Geoffrey C. Carpenter Phone (914) 206-8354
gcc@fargos.net
http://www.fargos.net/gcc.html

Skills Summary

Primary Research and Development Activities

Commercial Unix programmer since 1983, but all products shipped since 1996 have been maintained as single source images that also supported 32-bit Microsoft Windows (i.e., 9x/ME/NT 4/2000/XP). Primary R&D activities have been in distributed applications, usually in the network and system management domain, with a focus on implementing high-performance multi-threaded transparently distributed frameworks to enable the development of distributed, fault-tolerant applications.

Application Domains

Applications ranged from custom accounting/inventory control/billing systems, compilers (e.g., the **CEDARS** compiler for class scheduling [done for U-M], **G**, **OOG**, [done for IBM], **OIL2** [done for FARGOS Development, LLC]), network/systems management platforms and technologies (**XGMON**, **DRAGONS**, RFC 1228, RFC 1592, **SNMP Query Engine**, **9076 SP1/SP2** system monitor/framework for distributed systems management, The Enterprise Management Protocol [**TEMP**]), to genetic algorithms (VLAN configuration) and Byzantine fault-tolerant transaction monitors (**FARGOS/SolidState**). Designed and implemented price feed layer (exchange interfaces, network distribution layer and client APIs that supported synthetic variables and merged prices), shared memory variable API and utilities for statistics and control, and low-latency execution engines for high-frequency options trading on several exchanges (ISE, CBOE, NASDAQ, NYSE, ARCA, OSE, SGX, Eurex, etc.)

In addition, designed and implemented a multitasking operating system for TRS-80 Model 1's, implemented math kernels for Cray-2 vector multiprocessors, dynamic loader and lightweight process library for SunOS.

Languages

Commercial products developed using BASIC, COBOL, FORTRAN, Cray-2 Assembler, Zilog Z-80 Assembler, Intel 386 assembler, C, C++, etc. Research projects developed using Pascal, Lisp, ML, BCPL, IBM 360/370 Assembler, Motorola 68000 assembler, Cray X-MP assembler and other obscure languages. Primary development language has been C++ (hundreds of thousands of lines shipped in products).

Patents

U.S. Patent 6,748,416 – Client-side method and apparatus for improving the availability and performance of network mediated services

Experience

12/2006–2/2010

Volant Trading, LLC
99 Wall Street, 25th Floor
New York, NY 10005

As senior program, designed and implemented the performance-sensitive components for Volant's first few years of operation. These included the low-latency (i.e., less than 70 microseconds), high-frequency execution engines which embedded the logic and risk controls for options trading which were the firm's reason for existence as well as the multicast price feed layer supporting synthetic prices and merging across multiple exchanges (e.g., exchange connectivity, multicast distribution layer, client APIs, caches, and associated utilities for logging, reports and replay for simulation). These frameworks were interfaced to ISE, CBOE, NASDAQ, NYSE, ARCA, OSE, SGX, Eurex, etc. to perform the business of the firm. As team lead and manager, oversaw development efforts for connectivity to PHLX, AMEX, etc. Implemented a clone of IBM's ODE sandbox-based build environment with automated builds and multiple test environments. Designed and implemented an API for shared memory statistics and control variables and related utilities to permit non-intrusive management of applications with no impact on latency. Designed and implemented an efficient log filter that could consume multiple files and streams in parallel, extract content of interest and display in appropriate colors; this was used for all trader event GUIs and to drive background utilities like event-specific sound generation. FARGOS/VISTA-based infrastructure was used for multicast forwarding and remote execution of processes on trader workstations.

5/2003–present

IBM Poughkeepsie Unix Development Lab
2455 South Road
Poughkeepsie, NY 12601

As a consultant, helped repair design defects in IBM's Reliable Scalable Clustering Technology, create models of expected performance and provide education regarding C++ and algorithm design. Taught weekly class on fundamentals of distributed algorithms with a focus on the origins of the technology being shipped by IBM. One of several contributions for the scaling improvements required to support ASC Purple included identifying the flaw in the group consensus protocol that caused stabilization times to be over an hour and proposed the solution that brought the time to under 2 seconds.

7/99–present

FARGOS Development, LLC
President and CEO
757 Delano Road
Yorktown Heights, NY 10598

Performed design, implementation and documentation of the **FARGOS/VISTA** (a high-performance, secure, transparently distributed, architecture-neutral, multi-lingual, object-oriented applications infrastructure) and **FARGOS/SolidState** (a FARGOS/VISTA-based Byzantine fault-tolerant transaction monitor) software products. Managed and contributed to development efforts of various customer-specific applications.

5/88–7/99

IBM T. J. Watson Research Center
P. O. Box 218
Yorktown Heights, NY 10598

Hired as Senior Associate Programmer, but received multiple promotions during the period of 1988-1993 until promoted to highest possible position (Senior Programmer). Original job responsibility was the network management software for the National Science Foundation Network backbone (both SGMP/SNMP agents and management applications). Other research activities included configuration of virtual LANs by genetic algorithms, an Internet access cartridge for the Nintendo SNES, fault-tolerant services, enterprise management protocols, and pervasive computing. The **XGMON** and **DRAGONS** technologies were afforded special case treatment and licensed to select IBM customers before being generally available as products. IBM Research took the extraordinary step of creating *NetSmith's, Ltd.* as an independent firm dedicated to selling **DRAGONS** and other companies licensed the **DRAGONS** technology suite for resale under their own brands. Although an IBM Research employee and not working for an IBM product division, was able to contribute a component to an IBM licensed program product during many years of employment. Examples include:

1988 – Over the course of two weeks, performed an emergency port of the SUN RPC library (because a 9-month effort by another IBM employee had failed) and development of a BSD socket library for the **VM TCP/IP** product. These efforts enabled the product tape to be created on time. Subsequently received an award for contributions to the product.

1989 - **XGMON** (the network management technology developed for NSFNET in 1988) was accepted for release on AIX V3 (as the **Network Management/6000** LPP, although much of the functionality was removed by the product division). Received award for contributing to the launch of the **RISC System/6000** as well as an Outstanding Technical Achievement award for **XGMON**. SNMP agents for the **VM**, **MVS** and **OS/2 TCP/IP** products were based on the SNMP agent developed for the NSFNET routers. The **SNMP Distributed Program Interface**, originally invented for management of the Cylink ACSUs used in the NSFNET, was the key to enabling the implementation of the SNMP agents for VM and MVS. The **SNMP DPI** sub-agent technology was documented as a supported API on each IBM platform. The **SNMP DPI** protocol was subsequently published in 1991 as Internet RFC 1228. Received award for contributions to initial release of the **MVS TCP/IP** product.

1990 - Implemented the **SNMP Query Engine** to enable native SNMP support for **NetView/390** (**VM** and **MVS**). Without requiring modification, the **SNMP Query Engine** was also provided on other platforms (**AIX V3**, **AIX PS/2**, **AIX/370**, 4.3BSD, etc.) and enabled multi-user **XGMON** clusters and bi-directional **XGMON**/**NetView** communication. Received award for contributions to the various **TCP/IP products for VM, MVS, and OS/2**. Implementation of the follow-on to **XGMON**, **DRAGONS** (Distributed Reliable Architecture Governing Over Networks & Systems), began in September of 1990 after the design had been submitted by an IBM product division in response to an Open Software Foundation Request For Proposal.

1991 – In April of 1991, after 7 months of development and some 70,000 lines of C++ later, **DRAGONS** was demonstrated in Munich to the Open Software Foundation's Distributed Management Environment evaluation team. **DRAGONS** was selected and announced as the real-time framework of the **OSF DME** infrastructure in September of 1991.

1992 – After other IBM employees had failed to deliver a working system despite a year of development, did the emergency implementation of the system monitor and provided the infrastructure for distributed systems management of the **IBM 9076 SP1** parallel processor using **DRAGONS**. The **DRAGONS Display Manager** was invented and developed during the first month of work. During the second month of development, a supplemental employee assisted with the construction of some of the graphics classes that enabled the real-time display of performance counters and hardware sensor values (such as fan speeds, 7-segment LEDs, etc.). The two-month-long effort ultimately yielded a system with many more capabilities than had been envisioned by the product division. Also corrected flaws in the design of the communications protocol between the frame controllers and the management workstation.

1993 - Enhanced the **SP1** system monitor to support new **SP2** hardware and features.

5/87–4/88

Computing Center
The University Of Michigan
1075 Beal Avenue
Ann Arbor, MI 48109

As a systems programmer, implemented a dynamic loader for 4.3BSD UNIX (SunOS on Sun 3's), a library to implement lightweight processes and a process checkpoint/restart facility.

1/86–12/86

Research Institute for Advanced Computer Science
NASA Ames Research Center
Moffet Field, CA 94035

As a consultant, was responsible for developing appropriate techniques for benchmarking **Cray 2** supercomputers and the implementation of ultra-high performance algorithms for use by the computational chemistry group working on the NAS project. Most notable accomplishment was the implementation of the fastest matrix multiplication kernel for the **Cray 2**. Designed and implemented a "microtasking" library for the **Cray 2** before CRI decided to start their own development effort.

5/85–12/86

Magnetic Fusion Energy Computer Center at Lawrence Livermore
Los Alamos National Lab
San Diego Supercomputer Center
Numerical Aerodynamic Simulator project at NASA Ames Research Center

As a research assistant to Donald A. Calahan, designed and implemented several high-performance kernels for the **Cray 2** scientific library (e.g., scalar times a vector, vector times a vector, matrix times a matrix, etc.). Designed and implemented benchmarking routines. Performed only available comparisons on the effect of pseudo-banking on the Cray-2 before and after implementation of this hardware modification on the NAS **Cray 2**. Various benchmarking experiments comparing algorithm performance between dissimilar architectures, such as vector processors (e.g., **Cray 2**, **Cray Y-MP**) and hypercubes (e.g., nCUBE, Intel).

5/85–2/86 Cravath, Swaine and Moore
Worldwide Plaza
825 Eighth Avenue
New York, NY 10019

In what has been stated to be one of the landmark court cases pertaining to "look-and-feel", was retained to determine whether the source of one program was a derivative of another. Analysis results were explained in court by Bernard A. Galler and were sufficiently compelling to win a summary judgment.

9/84–5/86 Independent research at the University of Michigan, Ann Arbor, MI.

9/84-12/84: Designed and implemented **FARGOS** (Fantastic And Really Great Operating System), a multi-tasking operating system for TRS-80 model I microcomputers.

1/86-5/86: Implemented a Unix System III-based simulator of the TRS-80 Model I with multi-processor extensions and enhanced **FARGOS** to support multiple processors, which became **FARGOS/MP**.

Related Publications

NOMS 2000: Remote Management of Narwhal Clients using TEMP
Globecom 99: Enabling the Management of Everything using TEMP
INET99: Increasing the Availability and Performance of Network-Mediated Services
USENIX LISA VI: Concurrent Network Management with a Distributed Management Tool
RFC 1228: SNMP-DPI
RFC 1592: SNMP DPI Version 2

Awards

IBM Outstanding Technical Achievement for the National Science Foundation Network (the network management software).

IBM Outstanding Technical Achievement for 9076 SP1 System Monitor (DRAGONS-based infrastructure and applications).

IBM Research Technical Group Award for contributions to TCP/IP (SNMP DPI, SNMP Query Engine to enable SNMP support for Netview)

Education

M. S. in Computer Science and Engineering from the University of Michigan, Ann Arbor, Michigan (awarded May 1987).

B. S. in Computer and Communication Sciences from the University of Michigan, Ann Arbor, Michigan (awarded May 1985).

Citizenship

United States citizen.

Additional Information

The web page http://www.fargos.net/gcc.html provides links to several published papers and additional details about prior work. The web page http://www.fargos.net/gccAwards.html documents some of the awards that were received in recognition of technical accomplishments.