

# Karl A. Nyberg

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**Summary** Senior software professional with over twenty five years industry wide lifecycle software experience (including SEI Level 5 organizations) performing senior technical / supervisory projects. Particular strengths in automation and the area of writing (procurement material, requirements, technical specifications, design, code, documentation, newsletter and book authoring, editing and publishing, operation and training manuals), interoperation among programming languages, standards and tools (Ada, BASIC, C/C++, Java, Fortran), communications protocols (XML, HTTP, TCP/IP, SMTP, OFX, IFX), and server-side development in transactional systems on UNIX and variants (Linux, Solaris, AIX, etc.) Citizenship: United States.

**Education** 1975-1981 Massachusetts Institute of Technology Cambridge, MA

- Master's degree in Electrical Engineering and Computer Science  
Thesis: A Methodology for Using Algebraic Specifications
- Bachelor's degree in Computer Science and Engineering  
Thesis: An Experiment in Using Algebraic Specifications

**Awards**

- Association for Computing Machinery (ACM) Special Interest Group on Ada (SIGAda) Ada Community Contributions Award, November, 2007
- Sun Microsystems "Open Performance Contest" winner for submission of "A Constructive Approach to Integer Factorization" as evaluation of, and awarded, a Sun Fire T1000, January 2007
- Institute for Electrical and Electronic Engineering (IEEE) POSIX Pioneer award, March 1988

**Professional**

- ACM Senior Member, IEEE, ACM SIGAda
- US SC22 JTC1 TAG / ISO IETC J22 - Java Study Group (1997 - 1999)
- Federal Advisory Board on Ada (1990 – 1992)
- Ada 9X Requirements Team (1989 – 1990)
- IEEE Technical Committee Operating Systems P1003.1 (1986 – 1988)

**Experience** August 1985 – Present Grebyn Corporation Sterling, VA

Projects: Various projects ranging from single day to multi-year efforts covering the entire software lifecycle, including local, national and international efforts. Authored, edited, published and marketed multiple periodicals - newsletters, compact disks and books on Ada (technical,

market and informational).

Major Clients: Boeing (via VAST), Computer Sciences Corporation, Global Protocols, Inc., Honeywell Federal Systems, IBM (via ARC), Institute for Defense Analyses, IntelliData, JRL Associates, Lockheed Martin (via TAC Worldwide), Objective Interface Systems (OIS), Inc., Openet Telecom (via Sabianet), SAIC, SEI, Software Productivity Consortium, TowerSource LLC, VISA Interactive, VISA International, Waterford Consultants.

Oct. 2010 – Present      HTSI/Defense & Space      Greenbelt, MD  
Program Manager 5 (SME) (L)  
Temporary, part-time, on-call support for Near Earth Network Services (NENS).

Aug. 2005 – Dec. 2005      Geologics      Alexandria, VA  
Ada Software Engineer / Software Auditor  
Part-time support for software review of En Route Automation Modernization (ERAM) subcomponent.

Jan. 1983 – May 1986      Verdex Corporation      Chantilly, VA  
Various Senior Technical Positions

- Created initial concept of Verdex Secure Local Area Network (VSLAN).
- Authored winning Small Business Innovation Research (SBIR) Phase I proposal for Network Security Devices (later productized as VSLAN).
- Administered computing facilities and supervised junior staff.
- Verdex Ada Development System (VADS) product development, quality assurance and customer support.

Oct. 1981 – Sept. 1982      Digicom Research Corp.      Ithaca, NY  
Security Analyst

- Investigated use of Gypsy methodology to secure database systems.
- Presented oral and written reports to RADC and Pentagon personnel.
- Managed portions of subcontract with University of Texas.

Publications  
and Talks

- Nyberg, Karl A. "[Automatically Generating DTD-Specific XML Parsers](#)", ACM SIGAda AdaLetters, August 2010. Also available at <http://www.hdfgroup.org/pubs/others/>.
- Nyberg, Karl A. "[Parsing Hierarchical Data Format \(HDF\) Files](#)", ACM SIGAda AdaLetters, August 2010. Also available at <http://www.hdfgroup.org/pubs/others/>.
- Nyberg, Karl A. "[Multi-Core + Multi-Tasking = Multi-Opportunity?](#)", Proceedings of the ACM SIGAda 2007 conference, Fairfax, VA. November 2007; also ACM SIGAda AdaLetters XXXVII #4, pp. 79-81, December 2007. ([Slides](#))
- Nyberg, Karl A. "[A Constructive Approach to Integer Factorization](#)", an evaluation of the Sun Microsystems SunFire T1000.
- Nyberg, Karl A. "[Fun v. Tedium](#)", Letters to the Editor, *IEEE Software*, p. 9, May/June 2007. (Also available at [IEEE Software](#))
- Ausden, Howard and Nyberg, Karl A. "[Using ASIS to Generate C++ Bindings](#)", Proceedings of the ACM SIGAda 2005 conference, Atlanta, GA. November 2005; also ACM SIGAda AdaLetters XXV #4, pp. 23-30, December 2005. ([Slides](#))
- Nyberg, Karl A. "[Windows Disk Drive Recovery with Ada95 – An Application Note](#)", ACM SIGAda AdaLetters XXV #2, pp. 42-44, June 2005.
- Nyberg, Karl A. "[Optical Character Recognition \(OCR\) of Cryptographic Source Code](#)". ACM Washington, DC Special Interest Group on Ada (SIGAda), McLean, VA. May 8, 2003.
- Nyberg, Karl A. "[Barbarians at the Gate – Stopping Spam in its Tracks](#)", 2001.
- Emery, David E.; Mathis, Robert F.; and Nyberg, Karl A. "[Automating the Ada Binding Process for Java - How Far Can We Go?](#)" Reliable Software Technologies: Proceedings of the Ada Europe 1998 conference, June 1998, Uppsala, Sweden.
- Nyberg, Karl A., (Editor), "The Annotated Ada Reference Manual", Third Edition, March 1994.
- Engle, Charles B., Jr and Nyberg, Karl A. "[Mandating Ada Compiler Evaluation](#)", Invited Paper. Minutes of the Federal Advisory Board on Ada, June 27, 1991. Pittsburgh, PA. ([slides](#))
- Nyberg, Karl A., "Ada: Sources & Resources", Third Edition - April 1991.
- Nyberg, Karl A., "A Study of Ada's Input-Output Packages", SEI Special Report. 1990.
- The Ada 9X Revision Requests – Fact & Fantasy. MITRE Corporation, McLean, VA. April 10, 1990.
- Emery, David and Nyberg, Karl A. "[Observations on Portable Ada Systems](#)", in "Ada: The Design Choice", Proceedings of the Ada-Europe International Conference, Madrid, Spain, 13-15 June 1989. Cambridge

- University Press. Also MITRE Technical Paper MTP-282; February 1989, Bedford, MA. ([slides](#))
- [Nyberg, Karl A.](#), "[Denial of Service Flaws in SDI Software: An Initial Assessment](#)", Proceedings of the Fourth Aerospace Computer Security Applications Conference, December 12-16, 1988, Orlando, FL.
  - [Donaldson, Albert L.](#); [McHugh, John](#); [Nyberg, Karl A.](#), "[Covert Channels in Trusted LANs](#)", The 11th NBS/NCSC National Computer Security Conference, pp. 226 – 232. October 17-20, 1988, Baltimore, MD.
  - [Nyberg, Karl A.](#) "The Application of Formal Methods to Ada Software Development". ACM SIGAda, Phoenix, AZ. March 24, 1988.
  - [Preston, David](#); [Nyberg, Karl A.](#); [Mathis, Robert](#), "[An Investigation Into the Compatibility of Ada and Formal Verification Technology](#)", 6<sup>th</sup> National Conference on Ada Technology: Ada in the Life Cycle, March 14-17, 1988, Arlington, VA ([extended abstract](#)).
  - [Nyberg, Karl A.](#) "Porting Ada Applications between a PC and a VAX". Capital Area PC Users Group (CPCUG) Ada Special Interest Group, Bethesda, MD. February 15, 1988.
  - [Lee, JAN](#) and [Nyberg, Karl A.](#), "[Strategies for Introducing Formal Methods Into the Ada Life Cycle](#)", SPC-TR-88-002, Version 1.0. Software Productivity Consortium, January 1988, Reston, VA. Also [Virginia Tech - CS TR-88-09](#).
  - [Nyberg, Karl A.](#) "[Using Representation Clauses as an Operating System Interface](#)," Ada Letters, Volume VII, Number 4, July - August, 1987; pp. 98-101.
  - [Nyberg, Karl A.](#), "[Implementing Curses in Ada](#)", Proceedings of the 1986 USENIX Winter Conference, January 1986, Denver, CO.
  - [McHugh, John](#) and [Nyberg, Karl A.](#), "[Adapting the Gypsy Verification System to Ada](#)", in Proceedings of the First IDA Workshop on Formal Specification and Verification of Ada, Clyde G. Roby, ed., Memorandum Report #M-146, December 1985, Alexandria, VA. ([slides](#))
  - [McHugh, John](#) and [Nyberg, Karl A.](#), "[Ada Verification Using Existing Tools](#)", IEEE Software Engineering Notes, V 10, no 4. Special Issue: Proceedings of Verksshop III, pp. 104-106. August 1985.
  - [Nyberg, Karl A.](#); [Hook, Audrey A.](#); [Kramer, Jack F.](#), "[The Status of Verification Technology for the Ada Language](#)", IDA Paper #P-1859, July 1985, Alexandria, VA.
  - [Nyberg, Karl A.](#); "[A Methodology for Using Algebraic Specifications](#)", Master's Thesis, Massachusetts Institute of Technology, June 1981. Cambridge, MA.
  - [Nyberg, Karl A.](#); "[An Experiment Using Algebraic Specifications](#)", Bachelor's Thesis, Massachusetts Institute of Technology, August 1980. Cambridge, MA.

**Specific Project Experience****Openet Telecom. Reston, VA**

Requirements analysis, design, development, production deployment and support of rule based scripts to provide telecommunication billing and mediation efforts in a professional services development environment. Performed production ticket triage and categorization. Utilized proprietary programming language (DSD - Data Stream Decoder) on Solaris, cvs, wiki, Eclipse and Oracle.

**Waterford Consultants. Round Hill, VA**

Porting / conversion / refactoring of RF engineering codes in BASIC under Windows using PowerBasic and C on Windows.

**Objective Interface Systems. Herndon, VA**

Supported a requirements traceability analysis of ORBExpress middleware COTS product. Utilized a DO-178B-like safety evaluation process with VeroTrace Requirements Traceability tool. Prepared development and implementation requirements characterization and traceability linking between requirements, design and implementation. Created bulk import scripts for MS SQL 2005 / 2008 to automate development and analysis.

**Global Protocols, Inc. Greenbelt, MD**

Performed software development, modification, testing and documentation of a Performance Enhancing Proxy (PEP) component of a Space Communications Protocol Specification (SCPS) TCP acceleration product. Technologies included embedded Linux and C with both proprietary and Open Source Software components. Implemented and tested TCP Explicit Congestion Notification (ECN) module. Performed throughput and performance analysis with GCC development toolset (gcc, gprof, gcov, strace). Testing performed with expect / TCL and bugzilla. Documentation generated with doxygen and Wiki technology.

**Tower Source LLC. Waterford, VA & Denver, CO**

Performed web site maintenance, data analysis and extraction, development and rehosting for communications tower location service. Technologies used included Linux / Solaris and Apache, MySQL, Java, tomcat, Javascript, HTML, Fortran, Google Maps API, SSL, and USGS National Elevation Data (NED) terrain data.

**JRL Associates. McLean, VA**

Intermittent transportation procurement services for family-owned consultancy.

Metropolitan Atlanta Rapid Transit Authority (MARTA) - Atlanta, GA. Advised and assisted in the selection process for Architect / Engineering services and performed evaluation of submissions and recommendations for General Engineering Consultant.

Metropolitan Bus Authority (MBA) - San Juan, Puerto Rico. Prepared solicitation material, including procurement specification and technical specification, participated in pre-proposal conferences, developed evaluation procedures and factors, reviewed proposals, performed financial analyses and made recommendations on negotiations. Procurements include multimillion dollar regular bus stock, hybrid buses, fare collection systems, labor timecard systems, paratransit vehicles and preventive maintenance and information technology systems upgrades.

Ann Arbor Transportation Authority (AATA) - Ann Arbor, MI. Prepared solicitation material, including procurement and technical specifications, participated in pre-proposal conferences, reviewed proposals and made recommendations.

### **Lockheed Martin. Rockville, MD**

Ada Software Engineer on URET / ERAM (User Request Evaluation Tool / En Route Automation Modernization). Developed tools in Ada95 on AIX to provide interoperable support to Ada95 libraries called by C++. Project used an implementation of ASIS (Ada Semantic Interface Specification) on Linux and AIX with GNU Compiler Collection (GCC Ada and C++) and IBM Visual C++ and OC Systems PowerAda. Resulting output was used in various project libraries with unit and system test. Co-authored and published paper regarding effort.

Performed various components of SEI CMM Level 5 software development lifecycle (requirements analysis, design, software development, unit testing, string testing, inspection moderation, configuration management, system build, etc.) on C++ and Ada95 libraries for Addendum and Secondary Surveillance Radar, developed by self and by other team members.

Performed Detailed Design, Coding, Unit and Integration Test of Inter-Facility Protocol Adapter – URET Interface Protocol (IFPA-UIP) integrating the Track Management exchange function between the URET and the ERAM system for use during upgrade of systems. Performed application builds for a staff of approximately 10-15 developers.

### **Computer Sciences Corporation. Rockville, MD**

Ada Software Engineer on ERAM IFPA project developing tools in Ada95 for CSCI simulation, performing defect resolution and performance enhancements.

### **America Online. Dulles, VA**

Served as technical analyst in the registration group at America Online. Translated business requirements into technical requirements, design documents and coding changes for the registration server. Specified changes to underlying proprietary platform based on UNIX, C, and TCL code.

### **Convergys Corporation. Reston, VA**

Provided technical documentation associated with the Convergys Speech Network (CSN) Open Hosting Environment (OHE) project. Created Operations Manual,

consisting of existing and newly developed processes and procedures for development, testing and production activities. Documented logical and physical network layout diagrams. Prepared Application Procedures interface document for external users. Interviewed appropriate technical staff for knowledge transfer and documentation.

#### **Lew Read, Inc. Annandale, VA**

Intermittent Solaris support. Provided Solaris x86 5.7 System Administration support for the District of Columbia Superior Court. Updated DNS configuration, reconfigured Ethernet interfaces, installed Veritas backup software, and modified file system layout information. Provided disk drive recovery for Solaris x86 5.8 file systems.

#### **InteliData Technologies, Inc. Reston, VA**

Documenting data flow for Electronic Bill Presentment and Payment (EBPP) system from front end XML-based protocol through Oracle database to back end Open Financial Exchange (OFX) and Master Card Remote Payment Processing System (RPPS) protocol-based payment systems. Utilized ER/Win data modeling system.

Prepared sample payment reports for EBPP system from Oracle database through Java Database Connection (JDBC) with JReport.

Performed developmental Quality Assurance efforts on a web-based customer Electronic Bill Presentment and Payment (EBPP) system, primarily with Rational Enterprise Suite tools. Refined vision, defined functional requirements, wrote frontend customer interface and system use cases, created test plan and related integration interfaces documents. Created a message / protocol reference manual for an XML based protocol for frontend communications. Analyzed protocol certification suite components for Open Financial Exchange (OFX) and Interactive Financial Exchange (IFX) protocols. Performed technical coordination and supervision of six staff members, including employees and contractors. Solaris based system with WebLogic and Oracle was tested utilizing in-house web-based test tools. Created numerous support utilities for QA development in C, Ada, Java, UNIX shell. Utilized SQL interfaces from Solaris and Windows to access and manipulate data in the testing environment.

Development of message based test plan and scripts for electronic financial protocol switching system utilizing OFX and IFX protocols. Prepared test plan specifying over 1300 tests and automated bulk development of the IFX test cases. Trained staff in financial protocols, test suite and assisted in test case development. Automation of test script generation (in C, Ada, and UNIX shell) resulting in savings in excess of \$200,000 against projected estimates over a four month period. Performed technical supervision of six staff members, including employees and contractors.

#### **Escom Corporation. Oakton, VA**

Translated ASMTTP (Adaptive SMTP) spam filter quarantine software from C into Java. Ported to multiple platforms - Red Hat Linux, Microsoft Windows, Sun Solaris. Created Apache web server load module.

Developed test software in C for kernel portions of the Trusted Minix operating system on the IBM PC.

**IBM Corporation. Herndon, VA**

Performed multiple electronic banking projects, including design, development and maintenance of the IBM IFS (Interactive Financial Services) platform and the VISA Interactive Electronic Banking System platform. Utilized Sun / Solaris and IBM RS6000 / AIX with C, Java, Javascript, REXX, MQ, IPlanet, MTI, SQL, DB2, Informix, Interbase, Netscape Enterprise Server and WebSphere. Developed new design specifications and implemented solutions and fixed outstanding defects. Served as technical interface to external (both non-development and customer) organizations. Performed defect triage, management, assignment and resolution.

**Integrion Financial Network. Herndon, VA**

Performed multiple electronic banking projects. Architecture design and development for protocol conversion between differing electronic bill payment and banking protocols - VISA Access Device Message Specification / Electronic Banking Messaging System and Integrion GOLD. Designed and implemented extensions to banking simulator. Sun / Solaris and IBM RS6000 / AIX hardware with C, MQ series, MTI, SQL, DB2, Informix.

**VISA Interactive / International. Herndon, VA**

Performed technology transfer and technical support of divestiture of the international operations of the Electronic Banking System of VISA Interactive to a third party in London, England. Performed development and coordination of technical training, procurement of production and developmental support hardware and software for the third party staff numbering fourteen based in London.

Development, staffing and training of a third party validation group, including software script and code development. Performed training and support of third party developers, including installation and modification of applications utilizing C, TCP/IP, X.25, Interbase, Informix on Sun / Solaris. Edited initial version of Access Device Message Standard (ADMS) protocol reference manual.

**VAST Corporation. Vienna, VA**

Part of a six person Boeing Reserve Component Automation System (RCAS) performance analysis team. Simplified architecture and reduced Ada code to achieve two orders of magnitude improvement in startup / execution time. Developed compilation order tool. Primary hardware was IBM PCs running a secure variant of SCO UNIX with Verdix Ada Development System (VADS).

**SAIC. Reston, VA**

Performed multiple contracts for productization of the OCR Power Server (OPS). Developed process control and voting software that merged the output results of multiple OCR software engines resulting in significantly increased recognition accuracy.



Environment was Sun / SunOS in C, with communications with additional IBM PC / DOS platforms via TCP/IP sockets. Integrated both machine print OCR and hand print Intelligent Character Recognition (ICR) engines. Provided design documentation and status reports showing effectiveness of algorithms employed.

**Atlantic Research Corporation. Rosslyn, VA**

Performed cost to complete analysis for the Iceland Air Defense System (IADS), a large radar collection system written in Ada operating under VAX / VMS.

**E-Systems. Falls Church, VA**

Supported development and debugging of large Ada / X Windows / database application. Utilized Sun / SunOS with VADS.

**Verdix Corporation. Chantilly / Herndon, VA**

Performed multiple consulting efforts. Developed test software for Ada binding to X Windows product; performed computer systems security audit; provided general UNIX system administration support (emergency system reloads, system / mail / news configurations, physical relocation, etc.); and served as customer service support backup. Utilized VAX / UNIX, Sun / SunOS, Sequent Dynix.

**Institute for Defense Analyses. Alexandria, VA**

Part of a four to six member team responsible for the analysis of the revision requests as part of the Ada 9X revision process. Organized requests into appropriate requirements.

**Software Engineering Institute. Pittsburgh, PA**

Investigated input / output requirements for Ada 9X revision process. Published report.

**Honeywell Federal Systems, Inc. Vienna, VA**

Provided technical support for the successful Air Force WIS Workstation proposal effort. Recommended software products, performed benchmark evaluations, prepared white paper reports. Developed Ada binding to underlying operating system interfaces. Utilized Apple Macintosh / AUX with TeleSoft TeleGen Ada.

**ORI/Calculon. Rosslyn, VA**

Supported the Marine Corps proposal technical evaluation of software development capabilities for contract awarding of the MCTSSA contract.

**Software Productivity Consortium. Reston, VA**

Performed research into the utilization of formal methods in the Ada software development lifecycle. Published report.

**Computer Sciences Corporation. Fairfax, VA**

Developed white papers and proposal for Ada Verification Environment.

**Software A & E. Rosslyn, VA**

Investigation into denial of service attacks against SDI (Stragic Defense Initiative) software. Reviewed available design documents and performed interviews at the Naval Research Laboratory. Published report.

**Computer\*Thought. Dallas, TX**

Supported the development and translation of a LISP-based expert system into Ada on VAX / VMS and VAX / Ultrix.

**IIT Research Institute. Lanham, MD**

Performed research into issues regarding the formal verification and theorem proving of Ada software. Published report.