William Ahern

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Technical Skills

Programming

LANGUAGES	Awk, C, C++, Java, LaTeX, Lua, M4, PHP, Perl, Python, Sed, Shell, SQL, XSL
ADMINISTRATION	Apache, BIND, Linux, MySQL, OpenBSD, PostgreSQL, Samba, Sendmail, UW-IMAP
DEVELOPMENT	BSD Sockets, POSIX Threading, SysV IPC, OpenSSL, GNU Autotools, CVS, SVN, Git, Ragel, Perl XS
STANDARDS	C99, C11, BSD, GNU, POSIX/SUSv3, SysV

Internet Architecture

PROTOCOLS	DNS, HTTP, IPSec, IPv6, LDAP, RTP, RTSP, SMTP, SSL/TLS, XMPP
SECURITY	X.509 PKI, IPSec IKE, Smart Cards (CCID, ISO 7816), Sandboxing
STORAGE	Distributed Hash Tables, Syncronous & Asyncronous Replication, Forward Error Correction
AUDIO/VIDEO	Flash FLV, ICY Shoutcast, ISO 14496 (MPEG-4 Base File, ADTS, LATM, etc), Mobile Networks (iPhone HTTP, OEM RTSP, AMR v. MP3 v. AAC, H.263 v. H.264, etc)

Free & Open Source Software

Projects

cqueues	Lua module which binds Lua coroutines to Linux epoll, BSD kqueue, and Solaris Ports resources. Includes buffering sockets module, supporting SSL/TLS and descriptor passing.
dns.c	Reentrant, non-blocking DNS and SPF resolver. DNS resolver works in both recursive and stub mode. SPF resolver implemented as a virtual stack machine with network–oriented instruction set and operands.
timeout.c	Tickless hierarchical timing wheel implementation providing $O(1)$ insertion, deletion, and expiration of timeouts.
Tiny PHF	Single-file implementation of the Compress, Hash and Displace (CHD) perfect hash algorithm. CHD operates in $O(n)$ time and can generate a perfect hash for 1 million keys in less than a second (circa 2014 hardware).
AnonNet	Onion Routing/Pipenet P2P anonymizing network. Awarded grant from the Linux Fund. Preceded Tor.

See more projects at http://25thandClement.com/~william/projects.

March 9, 2017

Contributions

Contributed enhancements and bug fixes to LLVM/Clang, PostgreSQL, GNU ADNS, c-ares, OpenSSH, and libevent.

Professional Experience

Barracuda Networks, Inc. (Aug 2011–*present*) Principal Engineer

Design and enhance software stack for various products and services. On-call 24/7 for rapid turn-around of complex bug fixes and enhancements. Mentor junior programmers, particularly regarding network software design and implementation.

FastPCRE — Transform Perl-compatible regular expressions into Ragel syntax for static compilation to a DFA. Used Lua LPeg for expression parsing, and expression rewriting techniques to implement zero-width assertions where possible and without changing relevant matching semantics. For example, moving a symbol across a subexpression boundary, subject to correctness constraints, so a Ragel entering- or leaving-assertion could be attached. Improved real-world performance by several orders of magnitude relative to PCRE and RE2.

GURL — Library to scan URLs from plaintext and HTML e-mail. Implemented as byte-oriented state machines so URLs could be scanned in a streaming fashion. Implemented an HTML5-compliant streaming tokenizer (single C file) to ensure the scanner identifies the same set of URLs as HTML parsers within common e-mail viewers, regardless of obfuscations intended to bypass regular expression-based scanners.

Xera Radio, Inc. (Sept 2009–Dec 2016) President & Cofounder

Xera Radio transcoded live internet radio streams for on-demand streaming delivery to internet connected devices. Re-envisioned the RemoTV transcoding pipeline. From-scratch parsers and composers for all elements of the stack excepting the low-level audio compressors and decompressors. Demultiplexed and transcoded streams at multiple points in the pipeline, allowing per-client transcoding, upsampling, downsampling, and interleaving of announcements, advertisements, etc with extraordinarily low processor load.

RemoTV, Inc. (Sept 2007–July 2009) Cofounder, VP of Engineering $\oplus$ CTO

Designed and engineered back-end transport and transcoding systems. RemoTV allowed users to stream multimedia directly from their personal computer to any internet connected device—cellphones (including OEM handsets, not just smart phones, but including Blackberry and iPhone), gaming consoles, etc—without requiring separate software installation. Protocols, formats, and codecs were altered on-the-fly to suit the requesting device.

$1.3 million in funding prior to closure due to 2008 Recession.

Projects

Portway — Secure multimedia VPN between central servers and desktop-server. Worked through NAT firewalls, allowing desktops to serve locally stored or generated audio/video. Automatically updated routes through DNS-based topology registry, and utilized X.509 ECC certificate authentication. Fully distributed design; no single point of failure, nor intervention required when servers went offline.

RTSP Relay — Reverse RTSP proxy. Normalized RTSP communications and transcoded HTTP streaming formats and codecs (iPhone AAC, Flash FLV MP3) from RTSP source content.

More Professional Experience

Barracuda Networks, Inc. (March 2004–July 2007; May 2008–Aug 2012) Senior Engineer & Architect; Contractor
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Responsible for design, construction and maintenance of various systems level components of the product range.

Microsoft Exchange Accelerator Links Barracuda Spam Firewall with Active Directory/LDAP organization database by lightweight, event based, caching interconnect daemon. Seamlessly supports both LDAP and SMTP (fallback) recipient verification.

Barracuda::Bayes Constructed Bayesian statistical analysis component including a custom, fault-tolerant and self-healing embedded database for token storage, international script/character set (I18N) word boundary parsing, and Markov chaining.

Barracuda SMTP Daemon Engineered lightweight, high performance, filtering, event based SMTP server. Supports single-pass streaming filtering, encompassing all of RFC821/2821 communication, RFC822/2822 parsing, MIME decomposition, Unicodification and attachment decoding. Filtering modules written in C, Perl or Lua. Policies implemented through execution of declarative scripts. Automated code generation produces over 80% of the intermediate C source code to enhance type-safety and static analysis.

Support Infrastructure Built and maintained a highly secure environment through which technical support personnel remotely access tens of thousands of Barracuda appliances around the world. Robust, multi-layered authentication and authorization infrastructure within Barracuda's network and accompanying support software included within each appliance.

Build Infrastructure Refactored build infrastructure towards a non-recursive Make paradigm for multi-million LoC source tree.

MySQL C Library Non-blocking, asynchronous MySQL C client library. Custom protocol parser.

JINSA (Aug 2002–Dec 2003) Contracted Consultant
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Changes and additions to the JINSA Online content management system. Technical consultation as issues arose.

Projects

- Created new JINSA store. All data kept in central XML repository, using XSLT templates for presentation. Real-time USPS shipping rate quotes using their XML web services interface.
- Related article document-vectoring engine. Worked closely with the original author of the Text::Document Perl module to increase the document parsing and scoring speed. Batch processing of JINSA's document set went from hours to minutes.
- Integrated site administrator authentication with the underlying system authentication framework. The project mostly consisted of writing mod_auth_bsd, which links Apache's HTTP Basic Authentication functionality with the BSD Authentication framework (similar to PAM) employed in OpenBSD and BSDi Unix.
- Refactored various backend elements to generate XML for metadata storage and content presentation. Rewrote custom PHP XML processors to utilize XSLT templates. Home page, Recent news and side bars generated from XML using XSLT. These features tied into the custom CMS, and so re-transformed with change or addition of new content, not simply on each page view.
- Automatic RSS feed generation from XML site content using XSLT.
- Automatic weekly e-mail digests advertising new site content to members.

AG Consulting, e-Solutions Group (Oct 2000–June 2002) Associate Consultant
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Developed self-service web-based solutions atop clients' ADP Enterprise/Horizon and PeopleSoft HRMS/ERP systems.

Projects

- Stewart Enterprises: Web based self service timesheet application integrated with ADP Enterprise HRMS. Coldfusion and JavaScript with an MS SQL database. The front-end to this application heavily relied on DHTML to reduce client-server round trips, as the end-users were on 14.4- and 28.8- baud modems (and IIS did not support on- the-fly HTTP compression). Bandwidth could be maximally used for sending data and not presentation code. This methodology is now commonly called AJAX, following the advent of Google Maps.
- Kinetics Group: Web self-service interface into ADP EV2 installation using ADP's Java WYSIWYG EBuilder for the EV2 Java servlet web component.
- Financial Portal: Portal for AG Consulting project managers and executives to track project revenues and account receivables. Data fed from ADP Corporate headquarters' Oracle Projects system. Portal centered around Crystal Reports presentations, with several batch processes run on MS SQL and Oracle.

Achievements

- Published in an industry magazine with an article describing issues around Internet security and single-signon (SSO). Described the relationships between privacy, authentication and authorization and how those properties are effected across different web service schemes.

Mailshell.com (May 2000-Oct 2000) Software Engineer

Online e-mail service which provided a web based client mail interface to filter out SPAM. The service linked to existing POP3 or IMAP accounts, or used anonymous proxy e-mail addresses managed by Mailshell.

Projects

- Developed web-proxy interface which allowed users to easily utilize Mailshell's anti-spam services when browsing. PHP, Perl.
- Developed an indexing search engine for the mailing-list directory. PHP, Perl. IMAP client-interface tied into the Mailshell anti-spam facilities.

JINSA (March 1998–May 2000) Manager of Information Systems

Washington, DC K-Street defense and security policy think-tank.

Projects

- Developed JINSA Online (www.jinsa.org), including custom session support (pre-PHP Sessions), integration of seamless real-time credit card transactions, and web based document/article administration. Home page and Recent News content kept in XML, transformed using custom PHP processors (pre-XSL). Utilized PHP and Perl on top of Linux, Apache and MySQL solutions. Heavy integration of JavaScript GUI tool-kit (DynAPI2) into site navigation menus.
- Mailing list management, web site traffic analysis, and on-line multimedia content distribution. Multimedia management included porting of Apple's Quicktime Streaming Server to Linux servers.
- Developed service solutions and custom applications for staff members (i.e. Web Calendar, Database conversions).
- WWW, File and Database server (MS Access, Sybase ASE) maintenance. Firewall and router configuration. Office PC (Win9x/NT/Mac) and LAN maintenance.

The George Washington University (Sept 1997–Aug 1998) Helpdesk Support

Assisted students with computer laboratory issues. Handled university student computing services accounts; i.e. Unix account registration, e-mail issues, etc.

Discovered intruder on main student unix server (GWIS2), alerting administrators and leading to a complete overhaul of security management within GW's Information Services group.

Education

Awarded Juris Doctorate. One year leave of absence taken to work at RemoTV, Inc.