
EDWARD J. SEGALL, Ph.D.

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SYNOPSIS

Software Architect, Systems Engineer, Computational Scientist

Record of significant improvements to the **speed, reliability, functionality, usability** and **maintainability** of complex, highly concurrent, mission-critical systems and applications.

Demonstrated expertise in:

Performance optimization	Physical modeling/simulation	Scientific/numerical computing
Cloud/cluster/distributed/ parallel computing	Multithreaded/multi-process concurrency	Phased development and integration
Agile development	Build/release processes	Configuration management
Fault-tolerant systems	Rigorous testing	Embedded systems

Domain experience includes: Environmental modeling, Geolocation, Global banking—back-end processing, Interactive Television, Medical instrumentation, Personalized content, Rail Transportation, Real-Time Video Processing, Video-On-Demand, Wireless communications.

EDUCATION

Ph.D. Rutgers University, **Electrical and Computer Engineering**

Research area: **Scalable communication, fault-tolerant synchronization** and **programming language support** for **dynamic distributed** and **parallel** systems.

M.S. Rutgers University, **Computer Science**

B.S.E University of Pennsylvania, **Electrical Engineering**

PROFESSIONAL HISTORY

R&D Consultant

[Edge Technical Associates LLC](#), 1999-2000, 2002-present

Projects for client [Sarnoff Corporation](#), now [SRI International](#) (2010)

NOVA project: Real-Time WAAS Video Tracking

Performance evaluation tools

- Developed tool to generate track-oriented [ViPER \(Video Performance Evaluation Resource\)](#) XML from the tracklet-oriented XML output of *NOVA*, a real-time, wide-area, multiple-target video tracking system. Output is compatible with [ViPER-GT ground-truth authoring tool](#) and [NIST F4DE](#) (Framework For Detection Evaluations). Started from a prototype developed by Sarnoff staff. Used **C++, STL, BOOST, MSXML**.
- Developed and documented methods and workflows for using these tools.
- Fixed bugs in real-time tracking system related to XML generation. As part of this work, fixed a track/frame alignment bug in tracking system by revising inter-thread and inter-process (**MPI**) communication (joint work with a staff member).

Field Exercise Support

- Proposed and demonstrated using [MATLAB](#) a novel mechanism for scene-based Non-Uniformity Correction (NUC) of extinction artifacts in a shutterless, segmented image sensor.
- Developed a tool (in **awk**) to select co-synchronous video frames from asynchronous segmented camera arrays. Used this tool to obtain usable video from samples that were available but unusable.
- Proposed & set up Linux-based **CIFS (Samba)** server to work around speed limitations of Windows-based drivers that are available for reading high-resolution video data from ext3 RAID file systems. Used this server to make daily video drops from TNT10 field exercise available to team.
- Road marking for EA10 and OA/DT3 field exercises.

Other

- Ported tracker build environment to Windows XP x64.
As part of this work, found a fundamental application design flaw that must be fixed before upgrading to latest development tools, and that may be responsible for functional issues.
- Wrote road marking guide.
- Worked with other team members on a wide variety of build issues, concurrency problems, memory issues, and other problems.

Projects for client **TruePosition Inc. (10/2004-12/2009)**

U-TDOA Location Processing—Accuracy improvements

- **Improved 95th percentile accuracy** of TruePosition's **core location technology** by 10%.
- Co-recipient (with Chief Scientist and Senior Scientist) of TruePosition's **2008 Invention of the Year** award for this work. (Only non-employee ever to receive this award.)
- Used C (Visual Studio 2005) for the programming portion of this work.

U-TDOA Location Processing—Reference selection

- **Led** resolution of anomalous GSM reference selection metric values found in testing.

Coop Generation (Selection of Demodulating and Cooperating Receivers) Algorithms

- **Developed** and **verified** coop generation algorithms for [Distributed Antenna Systems \(DAS\)](#).
- **Invented, developed** and **verified** coop generation algorithms for [UMTS](#) and other air interfaces that use [selective combining](#).
- **Resolved** long-standing result inconsistencies among Solaris, Linux and Windows builds by revising core data structures. Developed tests that reproduced the discrepancies and verified the fixes.
- Used **C++/STL** for development (Visual Studio 2005 for coding and unit testing, with **gcc** and **Sun Workshop** for cross-platform integration, testing and verification). Used **Perl** for generating test configurations, DOS scripting for testing, and Excel for analysis & communication of results.

Real-time resource scheduling

- **Invented, developed** and **verified** load- and fault-tolerant scheduling method for LMUs (Location Measurement Units). Used **C++/STL** for development (VS 2005 for coding and unit testing, **gcc** for cross-platform integration, testing and verification), and **MATLAB** for visualization of results.

CGI+TA and E-CID location processing

- System engineering, software design and implementation for multiple features and updates.
- **C++/VS 2005** (development, unit testing), **gcc** and **bash scripting** (cross-platform verification).

Simulation/Modeling

- Improved Accuracy Prediction tool speed by **50X** and halved memory footprint (made server farm obsolete). Improved robustness across multiple platforms. This tool has been used to successfully engineer nationwide networks and has brought in new business through proposal support.
As part of this work:
 - Ported to **C++** a **Java** implementation of CBCA algorithm (fast cell-based polygon containment); found and fixed day-1 bugs (carried over from the Java implementation).
 - Using encapsulation and inheritance, integrated the C++ implementation into a related tool as a first step towards elimination of redundant code.
- Made numerous stability improvements, bug fixes and feature enhancements in both tools.
- Designed and developed (in **C++**) a domain-specific comparison tool for comparing related results, measuring their differences and formatting the differences for visualization.
- System engineer and subject matter expert/internal consultant for accuracy prediction + related tools. Developed baseline reference results, test configurations and pass criteria for regression testing. Worked with QA department to address all discrepancies over multiple major releases.
- Used **MS Visual C++** for development and profiling (code is mix of **C** and **C++**), **MapInfo** for visualization, and **DOS** for scripting unit level tests.

Configuration/build/release management

- Improved internal release process for library code that is incorporated into multiple system components and standalone tools.
- Managed and performed release builds of those tools and release labeling of library code in coordination with SMLC team, SCOUT team and Release Engineering (**ClearCase**, **Perl**).

- Managed branch/merge planning and implementation in coordination with TP CM lead; managed transition of those tools and libraries from **Base** ClearCase to **UCM** and back while multiple concurrent major releases and exploratory efforts were ongoing.

Standards

- Contributed to 3GPP UMTS standard **TS 25.111** "*Location Measurement Unit (LMU) performance specification; User Equipment (UE) positioning in UTRAN*" via RAN4 work items.

Projects for other clients (3/2002-4/2005)

Scientific Computing Associates: Developed distribution-ready Microsoft Visual Studio .NET port of Unix TCP **Linda parallel/distributed programming system** (written in **C**) from **Cygwin(GCC)** / Windows prototype.

SevenEcho: Designed and developed core system architecture and initial implementation of Personal Media Director – a highly scalable system that includes a lightweight **Flash** client API, **Java** servlets and **JSP** and **MySQL** database, and Personal Narrative Toolkit (PNT), a lightweight version of the PMT suitable for individual developer use and installed using the Nullsoft scriptable installer system (**NSIS**). Attained **Microsoft ISV/Software Solutions Competency** for the PNT. Represented client through successful **technical due diligence** review.

IntelliTrans LLC (originally August Design, Inc.): Led multi-organization team converting **STARR** legacy railroad ERP system from iSeries RPG to workflow-centric, web-based (**Java+JSP**) interface. Led **requirements elicitation; designed system architecture; designed interfaces** to existing programs, database tables, EDI subsystems, and jobs; **systematically improved application performance**; acted as **liaison to primary customer**, original STARR developers, and host site's developers. Used WebFacing tool, DB2/400.

Liberate Technologies: Redesigned and enhanced layout engine of set-top web browser (**C/C++**). Improved layout of images, tables, and text and brought into compliance with HTML 4.01 standards.

Other: "Smart building" energy technology development, including consultations, software/system architecture design, and evaluation of 3rd-party components.

Previous employment

Senior Software Engineer, Video-On-Demand (VOD) Server Products

Liberate Technologies, Inc. (originally MoreCom, Inc.) Horsham, PA 2000-2002

- **Led integration** of all 3rd-party **VOD servers** with Liberate's Connect Suite product line. To streamline integration, wrapped in easily reusable APIs the existing **Java** library interface to operations management system and the existing **Perl** installation/configuration library. Also fixed several long-standing regular expression bugs in installation/configuration utility routines.
- Developed multithreaded, **TCP socket**-based **Java** client for **nCUBE** asset metadata publisher protocol; developed **Java** library and API that flexibly maps **XML** asset metadata from nCUBE, **SeaChange**, and other XML-based video metadata servers to VOD Gateway parameters.
- Led video clip server development for Vidéotron Health project (**C++**).
- Researched **Java Virtual Machines** for **embedded** systems and taught internal short course.
- Actively participated in **Integrated Services Architecture (ISA)** standards working group.
- **Mentored** junior members of engineering staff.

Senior Software Engineer, Greystone Group

Sanchez Computer Associates, Inc. (now FIS), Malvern, PA 1998-1999

Database internals development for proprietary **GT.M parallel database engine** (in **C**):

- **Analyzed** new **replication and failover** features for potential impact to system performance and **business continuity**, resulting in several design and implementation refinements.
- **Designed** and **implemented ACID-safe, hard real-time transaction timeouts** to enable controlled failover during long transactions.
- **Identified and eliminated** concurrency hazards including **race conditions, livelock**, etc.
- Improved system performance, reliability and behavior during exceptional conditions.
- **Designed** and **implemented** crash/recovery tests (in **M/MUMPS** and **sh** scripting) that led to the understanding and resolution of several long-standing bugs. This **significantly improved database recoverability** after failures.

**Assistant Professor, Department of Computing Sciences and
Consultant, NSF I/UCRC Center for Advanced Communication
Villanova University 1996-1998**

- **Taught** undergraduate **Algorithms and Data Structures** courses in **C** and in **Java**.
- **Revised, taught** graduate **Distributed Systems, Object-Oriented Design and Programming**.
- Led class-wide **Rapid Application Development** projects.
- Closely **supervised** many M.S. independent projects.

**Visiting Assistant Professor, Dept. of Computer and Information Science
University of Delaware 1995-1996**

- Revised and taught graduate **Discrete-Event Simulation and Programming Languages**.
- Taught undergraduate **Algorithms and Data Structures** in **C** and in **C++**.

System Scientist

Carnegie Mellon University School of Computer Science 1992-1995

Research project: "Distributed Computational System for Environmental Modeling", an NSF High-Performance Computing and Communications (HPCC) initiative **Grand Challenge** project:

- **Parallelized** the Urban-to-Regional Multiscale Airshed air quality model (in FORTRAN and C), using **task and data parallelism, network-optimized communication, application-dependent data distribution, and pipelined I/O**.
- Ported model to **vector supercomputers, massively parallel processors, workstation clusters, and wide-area heterogeneous combinations** of these systems.
- Designed **model verification methods** that led to quick identification and resolution of errors.
- Achieved **highest regional air quality model performance ever** reported as of that time.
- Supervised staff and undergraduate programmers and managed tight schedules.

PRIOR EXPERIENCE

Software, firmware, and analog & digital hardware design, including real-time signal processing, medical instrumentation, robotics, and real-time optical measurement systems.

AWARDS, PATENTS, PUBLICATIONS, PRESENTATIONS

Recent:

- Patent Applications No. 12/648,753 and 12/648,783, (filed Dec 2009), both titled "*Cooperating Receiver Selection for UMTS Wireless Location*", with Simon Issakov and Rashidus S. Mia.
- Patent Application No. 12/346,146 (filed December 2008), "*Method for Position Estimation Using Generalized Error Distributions*": Inventors: Pete A. Boyer, Rashidus S. Mia, and Edward J. Segall (Awarded TruePosition 2008 **Invention of the Year**).
- [TruePosition 3GPP RAN Working Group 4 contribution R4-070478](#), "*Simulation Proposal for UTDOA LMU Performance*", Kobe Japan, May 2007, with Pete Boyer, Rashidus Mia, Ron Lefever.
- [TruePosition 3GPP RAN Working Group 4 contribution R4-070490](#), "*Simulation Results for UTDOA LMU Performance*", Kobe Japan, May 2007, with Pete Boyer and Rashidus Mia.

Earlier:

Please see <http://www.edge-technical.com/esegall-publist.html>

SYSTEMS, LANGUAGES, TECHNOLOGIES

Programming Languages	Java / J2EE / J2ME, JSP, C, C++, STL, XML, Adobe Flash, Perl, Smalltalk, Eiffel, MATLAB, M/MUMPS, HTML, ADA, High-Performance FORTRAN (HPF, F90), Lisp, Pascal, Postscript, Prolog, RPG-IV, CL, and others.
Scripting, build	sh (Bourne shell), bash, csh / tcsh, awk, ant, make / Imake, and others.
Assembly Languages	HP (DEC) Alpha, HP RISC, IBM RS6000/PowerPC, Sun SPARC, others.
Performance Tuning	Intel VTune Performance Analyzer and other tools
Web Application Platforms	Apache Tomcat, IBM WebSphere, and others.
Database access/Databases	SQL, JDBC, MySQL, IBM DB2/400, Sanchez/FIS GTM (Mumps)—a highly parallel SMP database, and others.

IDEs	Microsoft Visual C++, Eclipse, JBuilder, NetBeans, MATLAB, Flash MX, Smalltalk-80, X-Windows, etc.
OS + Platforms	Single and Multi-processor UNIX and Linux, incl. Sun Solaris, IBM AIX, HP (Compaq/DEC) Tru64 UNIX, RedHat Linux and Cygwin . Also OpenVMS, Windows, SGI (Cray) T90/T3E supercomputers, Scientific Atlanta PowerTV .
Inter-process communication	TCP/IP socket-level programming, DCOM, CORBA , shared memory (various), message-passing (PVM/MPI), Linda , & others.
Source control	ClearCase (Base and UCM), Perforce, CVS, Visual SourceSafe .
Visualization	MapInfo, MatLab

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