

2621 Turnbridge Ct.  
Norman, OK 73072  
Home: (405) 307-9444  
Cell: (405) 203-6986  
Online resume: <http://www.kellycrawford.org/KellyCrawford.pdf>  
kelly@kellycrawford.org

# Kelly D. Crawford, Ph.D.

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## Professional experience

2016 - 2017 Paycom, Inc. Oklahoma City, OK

### Senior Developer

- Developer for online web payroll software. Tools include PHP (PhpStorm), JavaScript, jQuery, CSS, MySQL (MySQLWorkbench), YouTrack bug/feature tracking software.
- Developer of primary payroll engine software. Worked in the Microsoft Visual FoxPro environment for both code and data.

2014 - 2015 CompSource Mutual Oklahoma City, OK

### Senior Java Developer

- Gosu development (a Java derivative) using Guidewire Software for Workers' Compensation Insurance.

2013 Apple, Inc. Sunnyvale, CA

### Senior Developer (Contract Position)

- Data analysis using MongoDB (noSQL), JSON, Node.js, Java, JavaScript, and Eclipse.

2012 - 2013 ExecuTime Software Norman, OK

### Senior Developer (Contract Position)

- Web development for time keeping software using Java, JavaScript, JSP, jQuery, CSS, Hibernate, MS SQL Server, and Eclipse.

2002 - 2012 MSCI/RiskMetrics Norman, OK

### Vice President/Senior Developer

- Manager and developer for the SOA/Middleware development group (May 2012). Managing a group of 7 people across two disjoint projects. Tasks include evaluating third-party software as an option to replace existing in-house systems, and charting a plan for the next generation of MSCI's SOA system. Also involved in various post-merger integration activities. Skills used include Java SE, XML, CLISP, and a general working knowledge of SOA technologies.
- Manager and developer for the Counterparty Credit Risk and WealthServer (portfolio simulation and asset allocation optimization) development groups. Managed a group ranging from 2 to 3 people. Interfaced with two different research and business groups to determine requirements. Determined project plans and monitored progress. Skills used include Visual Studio .NET, C++ (STL), XML, and quantitative finance (mathematical and statistical analyses, Monte Carlo simulation techniques, LP, QP).
- Manager, developer and lead designer, for the Factor Server project. Factor Server is a tool for performance attribution on fixed-income

securities. Managed a group ranging from 3 to 13 people. Interfaced with research and business groups to determine the feature set for this new product. Managed project plans and continually monitored progress. Skills used include Visual Studio .NET, C#, LINQ, XML, Microsoft Project, and quantitative finance.

- Designer and developer for the RiskServer analytics development group. RiskServer is a financial analytics web service that is the backbone calculation engine for all RiskMetrics products. Skills used include C++, Visual Studio .NET, XML, quantitative finance, and optimization support (e.g., linear programming).
- Designer, developer and manager for the RiskManager development group. RiskManager is financial risk analysis software used by large corporations to assess the risk of financial holdings. Managed a group ranging from 1 to 5 people. Interfaced with business and research to solicit client requirements. Planned projects and organized new feature requests and releases, as well as regular bug fixes and reviews. Skills used include Java, JSP, MSSQL/JDBC, Apache, Tomcat/Struts, XML, Eclipse and JBuilder environments.
- Co-Manager of the Operations/Application Management group dedicated to second line customer support and day-to-day monitoring of the RiskManager ASP (Application Service Provider) environment. Built the new group from the ground up, organized day-to-day activities addressing client needs. The group has now grown into a 24/7 operation with dozens of people in offices worldwide, including Berkeley, Norman, New York, London, Budapest, and Mumbai. Provided programming and database support as well as general troubleshooting of client issues, rollout of software, etc. Skills used include C#, Visual Studio .NET, XML, Java/JSP, MSSQL, Apache/Tomcat, Windows Task Services.

2001 - 2002                      Teloptica    Richardson, TX

**Senior Developer**

- Designed and developed optimization algorithms for an automated telecommunications network planning, design and optimization system (SONET ring and mesh network topologies). Skills used include Java, Borland JBuilder 4, Rational Rose and network optimization techniques.

2001                                      Ventura Technologies    Plano, TX

**Contract Developer**

- Designer and developer of a Java application for statistical analysis of loan data. Developed components for correlation, curve fitting, principal component analysis and k-means clustering. Skills used include Java, Borland JBuilder 4, Rational Rose, statistical analysis and other scientific computation techniques.

2000 – 2001                      Software On Line    Plano, TX

**CIO, VP Software Development**

- Manager, designer and co-developer for all software (web site, e-commerce, license management, etc.). Skills used include C++ and Visual Basic (Microsoft Visual Studio), MFC, ActiveX/COM, ASP (VBScript), HTML, JavaScript, Microsoft (IIS) and Linux (Apache)

platforms. Managed small team of two developers. Designed, directed, and helped implement ASP web site for software delivery.

2000 – 2001 Stone Bennett Carrollton, TX

**Contract Developer**

- Contract programmer for Stone Bennett's GoPower engine monitoring software. Required understanding of standard SAE protocols J1708/J1587 and J1939. Data is gathered through a serial interface using a Dearborn Protocol Adapter API. Skills used include C++ (Visual Studio), MFC, ActiveX/COM.

1997 – 2000 ARCO Exploration and Production Plano, TX

**Systems Consultant – Computing Technical Research Group**

- Successfully applied genetic optimization techniques to the problems of gaslift optimization (3 separate fields and applications), automated material balance and multiple suppression (C/C++, MS Excel/VBA). Coauthor of 2 patents in these areas.
- Developed optimization toolbox containing genetic algorithms, bit climbers (stochastic hill climbers), evolutionary programming, etc. (C/C++, Java).
- Successfully applied modifications to the traditional bit climber to work for normalized solution spaces, resulting in a new, highly versatile optimization tool (C/C++).
- Served as POSC (Petrotechnical Open Software Corporation) liaison/contact for ARCO. Worked on developing POSC standards at ARCO and in the industry. Developed working prototype of a POSC data store (C, OODB).
- Project lead for the ARCO PetroBank Pilot, a multi-operating company project to test IBM's PetroBank databanking tool.

1995 - 1997 Amoco Production Company Tulsa, OK

**Researcher/Systems Analyst**

- Member of Seismic Coherency Cube project. Responsible for development and maintenance of coherency cube software (C, Fortran, X/Motif). First-line user assistance for parameterization, execution and troubleshooting of all Coherency Cube products. Initial point of contact with several geophysicists from three of Amoco's Business Units.
- Designed and developed GUI for parallel coherency processing as an aid to technology transfer (C/C++, X/Motif).
- Responsible for initial installation of Amoco's coherency cube software at Coherence Technology Corporation (CTC).
- Responsible for integrating Amoco's proprietary seismic system with GeoQuest (IESX, C, Fortran). Responsible for technical evaluation and possible future integration with Stratimagic (CGG/Elf).
- Technical lead for future research and development of 2-d and 3-d seismic texture analysis and segmentation (C/C++, Fortran, X/Motif).

1993 - 1995 Amoco Production Company Houston, TX

### **Systems Analyst**

- Member of Amoco's Hewlett-Packard workstation cluster team. Responsible for development and maintenance of various system utilities (C/C++, Fortran, Tk/Tcl).
- Provided user support and maintenance for all Hewlett-Packard based seismic applications (C/C++, Fortran).
- System Architect for Amoco's Business Process Reengineering (BPR) effort (6 months). Technical liaison between two of the five BPR groups (C, PowerBuilder).

1985 - 1993                      Amoco Production Company                      Tulsa, OK

### **Research Scientist**

- Designed and developed parallel applications for seismic processing (seismic migration). Provided end-user support (C/C++, Experimental languages like ES-Kit Parallel C++ and PCN).
- Represented Amoco in various consortia: Cal-Tech, Microelectronics and Computer Technology Corporation (MCC), The Rice Inversion Project.
- Designed and developed a graphical display tool for manipulation of gravity/magnetic data (C, X/Motif).
- Part of a team that designed and developed a portable screen management utility for support of form-based programs across VM/CMS, Unix and PC systems (C, Fortran, X/Motif, GDDM).
- Original designer for the commercially available UniXedit tool.
- Part of a team that established programming standards for Amoco's Research Center (C/C++, Fortran).
- Designed and developed software tools for analysis and support of Amoco's many scientific Fortran programs, including smart editors, documentation utilities, automatic preservation of consistency between source and object code, version control and a tool to support various useful Fortran 90 features (C, Fortran, various macro languages).
- Served as committee head and Master of Ceremonies for Amoco's semi-annual Research Center Technical Meeting.
- Performed numerous evaluations of third-party software.

### **Teaching experience**

2015 - 2016                      University of Oklahoma                      Norman, OK

#### **Adjunct Professor, Computer Science**

- Software Engineering I & II, the capstone classes for the Computer Science department.

2015 - 2016                      Oklahoma Christian University                      Edmond, OK

#### **Adjunct Professor, Computer Science**

- Object-Oriented Software Engineering
- Patterns of Enterprise Applications

2012                                      University of Oklahoma                      Norman, OK

**Adjunct Professor, Computer Science**

- CS3202 – Software Requirements and Specifications. Students gather requirements from clients and produce specifications detailing those requirements. This is the pilot for a required course in the computer science degree program at The University of Oklahoma starting in the fall of 2013.

1988 - 1993: The University of Tulsa - Tulsa, OK

**Adjunct Professor, Computer Science**

- Developed and taught 7 sessions of an introductory computer science class ("Fortran for Engineers").

**Education**

1989 - 1996                      The University of Tulsa                      Tulsa, OK

**Doctor of Philosophy in Computer Science**

- Thesis: The Role of Recombination in Genetic Algorithms for the Fixed-Length Subset Problem

2009 - 2011                      Oklahoma Christian University                      Edmond, OK

**Master of Business Administration**

- Major: Finance
- Graduated member of Delta Mu Delta honor society

1984 - 1986                      The University of Tulsa                      Tulsa, OK

**Master of Science in Computer Science**

- Thesis: An Analysis of Parallel Sorting Algorithms and Techniques

1981 - 1984                      Oklahoma State University                      Stillwater, OK

**Bachelor of Science in Computer Science**

- Minor: Mathematics

**Environments and Languages**

Primary languages: C++, C, Java, C#, VBA

Primary IDEs: Microsoft Visual Studio .NET, Eclipse

Primary environments: Windows, Mac OS X

Experience with Unix (1987-2001; still use some at home on Mac OS X)

Experienced with Microsoft Office tools (Word, Excel, Powerpoint)

**Publications**

Martin, M., N. G. Grounds, J. K. Antonio, K. D. Crawford, J. Madden, "Banker's Deadlock Avoidance Algorithm for Distributed Service-Oriented Architectures", Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA '10), sponsor: World Academy of Science and Computer Science Research, Education, and Applications (CSREA), Las Vegas, NV, July 2010.

Marfurt, K., V. Sudhakar, A. Gersztenkorn, K. D. Crawford, S. Nissen, "Coherency Calculations in the Presence of Structural Dip", Geophysics, January, 1999.

McCormack, M. D., D. J. MacAllister, K. D. Crawford, R. J. Stoisits, "Applications of Genetic Algorithms in Exploration and Production", The Leading Edge (SEG, Tulsa, OK, 1999).

Crawford, K. D., M. D. McCormack, D. J. MacAllister, "Modified Gradient Techniques for Normalized Solution Vectors (A Probabilistic, Learning Bit Climber for Normalized Solution Spaces)", GECCO 1999.

Stoisits, R. J., K. D. Crawford, D. J. MacAllister, M. D. McCormack, A. S. Lawal, D. O. Ogbe. "Production Optimization at the Kuparuk River Field Utilizing Neural Networks and Genetic Algorithms", SPE paper 52177 (OKC, OK, 1998).

Crawford, K. D., C. Hoelting, R. Wainwright, D. Schoenefeld, "A Study of Fixed-Length Subset Recombination", Foundations of Genetic Algorithms, 1996, Morgan Kaufmann Publishers.

Crawford, K. D., R. Wainwright, "Applying Genetic Algorithms to Outlier Detection", Proceedings of the Sixth International Conference on Genetic Algorithms, San Mateo, CA, 1995, Morgan Kaufmann Publishers.

Crawford, K. D., R. Wainwright, D. Vasicek, "Detecting Multiple Outliers in Multiple Dimensions Using Genetic Algorithms", Proceedings of the 1995 ACM/SIGAPP Symposium on Applied Computing, ACM Press, 1995.

Crawford, K. D., "Solving the N-Queens Problem Using Genetic Algorithms", Symposium on Applied Computing, March 1992.

Crawford, K. D., "An Analysis of Parallel Sorting Algorithms and Techniques", Abstract published at the ACM Computer Science Conference, 1986.

## **Technical Reports**

Crawford, K. D., "Rutabaga – A Genetic Algorithm Toolkit Library", ARCO Web-based Technical Manual, 1997.

Crawford, K. D., C. Hoelting, K. Marfurt, "2D Texture Analysis: A User's Guide", Amoco Technical Report, March 1997.

Gersztenkorn, A., K. D. Crawford, "Time-Frequency Eigenstructure Coherence (c4)", Amoco Technical Report, March 1997.

Marfurt, K., V. Sudhakar, A. Gersztenkorn, K. D. Crawford, S. Nissen, "Coherency Calculations in the Presence of Structural Dip", Amoco Technical Report, January, 1997.

Crawford, K. D., R. Wainwright, "A Survey of Crossover Operators for Genetic Algorithms", Technical Report UTULSA-MCS-96-2, The University of Tulsa, February 1996.

Crawford, K. D., R. Wainwright, D. Vasicek, "Detecting Multiple Outliers in Multiple Dimensions Using Genetic Algorithms", Technical Report UTULSA-MCS-92-4, The University of Tulsa, July 1992 (Also, Amoco Technical Report, presented at an internal Amoco conference, May 1992).

Crawford, K. D., "A Practical Abstraction for Hierarchical Data Structures", Amoco Technical Report, February 1992.

Crawford, K. D., "Mixing Fortran and C Across the Major Platforms at the Tulsa Research Center", Amoco Technical Report, January 1991.

Bennett, C., C. Burstall, K. D. Crawford, R. Hill, "Portable File Manipulation Utilities", Amoco Technical Report, June 1990.

**Patents - view at**  
[www.uspto.gov](http://www.uspto.gov)

Michael D. McCormack, Kelly D. Crawford. "Removal of surface-generated multiple seismic energy using a genetic algorithm optimization procedure", 1998 (ARCO – Patent no. 6,154,705).

Richard F. Stoitsits, Kelly D. Crawford, Donald J. MacAllister, Michael D. McCormack. "Petroleum Production Optimization Utilizing Adaptive Network and Genetic Algorithm Techniques", 1998 (ARCO – Patent no. 6,236,894).

**Awards received**

Awarded for exceptional contribution to the achievement of company objectives through the development and technology transfer of coherency cube technology, 1996.

Awarded for outstanding efforts on an inter-divisional team to produce SAMMIG, an implementation of Kirchhoff seismic migration using a distributed workstation network as a parallel computing environment, 1993.

Awarded for successful implementation of a reservoir engineering simulation system as part of an inter-divisional team (GUI development), 1990.

**Professional activities**

Invited speaker for Dr. Rex Page's Software Engineering class, Oklahoma University, yearly since 2004.

Invited speaker and panelist for the technology transfer workshop *AI Methodologies in the Oil Industry: Concerns & Rewards*, sponsored by The University of Oklahoma, Sarkeys Energy Center, Rock Mechanics Institute, Norman, OK, October 7, 1999 (see <http://www.kellycrawford.org/rmi/> to view slide presentation).

Member of Program Committee for the Symposium on Applied Computing. Session Chair for technical paper sessions on Genetic Algorithms (1993). Paper reviewer for the Genetic Algorithm track 1993 to 2008.

Member of the Program Committee for GECCO (Genetic and Evolutionary Computation Conference). Paper reviewer from 1999 to 2008.

**References**

Dr. Roger L. Wainwright, The University of Tulsa, 600 South College, Tulsa, OK 74104, (918) 631-3143, rogerw@utulsa.edu

Dr. Rex L. Page, The University of Oklahoma, Norman, OK, (405) 325-5408,  
page@ou.edu

Mr. Jeff Muehring, Manager at NextThought, Norman, OK, (405) 226-  
1176, jeff.muehring@gmail.com