Edward J. Segall, PhD

409 Anthwyn Road
Narberth, PA 19072

(610) 668-0292
esr20@edge-technical.com

SYNOPSIS

R&D Engineer, **Software Architect, Technical Lead, Consultant.**

Record of significant improvements to the functionality, accuracy, performance, reliability and maintainability of highly performant safety-critical and business-critical systems.

Experienced in **cloud-based**, **HPC**, **distributed**, **parallel** and **embedded** systems, **wireless geolocation** (**5 patents**), **optical positioning**, railcar **modeling** and **parameter estimation**, **battery monitoring**, **video surveillance**, **global banking**, **video-on-demand**, **cable television**, **atmospheric modeling**, **medical instrumentation**, **health / fitness industry.**

PROFESSIONAL HISTORY

ClubOS, Inc, Philadelphia, PA *Lead Software Engineer* *Jan 2018 - April 2020*

Led inshore/offshore bugfix team, using a Lean/Kanban process:
- Guided analysis, troubleshooting, planning, coding, branch management and testing.
- Communicated/explained/reviewed/coached/transferred knowledge.

Led, performed and/or otherwise contributed significantly to:
- **Design, development, and rollout of new features** including Change-the-bill-date, Salesperson history, SMS campaigns, Custom email domains, Two-way HubSpot integration.
- **Identification, prioritization & resolution of complex issues** affecting :
  - SMS conversation threading, SMS campaigns, Email campaigns, Dashboard KPI calculations, PT billing, 3rd party integrations (multiple), Event attendees, Event validation, Reporting function/performance/stability, Inventory calculations.
  - General performance/stability/error handling in webapp and consumers.

Identified, implemented many **opportunities to improve site performance and stability**, including:
- Database optimizations, Unicode (emoji) handling, AWS autoscaling; found pathological usage patterns, options to separate read-write from read-only queries in the same session.
- Proactively improved logging, error handling, system testability, maintainability and stability.

Improved consumer release/deployment process:
- Identified and eliminated startup race conditions; improved alarm notifications.
- Developed processes and scripts that identify stale and zombie consumers in relevant AWS autoscaling groups, reliably kill stuck consumers, and more safely kill sensitive consumers.

Improved test environment refresh process and platform update process:
- Expanded refresh scope; documented process; eliminated manual reconfiguration of multiple tables when refreshing test databases from production.
- Developed automated AWS AMI update process.

Used AWS (Aurora, AutoScaling, Cloudwatch, DynamoDB, EC2, Elastic Beanstalk, Kinesis, RDS, Performance Insights, S3, SQS), MySQL, Linux, IntelliJ, Java, Joda, Guice, MyBatis, Hibernate, Tomcat, Git, Bash, grep, JSON, log4j, Maven, Junit, Postman, Swagger, Docker, H2, Jackson, etc.

TotalTrax, Inc, Newport, DE *Senior Research Engineer* *June 2016–Oct 2017*

SkyTrax LXOPTICAL Indoor Optical Location Tracking
- Subject Matter Expert in TotalTrax's proprietary optical indoor forklift truck location system.
- Fixed bugs in existing LXOPTICAL system
- Investigated six alternative indoor location technologies
- Developed generic integration / qualification framework (supports side-by-side accuracy comparison to LXOPTICAL).
- Served as technical liaison to two 3rd-party vendors:
  - Specified API requirements, tasks and milestones.

    - Implemented full POC integration with one vendor. Identified issues, negotiated improvements, tested and evaluated performance, advised senior management.
- Performed in-house experiments with another technology and evaluated results.

SX200 Telematics Server, VX Vehicle interface, Battery Monitor System

- Implemented and/or enhanced ReSTful APIs for data services, monitoring and reporting.
- Troubleshot issues, found root causes, designed and implemented solutions, workarounds.
- Identified and resolved system robustness and data persistence gaps.
- Specified functional requirements and developed test procedures.
- Worked with field engineers to support beta trial installations at two customer sites.

Used Java (J2EE), JPA, Go (golang), Javascript, RabbitMQ, Cassandra, MySQL, ROS, Linux, embedded (Yocto) Linux, Subversion, Glassfish / Payara, IntelliJ IDEA.

Edge Technical Associates LLC, Narberth, PA *Principal Consultant* *Jun 2002–May 2016*

Selected clients, projects and roles

PS Technology, Yard Systems Grp, , Norristown, PA (div Union Pacific) *Mar 2013– Dec 2015*

Software Engineer / Data Scientist / Systems Engineer / Database Architect *(Consultant)*

SwitchPro Hump Process Control (HPC) System -- Controls world's largest freight classification yard (and many others). Multiple features and subsystems:

Yard Tuning Tool ("Tuning Service") subsystem

- Designed, implemented and brought to successful production use this all-new system that estimates control parameters from operational data.
- Became a Subject Matter Expert in freight car rollability and rolling resistance modeling.
- Adapted design to support new use cases that arose in production operation.
- Developed operational procedures and novel strategies and methods.
- Trained other Union Pacific teams.

HPCS Database and Data Service subsystem

- Robust ReSTful web service used by HPCS to persist operational data for Tuning Service, KPI/dashboard/reporting, and for post-incident analysis.
- Conceived of, designed software and schema, implemented, and brought to successful production use.

Data Acquisition Mode

- Conceived of, advocated for, and assisted in development and testing of this new HPCS feature that makes it possible to tune a yard before attempting to control it.

Performance Analysis tools

- Developed queries, spreadsheets to monitor yard tuning performance, identify trends and isolate issues. Used these tools to inform management and guide operational decisions.

Rolling Resistance Model improvements

- Investigated systematic errors in physical model; discovered opportunities to improve model and yard performance over a wide range of conditions. Formulated analytic criterion to determine the useful temperature range of a given set of control parameters.

Used Java, C++, Apache Commons Math, Apache Axis 2, gSoap, SQL, Hibernate, JPA, MySQL, Tomcat, Eclipse, Java VisualVM, Ant, Excel, Git, Squish.

CCAD (now **Comcast**), **Horsham PA** CM + DevOps Team *(Consultant)* *Feb 2011–Dec 2012*

Designed and implemented new features for company-wide build/release management:

- Dependency management system for Bamboo continuous integration tool
- Jira plugin (OSGI) to manage storage of oversize attachments
- Automated cloning of sets of related Bamboo build plans
- Automated deletion of obsolete artifacts from Sonatype Nexus repository

Used Bash, Java, Groovy, awk, grep, cURL, wget, MySQL, JSON, Xml Starlet, XPath, Nexus, Sonar, Apache httpd, log4j, Tomcat, subversion, Git, Maven, SuSE Linux, VMWare, Eclipse.

SRI International (was **Sarnoff Research Ctr**) Machine Vision Engineer (*Consultant*) *Jul 2010-Dec 2010*

Project NOVA—Data-Parallel, Real-Time, Multi-Target Wide Area Aerial Surveillance (WAAS) Tracking

NOVA system - Highly Parallel Machine Vision:

- Found, fixed bugs in NOVA's tracklet generation and track/frame alignment; addressed issues related to builds, concurrency, memory, and other factors.

Multi-object tracking performance evaluation

- Developed tool to generate track-oriented Video Performance Evaluation Resource (ViPER) XML from NOVA's tracklet-oriented XML.
- Developed methods and workflows for using ViPER-GT ground-truth authoring tool and NIST's F4DE (Framework for Detection Evaluations) to evaluate tracking performance.
- Improved road marking methods and workflow; wrote guide for other team members.

Field Exercise Support

- Invented and demonstrated novel method for scene-based Non-Uniformity Correction of extinction artifacts in a shutterless, segmented image sensor.

Used C++, STL, BOOST, MATLAB, ViPER, ViPER-GT, F4DE, MSXML, awk, Ubuntu, MPI.

TruePosition (now Skyhook), Berwyn, PA *R&D Consultant (CTO Science team) Oct 2004–Nov 2009*

Improved 95th percentile accuracy of core U-TDOA location technology **by 10%**

- Significantly reduced system maintenance costs.
- Awarded **two patents** and TruePosition's 2008 **Invention of the Year award.**

Simulation/Modeling, Performance Tuning: Auto-Configuration tools

- Increased speed of Accuracy Prediction tool **50X; halved** memory footprint; made server farm obsolete. This tool was used to **engineer nationwide networks** and brought in **new business** through proposal support.
- Made numerous stability improvements, bug fixes and feature enhancements.
- Served as system engineer and **subject matter expert** / internal consultant.

Invented and Implemented Novel Receiver Selection Algorithms

- ...for reference and timing cooperation receivers for Distributed Antenna Systems (DAS).
- ...for signal demodulation and timing cooperation receivers for air interfaces that use macro diversity with selection combining (e.g. UMTS soft handover) (Three patents)
- Resolved long-standing inconsistent results across Solaris, Linux, Windows builds.

Invented, Implemented Real-time Scheduling Algorithm for Location Measurement Units

- Improved accuracy and system availability under high demand.
- Led resolution of anomalous GSM reference selection metric values found in testing.

Product CGI+TA and E-CID location processing

- System engineering, software design, implementation of multiple features and updates.

Other

- Contributed to 3GPP UMTS standard **TS 25.111** *"Location Measurement Unit (LMU) performance specification; User Equipment (UE) positioning in UTRAN"* via RAN4 work items.
- Improved internal release process for cross-platform library; performed release builds of internal tools, coordinated branch/merge planning and implementation with CM lead.

Used C, C++, STL, Boost, Intel Math Kernel Library and VTune Performance Analyzer, valgrind, Visual Studio, Visual Studio Profiling Tools, gcc, make, Sun Workshop, Cygwin, Java, JNI, JSP, Perl, RedHat Enterprise Linux, MATLAB, MapInfo, Rational ClearQuest, UCM, Base ClearCase.

Edge Technical Associates *(other consulting projects)* *Feb 2002–Jan 2005*

Scientific Computing Associates: Commercial Visual Studio port of TCP-**Linda** parallel/distributed coordination language from prototype.

Used C, C++, Cygwin, MKS, MSI.

SevenEcho: Designed, developed, and delivered core system architecture and initial implementation and brought it through **successful technical due diligence review**.

Used Java, Flash, MySQL, Tomcat.

IntelliTrans (originally August Design): Led multi-organization team converting STARR railroad ERP system from iSeries RPG to workflow-centric, web-based (Java + JSP) interface.

Used Java, JSP, RPG, DB400, WebSphere.

Liberate Technologies (originally MoreCom), Horsham, PA *Apr 2000–Feb 2002*

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

- Led integration of 3rd-party VOD servers with Liberate Connect Suite product line.
- Led video clip server development for Vidéotron Health project.
- Researched Java Virtual Machines for embedded systems and taught internal short course.
- Actively participated in Interactive Services Architecture (ISA) standards working group.

Used C, Visual C++, CORBA, Sun Workshop, Java, Perl, Oracle, Perforce, PowerTV, Tomcat.

Edge Technical Associates *R&D Consultant* *Aug 1999–Apr 2000*

- Redesigned and enhanced layout engine of set-top box web browser (C/C++).
- Improved image, table and text layout and made compliant with HTML 4.01 standards.

Sanchez Computer Associates (now FIS), Malvern, PA *Aug 1998–Aug 1999*

Senior Software Engineer, Greystone Group

Database internals for proprietary GT.M SMP-parallel database engine:

- 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**. This feature was **critical to acceptance by Citibank** of GT.M for global on-line ATM transaction processing.
- Improved system performance and reliability during exceptional operating conditions.
- Identified and eliminated concurrency hazards including race conditions, livelock, etc.
- **Significantly improved database recoverability** after failures.

Used C, C++, Assembly language (HP (DEC) Alpha, HP RISC, IBM RS6000/PowerPC, Sun SPARC), IBM AIX, HP (Compaq/DEC) Tru64 UNIX, Cygwin, X-Windows, emacs, vi.

Villanova University, Villanova, PA *Aug 1996–Aug 1998*

Assistant Professor, Department of Computing Sciences and Consultant, NSF I/UCRC Center for Advanced Communication

- Taught undergraduate Algorithms and Data Structures courses in C and in Java.
- Revised, taught graduate Distributed Systems and Object-Oriented Design (in Java).
- Led class-wide Rapid Application Development project; closely supervised M.S. projects.

University of Delaware, Newark, DE *Sep 1995–May 1996*

Visiting Assistant Professor, CIS Department

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

Carnegie Mellon University, Pittsburgh, PA *Jun 1992–Sep 1995*

System Scientist, School of Computer Science

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

- Converted Urban-to-Regional Multiscale Airshed air quality model to an HPC model using task and data parallelism, message passing, and network-optimized communication and I/O.
- Ported to vector supercomputers, massively parallel processors, server clusters at Pittsburgh Supercomputing Center, and heterogeneous combinations of these systems.
- Designed verification methods that led to quick identification and resolution of errors.
- **Achieved highest speed regional air quality model execution ever reported** as of that time.

- Supervised porting the model to the Fx task-and-data-parallel FORTRAN language.
- Developed the Airshed component of the **CMU Task Parallel Program Suite**.
- Supervised staff and undergraduate programmers and managed tight schedules.

Used C, FORTRAN, Parallel Virtual Machine (PVM), High-Performance FORTRAN (HPF, F90), gcc, make, awk, CVS, mach, Solaris, Andrew File System, Cray C90/T90/T3E supercomputers, emacs.

PRIOR EXPERIENCE

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

EDUCATION

Rutgers University, New Brunswick, NJ — ***PhD**, Electrical and Computer Engineering*

Dissertation: *Tuple Space Operations: Multiple-Key Search, On-Line Matching and Wait-Free Synchronization*

- Improved scalability of the Linda Tuple Space distributed key-value store.
- Added wait-free synchronization and language support for dynamic parallel systems.

Verified performance claims using C and FORTRAN on Yale's Intel iPSC/2 Hypercube. Prototyped algorithms in Smalltalk-80 with visualization using the Model-View-Controller (MVC) user interface paradigm.

***Rutgers* University, New Brunswick, NJ** — ***MS**, Computer Science*

***University* of Pennsylvania, Philadelphia, PA** — ***BSE**, Electrical Engineering*

Senior Design Project: Designed, implemented and programmed a novel real-time digital filter architecture using microprogrammed TTL Schottky logic.

Summer project (Physics department, Selove lab): Found, diagnosed and resolved a design flaw in a new scintillation detector amplifier that was developed for a Fermilab experiment.

PATENTS, AWARDS, PUBLICATIONS, PRESENTATIONS

Presentation: "Methods for determining the location of mobile devices in real time", to IEEE Philadelphia Consultants Network, December 4, 2012.

"Cooperating Receiver Selection for UMTS Wireless Location", Edward Joseph Segall, Simon Issakov and Rashidus S. Mia. US Patents **8290496**, **8442538**, **8738010**

"Method for Position Estimation Using Generalized Error Distributions", Pete A. Boyer, Rashidus S. Mia, and Edward J. Segall. US Patents **7956808**, **8138976** and TruePosition **2008 Invention of the Year.**

TruePosition 3GPP RAN Working Group 4 contributions R4-070478, "Simulation Proposal for UTDOA LMU Performance", with Pete Boyer, Rashidus Mia, Ron Lefever, and R4-070490, "Simulation Results for UTDOA LMU Performance", with Pete Boyer and Rashidus Mia, Kobe Japan, May 2007.

Earlier publications: http://www.edge-technical.com/esegall-publist.html

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Current version of this document: http://edge-technical.com/Segall-Edward-PhD-resume.pdf