Abhay B. Joshi

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Profile as Software Professional

Objective

To use my programming and testing experience to solve real-life problems.

Software Career Highlights

- Started a non-profit activity (SPARK Institute) in the area of "learning through programming". Designed and taught courses in Logo/Alice/Scratch/Snap/Python at schools in Pune and Seattle. Wrote and published several books. (August 2007 – till date)

- Consulting work for Motorola, Microsoft, and Palindrome in requirements analysis, software development, and testing. (3 years)

- Unix kernel/application development: enhancement of TCP/IP network protocols, and application-level security product development at Addamax Corporation (now Argus Systems) – a leading vendor of Secure UNIX systems based in Champaign, Illinois. (4 years)

Software Experience Details

Independent Consultant (April 2011 – till date)
Pune, India and Seattle, USA

Developed a tool in C to help with the synchronization of audio narrations of animated PowerPoint presentations with their video avatar.

Teacher (and Co-founder) at SPARK Institute (August 2007 – till date)
Pune, India

- Developed programming courses (including numerous programming examples and projects) in Logo, Scratch, and ALICE programming languages.
- Developed an 8-bit processor emulator in C for the purpose of a

course in "Introduction to the CPU and its Binary World".
- Developed an interpreter for Logo in Java.

CEO (and Co-founder) at Disha Technologies (Aug 1997 – Oct 2004)
(offices in Pune, India and Bellevue, WA)
2375 – 130th Avenue NE, Suite 210, Bellevue, WA 98005, USA

- Hands-on participation in many projects involving test strategy, test planning, test automation, test execution, and tool development.
- Tested products: OS components, device drivers, infrastructure tools, storage, online games, n-tier applications, database, mobility.
- Types of testing performed: functionality, localization, performance, security, compatibility, compliance, usability, setup/migration.
- Created intellectual property in the STQE space such as, methodologies and tools.

Independent Consultant (Dec 1993 – Jul 1997)
Under trade name: Disha Software Technologies
P. O. Box 2437, Champaign, IL 61825, USA
15600 NE 8th St, # B1-760, Bellevue, WA 98008, USA

- Monitoring System for Windows NT Server HCT (hardware compatibility test) Kit

Developed for Windows NT 4.0 in C++. The HCT Kit is used by PC vendors to get Windows NT Certification. Developed a client-server monitoring program which launches and monitors the NT Server tests. It synchronizes the NT Server and NT Workstations participating in the tests. It also monitors system performance parameters, such as, cpu time and memory usage. It finally generates an HTML report specifying whether the tests succeeded or not.
Customer: Microsoft Corporation, Redmond, Washington (1997)

- High-speed SECS Message Services (HSMS) Driver over TCP/IP:

Developed on Windows NT and HP/UX in C++. The driver library contained the following components:
1. HSMS Session Component

2. HSMS - TCP/IP Interface Component
3. TCP/IP Transport Component
The HSMS Session Component (HSMSSession) is the main interface visible to the application (server or client). HSMS Session takes SECS II messages from the application, builds HSMS messages, and transmits them to the peer HSMS entity using the Transport Component. It receives HSMS messages sent by the peer, and interprets them according to the HSMS state machine.
Customer: Asyst Corporation, San Jose, California (1997)

- NFS Target Service Agent:

Target Service Agent is the Server component of a network storage management system and it mediates access to the file systems or databases being backed up or restored, via a platform-independent API. Developed an NFS TSA on Windows NT 3.51 in object oriented C which allowed access to remote Unix filesystems via NFS. NobleNet's RPC was used to implement the NFS Client.
Customer: Palindrome Corporation, Naperville, Illinois (1996)

- Connection Manager:

Design and development of a module on Windows NT 3.51 for a Network Storage Management system (SMS). The module has a Requestor (client) and a Responder (server) side, and it handles communication among other pieces of the SMS and makes it network transparent. It also provides port-mapping facility for network services. Protocols supported: TCP/IP, IPX/SPX. Developed in Visual C++. Ported the Requestor side to Windows 3.1 using NetWare Client SDK.
Customer: Palindrome Corporation, Naperville, Illinois (1996)

- Unix Target Service Agent:

Development of a native TSA (see above) for Solaris 2.4 in object oriented C. Also developed a Motif-based test tool.
Customer: Palindrome Corporation, Naperville, Illinois (1995)

- Resource Requirement and Design Studies:

Conducted requirement analysis and initial design study for the following components of a network storage management product for

the purpose of porting it to the Solaris 2.4 platform:
NetWare Semaphores, NetWare Transport Layer Interface (TLI), Database subsystem, Queue Management System (QMS), NetWare Service Advertisement Protocol (SAP).
Customer: Palindrome Corporation, Naperville, Illinois (1995)

- Ethernet Device Driver:

This was a port of a SCO Unix-based STREAMS driver to a Trusted PC-based SVR4 Unix. The target Ethernet was a modified version of the IEEE 802.2 Spec with provisions for security and encryption.
Customer: Argus Systems Group, Champaign , Illinois (1995)

- IP Security Option:

The Security Option as described in RFC 1108 for the Internet Protocol (Ver 4) was implemented for Solaris 2.4 operating system for the Intel PC. The software also included software for processing CIPSO (Commercial Security).
Customer: Argus Systems Group, Champaign , Illinois (1995)

- Trusted TCP/IP:

Development of trusted TCP/IP protocol software based on the Defense Department's DNSIX 3.0 Specification. The development was done for Sequent's multi-processor Dynix (ptx 2.1) system. The software included a STREAMS module, two STREAMS pseudo drivers, modifications to TCP/UDP/IP layers, two daemon (server) programs, and user interface (Motif GUI) for administration.
Customer: Argus Systems Group, Champaign, Illinois (1994)

- Multi-Processor Unix Kernel Debugging:

Maintenance and debugging of Motorola 4.3 88K Unix system.
Customer: Motorola Computer Group, Champaign, Illinois (1994)

Senior Software Engineer at Addamax Corporation (Jul 1990 - Dec 1993)
2009 Fox Drive, Champaign, IL 61820, USA

- Trusted TCP/IP Networking product development: (May 92 - Apr 93)

The product implemented the DNSIX 2.1 Secure Network specification of US Dept. of Defense, and the SAMP/SATMP protocols specified by TSIG (Trusted Systems Interoperability Group). DNSIX 2.1, in short, is a specification for Secure Network software on TCP/IP. SAMP (Security Attribute Modulation Protocol) and SATMP (Security Attribute Token Mapping Protocol) provide a complete trusted network paradigm for TCP/IP. The development was done in C for an SVR4-based Trusted Unix (CMW) system.

System level:
Designed and developed a STREAMS module to implement the SAMP protocol. Enhanced and modified the TCP and UDP code according to DNSIX 2.1 specification. Developed a STREAMS driver to provide a communication channel between the TCP/UDP/IP modules and the user-level DNSIX daemon SMM (Session Mgmt Module). Developed a STREAMS driver to provide a communication channel between the SAMP module and the user-level SATMP daemon.

User level:
Designed and developed a daemon program to implement the SATMP protocol. Designed and developed administrative commands to manage the network database files and operations. Modified several daemon programs (e.g. ftpd, rlogind) to properly interact with the trusted networking. Designed and developed a Motif -based program to administer the Networking databases and operations.

- Trusted X Server development: (May 93 - Nov 93)

For Network Computing Devices (NCD), Mountain View
The Addamax Trusted TCP/IP and DEC's X security extension were implemented on NCD's X Terminals which run a stand-alone X (X11R5) server with BSD 4.3 networking.

System level:
Ported the SAMP module to the BSD networking paradigm. The module was interposed between the socket and TCP/UDP protocol layers. Ported the SATMP daemon program, and the modifications in the TCP/UDP layers. Implemented code in the X server to Interface with the trusted networking. Ported portions of DEC's X security extension to the NCD X server.

User level:
Developed a Motif -based program for Administration of Trusted X terminals on a LAN. Also developed a UIL-based version.

- Trusted UNIX Product Development: (Jul 90 - Mar 92)

Addamax's CMW (compartmented mode workstation) is a system consisting of System V 4.0, and a trusted windowing environment (based on X11R4 and OpenLook). The product is designed for B1 level security.

System level:
Enhancement of System V IPC (shared memory, messages, and semaphores) mechanisms to support security at the object level. Enhancement of the STREAMS subsystem to support security at the message level. Enhancement of the Process subsystem (by modifying the Credential structure) to support security at the process level. Enhancement of the Device file system (by modifying the snode structure) to support security at the device level. Added security features to the kernel, device drivers, boot code and Unix commands.

In-depth study of SVR4 memory management scheme, 80486 instruction set, various file systems and the STREAMS subsystem to aid the NCSC evaluation team. Miscellaneous tasks such as kernel debugging, product packaging, and design documentation.

Application level:
Graphical User Interfaces to various security features and administrative commands of the ACMW, were implemented using the OpenLook toolkit. Modified the Motif Window Manager (mwm) to display window-level security information as a part of the decoration.

- Enhancement of INTERACTIVE UNIX to C2: (Mar 92 - Jun 92)

For Interactive Systems Corporation, Santa Monica

INTERACTIVE UNIX Release 3.0 was enhanced to have C2 security features. Team leader of the kernel group. Work mainly involved porting the Audit Subsystem of the Addamax CMW, as an add-on package, with the required hooks in the kernel. This included incorporating audit-related data structures (e.g. a per-process record

in the u-block), modifying access-check routines (e.g. suser), and porting the audit system calls (which were packaged into a single entry point) and the audit daemon.

- Enhancement of Motorola SVR4 MP-UNIX to C2: (Jul 92 - Oct 92)

For Motorola Computer Group, Urbana

Motorola Multi-Processor SVR4 UNIX (for 88k machines) was enhanced to have C2 security features. Team leader of the test group. Work mainly involved testing and debugging the Audit Subsystem. Testing involved designing and writing a Audit Test Suite. Debugging included debugging of the kernel, audit daemon and commands.

Software Engineer (Dec 1988 - Jun 1990)
Lachman Associates (Naperville, IL) / Interactive Systems Corporation, (Santa Monica, CA)

- Network Based Trading System: (Jan 89 - Jun 89)

The project involved design and implementation of a set of applications which would run on a cluster of Sun workstations and allow the users to retrieve market/financial data from remote computers and display it dynamically in X environment. Developed one of the applications called Montage Editor, which allowed creation of customized pages by means of operations such as cut and paste. Used Xlib (C library) and Athena Toolkit. This project provided good experience in:
- X application programming, Athena toolkit (X11R3)
- Network programming using Sockets

- Running VP/ix in X: (Oct 89 - Apr 90)

The project involved running VP/ix (a DOS emulator) as an X client, in an 80386-based Unix environment. The work included (a) moving some user-mode emulation code to kernel-mode, (b) writing an extension to the X server and Xlib, and (c) design of the user interface. The extension to X was made to handle off-screen video memory access. The work also involved changing Xlib calls to X toolkit calls. The user interface was implemented using Xt intrinsics and Athena widgets. This project provided good experience in:

- 80386 architecture, its v86 mode, its assembly language
- X Server and Xlib internals, Xt (X11R3)
- Unix (Interactive's implementation of System V 3.2 for x86 desktop) process and IPC subsystems

Research Assistant (Sep 1986 - Dec 1988)
Department of Electrical and Computer Engineering, Syracuse University, Syracuse, NY

- Automatic Vectorization of Programs: (Aug 86 - Jul 87)

Vectorization is the process of converting scalar instructions in a program into vector instructions. It involves dependence analysis, recurrence detection and dependence breaking. Fortran 77 was chosen for the prototype development. Vectorization tools consisting of a Fortran Parser, Frequency Analyzer and Vectorizer (or Performance Predictor) were designed and developed in C. A technical paper, based on this work, was presented at a Conference on Workstations and Parallel Processing.

- Parallel Software Design Environment: (Aug 87 - Dec 88)

Software development tools were designed for the Parallel Fortran (IBM) language. The Hot Spot Analyzer and Parallelism Detector together analyze portions of the program which are most suitable for parallel execution. The Performance Predictor does a cost analysis. The User Interface (in X) to these tools consisted of a Flowchart Generator which displays the data and control flow of a parallel program, and a simulator which simulates the execution of a parallel program, depicting the parallelism, hot spots, bottlenecks etc. The development was done using Xlib.

Application Engineer (Nov 1985 - July 1986)
Datapro Electronics, Pune, India

Application of PLC (programmable logic controllers) systems for industrial automation.

Research Scientist - B (Oct 1984 - Oct 1985)

Defense Research and Development Organization (DRDO), Government of India, Bangalore, India

EKG Simulator:
Developed an 8085 microprocessor-based EKG (Electro-cardiogram) simulator to be used as a training tool for medical practitioners.

Computer Skills

- Comfortable with the art and science of computer programming in a variety of languages (can pick up any new language in a short time). Have written programs in: C, C++, LISP, x86 Assembly, Logo, and Scratch.

- Programming Environments:
  Windows XP/Win2K/NT 4.0/95, UNIX System V R4;
  Solaris, BSD 4.3, Linux, X Window System and Motif.

- Working Experience in: Computer Networking, Operating Systems, Software Security, Software Testing, E-learning, Parallel Compilers, Expert Systems, Image Processing, and many others.

Academic Record

- **Master of Science** in **Computer Engineering** (December 1988)
  Syracuse University, Syracuse, NY 13244

- **Bachelor of Engineering** in **Instrumentation** (June 1984)
  College of Engineering, University of Poona, Pune, India

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