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Colorado School of Mines - BSc - Mathematics

Architect, Designer and Mentor for 27 Years

My current interests revolve around humanistic and data science practices, polyglot languages supported by UI, cloud and data innovations. I have recently written PDF mini books in each of these areas with AsciiDoctor.

Over the years I have worked with groups to simplify core technologies to focus on their strengths. So web UIs are dedicated to the user experience, services project business expertise, databases model semantics, the cloud based on the Reactive Manifesto transparently links platforms and data science realizes benefits. I have found the most productive technologies to be: languages: (Scala, CoffeeScript, Math DSLs), visualization (D3, Plotly, MathBox, Leaflet), cloud platforms: (Akka, Apache Spark, NodeJS).

27 years of experience in each the three disciplines of Technology, Languages and Practices:

Discipline	Experience	Y	Experience	Y	Experience	Y	Experience	Y
Technology	Spark / GIS	2,3	UI	7	Akka/J2EE	2,5	Data Modeling	8
Languages	Scala	9	CoffeeScript	7	Java	6	C++	5
Practices	Data Science	6	Math / Visual	7	Practices	8	Design Patterns	6

Presentations

- Humanistic Practices (Book and Presentation) - Refresh Denver 1/11/2017
- Data Science Practices (Book and Presentation) - Data Science Association 9/7/2016
- Getting to Know Scala for Data Science - Data Science Association 6/24/2015
- Reactive Principles in Data Science - Data Science Association 2/28/2015
- Scala Math DSL- Denver Scala Users Group 6/11/2013
- Math Box 3D Visualization - HTML5 Denver 5/13/2013
- GIS with Leaflet - Denver JS 5/2/2013 and Den of Clojure (OpenBike) 6/20/2013
- An Architectural Blueprint for a REST CMS in NetKernel - NetKernel Conference 4/14 2011
- The Evolution of 4-Tier Architectures with REST - Northern Colorado Architects 12/15/2010
- A Practical Road Map to Enterprise Architecture - Denver Open Source Users Group 10/5/10
- Polyglot Panel & Scala Expert - Denver Java 4/14/10 CO Springs 11/25/10 Boulder 5/10/11
- Polyglot Principles (Book) - The principles that inspired Scala Clojure Groovy Ruby 2010
- Principles of Programming Languages - 2/2/10 Scala Groovy Clojure Smalltalk Lisp & Ruby
- Scala Paradigms Denver 8/5/08 8/4/09 Boulder 8/11/09 CO Springs 8/26/09

Humanistic Practices

Since 1990 Axiom's 9 core practices have evolved from an innovative technology focus to facilitating a collaborative culture that encourages productivity and creativity over process. A key enabler is the hands on experience deriving benefits with each practice at Axiom, NREL, California, XCare, DMR, Williams, NorTel and Glaxo. See: [Humanistic Practices](#)

	Embrace	Innovate	Encourage
Learn	Collaborate	Product	Discovery
Do	Adapt	Technology	Benefits
Share	Change	Production	Govern

Collaborate Team building with psychological safety for creative interaction

Product Transforming propositions into an attractive portfolio

Discovery Finding and sharing our vision within our company and to our clients

Adapt Fine tuning our work to respond to new features and components

Technology Innovative architecture, engineering and construction

Benefit Realizing the benefits that propel our discoveries

Change Continuous delivery and evolution

Production Sharing our work with our communities on the cloud

Govern Facilitating and improving the maturity of the entire company

Data Science Practices and NREL 2014-2016

Defined a set of 10 data science practices at NREL. These practices provide a uniform approach to data science by defining the context for clustering, dimensionality reduction, regression, model selection, naive bayes, support vector machine and decision tree techniques. See: [Data Science Practices](#)

Acquire The collection, refinement, schema model and preparation of data

Desktop Tools for visualization, exploration, data access and notebooks

Insight Hypothesis, statistics, ontology and the choices for analysis

Describe Insight with reports, profiles, clustering, dimensions and metadata

Distill Discovers behavior patterns with regression and model generation

Predict Classify and arranges relations to determine future probabilistic outcomes

Advise Promotes decisions using optimization, simulation

Prove Diagnostics, benchmarks and protects data for integrity and reproduction

Process Streams, transforms and archives data with deployed systems

Explain Measures assets and articulates decisions with teaching and publishing

UI/UX Applications Axiom 2010-2015

Created UI/UX apps with refined JavaScript library management, page navigation with REST / JSON interfaces. The web technology stack included: CoffeeScript, Electron, RxJS, jQuery, Backbone, Visualization(D3, Leaflet, Mathbox, CSS3(Less, Bootstrap), Test(Jasmine, PhantomJS) and PhoneGap for mobile. In 2014 I brought in RxJS to replace MVC with notification driven publish and subscribe. Built REST servers in Akka and NodeJS. Leverage NodeJS with CommonJS for development.

Exit Now	2015	Won the GoCode Denver Competition on April 19 with mobile app for I-70
Visualization	2014	Data Science browser app in PivotTable, D3, MathBox and Plotly
DN2K	2013	GIS in Leaflet with crop layers and symbols for farm management
Snugg Home	2012	Contractor mobile app for capturing energy savings specs in homes
PSS	2011	Upgraded JavaScript and CSS UI practices for ordering medical supplies
Part Miner	2010	Create all web pages in HTML for an electronic part search portal

Enterprise State of California 2009

In 2008 my partners secured a contract with California's Health and Human services. We converted asset data to the Federal Enterprise Architecture (FEA) reference models (BRM SCRM, DRM, TCM, PRM). We then mapped the FEA repository to Axiom's Practice Road Map, that made FEA accessible to all 13 health departments. To focus on capital budgeting we replaced the PRM score cards with CPIC and added a quantitative platform in Pentaho BI that our clients used to anticipate the effects of budget cuts.

Symbolic Math Glaxo 2007-2008

To learn Scala I recreated my symbolic math Lisp libraries into a Scala Math DSL (Domain Specific Language). Math equations were written in AsciiMath and parsed into Scala case classes for pattern matching transformations. Transformations included differentiation, some integration, simplification, evaluation and MathML for typeset equations in browsers. Showed the Scala Math DSL to Glaxo and was awarded a contract for integrating symbolic math into Glaxo's molecular modeling research.

4-Tier B2B Axiom 2001-2006

From 1996-2001 my teams and I had become proficient in J2EE with XML transactions. So we leveraged our experience to build fully integrated portals. Started Axiom Architectures LLC in 2001

Time Warner	2006	Refactored J2EE, Struts, Web Logic and webMethods
Level3	2005	Java Swing GUI and mentored developers for provisioning Level 3's VPN
EchoStar	2004	Build security in Web Logic for Pay per View services
IBIS	2003	Built a local search engine with business to consumer semantics
Avert	2002	Created a complete web front end in JSP for HR background checks
Next Step	2002	Advised on web design and tracked user interest in product catalogues
Digiterra	2001	Integrated AT&T, Time Warner, DirectTV, Sprint, Comcast with Circuit City
Fuel Base	2001	Built a 4-Tier B2B portal in J2EE with Vitria

XCare Med Unite Portal Quovadx 2000-2001

My team built MedUnite's HIPAA XML transactions portal for Aetna, Cigna, Anthem, Wellpoint and PacificCare. Created Topic Maps in Ontopia that traversed medical documents with semantic relationships. Designed an integration tier for Vitria. Upgraded the solution architect methodology that passed a SAS-70 audit.

E-Commerce DMR 1999-2000

Created a reference 4-Tier architecture for DMR's e-commerce practices and proposals. Formed strategic partnerships with Web Logic, Vitria and Cygent to reinforce 4-Tier integration within J2EE. Initiated projects for a team of 20 Java developers for 4-Tier sites at American Express and ICG. Captured the knowledge of DMR's Benefit Realization experts into Strategic, Governance and CMM practices. Combined DMR's benefits and 4-Tier for a complete methodology.

Chief Architect Williams Communications 1996-1999

As Chief Architect for the Planning Group I transformed the company's (SPEC) methodology into an enterprise architecture (Zachman). Cross referenced all of WCG's organizations, business processes, connectivity and data models. Created an enterprise data model and warehouse that included: marketing, sales, order, fulfillment, customer care and finance. Mapped the marketing data model into a Java Swing GUI and integrated it with Brio for the first BI / OLAP application. Led the first CRM integration (Neon) that established the planning group's credibility.

Incorporated Design Patterns into a distributed 3-Tier platform, conducted seminars and authored the teams OO methodology.. Key components included a fax-broadcast dispatcher, job monitoring, Internet and persistence. These components reduced development time by 1/3 in months for each platform: fax 9, invoice 6, audio 4 and video 3. Rewrote the video application in Java/Swing.

Telephony Nortel 1992-1996

Developed & taught the Design Patterns & OO courses for BNR's switch developers at Bell Northern Research. The courses emphasized the GOF and POSA Design Pattern catalogs applied to DMS-100 switch architecture. Authored an OO handbook on how to implement the best features of OO.

Collaborated with NorTel's Object Center to define a methodology that merged OMT with OBA/CRC in 93. Within NorTel's BPR effort CODB (Central Order Database), led the Site Tracker and Loader Smalltalk/C++ projects for viewing and loading and switch configurations.

OO Designer for Fiber Vision that monitored DMS-100 Switches via a centralized network operations center. Classified 2100 DMS-100 log reports. Built OO databases and Smalltalk/C++ apps for the DMS-100 switch and SS7 network topology.

Scientific Research Glaxo 1990-1992

Reengineered the experimental processes for Glaxo's pharmaceutical research division. Developed C++/Lisp libraries for symbolic math, relational tables and trace curve fit models. Built a visualization package in PV-Wave. Added a curve fit to Excel to create the scientific spreadsheet adopted by over 300 scientists. <<<<

GIS Criterion 1987-1990

Designed and built LandTrak Plus, a complete Geographic Information System (GIS) for the telephone industry. In its time LandTrak was a major competitor in the PC GIS market with MapInfo and ESRI. LandTrak mapped street networks (Census Dime Files) for public safety and education. LandTrak Plus added an event driven GUI framework and persistent classes to dynamically query thematic data associated with graphically depicted map features. These capabilities enabled cable-transfer and loop-makeup that traversed telephone cable pair hierarchies. Prototyped a network topology for the connectivity and associativity of map features.

Reengineering Telcor 1985-1987

Provided technical expertise to telephony experts who were tasked with reengineering the drawing and record management processes for outside plant and central office telephone networks. Wrote specifications for an integrated facility management system that combined CAD, GIS, and databases to manage assets of 14.5 billion dollars. During the study period my team gathered user requirements and interviewed over 30 CAD and GIS vendors. Coordinated a field trial with ESRI to demonstrate ARC / INFO's outside plant capabilities. Defined a design methodology that combined entity-relationship, state-transition and data flow diagrams.

CAD UniCad 1984-1985

Worked with a start-up company on the design and programming of a CAD toolbox in C. The main product was called MPE for Modifiable, Portable and Extensible software. MPE consisted of subsystems for drafting, solid modeling (Romulus), customizable user interfaces (UIMS), device independent graphics (GKS), a relational database (Oracle), and a structured application language (SAL). My contributed 3D geometry, modeling and GKS.

Geology Petroleum Information 1980-1984

My team at Petroleum Information designed GAS (Geologic Analysis System) with integrated graphics, data base, and statistics. GAS was the culmination of over four years of data collection, programming and analysis on Alaska's North Slope. These projects were researched, designed and coded in close collaboration with scientists at the USGS.

SDS	A complete multivariate statistics package with curve fitting, spreadsheet, data retrieval and graphics.
TECHSYS	An entire database system for oil well and production data.
DEMS	A digitized mapping system for oil well location and USGS DLG (Digital Line Graph) file formats.
TTI	An oil maturation and burial history package.
SRG	Markov Chains for modeling sedimentary transitions.
SEDAS	An earthquake recognition and location system in UNIX with the USGS branch of Global Seismology.

Geophysics Texas Instruments 1978-1980

At Texas Instruments I programmed wavelet-processing modules that utilized Fourier (frequency) and Hilbert (phase) transforms that sharpened fuzzy minimum phase wavelets to symmetric zero phase wavelets. Additional wavelet modules filtered marine air gun bubbles and reconstructed Vibroseis frequency sweeps. Designed a complete grid and contour system with geologic fault honoring.

Math Instructor Arapahoe Community 1974-1978

At Arapahoe Community College I taught and developed course materials for 17 math courses from arithmetic up through calculus and differential equations. Administered teacher training, authorized course changes, supervised registration, and assisted in career counseling.

Academics Colorado School of Mines 1973-1978

Mathematics courses: Differential Equations, Partial Differential Equations, Numerical Analysis, Integral Transforms, Real Variables, Complex Variables, Linear Algebra, Calculus I, II, III, Statistics, Probability, Operations Research and Linear Programming. Geophysics courses: Fourier Transforms, Potential Theory, Seismic Processing, Geology and Stratigraphy