Mark Montague's Resume

An updated, interactive version of this resume with controllable levels of detail is available at

https://markmont.github.io/resume/?role=hpc

Highlight Mark's experience as a **High Performance Computing Consultant**

Overview

If you are looking for a technical lead for High Performance Computing services who has a broad background and a researcher-centered philosophy of continuous improvement, I am an excellent choice.

- I currently provide support for a shared cluster consisting of 22,724 cores / 1,371 nodes
- I have managed four HPC clusters totaling 182 nodes.
- I performed a major rewrite and deployment of a web-based service from the University of Texas that allows researchers using HPC clusters to easily access scientific applications and interactively collaborate with colleagues.
- I write custom HPC support and management scripts (flux-utils, fluxaaa) to improve functionality for researchers and reduce the number of support tickets.
- I write training materials, provide one-on-one instruction to faculty and graduate students, and I have proctored HPC workshops.

I have an extensive background in IT support for research.

Big Data / Hadoop	**OpenMP, pthreads**	**Fortran**
GPU acceleration	**MATLAB**	**C, C++**
Bioinformatics	**Scientific Python**	**Java**
Cluster management	**R**	**XSEDE**
HPC service delivery	**Julia**	
OpenMPI, MPICH	**Perl**	

Award-winning excellence

Winner of the 2015 Robin Sarris Outstanding Individual Employee Award for the College of Literature, Science, and the Arts at the University of Michigan.

Winner of a Fall 2015 Staff Spotlight Award for the College of Literature, Science, and the Arts at the University of Michigan.

A broad and solid foundation

One of the many strengths I will bring to your organization is as a generalist who has deep experience in a large variety of areas. You will get more innovative solutions, more flexibility, and more agility in the face of changing business requirements, all at a lower overall cost.

- Formal computer science education
- Management
- Project management
- DevOps
- End user support & CRM
- Security
- Web infrastructure & development
- Service integration & development
- Regular open source contributor
- Communications

Skills

Operating systems

I have extensive systems administration experience under:

Linux Expert
- **Fedora 24**
- **RHEL 5, 6, 7**
- **Ubuntu**
- **Linux From Scratch**

MacOS X

Solaris, SunOS

HP-UX

AIX

Microsoft Windows

Programming

I am proficient in the following programming languages:

C Expert

C++

Perl 5 Expert

Perl 6

PHP (including writing extensions and fixing PHP interpreter bugs) Expert

Python

- **JavaScript ES6**
- **Bourne shell, bash** Expert
- **csh / tcsh**
- **R**
- **Java**
- **Fortran**
- **Assembly**

Web technologies

Being skilled in many different web technologies allows me to recommend the best solutions and be effective regardless of what technologies are already in place.

- **HTML 5**
- **CSS3, Sass/SCSS**
- **JavaScript (ES6)**
- **XML, XSLT**
- **TLS / SSL**
- **Web Single Sign On** Expert (OpenID Connect, OAuth, Shibboleth, and cosign)
- **Web multi-factor authentication** Expert (including X.509, OATH TOTP / Google Authenticator, Shibboleth, and cosign)
- **Social media integration** (Google, Facebook, GitHub, Twitter APIs)
- **PHP** Expert
- **Node.js** (Express, Bower, Gulp, Grunt, npm)
- **Python**
- **Perl** Expert
- **Bootstrap 4** Expert
- **JQuery**
- **Electron**
- **Web security** Expert
- **JSON**
- **YAML**
- **Apache HTTP Server** Expert (including mod_php, mod_perl, writing custom modules, and fixing bugs)
- **FastCGI** (PHP-FPM, mod_proxy_fcgi) Expert
- **Unicorn**
- **Apache Tomcat**
- **Databases** (MariaDB / MySQL, PostgreSQL, MongoDB, Redis, Oracle, memcached, SQLite, and Microsoft SQL Server)
- **Amazon Web Services**

Web applications

I am an expert at securely hosting and administering web applications at enterprise scale with enterprise reliability.

- **WordPress** Expert (including writing plugins and themes)
- **Drupal**
- **Mediawiki**
- **Custom (in-house) web apps**

HPC technologies

I have worked with and supported the following High Performance Computing technologies:

Cluster schedulers (Moab, Maui)

Cluster resource managers (TORQUE)

MPI (OpenMPI, MPICH, MVAPICH2)

OpenMP

pthreads

CUDA (NVIDIA Tesla GPU accelerators)

Intel Xeon Phi

Big data (Hadoop / HDFS)

Globus Toolkit

HPC applications

I have provided support for hundreds of scientific computing software packages and languages on High Performance Computing clusters.

MATLAB

R

Scientific Python (numpy, scipy, biopython, matplotlib)

NCBI BLAST

yt

Lumerical FDTD Solutions

IDL

DS9

Lenstool

Julia

Perl

Fortran

C, C++

Java

XSEDE

Security

I have extensive security skills. I believe that good security is the responsibility of all IT staff, not just security specialists.

X.509 certificates

TLS/SSL

SELinux Expert
(including writing new policies and local policy customization)

iptables / Netfilter (including outbound traffic filters)

PCI DSS

Web single sign on Expert

- **OpenID Connect**
- **OAuth**
- **Shibboleth**
- **cosign**

Multi-factor authentication

- **X.509**
- **OATH TOTP**
- **Duo**
- **EMC/RSA SecureID**

One-time passwords (OPIE, OATH HOTP, S/Key)

Kerberos

LDAP

OWASP

Vulnerability assessment

Incident management

DevOps

I have experience with many DevOps technologies.

- **Docker**
- **Red Hat Satellite Server** (provisioning, configuration management)
- **Kickstart** (including fixing pykickstart bugs) Expert
- **Revision control** (git, Mercurial, SVN, CVS, RCS)
- **Radmind, Synctree** (configuration management and playbooks)
- **Amazon Web Services** (EC2, S3, Glacier)
- **Linode API**

Services

I have experience running the following services at enterprise scale with enterprise reliability:

- **Apache HTTP Server** Expert
  Including module development and local feature patching.
- **MariaDB / MySQL**
- **VMWare**
- **Xen**
- **Postfix**
- **Sendmail**
- **NFS** (v3 and v4)
- **OpenAFS**
- **Kerberos 5**
- **ISC BIND**
- **ISC DHCP**
- **Cyrus IMAPd**
- **license servers** (FlexLM and others)
- **FastCGI** (PHP-FPM, mod_proxy_fcgi)
- **Apache Tomcat**
- **FootPrints**

Databases

I have administered database servers, performed database administration, and written code for the following databases:

- **MariaDB / MySQL**
- **PostgreSQL**
- **MongoDB**
- **Redis**
- **Oracle**
- **memcached**
- **SQLite**
- **Microsoft SQL Server**

Business

An IT expert with strong business and leadership skills is much more versatile and valuable than just an IT expert.

- **Hiring / Recruiting**
- **Performance management**
- **Mentoring**
- **Conflict resolution**
- **Team building**
- **Managing organizational change**
- **Budgeting**
- **Report writing**
- **Proposal writing**

Strategic planning

Knowledge management

Continuity / disaster recovery planning

Customer Relationship Management

Continuous improvement Expert

Experience

Research Computing Consultant **September 2011 - present**
LSA IT Advocacy and Research Support Team
The University of Michigan

I provide supercomputing support to 822 researchers in the College of Literature, Science, and the Arts at the University of Michigan.

- I provide support for a shared cluster consisting of 22,724 cores / 1,371 nodes.
- I am the architect, project manager, technical lead, and programmer for deployment of the ARC Connect service. ARC Connect allows researchers to easily access scientific applications and interactively collaborate with colleagues on HPC clusters belonging to the University via a simple to use web-based interface. Major changes that I implemented include:
  - I designed and implemented a new authentication system based on Shibboleth (with mandatory multi-factor and InCommon/eduGAIN federation support) and OpenID Connect. This included writing a new Globus Toolkit user mapping module.
  - I designed and implemented a new port forwarding architecture that supports up to 99 VNC or X sessions per node while using a limit number of TCP ports efficiently and scalably.
  - I locally patched the TurboVNC server code to require mandatory VNC session encryption while being flexible in terms of which layer the encryption was occurred at (at the VNC layer via the TLSvnc security type, via websockets with HTTPS, or via SSH tunneling), meeting the business requirement for the service while preserving ease of use and choice of VNC client for researchers.
  - I implemented support for multiple concurrent ARC Connect VNC sessions, and rearchitected the service to allow sessions to follow researchers across multiple devices and networks.
  - I made several major security improvements, including rearchitecting websocket support to avoid exposing web server private TLS keys to researchers, and implementing reverse proxying to enforce encryption and multi-factor authentication for web-based ARC Connect sessions (Jupyter and RStudio Server).
- I provide scientific programming consulting for MATLAB, R, Python, Perl, Fortran, C/C++, and Java.
- I provide scientific application support for over 497 different scientific software packages.
- I provide support and consulting for NVIDIA GPGPUs (CUDA) and Intel Xeon Phi (MIC).
- I collaborate with other HPC support staff across campus in order to provide a unified, campus-wide, users-first support experience for researchers.
- I have administered cluster schedulers (Moab/Maui) and cluster resource managers (TORQUE).
- I have proctored High Performance Computing workshops (HPC 100, HPC 101, HPC 201, and HPC 470).
- I administered two college-level HPC clusters totaling 150 nodes.
- I wrote a proposal for a GUI-based cluster interface to dramatically reduce the learning curve for social scientists and humanists to start using HPC clusters and I implemented two proof-of-concept prototypes.

I provided research computing support for the Department of Astronomy, half time, March 2013 - November 2015.

- I provided research IT support to 62 faculty/visitors and 32 graduate students.
- I supported 201 end user computers plus 7 servers.
- I supported Astronomy-specific software packages including IDL, IRAF/Pyraf, DS9, yt, Lenstool, wcstools/wcslib,

and cfitsio.
- I supported the Department of Astronomy instructional computer labs.
- I provided data management, backup, and data recovery services.
- I provided planning and support for 10 Gbps networking.
- I provided Wireless network troubleshooting and support.
- I made proposals for improving IT services and reducing costs.

I was a senior system administrator managing Linux infrastructure for the College of Literature, Science, and the Arts, September 2011 - August 2012.

- I managed 45 Red Hat Enterprise Linux and Solaris x86 servers.
- I administered Red Hat Linux Satellite Server for the University as a whole; the Satellite Server managed approximately 1,100 Linux workstations and servers.
- I administered web servers (Apache HTTP Server, Apache Tomcat, Unicorn) and various instructional and administrative web applications written in PHP, Python, Ruby, and Java.
- I administered backup services including IBM TSM, and rsync with ZFS).
- I administered a license server triad (FlexLM and others) serving licenses for over 50 university-wide software titles.
- I administered virtualization farms, including Red Hat Enterprise Virtualization with a local Storage Area Network, Xen, and VMWare.

I organized monthly in-person professional development / training sessions for University IT staff, 2011 - 2013.

Winner of a Fall 2015 LSA Staff Spotlight Award.

Winner of the 2015 Robin Sarris Outstanding Individual Employee Award.

Sabbatical **August 2010 - September 2011**
Ann Arbor
Michigan

- I wrote a proof-of-concept log analysis program to solve the "swatch rule set problem" by applying Longest Common Subsequence analysis to tokens derived from individual "words" from a log file entry. This solution takes most of the work out of rule set creation and maintenance, making it much more feasible to tightly monitor log events for anomalies.
- I worked extensively with Fedora Linux, with a focus on configuring and managing it for use on servers (service management, advanced firewall configuration, configuration management, log management, monitoring, tripwire, reporting, security lock down and auditing, eliminating traditional password based authentication, and creating SRPMs for local software packages).
- I wrote several new SELinux policy modules, mastered SELinux packet labeling, and gained experience with running servers with no unconfined users. I wrote a netfilter (iptables) module for matching packets based on SELinux contexts.
- I worked extensively with the alpha and beta releases of Apache HTTP Server 2.4. I provided support for Apache HTTP Server on the users@httpd.apache.org mailing list. Submitted six patches for Apache HTTP Server trunk to fix various bugs, mostly related to mod_proxy_fcgi.
- I worked extensively with PHP, especially with the PHP-FPM SAPI for FastCGI. Submitted two patches against PHP 5.3.x branch and did a major experimental rewrite of the PHP-FPM code that sets up the PHP environment for requests. I also worked on the APC PHP cache and Suhosin.
- I gained hands-on experience with WordPress. I used FastCGI (mod_proxy_fcgi + PHP-FPM) for privilege separation, used OpenID and OAuth 2.0 for user authentication and transparent registration, wrote a WordPress plugin for custom Facebook functionality (and learned the Facebook Graph API), and made significant changes to a WordPress plugin for Twitter integration.
- I gained hands-on experience with Drupal and updated my Drupal skills to Drupal 7: I used FastCGI (mod_proxy_fcgi + PHP-FPM) for privilege separation and explored workflow and revisioning in Drupal 7.

- I learned Perl 6, experimenting with Rakudo extensively. I followed Perl 6 and Rakudo development closely.
- I learned Python 2.x and 3.x. I created a Python web application as a proof of concept for an OPIE-based one time password web authentication solution to eliminate the need to use traditional passwords.

Manager
March 2010 - July 2010

ITS Enterprise Email & Collaboration Technologies Team
The University of Michigan

I was the interim manager of the team during the latter part of the ITS service reorganization. The Enterprise Email team was a vertically-integrated team responsible for all aspects of service design, service operations, service support, and user support for the services it provided.

- I managed seven full-time staff, including managing team meetings, work planning, professional development, performance reviews, and coaching.
- I provided a portfolio of 42 IT infrastructure services.
    - University-wide email gateway (SMTP), including spam blocking (RBL, greylisting). The service handled an average of 50 million messages per week.
    - University-wide IMAP email service, including spam filtering (Bayesian filtering). The service held 53 TB of email for 89,612 users.
    - Main DNS servers for the university (operations).
    - Main LDAP servers for the university (operations and user support).
    - Campus desktop infrastructure services for Campus Computing Sites (operations).
    - Internal services, including configuration management and server load sets (radmind), service monitoring, and notification for all departmental infrastructure.
- I managed and operated the 225 Linux servers providing the above services.
- Some of my notable achievements include:
    - **MeMail email archiving project:** I served as liaison between technical and business sides of the project, educated business stakeholders, resolved problems, created business process workflow, and created step-by-step provisioning procedures for archival mailboxes.
    - **Emergency notifications project:** I served as a member of the university-level Emergency Alert Core Team (which was the business process owner for emergency notifications). I performed a complete code review of all of the in-house code responsible for broadcasting emergency email notifications, and documented the process for IT management. I made several changes to the code and configuration in order to address friction points for the business process owners. I participated in several test notifications and actual notifications.
    - I kept all services stable during a time of staff and organizational transition.

Manager
October 2006 - March 2010

ITS Web / Database Team
The University of Michigan

I managed the team responsible for providing the central web infrastructure and hosting services for the University of Michigan. The Web/Database team was a vertically-integrated team that consisted of web application developers, system administrators, database administrators, and user support staff.

- I managed nine full-time direct reports, plus two part-time staff. Managed team meetings, work planning, professional development, performance reviews, coaching, hiring, and strategic planning.
- I provided a portfolio of 39 IT infrastructure services.
    - Web servers for the main University of Michigan web gateway (http://www.umich.edu/).
    - Web single-sign-on (cosign, Shibboleth).
    - Web site hosting.
    - Web application hosting.

    - Database hosting (MySQL and Oracle).
    - Web mail (RoundCube, Horde IMP).
    - Web-based file access (MFile/Filedrawers).
    - Content management systems (Drupal, MediaWiki).
    - Trouble ticket systems (Numara FootPrints).
    - Secure, auditable, verifiable, non-repudiatable online voting system (in-house code).
    - SSL certificates (InstantSSL/Comodo, Entrust, in-house certification authority).
- I managed and operated the 137 Linux servers providing the above services.
- The team wrote and maintained a large variety of in-house web applications, primarily in PHP and Perl, including an online voting web application for university elections, a self-service provisioning and service management web application, and a file management web application.
- I provided first level support (for end users), second level support (for front-line IT staff), and third level support (for incidents escalated from other IT infrastructure groups) for all of the team's services. I routinely met with campus units to listen to and resolve their concerns.
- I architected, developed, and deployed new services in response to campus needs and decommissioned old services when appropriate.
- I was the technical lead for Payment Card Industry Data Security Standards (PCI DSS v1.2) compliance in the hosting environment. I provided consulting to the U-M Treasurer's Office on web-based credit card transaction processing solutions.
- I responded to security breaches resulting from insecure customer-managed web applications.
- I acted as the department-level liaison for datacenter issues. I was a member of the Michigan Academic Computing Center Operations Committee and the ITS Virtual Data Center Operations Committee.
- I was a member of the ITS Infrastructure Services Product and Services Lifecycle Transition Team. I led numerous service reviews for Web/Database Team services, made strategic planning recommendations, and facilitated the merger of the old IT organizations.
- Some of my notable achievements include:
    - A successful roll out of a major new web mail product (RoundCube) ahead of schedule and under budget. The entire project took under 90 days from start (requirements gathering) to finish (deployment to production). At the time, it was the largest deployment of RoundCube in the world, both by number of active users as well as by number of servers. The team did extensive customization of RoundCube for the U-M environment and contributed several major new features back to the RoundCube project.
    - I coordinated technical work for the university-wide deployment of the Shibboleth federated login system. I shepherded the university through the process for joining the InCommon Federation.
    - I coordinated the campus-wide upgrade of the university's web single-sign-on infrastructure, including over 400 unit-owned-and-managed web servers, from cosign version 2 to version 3 on a very tight time line in response to security concerns. This project emphasized documentation, planning, coordination, communication, and management abilities in a high-pressure, politically sensitive situation.
    - Each year, I improved team efficiency in order to provide more services to campus with the same fixed amount of staff and a decreasing capital budget.

Manager
June 1998 - October 2006

LSA IT Mac / Unix Infrastructure Team
The University of Michigan

I managed the team providing Unix and Macintosh infrastructure services for the College of Literature, Science, and the Arts. I was initially hired as the team leader but was promoted to manager in February 1999.

- I managed a staff of four Senior System Administrators. I hired and trained new staff, including student temps. I managed and supervised contractors.
- I managed 74 servers across 5 server rooms.
- I participated in the deployment, maintenance, and support of the services provided by the team.
    - I managed load sets for Linux servers, MacOS X workstations, and Solaris workstations and servers.

    - I provided high-performance computing services, including managing the projects to propose, purchase, deploy, and support a 17 node Linux Rocks cluster, a 17 node Apple XServe cluster, and a 5 node test Apple XServe cluster.
    - I was the architect, project manager, and technical lead for the University-wide deployment of the FootPrints web-based request tracking / help desk automation service.
    - I managed Apache web servers and MySQL database services.
    - I managed DNS and DHCP services for LSA, including the web-based administration service for DHCP based on CMU NetReg.
    - I managed the college AFS cell and Kerberos realm.
- I was the College's technical lead for server room power and cooling.
    - I was responsible for power and cooling capacity analysis; server room facilities planning; rack, UPS, and PDU selection; and responding to server room incidents (power outages, cooling problems, etc.).
    - I was a member of the Michigan Academic Computing Center Datacenter Operations Committee. I drafted operation policies, consulted on datacenter build-out and construction decisions, served on the physical access and security sub-committee, and drafted rack requirements and standards for datacenter tenants.
    - I provided server space in LSA server rooms to LSA departments and wrote and managed the SLAs governing the server hosting. I negotiated MOUs for space rented by LSA in the School of Information datacenter and managed the leased space.
- I assisted LSA departments with interviewing and hiring IT staff. I conducted technical skills assessment interviews. I designed and wrote a web-based technical skills assessment tool, allowing departments to consider two to three times as many candidates in half of the time of in-person skill assessments. I trained new staff on college infrastructure.
- I managed the team's budget and day-to-day finances.
- I wrote new service proposals and performed analyses for upper management and the LSA Dean's Office.
- I managed all computing services for the Department of Mathematics 1999 - 2001. I worked with department administration to create new IT support policies, standards, and expectations. I replaced the majority of the department's servers in order to modernize services and solve reliability problems. I upgraded the department's five instructional computing labs and redesigned the way the student temps staffed the labs. I replaced all thin-client X terminals in the department with Unix workstations and upgraded a large fraction of the desktop machines. I supported research labs with special data storage/management needs. I hired and trained an all-new IT team to support the department long-term, and this new team kept the department running smoothly without any problems until this model for providing IT support was replaced during a major IT reorganization in 2011.

Manager
July 1996 - June 1998

ITCS Contract Services
The University of Michigan

I was one member of a two-person team managing ITCS Contract Services. During this time, I also continued to work part-time as a system administrator.

- I worked with customers to determine their needs. I negotiated contracts, assigned staff, monitored contract progress, and followed up to ensure customer satisfaction.
- I managed a staff of 15 professional system administrators and 14 desktop support providers. I hired new staff, conducted performance reviews, and assisted staff with their professional development.
- I designed and implemented new service offerings, including the new Desktop Support Service.
- I created fiscal-year and three-year budgets for the group.

System Administrator
April 1995 - June 1998

ITCS Contract Services
The University of Michigan

I contracted to various sites around campus to provide system administration, consulting, and user support services. I

assessed customer needs, wrote proposals for solutions, and implemented the solutions. I ordered equipment, installed hardware and software, performed systems integration, and trained users.

I worked under dozens of contracts, of which the most notable are:

- **Comprehensive Cancer Center Biostatistics Core:** I implemented a backup solution, upgraded and modernized their Unix computing environment, performed SAS / Oracle / Apache integration, and provided end user support. I implemented security and wrote documentation per the Food and Drug Administration Guidance for Industry for Computerized Systems Used in Clinical Trials.
- **SNRE GIS Research Facility:** I maintained research and classroom environment consisting of Unix, Microsoft Windows, and Macintosh systems. I worked in partnership with ITCS Campus Computing Sites to design and install a new 100 Mbps and switched Ethernet network, I designed and deployed a high-end GIS file and compute server solution, and I provided end user support.
- **Digital Microscopy and Scientific Visualization Collaboratory:** I led a team of four system administrators on a major pharmaceutical study. I maintained the Unix computing environment and the FDDI, switched Ethernet, and ATM networks. I maintained and enhanced the electron microscope control software, and I administered the dmsv.med.umich.edu AFS cell.

President
August 1992 - March 1995

The Xenosync Corporation

I started and ran a two-person computer engineering and consulting firm. Notable projects included:

- I ported Unix software to Linux, identified and eliminated bugs, and improved user interfaces.
- I researched and proposed a design for a computer hardware bus based on a cross-bar network of smaller buses. I worked with an attorney to perform a patent search for prior art.
- I performed a design feasibility study for a COBOL-to-C translator for Unix platforms. The code produced by the translator was required to interface with existing database engines.

Backup Operator
November 1992 - May 1993

CAEN Operations

The University of Michigan

I administered backup services for a network of over 2,300 Unix workstations, IBM PCs, and Macintosh computers. I maintained and revised backup programs and scripts. I performed troubleshooting, preventive maintenance, and hardware installation.

Education

Computer Engineering, Electrical Engineering
1988 - 1991

The University of Michigan

Data Structures and Algorithms

Operating Systems

Computer Networking

Compiler Construction

Theory of Computation

Microprocessor Architecture & Design

Digital Logic

Circuit Design

Signals and Systems

Electromagnetics

Materials Science

Professional training

Moab Administrator Training

ITIL v3 Foundation (with exam)

Red Hat Enterprise SELinux Policy Administration (RHS429)

Foundations of Supervision

Team Leader Training

Crucial Confrontations

Publications & Presentations

GitHub http://github.com/markmont/

Select presentations

- Keeping Your WordPress Site Up To Date (invited speaker, WordCamp Ann Arbor conference, October 2015)
- PHP Programming for WordPress Admins (WordPress Ann Arbor, April 2015)

- Attacking WordPress (invited speaker, WordCamp Ann Arbor conference, October 2014)
- Understanding Content Caching with WordPress: What it is and How it Works (WordPress Ann Arbor, October 2014)
- WordPress, Bad Guys, and You (WordPress Ann Arbor, January 2014)
- Text-Based Internet Application Protocols (University of Michigan, February 2013)
- Ins and Outs of Unix Shells (University of Michigan, May 2012)
- FootPrints "Under the Hood": Supporting and Extending FootPrints In-House (invited speaker, FootPrints User Conference, 2004 and 2005)

Activities

I am a member and co-organizer of the Ann Arbor WordPress meetup group (WP Ann Arbor site).

I have helped organize the WordCamp Ann Arbor 2014, 2015, 2016 conferences.

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