

Barry Demchak, PhD

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Education

B.A. in Computer Science, University of California, San Diego (Revelle), 1979
M.S. in Computer Science, University of California, San Diego, 2008
Ph.D. in Computer Science, University of California, San Diego, 2013

Web pages

<http://www.tpsoft.com>, <https://www.slideshare.net/bdemchak>,
<http://orcid.org/0000-0001-7065-7786>

Employment

2012-2018 University of California, San Diego (Chief Software Architect/Project Manager,
National Resource for Network Biology)

- Lead international group of researchers to evolve Cytoscape **network biology data integration, analysis and visualization** tool (“most successful open source project in biology”). Nearly tripled monthly downloads to 20,000/month, created cyberinfrastructure and service-based automation features.
- Designed, implemented and managed **high performance compute (HPC) cluster** (800 cores, 14TB RAM, 700TB storage) at San Diego Supercomputer Center.

2005-2013 University of California, San Diego (Graduate studies, research assistant)

- Dissertation: **Policy Driven Development** - SOA Evolvability through Late Binding
- Created **Service Oriented Architecture (SOA) systems** for mass casualty disaster management (RESCUE and WIISARD), research of Physical Activity Energy Expenditure (PALMS)

1986-present Torrey Pines Software, Inc (President)

- **Consultant to Management**, Board of Advisors, Project Management and Corporate Acquisition consulting;
- **Expert Witness and Consulting** on cases involving contract disputes, computing malfeasance, intellectual property violations, and fraud; (*see below*)
- **Life Sciences engineering** on quantitative PCR device;
- **System Architect** for numerous PC-based products and projects;
- **Audio and video playback and routing** engineering work and project management;
- **Digital audio workstation (DAW)** engineering work and project management;
- ... *see below*

1982-1986 Software Construction, Inc (President)

1980-1982 Advanced Computer Design (Director of Software)

1979-1980 SofTech Microsystems, Inc (Software Engineer)

1977-1979 University of California (Senior Coder)

1975-1977 Chama Corporation (Analyst, partner)

1971-1975 Independent Contractor

- Published** **Network Biology** and related tools; **Service Oriented Architectures (SOA)**; **disaster management**
- 2019**
- Otasek D, Morris JH, Bouças J, Pico AR, Demchak B. **Cytoscape Automation: empowering workflow-based network analysis**. Genome Biol. 2019 Sep 2;20(1):185. doi: 10.1186/s13059-019-1758-4. PMC6717989.
 - Yu MK, Ma J, Ono K, Zheng F, Fong SH, Gary A, Chen J, Demchak B, Pratt D, Ideker T. **DDOT: A Swiss Army Knife for Investigating Data-Driven Biological Ontologies**. Cell systems, 2019, vol. 8, no. 3, pp. 267-273.e3 (doi: 10.1016/j.cels.2019.02.003). PMID: 30878356.
- 2018**
- Demchak B, Kreisberg JF, Fuxman Bass JI. **Theory and Application of Network Biology Toward Precision Medicine**. J Mol Biol. 2018 Jul 18. pii: S0022-2836(18)30811-8. doi: 10.1016/j.jmb.2018.07.019. PMID: 30030027.
 - Settle B, Otasek D, Morris JH, Demchak B. **Copycat Layout: Network layout alignment via Cytoscape Automation** [version 1; referees: 2 approved]. F1000Research 2018, 7:822 (doi: 10.12688/f1000research.15144.1). PMCID: PMC6039917.
 - Settle B, Otasek D, Morris JH, Demchak B. **aMatReader: Importing adjacency matrices via Cytoscape Automation** [version 1; referees: 2 approved]. F1000Research 2018, 7:823 (doi: 10.12688/f1000research.15146.1). PMCID: PMC6039939.
 - Demchak B, Otasek D, Pico AR et al. **The Cytoscape Automation app article collection** [version 1; referees: not peer reviewed]. F1000Research 2018, 7:800 (doi: 10.12688/f1000research.15355.1). PMCID: PMC6013757.
 - Ma J, Yu MK, Fong S, Ono K, Sage E, Demchak B, Sharan R, Ideker T. **Using deep learning to model the hierarchical structure and function of a cell**. Nat Methods. 2018 Mar 5. doi: 10.1038/nmeth.4627. PMCID: PMC5882547.
- 2017**
- Pratt D, Chen J, Pillich R, Rynkov V, Gary A, Demchak B, Ideker T. **NDEx 2.0: A Clearinghouse for Research on Cancer Pathways**. Cancer Res. 2017 Nov 1;77(21):e58-e61. doi: 10.1158/0008-5472.CAN-17-0606. PMCID: PMC5679399.
 - Carlin DE, Demchak B, Pratt D, Sage E, Ideker T. **Network propagation in the cytoscape cyberinfrastructure**. PLoS Comput Biol. 2017 Oct 12;13(10):e1005598. doi: 10.1371/journal.pcbi.1005598. eCollection 2017 Oct. PMCID: PMC5638226.
 - Fitts B, Zhang Z, Maher M, Demchak B. **dot-app: a Graphviz-Cytoscape conversion plug-in** [version 2; referees: 4 approved]. F1000Research 2017, 5:2543 (doi: 10.12688/f1000research.9751.2). PMCID: PMC5105883.
- 2016**
- Kramer MH, Farré JC, Mitra K, Yu MK, Ono K, Demchak B, Licon K, Flagg M, Balakrishnan R, Cherry JM, Subramani S, Ideker T. **Active Interaction Mapping Reveals the Hierarchical Organization of Autophagy**. Molecular Cell. 2017 Feb 16;65(4):761-774.e5. doi: 10.1016/j.molcel.2016.12.024. PMCID: PMC5439305.
 - Farcas E, Menarini M, Farcas C, Griswold W, Patrick K, Krueger I, Demchak B, Raab F, Yan Y, Ziftci C. **Influences of Architectural and Implementation Choices on Cyberinfrastructure Quality – A Case Study**. With. Chapter in Software Quality

Assurance in Large Scale and Complex Systems. Eds. I. Mistrik, R. Soley, J. Grundy, B. Tekinerdogan, and N. Ali. Elsevier Inc, Waltham, MA. 2016.

- Qu K, Garamszegi S, Wu F, Thorvaldsdottir H, Liefeld T, Ocana M, Borges-Rivera D, Pochet N, Robinson JT, Demchak B, Hull T, Ben-Artzi G, Blankenberg D, Barber GP, Lee BT, Kuhn RM, Nekrutenko A, Segal E, Ideker T, Reich M. **Integrative genomic analysis by interoperation of bioinformatics tools in GenomeSpace**. Nature methods, 2016, vol. 13, no. 3, pp. 245-247. PMCID: PMC4767623.

2015

- Summer G, Kelder T, Ono K, Radonjic M, Heymans S, Demchak B. **cyNeo4j: connecting Neo4j and Cytoscape**. Bioinformatics (Oxford, England), 2015, vol. 31, no. 23, pp. 3868-3869. PMCID: PMC4653389.
- Pratt D, Chen J, Welker D, Rivas R, Pillich R, Rynkov V, Ono K, Miello C, Hicks L, Szalma S, Stojmirovic A, Dobrin R, Braxenthaler M, Kuentzer J, Demchak B, Ideker T. **NDEx, the Network Data Exchange**. Cell systems, 2015, vol. 1, no. 4, pp. 302-305. PMCID: PMC4649937.
- Ono K, Muetze T, Kolishovski G, Shannon P, Demchak B. (2015) **CyREST: Turbocharging Cytoscape Access for External Tools via a RESTful API** [v1; <http://f1000r.es/51y>] F1000Research 2015, 4:478 (doi: 10.12688/f1000research.6767.1). PMCID: PMC4670004.
- Carlson JA, Jankowska MM, Meseck K, Godbole S, Natarajan L, Raab F, Demchak B, Patrick K, Kerr J. **Validity of PALMS GPS scoring of active and passive travel compared with SenseCam**. Medicine and science in sports and exercise, 2015, vol. 47, no. 3, pp. 662-667. PMCID: PMC4289119.

2014

- Ono K, Demchak B, Ideker T. **Cytoscape tools for the web age: D3.js and Cytoscape.js exporters** [version 2; referees: 2 approved]. F1000Research 2014, 3:143 (doi: 10.12688/f1000research.4510.2). PMCID: PMC4264639.
- Demchak B, Hull T, Reich M et al. **Cytoscape: the network visualization tool for GenomeSpace workflows** [version 2; referees: 3 approved]. F1000Research 2014, 3:151 (doi: 10.12688/f1000research.4492.2). PMCID: PMC4133763.
- Pico AR, Bader GD, Demchak B et al. **The Cytoscape app article collection** [version 1; referees: not peer reviewed]. F1000Research 2014, 3:138 (doi: 10.12688/f1000research.4642.1). PMCID: PMC4288400.
- Dutkowski J, Ono K, Kramer M, Yu M, Pratt D, Demchak B, Ideker T. **NeXO Web: the NeXO ontology database and visualization platform**. Nucleic Acids Res 42(1): D1269-74 (2014). PMCID: PMC3965056.
- Su G, Morris JH, Demchak B, Bader GD. **Biological network exploration with Cytoscape 3**. Curr Protoc Bioinformatics. 2014 Sep 8;47:8.13.1-8.13.24. doi: 10.1002/0471250953.bi0813s47. PMCID: PMC4174321.
- Welker D, Demchak B. **Porting and using PanGIA for Cytoscape 3: challenges and solutions** [version 1; referees: 3 approved]. F1000Research 2014, 3:150 (doi: 10.12688/f1000research.4546.1). PMCID: PMC4103495.

2013

- Altschul S, Demchak B, Durbin R, Gentleman R, Krzywinski M, Li H, Nekrutenko A, Robinson J, Rasband W, Taylor J, Trapnell C. **The anatomy of successful computational biology software**. Nature biotechnology, 2013, vol. 31, no. 10, pp. 894-897. PMCID: PMC4166496.

- Demchak, B. **Policy driven development: SOA evolvability through late binding.** UC San Diego. 2013. ProQuest ID: Demchak_ucsd_0033D_13016. Merritt ID: ark:/20775/bb3380248r. Retrieved from <https://escholarship.org/uc/item/8d79f7r4> .

2012

- Demchak B, Krüger I. **A Model-Driven Engineering Approach to Requirement Elicitation for Policy-Reactive Cyberinfrastructures.** Technical Report CS2012-0988. UC San Diego, September 2012.
http://csetechrep.ucsd.edu/Dienst/UI/2.0/Describe/ncstrl.ucsd_cse/CS2012-0988.
- Demchak B, Krüger I. **Policy Driven Development: Flexible Policy Insertion for Large Scale Systems.** Proceedings. IEEE International Symposium on Policies for Distributed Systems and Networks, 2012, vol. 2012, pp. 17-24. PMCID: PMC4224141.
- Krüger I., Demchak B., Menarini M. **Dynamic Service Composition and Deployment with OpenRichServices.** In: Heisel M. (eds) Software Service and Application Engineering. Lecture Notes in Computer Science, vol 7365. 2012. Springer, Berlin, Heidelberg.
- Patrick K, Griswold WG, Norman G, Raab F, Kerr J, Demchak B, Krueger I, Dasgupta S, Nikzad N, Ziftci C, Verma Nakul, Zappi P, Bales E, Quick N. **Mobile Technologies and the Exposome: Continuous Assessment of Environmental Exposures Critical to Health.** Lecture Notes on Wireless Healthcare Research, 2012, pp. 25- 32.
<http://www.ust.edu.tw/upload/Lecture%20Notes%20on%20Wireless%20Healthcare%20Research.pdf#page=31> .
- Demchak B, Kerr J, Raab F, Patrick K, Krüger I. **PALMS: A Modern Coevolution of Community and Computing Using Policy Driven Development.** Hawaii International Conference on System Science 45, Maui, Hawaii, January 2012. (Best Paper nomination)

2011

- Nikzad N, Ziftci C, Zappi P, Quick N, Aghera P, Verma N, Demchak B, Patrick K, Shacham H, Rosing TS, Krueger I, Griswold W, Dasgupta S. **CitiSense – Adaptive Services for Community Driven Behavioral and Environmental Monitoring to Induce Change.** Technical Report CS2011-0961 UC San Diego, January, 2011.

2008

- Demchak B, Krueger I. **Rich Feeds for RESCUE.** International Conference on Information Systems for Crisis Response and Management (ISCRAM 2008). Washington, DC. May 2008.
- Demchak B, Ermagan V, Farcas C, Farcas E, Krueger I, Menarini M. **Rich Services: Addressing Challenges of Ultra-Large-Scale Software-Intensive Systems.** ULSSIS 2008, Leipzig, Germany, May 2008.
- Demchak B, Krueger I. **Composable Chat: Towards a SOA-based Enterprise Chat System.** Technical Report CS2008-0918 UC San Diego, April 2008.
http://csetechrep.ucsd.edu/Dienst/UI/2.0/Describe/ncstrl.ucsd_cse/CS2008-0918.

2007

- Demchak B, Ermagan V, Farcas E, Huang TJ, Krueger I, Menarini M. **A Rich Services Approach to CoCoME. The Common Component Modeling Example: Comparing Software Component Models.** GI-Dagstuhl Research Seminar, Dagstuhl Castle, Germany, Lecture Notes in Computer Science, Springer-Verlag, August 2007.

- Demchak B, Farcas C, Farcas E, Krueger I. **The Treasure Map for Rich Services**. IEEE 2007 International Conference on Information Reuse and Integration (IRI), Las Vegas, August 2007.
- Arrott M, Demchak B, Ermagan V, Farcas C, Farcas E, Krueger I, Menarini M. **Rich Services: The Integration Piece of the SOA Puzzle**. IEEE 2007 International Conference on Web Services (ICWS), Salt Lake City, 2007.
- Demchak B, Griswold WG, Lenert LA. **Data Quality for Situational Awareness during Mass-Casualty Events**. AMIA Annu Symp Proc. 2007 Oct 11:176-80. PMID: PMC2655881.

2006

- Brown SW, Griswold WG, Demchak B, Lenert LA. **Middleware for Reliable Mobile Medical Workflow Support in Disaster Settings**. AMIA Annu Symp Proc. 2006:309-13. PMID: PMC1839360.
- Demchak B, Chan TC, Griswold WG, Lenert LA. **Situational Awareness During Mass-Casualty Events: Command and Control**. AMIA Annu Symp Proc. 2006:905. PMID: PMC1839568.

1980s

- Advanced UCSD Pascal Programming Techniques, Willner and Demchak, Prentice-Hall, April 1985.
- AOS System User's Manual, Demchak, Gleaves, and Richardson, June 1982.
- AOS Programmer's Manual, Gleaves and Demchak, June 1982.
- AOS Library User's Manual, Demchak, June 1982.
- PDQ-3 Programmer's Manual, Gleaves and Demchak, July 1981.
- PDQ-3 Hardware User's Manual, Demchak, Gleaves, Condit, and Lin, July 1981.

Program Committees

- **RECOMB/ISCB** Conference on Regulatory & Systems Genomics with DREAM Challenges & Cytoscape Workshops
 - 2014
 - 2015
 - 2016

Invited Lectures

- Institute of the Americas (University of California, San Diego), May 19, '09. **Background - Scenario Drivers and Critical Issues with a Focus on Technology Trends, and Systems Architecture**.
- San Diego State University, Nov 11, '02. **Computer Security**.
- Software Development Conference East '92. **Cross-platform Development**.

Languages

Java, C++, Visual Basic, C, JavaScript, XQuery, Pascal, Python, Assembly language, Basic

Processors

Intel Pentium/80x86 family, Motorola 680xx family, National 320xx family, DEC PDP-11/xx, Fairchild Clipper, WE 32000, TI 9900, Intel 808x family, Zilog Z-80 family

Past

Activities

Embedded controller devices; OS/2 and Windows Client/Server Applications; SQL compiler and code generation; LU2-based micro-mainframe communications; device drivers for displays, keyboards, disks, tapes, and comm boards; proprietary assemblers and compilers; fourth generation language design and implementation, PC-based

database servers (Novell & IBM Token Ring), process control and simulation (including networking, graphic display and multitasking executive); graphics subsystems; transaction processing subsystem design; mass storage subsystems; coauthor of UCSD Pascal operating systems and virtual machines; multi-user student on-line admissions/registration system; stock/commodities trading system

Clients

Science Applications International Corp (SAIC), exBand Systems, Berkeley Process Controls, Stratagene, Harris Corporation, Graham-Patten Systems; Orban; Sterling Software; AT&T; Digital Descriptor Systems; Unidata; Symantec; Nevis Technologies; Harcourt Brace Jovanovich; Vienna Software; Software Shop Systems; UOP Process Division; National Semiconductor; Ashton-Tate; Bridgeport Controls; University Mechanical (JWP), Sutton SignWriting

Professional Groups

Association for Computing Machinery (ACM), San Diego Software Industry Council (Charter member), Corporate Directors Forum, San Diego Military Advisory Committee (SDMAC), International Society for Computational Biology (ISCB)

Board Positions

Torrey Pines Software, Inc (President and Chairman, 1987-), The Cytoscape Consortium (Secretary/Treasurer, 2013-2018), Association for Computing Machinery (Chairman, 2002-2005), La Jolla Village Park HOA, Cambridge HOA

Expert Witness

Qualified to testify in

- **Federal Court** (Judge David O. Carter, Central District of California),
- **California State Court** (Judge Geary D. Cortes, Superior Court of San Diego County),
- **California State Court** (Judge Gonzalo Curiel, Superior Court of San Diego County);

Contract Dispute

- Counterclaim **alleging incompetent work product**. Audited development process and work product, produced opinions supporting both. Disposition: client prevailed;
- **Payment for services rendered**. Audited work product and produced report on extent of product and its market value. Disposition: client prevailed;
- Marshalling and interpreting accounting information and discovery of general malfeasance. Disposition: unsettled;
- **Rehabilitation of non-performing third party** developer. Disposition: dropped;

IP

Infringement

- **Initial authorship** of in-house medical database management software. Audited database schema and content, produced opinion regarding original authorship. Disposition: settled;
- **Ownership** of supercomputer weapons simulation software between two national labs. Audited development processes and code bases, produced opinion regarding original authorship for potentially infringing party. Disposition: accepted;

- **Ownership** of supercomputer data management software. Audited code bases, produced opinion regarding original authorship for potentially infringing party. Disposition: accepted;
- **Misappropriated database.** Real-time analysis of infringing behavior, onsite support of deposition, formulation of remedy enforcement. Disposition: restraining order granted, infringement discontinued;
- **Theft of trade secrets.** Generated copies of 12 hard disks and sequestered evidence in preparation for trial. Disposition: settled;
- **Theft of trade secrets.** Compared SAP security computer source code from defendant to source code belonging to plaintiff to determine whether derivation occurred. Disposition: settled;
- **Theft of trade secrets.** Identified trade secrets, evaluated evidence of misappropriation, testified as expert. Disposition: opposition prevailed;
- **Misappropriation of system requirements.** Investigated creation and development of insurance claims processing system by litigants to determine derivative works. Disposition: settled;
- **Trademark violation.** Investigated numerous parties regarding misappropriation of trademarked name. Disposition: settled;
- **Trademark violation.** Investigated true identity of web domain holder and assisted in recovering name through auction and letter. Disposition: settled;

Forensic Analysis

- **Destruction of 350GB of hard disk-based evidence.** Recovered sufficient material to generate numerous significant deposition questions. Disposition: settled;
- **Fraudulent representation of commodities on Internet.** Identified criminal parties; web site structure, content, ownership, and location; assisted in evidence collection. Disposition: settled;
- **Misappropriation of name and web site content** involving on-shore and off-shore parties impersonating large U.S. institution in order to defraud Internet users. Disposition: in progress;
- **Fraudulent representations in a contract dispute.** Examined hard disk evidence for correspondence demonstrating a business relationship. Disposition: opposition prevailed;
- **Misappropriation of intellectual property** in an employment dispute. Examined hard disk evidence for presence of various files, supervised discovery by opposing experts. Disposition: settled;
- **Misappropriation of assets** in an employment dispute. Examined hard disk evidence for evidence of accounting information and general malfeasance. Disposition: settled;
- **Damage to hard disk drive.** Examined hard disk to determine cause of destruction; supervised discovery by opposing experts, supervised analysis of data by independent expert, argued motions in front of special marshal. Disposition: settled;
- **Damaged web site sources.** Analysis of hard disk and web server containing misappropriated sources. Disposition: settled;
- **Wrongful employment termination.** Analysis of hard disk and thumb drive containing employment documentation. Disposition: settled;
- **Legal malpractice.** Analysis of hard disk and thumb drive containing financial transactions. Disposition: settled;

- **Misappropriation of assets.** Analysis of web site source to determine likely authorship. Disposition: settled;
- **In-place security.** Analysis of accounting system security. Disposition: completed;
- **Online slander.** Analysis of e-mails and creation of honeypot strategy. Disposition: completed;
- **Web domain misappropriation.** Analysis of domain name ownership and acquisition strategy. Disposition: completed;
- **In-place security.** Analysis of US Treasury SDN List. Disposition: completed;
- **Misappropriation of assets.** Analysis of internal network to determine presence of private servers. Disposition: dropped;
- **Liabe and slander.** Analysis of hard disks containing e-mail and other documents. Disposition: dropped;
- **Patent Litigation** involving evaluation of patent and potential infringers' products. Disposition: settled;
- **Sound File Analysis** involving vendor **misrepresentation of delivered goods.** Analysis of files containing AES emerging standard CartChunk (AES-X87) format. Disposition: settled;
- **User Interface Analysis** involving trust dispute and self-help will software. Disposition: settled;