, Software Architect

- Developed software (Python, bash, Tcl/Tk, and C, on Linux) for FDA and CE certified robots that assist stroke and other patients with rehabilitation.
- Worked with clinical staff to design treatment protocols and translate these into products.
- Made sure the robots followed Asimov's First Law of Robotics by implementing multiple redundant safety systems including software- and hardware-based power-off systems triggering on logical, electrical, and mechanical faults, with hard real time (<1 ms) decision time requirements.
- Rewrote tens of thousands of lines of legacy Tcl/Tk code in (much less) Python
- Developed software in C for an Atmel microcontroller, replacing the PLC in a new product line
- Developed robot mechanical dynamics simulations in Jupyter/IPython Notebook
- Rewrote the central Xenomai-based real-time robot control loop to use a CANbus architecture
- Redesigned software deployment mechanism, which had been based mostly on manual instructions and loose collections of shell scripts, to use modern Debian packages and containerization
- Mentored junior programmers and interns

Design Science / Core HF Philadelphia, PA 2010 – 2012
Usability Specialist

- Heuristic analysis, usability testing, statistics, data analysis, and background research in the service of medical device usability and safety, including human factors testing for regulatory approval.
- Applied principles of human psychology and cognitive performance to improving usability.

AT&T Easylink, TransactPlus/JP Morgan, Bristol-Myers Squibb 1999 – 2002
Lead, Network Operations; Systems Analyst
At these three positions:

- Developed tools in Perl and shell to monitor Unix systems and networks.
- Supported Unix systems providing financial and other messaging services to 100,000+ customers in a high availability environment.
- Created formal documentation of procedures that had previously been passed down orally.

EDUCATION

University of Pennsylvania
M.A. 2006; Ph.D. 2009, Psychology (cognitive neuroscience).
Thesis: Neural Object Representation Spaces and their Metric Properties

I showed a new method of computationally modeling and analyzing functional neuroimaging data using multidimensional scaling-like methods. Code (primarily Matlab) written for my dissertation is available at `http://github.com/dmd/thesis`.

I wrote tools in Python and Matlab to manage long-running computation jobs and the operation of the Penn Center for Functional Neuroimaging cluster, and created a calendaring system, still in use, to manage MRI reservations with complex business process requirements. I additionally took coursework in the theory of human decision-making: the science of how and why people and organizations make mistakes, and how to overcome these mistakes and make rational decisions instead.

Rutgers University
B.A., 2003, Psychology; Certificate in Cognitive Science

KEY PAPERS

Drucker DM, Kerr WT, Aguirre GK. 2009. *Distinguishing conjoint and independent neural tuning for stimulus features with fMRI adaptation*. J Neurophysiology. `http://3e.org/paper/dci`

Drucker DM, Aguirre GK. 2009. *Different spatial scales of shape similarity representation in lateral and ventral LOC*. Cerebral Cortex. `http://3e.org/paper/scale`

EXTRAS

I am a licensed pilot and fly small sport aircraft; I contribute to numerous open source projects; I contradance and participate in other folk music events.

I have managed my own mail and other network services on Linux at `3e.org` for more than 25 years. I have been using, programming, and administering Unix since 1991.