

Craig Stewart Holman, Ph.D.

13050 Dahlia Circle, Apt. 311
Eden Prairie, Minnesota 55344

www.patterncraft.com

(952) 388-8727
craig@patterncraft.com

Services Offered

- Software architecture, design, and development in C#, C++, C, PL/SQL, rule systems; software engineering
- Algorithm engineering: design, implementation, and tuning
- Object-oriented design of frameworks, class libraries, components, and applications; design patterns
- Review of architectures, designs and code; review and tuning of development methodologies
- Instruction in C#, C++, C, .NET, PL/SQL, rule systems, object-oriented analysis and design, optimization, testability, GUI design, and other aspects of software development
- Creativity, innovation, and performance

Available immediately.

Education

Ph.D. Northwestern University, Computer Science

M.S. Northwestern University, Computer Science

B.S. Northeastern Illinois University, Information Science, Mathematics minor

B.A. University of Illinois at Urbana-Champaign, English Literature, Mathematics minor

Dissertation : Elements of an Expert System for Determining the Satisfiability of General Boolean Expressions

Thesis : A Method for Determining the Satisfiability of General Boolean Expressions

Qualifiers: Artificial Intelligence, Formal Theory, Programming Languages and Compiler Theory

Software Engineering Experience

Languages and Programming Technologies

C	25 years	Microsoft, Borland, DeSmet, and UNIX V, taught to undergraduates, IBM developers
C++	19 years	Microsoft, Borland, UNIX V; taught to undergraduate and graduate students
Visual C++	14 years	1.52 – 2008; .NET 3.5, STL, Boost, Win32 API, MFC, COM, OLE automation (Word, Excel), graphics, multithreading, messaging, GUI, enhanced controls, DLL, exception handling, serialization, memory-mapped files, private heaps, Unicode, embedded SQL, SNMP, NT services, performance optimization; taught to undergraduates and others
C# and .NET	2 years	Visual Studio 2005 and 2008. .NET 2 - 3.5; Visual Studio Tools for Office (VSTO); add-ins for Office 2003 and 2007 applications; Fluent Ribbon tabs for Office 2007 add-ins; robust multithreading, GUI, SQL, TCP, XML. Experience with namespaces including System.Collections (Generic, Specialized), ComponentModel, Data, Diagnostics, Drawing, Globalization, IO, Messaging, Reflection, Runtime (InteropServices, Remoting (Channels.Tcp), Serialization.Formatters), Text, Threading, Windows.Forms (Xml); Microsoft.Office (Core, DocumentFormat (OpenXml, OpenXml.Packaging), Interop (Excel, PowerPoint, Word); Microsoft.Windows.Forms; Microsoft.Win32. Exploring ASP.NET, LINQ, WPF, and WF.
Open XML	1 year	Experience parsing and manipulating Microsoft's new open format for Office files, including Microsoft Word 2007, PowerPoint 2007, and Excel 2007.
Rule Systems	21 years	Extensive coursework in Artificial Intelligence, Mathematical Logic, Automated Theorem Proving, Database Theory, and Deductive Databases; member of the Deductive Database Research Group at Northwestern University; teaching assistant for Automated Reasoning course; taught graduate course in Automated Reasoning; Otter; 2 years at Blue Cross Blue Shield of MN driving an enterprise business rules initiative, including vision, architecture, methodology, design, and prototyping; Pegasystems
Database	20 years	Theory, design, deductive database systems, dBase, embedded SQL, Oracle PL/SQL; Oracle 7i-9i; MS SQL 2005 stored procedures, SQL Express; taught undergraduate and graduate courses in database design and theory
Significant experience:		XML (DOM and SAX), HTML, Pascal, BASIC, Lua
Moderate experience :		Java; Assembler (6502), LISP, Logo, Modula-2, Prolog, SNOBOL
Limited experience :		Assembler (370, 3090, 8088), COBOL, FORTRAN, PL/I, Python, Visual Basic 5

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Software Engineering Experience

Operating Environments

Windows Vista, XP, 2000, NT 4.0, NT 3.51, 98, 95, and 3.x; DOS, Unix System V, Linux, OS/2, MVS

Object-Oriented Analysis, Design, and Development

OOA, OOD, OO development (18 years); design patterns (13 years); Booch, Rational Rose; UML, ORM; Agile

Quality Assurance and Reviewing

Design and code reviewer (13 years); computer science teacher (review and evaluation) (8 years)

Standards and Methodology

Rule systems (2.5 years), C++ standards (2 years), development methodology (6 years), IS Standards (1.5 years)

Current Projects

Algorithm Development Graph Isomorphism, Maximal Cliques, k-Clique Exists, Factoring composite integers into two factors, Boolean expression satisfiability and simplification. Emphasis on finishing the implementation, analysis, and proofs of a new algorithm for determining Graph Isomorphism and writing up and posting research results. (Visual C++ 2005 – 2008, Visual C# 2005 – 2008, .NET 3.5, personal)

Algorithm Implementation Porting several of my libraries (e.g. Set and Graph) and applications that implement my Graph Isomorphism and Maximal Cliques algorithms from C++ to C#. (Visual C# 2008, .NET 3.5, personal)

Significant Algorithms and Design Patterns

Graph Isomorphism - Completing a new algorithm for determining whether two graphs are identical except for the labeling of their nodes.

k-Clique Exists - Developed six new algorithms for determining whether a k-clique (a completely connected subgraph of size k) exists in a graph.

Maximal Cliques - Developed a new algorithm for constructing and listing the maximal cliques of a graph. A maximal clique is a clique that is not a subgraph of any other clique of the graph.

Boolean Satisfiability - Developed a new algorithm for determining the satisfiability of general boolean expressions.

Boolean Simplification - Developed a new algorithm for simplifying boolean expressions to a canonical form.

Factoring - Developing an algorithm to factor a composite integer into two factors.

Adaptive Market Pattern - Multi-level free-market framework for selecting and applying the best tools for tasks that learns from experience and incorporates the elements of prediction, estimation, bidding, reputation, and adaptation.

Employment

SpeechGear

Northfield, Minnesota

Senior Software Developer, December 2007 – December 2008.

SpeechGear develops software for translation between natural languages.

Document Workbench Enhanced the natural language translation workbench that also provides translation services to SpeechGear's add-ins for Microsoft PowerPoint and Word. Enhancements included access to translation memory domains by integration with SQL Express, domain stacking, acronym expansion, robustness, and performance. (Visual C# 2005, .NET 2, MS SQL 2005, 2007–8, SpeechGear)

Document Add-ins for Microsoft Word Redesigned and rewrote natural language translation add-ins for Word 2003 and 2007. Devised and implemented a new capability for document-translation systems: the retention of nearly all formatting elements, including font properties and style. For example, the sentences

Some text is **bold**, some is underlined, and some is *italic*. Red text can **startle** cats.
could be translated and automatically formatted as

Algunos texto está escrito en **negrita**, subrayado algunos y algunos en *cursiva*. Texto rojo pueda **asustar** gatos.

New features also included the translation of most Word document components (e.g. footnotes, comments), translation caching, retranslation prevention, automatic protection from translation of text in scripts that should not be translated, user-specified protection of text from translation, interaction with Word via interop assemblies, and a tab on the fluent ribbon for the 2007 add-in. (Visual C# 2005, .NET 2, VSTO, 2007–8, SpeechGear)

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Employment

SpeechGear (continued)

Document Add-ins for Microsoft PowerPoint Redesigned and enhanced natural language translation add-ins for PowerPoint 2003 and 2007. New features included translation caching, retranslation prevention, automatic protection from translation of text in scripts that should not be translated, interaction with PowerPoint via interop assemblies, and a tab on the ribbon for the 2007 add-in. (Visual C# 2005, .NET 2, VSTO, 2007–8)

Translation Client/Server Prototype Developed prototypes of a translation server that can translate between several pairs of natural languages simultaneously and multiple clients that use the translation server for translation. (Visual C# 2005, .NET 3.5, Message Queuing, 2008)

HTML Translator Developed an application for translating HTML files between natural languages. This application is a client of the translation server. (Visual C# 2005, .NET 3.5, 2008)

Open XML Parser Developed a hierarchy of classes for parsing, representing, and manipulating Microsoft Office PowerPoint and Word documents that are in the new Open XML file format. The implementation was not complete but was sufficient to provide a proof of concept. (Visual C# 2005, .NET 3.5, 2008)

National Cinemedia

Eden Prairie, Minnesota

Software Engineer, contractor, November 2006 – March 2007.

National Cinemedia prepares and distributes the half-hour programs that are shown before movies in many theaters.

Content Manager Advertising content manager for movie theaters. (Visual C++ 2005, 2006–7)

Code generator for XML-ready classes Generates source for classes from brief XML-encoded class descriptions. The generated classes are fully interoperable with the rich DOM and SAX wrapper classes described below (e.g. object tree from SAX, object tree from and to DOM). (Visual C++ 2005, 2006–7)

Rich wrapper classes for DOM and SAX for XML manipulation (Visual C++ 2005, 2006)

Blue Cross Blue Shield of Minnesota

Eagan, Minnesota

Rule Systems Architect, November 2003 – September 2006.

Business Object Model Repository Vision, requirements, and architecture for a complete BOM repository, with special emphasis on business rules (2006)

Business Rules Initiative Vision, architecture, methodology, and design (2003–6)

Near Real-time Pharmacy Claims Processing Analysis and design (Pegasystems, 2006)

Connectivity Coordinator Filled new role, tasked with eliminating backlog and improving processes. Coordinated efforts of several groups responsible for establishing connections with clients for the transmission and processing of electronic files. Task was successfully completed. (2005)

Rule Repository User Interface Prototype Architecture, design, and implementation (Oracle 9i, PL/SQL, Apache, Web Application, 2005–6)

Return

Wayzata, Minnesota

Senior Software Engineer, March 2002 – August 2003 (contractor for first five months).

Return facilitates reverse logistics, handling and accounting for product that is returned from retailers.

Web-based Reporting Architecture, design, and implementation (Oracle 7i, PL/SQL, Apache, Web Application, 2003–4)

Data Auditing Architecture, design, implementation (Oracle 7i, PL/SQL, Apache, Web Application, 2002–3)

Jasc Software

Eden Prairie, Minnesota

Senior Software Engineer, July 1998 – November 2001 (contractor for first five months).

Paint Shop Pro Versions 6, 7 and 8, design and implementation (Visual C++ 6, STL, COM, MFC, 2001)

Digital Video Editor Design and implementation of composition serialization and aspects of the user interface for a new product that was promising but later abandoned. (Visual C++ 6, STL, COM, MFC, 2000)

Animation Shop Versions 2 and 3, feature design and implementation, Windows 2000 certification research and preparation (Visual C++ 6, MFC, 2000)

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Employment

Best Buy

Eden Prairie, Minnesota

Senior Technical Analyst, July 1996 – April 1998.

Enterprise-wide event forwarding Designed and implemented several programs for logging events, summarizing event logs, and forwarding events from event logs to HP OpenView via SNMP (Visual C++ 5, GUI, MFC, COM, NT service, multithreading, ODBC, embedded SQL, string patterns, DLLs, 1997–98, Best Buy)

ReplicationLogMonitor (Visual C++ 5, MFC, GUI, multithreading, scripting, 1997)

SQL Gateway Enhancements (Visual C++ 5, NT service, MFC, multithreading, sockets, registry, 1997)

Clear With Computers (now Firepond)

Edina, Minnesota

Senior Programmer / Analyst, June 1995 – July 1996.

Clear With Computers developed custom salesforce-automation applications for many corporations, especially in the automotive industry.

Proposal module of a salesforce-automation tool OLE automation of MS Word to generate proposals for truck/tractor purchases based upon information derived from other modules of a custom salesforce-automation tool for Freightliner, (Visual C++ 1.52, MFC, OLE automation, GUI, 1995–96)

Xavier University of Louisiana

New Orleans, Louisiana

Assistant Professor, Computer Science Department, 1993 – 1995.

University of North Dakota

Grand Forks, North Dakota

Assistant Professor, Computer Science Department, 1990 – 1993.

International Business Machines Corporation

Poughkeepsie, New York

Graduate Intern, System Performance / System Workload Analysis Department, Summers 1988, 1989.

Programs for reconstructing / analyzing channel programs from traces Rewrote PL/AS program in C, reducing its runtime from 24 hours of 3090 CPU time to less than 1 minute (C, Assembler, IBM 3090, MVS, 1988)

Northwestern University

Evanston, Illinois

Instructor, Department of Electrical Engineering and Computer Science, Fall quarter, 1989.

Senior Teaching Fellow, Department of Electrical Engineering and Computer Science, 1988 – 1990.

Teaching Assistant, Department of Electrical Engineering and Computer Science, 1987 – 1988.

Programmer, Solid-State Devices Laboratory, Summer 1987.

Honors and Awards

University of North Dakota Outstanding Faculty Advisor Award, 1992, *University of North Dakota*.

Dean of Students Exceptional Performance Award, 1992, *University of North Dakota*.

Senior Teaching Fellowship, 1988 - 1990, *Northwestern University*.

Graduate Teaching Assistantship, 1987 - 1988, *Northwestern University*.

Walter P. Murphy Fellowship, 1986 - 1987, *Northwestern University*.

Bachelor of Science degree awarded with high honors, 1986, *Northeastern Illinois University*.

Supervisory and Mentoring Experience

As an assistant professor in two universities, directed the activities of several teaching assistants, oversaw the research and thesis writing of several graduate students, and directed the independent studies of over twenty students. Invested a great deal of time working with advisees as well as students. Was awarded the University of North Dakota Outstanding Faculty Award, and the Dean of Students Exceptional Performance Award for my work with dyslexic students. Continued mentoring and tutoring several undergraduates after leaving teaching for software development.

In the role of the Rule Systems Architect for Blue Cross Blue Shield of Minnesota, worked with several people in different roles on educating them about what the business-rules approach was, how it could affect the business, and how to implement it effectively. These people included the senior vice president who was responsible for the business rules initiative, the vice president over my area, half a dozen business staff (director and below) who were charged with implementing the initiative on the business side, several enterprise architects, a few application architects, the technical business analysts, the director of the electronic claims processing division, and several developers.

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Teaching Experience

Undergraduate : C, C++, Pascal, SQL, Modula-2, Logo; object-oriented analysis, design, and programming; problem analysis, computer architecture, algorithms, operating systems, database theory and design, AI, and automated reasoning.

Graduate : Database theory and deductive database systems, automated reasoning.

Professional : 2 courses on programming in C and presentations on C++ at IBM in Poughkeepsie, NY.

Relevant Coursework

Undergraduate : Algebra, Trigonometry, Calculus and Analytic Geometry I, II, and III, Computer Calculus Lab, Differential Equations, Real Analysis, Complex Variables, Discrete Mathematical Structures, Probability Theory and Applications I, Numerical Analysis, Computer Programming I, Algorithmic Processes, Data Structures, Advanced Programming Techniques, Compiler Theory, Operating Systems Concepts, Operating Systems Theory, UNIX Systems, Networking, IBM 360/370 Assembly Language/Architecture, Advanced Assembler Programming, COBOL Programming, Advanced COBOL Programming, PL/I Programming, General Physics I, II, and III, Intermediate Electricity and Magnetism I, Chemistry I and II, Psychology, Introduction to Linguistics, Descriptive English Grammar

Graduate : Mathematical Logic, Number Theory, Modern Algebra II (Linear Algebra), Theory of Computability, Turing Machines, and Recursive Function Theory, Computer Subsystems, Computer Architecture, Advanced Computer Organization, Robotics, Computer Networks, Database Systems, Relational Database Theory, Artificial Intelligence, Natural Language Processing, Theorem Proving, Automated Theorem Proving, Seminar on Advanced Theorem Proving, Linguistic Theory, Syntactic Analysis (Government-Binding Theory)

Professional training : Business Rules Forum 2004 and 2005 (80 hours), Pegasystems PegaRULES BPM and rule engine development / runtime environment (80 hours), Vitria BusinessWare BPM development environment (80 hours), Microsoft Visual C++ and MFC (80 hours), Object-Oriented Analysis and Design (40 hours), UML (40 hours)

Research Interests

Design of algorithms for NP-complete and other challenging problems, including problems in graph theory, logic, and number theory; architecture of problem solving systems; the Adaptive Market pattern. In the process of preparing the results of research over the past twenty-two years for posting on the internet at www.patterncraft.com.

Personal Interests

Baroque music, science, reading, mathematics, Greek history, writing, movies, friends, pets, and good conversation.