David W. Dykstra

37W645 Heritage Dr, Batavia, IL 60510
(630) 264-0296 / dwd@drdykstra.us

Career Summary

Distinguished Software Engineer with excellent technical leadership skills and a strong academic background in Computer Science and Computer Engineering. Excels at identifying what needs to be done and making it happen. Areas of expertise include tool development and support, open source software, software distribution, computer security, software development methodologies, software development environments, software architecture, clustered computing for reliability and high performance, dynamic object-oriented programming, embedded real-time operating systems, device drivers, system administration, VxWorks, and Unix/Linux.

Professional Experience

Fermi National Accelerator Laboratory, Batavia, Illinois 2006-present

Software Professional

- Integrated and hardened software and servers for distributing calibration data for the CMS detector of the new LHC particle collider being built at CERN in Geneva, Switzerland. See frontier.cern.ch
  - Greatly improved the performance of the world-wide data distribution, between two and five orders of magnitude.
  - Configured and maintained Linux servers at CERN and Fermilab, in high-availability configurations.
- Supported the CernVM File System for the Open Science Grid, and contributed a significant amount of code to the project.
- Member of the Open Science Grid Security team, including a time of OSG Security Officer.
- Developed client tools for obtaining X.509 certificate proxies and OIDC security tokens.
- Supported the Singularity container tool for the Open Science Grid.
- Worked primarily in C, C++, Java/EGEE/Tomcat, Python, Go, and bash.

CMC Electronics, Sugar Grove, Illinois 2003-2006

Software Engineer

- Supported and expanded VxWorks Board Support Package for PowerPC- and PCI-based mission computer.
- Wrote and/or supported VxWorks device drivers for RS422, ethernet, flash filesystem, event logging, 3d graphics controller, and Built-In-Tests.
- Member of the architecture team for the next generation mission computer product.
- Fixed bugs and added features to Head-Up-Display application for military trainer airplane.
- Administered and expanded Solaris and Linux Servers including setting up a Linux-HA high availability file server pair.
- Administered Mac OS X desktops for software group.
- Administered portions of the company network including the DNS servers.

Lucent Technologies, Naperville, Illinois 1996-2003

Distinguished Software Engineer in the Switching Division

Revitalized the 'Exptools' project, which provides automated updates for a large set of critical R&D software tools throughout Lucent, and led the project for six years with the following results:

- Saved the company over $20 million annually according to conservative estimates.
- Measured that the tools were used by by tens of thousands Lucent R&D users.
- Achieved greater than 99% user satisfaction in annual surveys and received numerous comments about the excellence of the support and indispensable nature of the tools.
- Convinced management at the beginning of the Exptools revitalization to supply funding for a full-time administrator, and then accepted the position; previously it was entirely run by volunteers.
- Redesigned and rewrote the distribution system, based on many open source tools, in such a way that it greatly improved security and greatly simplified both administrative and tool provider tasks.
- Recruited volunteers from all over Lucent to provide new tools, mostly open source.
- Procured funding from multiple Lucent divisions and two other companies, and led an Exptools team that supported the distribution system and many of the tools.

- Sought and received permission to make many of the tools, both open source and Lucent-owned, available to the internet.

During the same time period, also participated in many other activities with far-reaching impact:

- Ran the popular open source 'rsync' project for the whole internet for about a year.
- Frequently assisted and advised other employees from all around Lucent regarding their tool problems so they could quickly be more productive.
- Specialized in the open source security-related tools SSH and GnuPG inside Lucent, including support of SSH for all the thousands of Unix computers that IBM administered for Lucent.
- Co-founded the technical leadership group in the Switching division which increased the impact the Distinguished Software Engineers had on the business and kept them informed.
- Co-founded and led the Lucent-wide Technical Platform Security team which focused on improving R&D computer security and on communication between R&D and Corporate Security, resulting in a number of recommendations to improve security.
- Founded the Lucent Linux on the desktop initiative, and provided technical guidance and direction for the IBM/Lucent Linux Initiatives.
- Provided primary leadership for the most active Linux User's Group in Lucent. Brought in speakers from many different companies for monthly meetings.
- Tracked many new developments in the software industry, including participating in the Internet Engineering Task Force (IETF).

AT&T, Naperville, Illinois 1992-1996
Software Engineer in the AT&T internal contracting firm called Resource Link

- Contract with the 5ESS (Number 5 Electronic Switching System) Software Engineering Technology Team. Developed a Domain Engineering Application Engineering Environment for layer 4 call processing signaling and protocol translation, written in Smalltalk. Reviewed architectures of other projects as an object-oriented software expert.
- Contract with AT&T Network Systems. Developed several subsystems and made performance enhancements for a ATM (Asynchronous Transfer Mode) controller that was based on the CLOS (Common Lisp Object System) language and computer boards running VxWorks. In early 1995 the product was decided to be redesigned based on old 5ESS hardware, but I spearheaded an effort to instead change the architecture so that the control computers would be standard Sun workstations. That architecture was later accepted.
- Contract with NCR Columbia. Made windowing host software for Teletype terminals into a supported product on NCR Unix computers. Persuaded NCR to use easier to support application-level software instead of the previous driver-based software.
- Contract with NCR Florida. Converted a Unix curses-based 3270 synchronous terminal emulation package to X/Motif.

Memorex-Telex Corporation, Naperville, Illinois 1990-1991
Software Engineer in Synchronous Terminal Products Division (*remote half-time)*

- Invented a fast interprocess communication protocol for their terminal system's proprietary operating system.

AT&T Teletype, Skokie, Illinois 1983-1990
Software Engineer in the Synchronous Terminal Products Division
(full time at first, remote half-time from Champaign, Illinois, beginning 1988 while pursuing a Ph.D.)

- Developed software for Z80, 80186, and 80386 microprocessor-based terminal systems, cross compiled from UNIX, and developed UNIX-based development environment tools.
- Wrote device drivers and windowing system for the synchronous terminal product's proprietary operating system.
- Brought Exptools to Teletype and provided several Exptools.

Computer Skills

Languages: Expertise with C, C++, Java, Python, Go, Tcl/Tk, bash, awk, SmallTalk, CLOS, Scheme, ICON, Assembler

Operating Systems: Expertise with Unix/Linux, MacOS, VxWorks.

Education

Ph.D. in Computer Science, University of Illinois at Urbana-Champaign. GPA = 5.0/5.0
Specialization: Object-oriented Embedded Operating Systems. Thesis work involved object-oriented inheritance across protection boundaries in the C++-based *Choices* operating system.
M.S. in Computer Science, Illinois Institute of Technology, Chicago, Illinois. GPA = 3.9/4.0
Master's project was a compiler for a language called Low-Level ICON, a C-like language with the backtracking constructs of ICON.
B.S. in Computer Engineering, University of Illinois at Urbana-Champaign. GPA = 5.0/5.0

Publications

- Dave Dykstra, Brian Bockelman, Jakob Blomer and Laurence Field, "The Open High Throughput Computing Content Delivery Network", CHEP 2018, *EPJ Web Conf.* **214 (2019)** 04023 https://doi.org/10.1051/epjconf/201921404023
- Michal Svatos, et. al., "Understanding the evolution of conditions data access through Frontier for the ATLAS Experiment", CHEP 2018, *EPJ Web Conf.* **214 (2019)** 03020 https://doi.org/10.1051/epjconf/201921403020
- Kenneth Herner, et. al., "Advances and enhancements in the FabrIc for Frontier Experiments project at Fermilab", CHEP 2018, *EPJ Web Conf.* **214 (2019)** 03059 https://doi.org/10.1051/epjconf/201921403059
- Derek Weitzel, Brian Bockelman, Dave Dykstra, Jakob Blomer and Rene Meusel, "Accessing Data Federations with CVMFS", CHEP 2016, *J. Phys.: Conf. Ser.1742-6596* **898** 062044 https://doi.org/10.1088/1742-6596/898/6/062044
- L Bauerdick, et. al., "Experience in using commercial clouds in CMS", CHEP 2016, *J. Phys.: Conf. Ser.1742-6596* **898** 052019 https://doi.org/10.1088/1742-6596/898/5/052019
- K Herner, et. al., "Advances in Grid Computing for the Fabric for Frontier Experiments Project at Fermilab", CHEP 2016, *J. Phys.: Conf. Ser.1742-6596* **898** 052026 https://doi.org/10.1088/1742-6596/898/5/052026
- D Dykstra, J Blomer, B Blumenfeld, A De Salvo, A Dewhurst and V Verguilov, "Web Proxy Auto Discovery for the WLCG", CHEP 2016, *J. Phys.: Conf. Ser.1742-6596* **898** 052026 https://doi.org/10.1088/1742-6596/898/5/052043
- J Teheran, D Dykstra, and M Altunay, "Bringing Federated Identity to Grid Computing", in Proceedings of the 11th Annual Cyber and Information Security Research Conference CISRC '16, article No. 10, ACM, 2016 http://dx.doi.org/10.1145/2897795.2897807
- D Box, et. al., "Progress on the Fabric for Frontier Experiments Project at Fermilab", CHEP 2015, *J. Phys.: Conf. Ser.* **664** 06240 http://iopscience.iop.org/article/10.1088/1742-6596/664/6/062040
- D Dykstra, B Bockelman, J Blomer, K Herner, T Levshina and M Slyz, "Engineering the CernVM-Filesystem as a High Bandwidth Distributed Filesystem for Auxiliary Physics Data", CHEP 2015, *J. Phys.: Conf. Ser.* **664** 042012 http://iopscience.iop.org/article/10.1088/1742-6596/664/4/042012
- D Dykstra and J Blomer, "Security in the CernVM File System and the Frontier Distributed Database Caching System", CHEP 2013, *J. Phys.: Conf. Ser.* **513** 042015 http://dx.doi.org/10.1088/1742-6596/513/4/042015
- G Garzoglio, et. al., "Big Data over a 100G Network at Fermilab", CHEP 2013, *J. Phys.: Conf. Ser.* **513** 062017 http://dx.doi.org/10.1088/1742-6596/513/6/062017
- P Kreuzer, et. al., "Opportunistic Resource Usage in CMS", CHEP 2013, *J. Phys.: Conf. Ser.* **513** 062028 http://dx.doi.org/10.1088/1742-6596/513/6/062028
- A Valassi, et. all., "CORAL and COOL during the LHC long shutdown", CHEP 2013, *J. Phys.: Conf. Ser.* **513** 042045 http://dx.doi.org/10.1088/1742-6596/513/4/042045
- J Adelman, et. al., "CMS computing operations during run 1", CHEP 2013, *J. Phys.: Conf. Ser.* **513** 032040 http://dx.doi.org/10.1088/1742-6596/513/3/032040
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- Dave Dykstra, et. al., "Identifying Gaps in Grid Middleware on Fast Networks with the Advanced Networking Initiative", CHEP 2012, *J. Phys.: Conf. Ser.* **396** 032034 http://dx.doi.org/10.1088/1742-6596/396/3/032034

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