

## Rich Rein

*richrein@richrein.com*

*856 Hancock St #36, Hayward, CA 94544*

*(510) 378-6480*

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### O V E R V I E W

- Solid engineering of iPhone, mobile, web, video, audio, geo, search, real-time, business applications, cloud computing (Amazon AWS), large-scale HA servers, distributed systems, databases systems, embedded systems, operating system internals, communications, storage and device drivers using Java, C++ and C.
- Consistent on-time and on-budget delivery.
- Very successful engineer on-site, off-site and as part of offshore or multisite teams.

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### A C H I E V E M E N T S

Groundbreaking products and services include:

- First mobile talking tour-guide covering ¼ million points of interest on the earth (HearPlanet).
- Video servers for cable VOD, Video Mail, Satellite, etc (Hewlett-Packard, Hyundai, TV/COM, VTEL)
- Nationwide VISA/MasterCard card POS service (Tymshare - McDonnell Douglas).
- First computer controlled digital voltmeter (Systron-Donner)
- First microprocessor analyzer (Systron-Donner).

Experience developing multimedia and digital video products:

- Fujitsu – one-click record, publish and play video presentation over division's intranet.
- VTEL – Java Video over IP (online video) project lead
- TVCOM – Live Java computation and transmit of 1GB electronic program guide at 270 mbps
- Hyundai – Video pump for satellite store and forward of broadcast content
- HP Media Server – Architect cluster served 10,000 VOD users. FF/Rewind executed on server
- ESCAtch – content development and network for editing and distribution
- Member ISO MPEG-2 DSM-CC committee (Dec. 1994 to Aug. 1995)

Extensive experience developing device drivers and embedded systems

- Designed or ported Unix device drivers for 10 years for protocols such as DVB-ASI (270Mbps), X.29, X.25, Datakit, bisync and async on operating systems such as Solaris, SVR4, SVR3, BSD, Pyramid DC/OSx, FOR:PRO and IBM MVS.
- Developed embedded systems development on HP-RT (real-time POSIX derived from LynxOS), VRTX and many homegrown OS's. Developed own RT OS as required.
- Developed assembly code for Motorola 680x0, more than 10 8-bit microprocessors and a 4-bit micro. Developed some and debugged much assembly code for RISC processors such as Pyramid RISC, PA-RISC, SPARC, MIPS R3000 and CISC processors such as Motorola 680x0 and Intel 8086. Micro-coded bit-slice engines such as the AMD 2900

Extensive large-scale server development:

- Managed teams and designed storage architecture for large Java telco management system, which contained 1+ terabytes of highly volatile data for 10,000 network elements. (Fujitsu).
- Architected service and server farm for video over IP (On Screen 24).
- Architected, led and coded very large commercial video-on-demand (VOD) server designed for 10,000 set-top-boxes. Designed to boot and then serve each STB at 3Mbps. Key player in managing stressful relationships with partners and other divisions. (HP, Fujitsu, Hyundai)
- Added threads debugging support to very large (2000 classes) C++ based SDB (symbolic debugger).
- Lead engineer responsible for entire VISA/MasterCard bankcard processing for 200 banks. Led crash development of one of the first nationwide Point-of-Sale (POS) services in 6 weeks. (Tymshare).

**The Inforte Group** (Hayward, CA)  
*Engineering Consultants*

May 2004 to Present

### M-VIA – TRANSITION ARCHITECT

M-Via provides mobile phone funds transfer and mobile wallet services to US and Mexico on a Java JBoss platform. Captured architecture from departing architect and delivered to arriving architect. Worked as part of GreenAxle team with M-Via team to design and model a new Java architecture in alignment with business goals and delivery deadlines. Guided and helped create long-term phased plan for agile SCRUM sprints.

New plug-in design allowed for more rapid development, which allowed engineering to respond more quickly to changes in direction at lower cost with fewer defects. It was more capable of modeling the business reality with fewer exceptions and could acquire more sophistication with reduced complexity. See <http://www.m-via.com>.

### HEARPLANET (SAN FRANCISCO, CA) - ARCHITECT/ENGINEER

HearPlanet is a self-funded startup providing audio tour guides over 1/4 million global points of interest on iPhone. HearPlanet received greater acceptance than expected – 50,000 users the first 3 weeks – 1/2M in May 2009. Did what it took to get company to launch. Helped create original concepts, architecture, coding, and operation. See <http://www.HearPlanet.com>.

#### Architecture

- Automated many aspects cloud deployment of Amazon EC2 and S3 cloud computing services. Enable rapid scaling from 1 to many nodes according to load. Strategy saved the MacWorld launch. The first day load was far too great for 1 server. Amazon AWS allowed us to triple compute power in hours and get on top of the load.
- Developed search engine using SOLR (Java). Proved to be quick (20-30ms per request). Delivered 1/4 million geo-coded articles in SOLR search engine for initial prototype server.

#### Coding:

- iPhone Development - Coded 1/2 if v1.0 HearPlanet native iPhone application.
- Created SOLR xml search service, search queries and educated server team.
- Enhanced Java parser for importing first 1/4 million points of interest into SOLR.
- EC2/S3 management code.

### WHISPER NAVIGATION LLC (SAN FRANCISCO, CA) – IPHONE DEVELOPER

Developed 1/2 of “Airport ETA”, an iPhone application. It provides driving directions to and from major airports with arrival times. See <http://airporteta.com/>.

### EQUILIBRIO (SAN FRANCISCO, CA) – ARCHITECT/DEVELOPER

Equilibrio provides a mobile health and wellness application for J2ME mobile phones and iPhone. Architect/coder. Performed extensive Java code audits and database audits and then introduced and enforced common web framework on server side. Introduced search engine based expert architecture for user self-serve in next gen product. Coded FLEX accordion wizard. Nearing private launch. See <http://www.equilibrio.us> when launched.

### MAXSP (MOUNTAIN VIEW, CA) – VPE

MaxSP provides IT solutions, appliances and services to automate monitoring, backup, recovery and failover of servers and desktops. Founded by John Goodrich of from the well-known Silicon Valley law firm of Wilson, Sonsini, Goodrich and Rosati. Provided technical leadership to turn around quality and delivery of a critical monitoring product. Proposed, evaluated and approved architectures for backup, recover systems and UIs.

### HABEAS (MOUNTAIN VIEW, CA) –ARCHITECT/CODER

Habeas’ was an email trust authority. It put legitimate email senders on white lists across the world. It monitored the Internet for email sender/receiver traffic, serves white-list queries, monitors customer trustworthiness and can place certified customers on a white list used by millions of email servers. A website was provided to allow customers to monitor and respond to changes in their global email reception and trustworthiness. Purchased by ReturnPath. See <http://www.returnpath.net/>.

- Introduced Flex to Habeas website, to provide maps, rich graphics, rich look and feel, modular, pre-debugged and robust Web 2.0 service in a single release. Key piece of UI now in use by ReturnPath.
- Contributed to architecture of data mining product on data from our instrumentation of 2 million nodes in the Internet.
- Lead development and many code reviews.

### SUN/MSII - ARCHITECT/JAVA, WEB, SWING, SERVER DEVELOPER

MSII provided Sun with sales information systems written in Java development of JSP/Servlet web server, remote heavyweight Swing client and RMI server to support Sales upgrade programs. Deployed on SunOne Application Server for deployment on Sun's internal and external facing systems. Developed using Java, Swing, Raincity Framework and RMI. Used Eclipse, IntelliJ, subversion, VNC, SunOne Application Server, Solaris and other tools.

- Development of heavyweight swing client and RMI server for Usage Fee feature for tracking Sun's complex customer equipment discounts by Sun internal RMA Sales users.
- Various JSP/Servlet based web server enhancements for Sun customer facing system.
- Solved various server performance problems. Resized some systems. Various bug fixes in heavyweight client, RMI server and JSP web server. Introduced Subversion and VNC.

### ARCHITECT/JAVA DEVELOPER

Provided various companies with architectural, technical and business assistance. Developed using Java, VMware, Linux, Tomcat, VNC, Eclipse, IntelliJ, ANT and CVS.

- Broad Horizon - Performed storage/db/system sizing and storage layout for proposed large-scale web spider, a web based expert data mining startup in Los Altos, CA.
- \$100M/Year wireless master dealer - Provided technical consulting and selection of vendors for replacement of all financial, POS and web systems.
- Softrock Systems – Evaluated value to market and recommended positioning.
- Evaluated open source business models and communities, The emerging software deployment models (virtual installation and cached file systems), Information frameworks, Rich clients, AOP, Language trends, Copyright and patent strategies and Video/Audio distribution and servers.

### **Fujitsu Network Communications (San Jose, CA)**

December 1999 to April 2004

#### *Large Scale Telephone Network Management Systems*

This division of Fujitsu USA produced the primary network management server for most of its telephone switches. The product was provided as a CD that customers installed on Sun servers. The software would auto-discover and configure these servers. These servers would manage from 1 to 10,000 Fujitsu telephone switches (network elements – NE's) which would cover from one city to many states. The system was a self managed 24x7 operation. It had many built-in layers of transparent backup, transparent recovery, manual recovery, remote site failover, etc. Provided senior development expertise to several elite framework teams.

### DBA AND STORAGE TEAM

Managed development for framework of highly available (HA), self-managed, large-scale (terabytes), turnkey telco network management system called NETSMART. This required more than usual analysis, design and testing. Mentored DBAs on architecture, reducing complexity and debugging performance problems.

- Designed automated discovery and installation of storage hardware, OS, file systems, and database for each release on wide array of storage architectures.
- Architected part of automated management software for files and database. Backups and purging was automated for lights-out operation. Architected a backup plug-in to allow customer to purchase or use their existing enterprise backup systems.
- Participated in specifying multi-site Database Replication Engine (DRE) for high availability. Enabled a remote site to fully service a network 1 hour after a total site failure.
- Architected very high performance storage architecture. Redesigned storage architecture and develop new auto-detection, auto-mirroring, auto-striping storage installation. Algorithm optimized an arbitrary mix of disks

(SCSI or FiberChannel) or FiberChannel storage bricks (Sun T3s) to support megabytes or terabytes of customer data. The new simpler architecture increased performance 15% over former tablespaces-on-separate-volumes solution. Many layers of redundancy and transparent recovery as well as manual recovery. Increased number of customer NE's from 4000 to 10,000, from 200GB to 1TB of storage.

- Architected installation-time database sizing.
- Designed data pivot for data mining customer equipment reports when Oracle 7 performed self-joins too slowly.
- Introduced object-oriented design techniques and finite-state-machine design techniques where appropriate. Improved modularity and reliability on subsequent projects.
- Assisted DBAs in locating performance issues.

#### DATABASE FRAMEWORK TEAM

- Replaced Software Through Pictures (StP) version. Participated analysis and rewrite of UML to java code generation customizations to automatic object-relational-mapping (ORM).
- Assisted database framework team members in debugging show-stopper bugs.

#### GUI FRAMEWORK TEAM

- Assisted GUI Framework developers in debugging code.
- Created automated recording, conferencing, publishing and review system for desktop video of UI demos and TOIs. Resulting system was used to remotely review proposed GUI behavior, training and TOIs. Also allowed VP and managers to catch up on missed meetings and for engineers to pick up where alumni engineers left off. UI behaviors encoded in specifications. Also, knowledge captured when key staff left company proved to be critical more than once. Led tools team to develop 1 step web publishing and 1 step viewing of video on platforms such as Microsoft Windows, Apple, Linux and Solaris.

#### PERFORMANCE TEAM

- Developed part of a Java Swing client test environment for parallel testing hundreds of real java clients (heavy) each with its own virtual display and virtual user. Simple record/play paradigm.
- Developed automated configuration of Python rapid test development environment.
- Wrote Programmer's Guide and Developer's Guide for Python/Java test development for general use.
- Created website for developing Python/Java tests. Automatic pydoc update.
- Developed and executed tests for tuning database performance (DRE tests).
- Developed and executed tests for tuning storage performance (diskdelay)

**VTEL** (San Jose, CA)

March 1998 to December 1999

*Video Telephony over IP, Video Telephony over Telephone*

#### ARCHITECT, PROJECT LEAD, DEVELOPER

Provided architecture and leadership for next generation of server based video conferencing projects.

- Multi-site development between San Jose and Austin, Texas.
- Jointly architected Java based MPEG video mail service, which VTEL spun off and went live on November 29, 2000 as OnScreen24. Prototyped some elements of video mail GUI.
- Evaluated multiple Video-over-IP companies to purchase. VTEL purchased Vosaic, which as responsible for 2 million single cast streams of the Mars Pathfinder in 1997 using Java based servers and java based browser decoder/players.
- Joint lead for server architecture development for NextGen H.323 architecture for video meeting, video conferencing, and video education.
- Introduced Java. Brought in instructor. Provided mentoring. Then created product with Java.
- Created Window's System Tray ICON manager in Java for better desktop integration.
- Prototyped browser pages using JavaScript for AJAX-like implementation. Discovered that JavaScript was too unreliable at the time for commercial deployment.

**TV/COM, subsidiary of Hyundai Electronics America** (San Jose, CA)  
*Video Servers and Video Set Top Boxes*

Aug. 1995 to Feb 1998

**SR. COMMUNICATIONS SOFTWARE ENGINEER**

- Developed Java API and architecture for real-time continuous generation and broadcast of electronic program guide (EPG) for digital video broadcast (MPEG-2 DVB-ASI 270mbps) on Windows NT. The EPG was 1GB in size, continuously changing and continuously streamed over satellite.
- Developed MPEG-2 Near-Video-On-Demand (NVOD) software components for a digital video broadcast head-end.
- Single handedly prototyped and demonstrated feasibility of MPEG-2 real-time software based Storage Multiplexer by creating a storage pump that recorded at 30 megabits/second while playing out at 30 megabits/second. The prototype used off-the shelf hardware including RAID-5. Prototype exceeded requirements for Digital Video Broadcast (DVB) maximum bit rates. Derivative technology used in several TV/COM broadcast products.
- Wrote T-Link driver (DVB-ASI) under SPARC Solaris 2.5/2.6. Each controller in the host continuously transferred data at 270 megabits/second. Supported symmetric multiprocessing and clone architectures (Axil) as well.
- Wrote and handled RFI's for tool selection. Responded to RFI's from prospective customers.
- Provided initial requirements, specifications and architecture for the Video Server. Worked with team members to complete requirements, specifications and architecture for much of the Video Server. Mentored engineers.

**Hewlett Packard** (Santa Clara, CA)  
*VID division – Video Server Products*

Feb. 1994 to Aug. 1995

**SENIOR SYSTEMS ARCHITECT**

Developed extremely high bandwidth interactive movie video servers for HP VTE (Video Transfer Engine AKA Media Server) for broadband video-on-demand (VOD) product. System was scalable to 10,000 users. Each user could, in parallel, remotely boot set-top-box (STB), select content to view, view 3Mbps movie with FF and rewind, view multi-media.

- Co-architect for overall system. Designed load balancing n+1 distribution scheme.
- Led team, designed and implemented the HP VTE Stream Controller (SC). Rapidly implemented SC for customer delivery in 3 months. SC developed using HP-RT (LynxOS) is portable to any POSIX platform. Wrote control application and framework (middleware).
- Identified key issues in industry before industry unfolded and defined architecture accordingly. For example, identified user patterns/timing requirements, end-to-end performance issues, end-to-end operation, and impacts of heterogeneous content types such boot images, content indexes, video, and multi-media.
- Developed Set-top-box API. Designed and implemented transparent API to overcome extremely long (.33 second) network delay. API library pipelined asynchronous RPC requests. Reduced user interaction delays from 8 seconds down to below 2 seconds. Framework also permitted rapid development of simple synchronous RPC services, which could easily be morphed into asynchronous services, as parallelism was increased.
- Architected Set-top-box IP communications. Designed IP interface to transparently route TCP/IP traffic over UDP back-channel, over ATM over cable, and over MPEG data frames. Regardless of STB state (booting, navigating multimedia, or watching movie), the application was unaware of the routing changes over multiple changing protocol stacks.

**ESCAtech** (Princeton By the Sea, CA)  
*Multimedia Development Company*

Jul. 1993 to Feb. 1994

**SR. COMMUNICATIONS ENGINEER**

Prepared to enter interactive TV market. Provided network for distributed content development in exchange for experience with content authoring:

- Authored CD-ROM content.
- Provided wide area network that included Apple Remote Access, async file transfer (Kermit, etc) integrated with local Ethernet LAN using Internet router.

**Network Automation** (Mountain View, CA)

Dec. 1993 to Feb. 1994

*Telephone Switching Equipment and Network Management Systems*

SR. COMMUNICATIONS SOFTWARE ENGINEER

- Designed and coded file replication software for company's remote host management software.
- Designed and coded portion of remote host management product.
- Wrote portions of distributed interface to name service API, NIS database, and UNIX configuration files.
- Dealt with issues of version independence, management model abstractions, and degrees of user configuration constraints in heterogeneous environments.

**Pyramid Technology Corporation** (San Jose, CA)

Mar. 1988 to Dec. 1993

*Large Scale Symmetric Multiprocessing UNIX Servers, Mesh UNIX Servers*

SR. COMMUNICATIONS SOFTWARE ENGINEER

- Developed communications software for company's RISC symmetric multiprocessor (SMP) super-minicomputers:
- Developed threads support for SDB in C++ for customer debugging of Distributed Computing Environment (DCE) client/server applications.
- Participated in porting Datakit tty driver to SVR4 streams.
- Ported ISODE v7 source to create SNMP 2.0 product.
- Ported CMU source to create SNMP 1.0 product.
- Developed highly optimized and seamless integration of tty driver into the X.29 driver. Features included heuristic adaptation to parameters supported by PAD as well as user performance spec.
- Ported, dual universe (UCB and SVR3) X.25/X.29 product to SVR4. Product builds all versions of operating system from one source.
- Defined hardware and software architecture for a several very high performance communications front ends.
- Developed automated software for loading and testing the functionality of X.25/X.29 interface. One command installed and configured the test. One command ran a complex suite of tests. One command started and monitored progress, evaluations and statistics over 16,000 parallel connections under test.
- Wrote SNMP manual.
- Wrote large part of X.25 manual.

**Raynet Corporation** (Redwood City, CA)

Mar. 1991 to Sep. 1993

*Telephone Switching Equipment*

SR. COMMUNICATIONS SOFTWARE ENGINEER

Developed software for POTS and fiber telephone equipment management system on Pyramid, Sun and Motorola UNIX systems:

- Wrote streams X.25 data communications interface for value added mediation device (SAM) for interface to NMA. The interface transported and routed TL1 (MML), the Bellcore telephony management protocol.
- Wrote flexible X.25 print facility to interface printers on X.28 PAD's to the SVR4 print spooler.
- Provided senior level expertise for application data communications problems and application development problems.
- Rewrote portions of TCP/IP and UDP/IP based interface between Pyramid and value added mediation device (SAM).

**Network Equipment Technology** (Redwood City, CA)

Mar. 1988 to Mar. 1989

*Telephone Switching Equipment*

SR. COMMUNICATIONS SOFTWARE ENGINEER

Developed software and coached team of 30. Environment: Sun workstation (SunOS) and servers:

- Senior-most engineer on project. Coached and trained 30 engineers.
- Designed and deployed new development environment for multiple hardware platforms.
- Network management software maintenance of embedded SQL interface.

- Wrote key based software licensing package.
- Integrated drivers into kernel delivered in VAR package.

**Plexus Computers Inc. (San Jose, CA)** Oct. 1986 to Mar. 1988  
*Symmetric Multiprocessor UNIX Servers*

**SR. COMMUNICATIONS SOFTWARE ENGINEER**

Developed communications protocols for 68020 UNIX super microcomputers.

- Developed product from TITN X.25 source for host and VME based communications processor.
- Developed product from TITN X.25 source for host with Multibus communications processor. Product used in United States Ballistic Missile Early Warning System (BMEWS).

**Fortune Systems Inc. (Redwood City, CA)** Apr. 1984 to Oct 1986  
*Microprocessor UNIX Systems for Offices*

**SR. COMMUNICATIONS SOFTWARE ENGINEER**

Fortune Systems was 1 of the first 2 microprocessor based and user manageable UNIX system vendors. I developed UNIX I/O drivers, embedded communication controllers and utilities for 68020 microcomputers:

- Single handedly developed automated and 6 channel programmable high performance async communication test system. Developed UI, test language (and parsing and code generation), UNIX drivers, communication controller software, real-time OS for z80-based controller, and automated end-to-end operation-recording-presentation of tests.
- Ported z80 synchronous communications controller and driver from BSD to SVR3.
- Ported z80 asynchronous communications controller and driver from BSD to SVR3.
- IBM 3270 BSC emulation product.
- IBM RJE emulation product.
- Ported various UNIX utilities from BSD to SVR3.
- Developed automated and programmable X.25 test package. Automatically generated exhaustive test sequences.
- Led and developed 3270 SNA testing.

**Tymshare-McDonnell Douglas, Inc. (Fremont, CA)** Nov. 1981 to Apr. 1984  
*Credit Card Processing Service for 200 Banks*

**COMMUNICATIONS PROGRAMMER**

Performed development for Communication Support Group (IMD division: Point of sale network for VISA and MasterCard on IBM 3033, Amdahl V6, and Tymnet using system level assembly interfaces to MVS and other OS's. Youngest engineer to become lead engineer responsible for the support and enhancement of Converse internals, a real-time VISA/MasterCard transaction system for 200 merchant banks.

- Project leader of one of the first POS services. The 6-member EDC Crash Project Team rewrote the on-line application in 6 weeks and added real-time capture of merchant sales information.
- Developed communication drivers at all logical levels, including BISYNC channel programming.
- Developed and maintained the systems file access methods and real-time executive.
- Supported internals of Reason, an early relational database system.
- Provided programming and senior technical support for the Security On-line System and for the Sales Authorization System.
- Programmed communications interfaces with VTAM (SNA) and BTAM (BSC).

**Mathis, Rein and Associates (Danville, CA)** May 1978 to Nov. 1981  
*Custom Business Software*

**SOFTWARE ENGINEER**

Started consulting firm to developed business applications for customers under a variety of hardware/software platforms. Managed 8 subcontractors on assignments. Specified and designed all software. Coded and tested most of the software.

- Developed C application program generation package called Insight on ONYX UNIX platform. User drew forms on screen. Generated database, UI, and application code for database centric applications.
- Analyzed, designed, developed, and deployed inventory/product structure reporting system on HP 3000.
- Analyzed, designed, developed, and deployed phone sales management system on Jacquard.
- Analyzed, designed, developed, and deployed continuing education (CE) transcript management system on Jacquard.
- Analyzed, designed, developed, and deployed accounts receivables (AR) on Jacquard minicomputer.
- Analyzed, designed, developed, and deployed accounts payables (AP) on HP 3000.
- Analyzed, designed, developed, and deployed general ledger (GL) package on HP 2000F.

**Systron Donner** (Concord, CA)

May 1977 to Nov. 1977

*Test Equipment and Military Electronics*

PROGRAMMER

Wrote microcomputer software for the instrument division.

- Wrote all micro-code/software to supported more than 6 microprocessors including 8080 and 6502. This was a predecessor of today's ICE. Product was industry's 1st commercial microprocessor analyzer to diagnose CPU, bus, and programming errors.
- Coded part of 1st commercial computerized digital voltmeter. Fast floating point software provided users with polynomial transforms on readings in real-time.

P R O F E S S I O N A L   A S S O C I A T I O N S

**SDForum**

March 2006 - present

*Software Development Professional Organization*

CO-CHAIR, JAVA SPECIAL INTEREST GROUP

The Java SIG is a forum for discussing the internal workings and use of the Java programming language, frameworks and tools. Applications include web, client, server and embedded. Speakers have ranged from James Gosling (the "Father" of the Java language) to expert users and inventors of APIs and improvements that have been added in recent years. The Java SIG meets in Palo Alto, CA on the first Tuesday of each month.

**ISO MPEG-2 DSM-CC committee**

Dec. 1994 to Aug. 1995

*Committee to Standardize Digital Video Broadcast*

COMMITTEE MEMBER

Represented the public's interests (as we believed them to be) and Hewlett Packard's interests at ISO MPEG-2 DSM-CC committee. Remarkably political forum where competitors and partners negotiated standardization of features for the real-time command and control of MPEG-2 services.

S K I L L   S U M M A R Y

Performed as an engineer, coach, project leader, architect, manager, director and VPE.

- Provided mobile applications on iPhone. Oversaw some J2ME development.
- Built web servers, telco management servers, etc. Responsible for large and small scale GUI development.
- Provided architecture for very large video on demand systems (10,000 simultaneous 3mbps users - HP).
- Provided terabyte storage architecture for large telco management systems (10,000 network elements - Fujitsu).
- Lead engineer for VISA/MC processing for 200 banks (Tymshare).
- Responsible for projects with thousands of source files and 500,000 lines of code (LOC). Of course also worked on many projects with millions of LOC.
- Can lead when required. Managed of up to 29 in many teams with several offshore successes. Managed up to 18 direct reports in very flat management situation.

All development task types have been performed many times including: proposal, specification, feasibility study, analysis, design specification, coding, packaging, documentation, unit testing, system testing, automated testing, deployment, training, customer support, problem tracking, and product maintenance.

#### Application level programming platforms

- UNIX: Mac OS X, CentOS Linux, Red Hat Linux, Cygwin, Sun Solaris, HP-RT (LynxOS), HP 800, Pyramid DC/OSx, Pyramid OSx, Sun OS, Plexus System 5, Fortune Systems' For:Pro, Onyx UNIX; IBM MVS on 3033 and Amdahl V6, IBM System 3; HP 3000, HP RTE-3 on HP 2100, HP 2000F; Jacquard, Commodore PET, various other mini and microcomputers; IBM PC using Microsoft C; Apple Macintosh using Think C.

#### Third generation languages

- Java, C++, C (ANSI and K&R), Python, YACC, Lex, FORTRAN, Ratfor, COBOL, PL/I, PL/M, HP SPL.

#### I/O driver, kernel, and operating systems programming

- Symmetrical multiprocessor operating systems (SMP): Sun SPARC and Axil Solaris 2.5 and 2.6; Pyramid DC/OSx (SVR4 UNIX) and OSx (dual universe SVR3/UCB); IBM MVS with Attached Processor and Virtual Machine.
- Single processor operating systems: Plexus' System 5 UNIX; Fortune System's For:Pro UCB UNIX.
- Communication controllers: UNIX in Plexus' ACP and VCP 680x0 based comm. Processors; Fortune system's z80 based COMM-B.

#### Assembly and machine languages

- RISC (used for debugging and performance): SPARC, Pyramid, R3000; CISC: IBM 360/370, Motorola 680x0, Intel family, HP 2100/21MX; 8-bit: Zilog z80, Intel 8080, Motorola 6800, MOS 6502, several others; Bit Slice: AMD 2900.

#### Electronic Instruments

- ICE, Microprocessor analyzers, bus data scopes, network data scopes, oscilloscopes.

#### Data description languages

- ASN.1 (CMU and ISODE versions), Embedded SQL (C interface maintenance), various proprietary query languages: Q (Rubix relational query language), Reason (relational language), Insight (C program generator).

#### Communication protocol drivers developed

- Protocols developed from scratch - DVB, X.29, BISYNC and ASYNC.
- Protocols ported - SNMP (ISODE and CMU), X.25 (TITN) and Datakit (AT&T).

#### Fully automated test suites developed

- Swing heavy client record-play testing for 100 clients. Two X.25 tests (suites and command interpreters). UNIX tty test of 90+ options (suite, test programming language, all software on test front-end: real-time executive, comm. library, etc.).

#### Maintenance and extension of database query parsing or storage access methods

- Reason (relational database), Converse's common and custom access methods.

#### Content Authoring software

- PhotoShop, SoundEdit Pro, Adobe Premiere, CameraMan, Apple Media Tool, Sound Manager, Fractal Design Painter.

#### User level applications developed

- Remote host management, network management, telephony management, credit card authorization, credit card security, point of sale, accounts payables, accounts receivables, general ledger, inventory.

#### Integrated Development Environments

- Eclipse, IntelliJ, Borland JBuilder, Symantec and Visual Studio.

#### Debugging environments

- Java remote debugging environment, various kernel debuggers (kdb : Sun, Pyramid, Plexus, Fortune), HP's 680x0 ICE, IBM GTF, IBM IPCS, Candle's Omegamon, Think-C debugger, adb, and sdb.

#### Protocols used in user level applications

- NIS API, TL1 (implementation of Bellcore's MML), SNMP (CMU and ISODE), TCP/IP (sockets), UDP/IP (sockets), X.25 (Sun, Motorola, Pyramid, Plexus, Fortune), X.29 (Pyramid), BISYNC (IBM BTAM, direct channel, and supervisor calls), ASYNC (UNIX tty and SCC chip), SNA (IBM VTAM).

#### Access methods used in user level applications

- Rubix (relational database using b-tries), Reason (relational database using a variety of access methods), HP Image (Master/detail database using hash), Insight (custom database using b-tries), Converse (various access methods), other access methods.

#### Manuals written and published

- Programmer's guides: several X.25, application program generator.
- Administrator's and user guides: several X.25, SNMP, accounts receivables, accounts payables, general ledger, application program generator, inventory/product structure reporting, phone sales management, continuing education transcript management.

#### Documentation tools

- OpenOffice, StarOffice, FrameMaker, Microsoft Word, Microsoft PowerPoint, Microsoft Project, PageMaker, Ventura Publisher, Adobe Illustrator, SuperPaint, Excel, MacProject, More II, MacFlow, Fortune:Word.  
Formatters: IBM script, tbl, nroff, and troff using man, mm, me, and other macros.

#### Source control software

- Subversion (SVN), CVS, ClearCase, SCCS (some using the S tools scripts), RCS, and Panvalet.

#### Build languages

- Ant and make.

#### Scripting languages

- Bash, Bean Shell, Python, expect, awk, Bourne shell, C shell, Korn shell, IBM TSO script, IBM JCL, and DOS Batch files (IBM PC)