Curriculum Vitæ

Nadav Har'El

Basic information:

Born: February 28th, 1975.

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Academic education:

BA in Mathematics, summa cum laude, from the Technion – Israel Institute of Technology. April 1994. Top-of-the-class grade-point average of 95.7.

MSc in Applied Mathematics, from the Technion – Israel Institute of Technology. December 1999. Grade-point average 97.4, thesis grade 90.

Work experience:

March 2013–today: Distinguished Engineer in **ScyllaDB** developing a new operating-system kernel for virtual machines in the cloud, and a high-performance distributed database.

January 2010–February 2013: Researcher in **IBM Haifa Research Lab**, in Virtualization and Network Architecture group. Working on virtualization and the KVM hypervisor.

May 2003–January 2010: Researcher in **IBM Haifa Research Lab**, in Information Retrieval group. Working on search engines and text analytics.

October 2002–today: Founder and head developer of **Hspell**, a Hebrew spell-checker and morphological analyzer (a free-software project).

Feb 2004–May 2005: Board member of **Hamakor**, Israeli Society for Free Software and Open Source Code.

August 2000–May 2003: Software engineer and researcher at **Radware**. Working on global Internet performance and content delivery networks (CDNs), and embedded Linux-based SSL acceleration devices.

August 2000–2004: A consultant to Rafael.

June 1994–August 2000: Researcher at **Rafael**, in the areas of Computational Fluid Dynamics and High Performance Computing.

1994–2002: Founder and editor of **iguide.co.il** (formerly "the (almost) Complete Guide to WWW in Israel".)

August 1991–June 1994: UNIX system administrator at the **Technion**'s Department of Mathematics.

Summer 1993: Summer intern, **AT&T Bell Laboratories** (now Lucent Technologies), Mathematical Sciences Division, in creating an X-Windows graphical user interface.

August 1991–August 1992: Research assistant, **Technion** Department of Mathematics, on research concerning linear algebra and computerized image recognition.

Computer experience:

- 35 years experience in UNIX and C programming.
- Experienced in many operating systems, including Linux, numerous flavors of UNIX (System V, Solaris, Digital Unix, and more), OSv, Microsoft Windows, and MS-DOS.
- Experienced in many programming languages, including C, C++, Python, Java, Perl, Pascal, Fortran, Awk, Yacc, Lex, Tcl.
- Experienced in operating-system kernel development, including Linux kernel programming, KVM (the Linux hypervisor), and OSv.
- Experienced in the TCP/IP protocol suite, network and socket programming on Unix systems and Linux-based embedded systems, and in the common Internet protocols (HTTP, SSL, FTP, SMTP, BGP, etc.).
- Experienced in information retrieval theory and practice, and the Lucene search-engine library.

- Experienced in many standard libraries: Tk, Xt/Motif, Xlib (for X-Windows user interfaces), PVM (for parallelization), OpenSSL (for encryption and the SSL protocol), and more.
- An experienced system administrator of Linux and various UNIX servers.
- Has taken many graduate-level computer-science courses in the Technion, including Automata, Graph Theory, Compiler Theory, Distributed and Parallel Computing, Digital Systems, Quantum Computation, and Complexity Theory. Has read on his own many other computer-science and computer-engineering books.
- Experienced in Parallel and High-Performance computing.
- 30 years of experience with the Internet. Has followed closely the development of the World-Wide-Web, and specifically its development in Israel. Was the creator and editor of `iguide.co.il` which was a well-known index of (almost) all WWW sites in Israel. The site has received numerous acclaims in national newspapers, professional magazines, and national radio, as well as being well-known in the Israeli Internet community.

  Experienced in WWW skills such as HTML markup, CSS, Javascript, CGI programming, server administration and security (on UNIX), server programming, search technologies, and more.
- Highly involved in the Israeli Open Source community, and has written a number of free-software packages that are widely used now including **Hspell** the Hebrew spell-checker, and a program to send SMSs from Internet-connected machines. Was the founder of the **Ivrix** project which organized Open-Source developers to create a distribution of Linux with a complete Hebrew support, and was one of the founders, and board member, of **Hamakor**, the Israeli Society for Open Source and Free Software.

Prizes and Awards:

2013: **IBM Research Accomplishment** for Nested KVM.

2013: **Pat Goldberg Best Paper Award** for "ELI: Bare-Metal Performance for I/O Virtualization".

2012: **HiPEAC Best Paper Award** for "ELI: Bare-Metal Performance for I/O Virtualization".

2011: **Hamakor Prize** for Hspell.

2011: **Pat Goldberg Best Paper Award** for "The Turtles Project: Design and Implementation of Nested Virtualization".

2010: **Jay Lepreau Best Paper Award** at OSDI 2010 for "The Turtles Project: Design and Implementation of Nested Virtualization".

2010: **Outstanding Technical Achievement Award** in IBM.

11/1997, 10/1998, 11/1999: Received awards in Rafael.

1995: **Wolf Prize** for excellence from the Technion.

April 1994: **Yuval Levi Prize** for top-of-the-class GPA at the Technion Department of Mathematics.

1991–1995: Receives **Technion President Awards** for excellence in Studies.

Publications:

1. *MIKELANGELO: Micro Kernel Virtualization for High Perfomance Cloud and HPC Systems* (together with Nico Struckmann et al.), European Conference on Service-Oriented and Cloud Computing, September 2017.
2. *Towards a Lightweight RDMA Para-Virtualization for HPC* (together with Shiqing Fan et al.), Virtualization Solutions for HIgh-Performance Computing (VisorHPC 2017), January 2017.
3. *Bare-Metal Performance for Virtual Machines with Exitless Interrupts* (together with Nadav Amit et al.), Communications of the ACM, January 2016, Vol. 59 no. 1, pages 108–116.
4. *OSv—Optimizing the Operating System for Virtual Machines* (together with Avi Kivity et al.) USENIX Annual Technical Conference, June 2014.
5. *Efficient and Scalable Paravirtual I/O System* (together with Abel Gordon et al.) USENIX Annual Technical Conference, June 2013.
6. *Secure Logical Isolation for Multi-tenancy in Cloud Storage* (together with Michael Factor et al.) IEEE Conference on Massive Data Storage (MSST), May 2013.
7. *High Performance I/O Interposition in Virtual Systems* (together with Abel Gordon et al.) IBM Research Report, March 2013.
8. *Towards Exitless and Efficient Paravirtual I/O* (together with Abel Gordon et al.) SYSTOR 2012, Haifa Israel.

9. *ELI: Bare-metal Performance for I/O Virtualization* (together with Abel Gordon et al.) ACM ASPLOS 2012, March 2012, London UK
10. *The Turtles Project: Design and Implementation of Nested Virtualization* (together with M. Ben-Yehuda et al.) *best paper* in 9th USENIX Symposium on Operating Systems Design and Implementation (OSDI), October 2010, Vancouver, BC, Canada.
11. *Personalized Social Search Based on the User's Social Network* (together with D. Carmel et al.) CIKM 2009, October 2009, Hong Kong.
12. *Social Search and Discovery Using a Unified Approach* (together with E. Amitay et al.) ACM Hypertext 2009, July 2009, Torino, Italy.
13. *Social Networks and Discovery in the Enterprise (SaND)* (demo, together with D. Carmel et al.) ACM SIGIR 2009.
14. *Social Search and Discovery Using a Unified Approach* (poster, together with E. Amitay et al.) 18th International World Wide Web Conference, April 2009, Madrid, Spain
15. *Finding People and Documents, Using Web 2.0 Data* (together with E. Amitay et al.) Future Challenges in Expertise Retrieval Workshop, ACM SIGIR 2008, July 2008, Singapore.
16. *Beyond Basic Faceted Search* (together with O. Ben-Yitzhak et al.) First ACM International Conference on Web Search and Data Mining (WSDM) 2008, February 2008, Palo Alto, California.
17. *Hspell - the Free Hebrew Spell-Checker and Morphological Analyzer* (together with D. Kenigsberg) Israeli Seminar on Computational Lingustics (ISCOL) 2004, December 2004, Bar-Ilan University, Israel.
18. *Finding the Geographic Focus of Web-Pages* (together with E. Amitay, R. Sivan and A. Soffer) ACM SIGIR 2004 Geographical IR Workshop, July 2004, Sheffield, UK
19. *Web-a-Where: Geotagging Web Content* (together with E. Amitay, R. Sivan and A. Soffer) ACM SIGIR 2004 Conference, July 2004, Sheffield, UK.
20. *Harnessing the Power of the Web (Web Automation and Libwww-perl)* February 2004, Yet Another Perl Conference 2004, Herzlia, Israel.
21. *A 3D Collision Scheme for Compressible Media in a General Connectivity Lagrangian Formulation* (together with N. Bar-Gill, J. Nemorivsky and O. Agmon) November 2003, First International Conference on Materials Characterisation, Santa Fe, New Mexico.
22. *Hspell's Short Road, from Ideas into Perl Code* May 2003, Yet Another Perl Conference 2003, Haifa, Israel.
23. *Hspell — a Free Hebrew Spellchecker* April 2003, Go-Linux 2003 Conference, Tel-Aviv, Israel.
24. *Operator-split computation of 3-D symmetric flow* (together with A. Birman, J. Falcovitz, M. Ben-Artzi and U. Feldman) April 2001, Japan Society of CFD / CFD Journal vol. 10 no. 1 pp 37-43
25. *The Ivrix Project - Towards a Hebrew Linux Distribution* March 25, 2000, Fourth International Symposium on Multilingual Information Processing, Tsukuba, Japan.
26. *Geometric Tomography* October 1999, M.Sc. thesis, Department of Mathematics, Technion Israel Institute of Technology.
27. *Operator-split computation of 3-D symmetric flow* (together with A. Birman, J. Falcovitz, M. Ben-Artzi and U. Feldman) July, 1999, 22nd International Symposium on Shock Waves, London, UK.
28. *Numerical Solution of One-Dimensional Duct Flow By Method of Characteristics* 1994, research report.
29. *Finding the largest eigenvalues of a real symmetric matrix, and corresponding eigenvectors* 1992, Technion Department of Mathematics research report.

Issued U.S. Patents:

1. *Heat-based Load Balancing*, US Patent 11,157,561 B2, filed 2018.
2. *Seamless Extension of Local Computing Power*, US Patent 9,405,579 B2, filed 2012.
3. *Manipulating Source Code Patches*, US Patent 9,158,533, filed 2012.
4. *Source Code Patches*, US Patent 9,052,983, filed 2012.
5. *Input/output Monitoring Mechanism*, US Patent 9,043,501, filed 2013.
6. *Optimizing of Spawning Request Handling Processes in a Secured Computing Environment*, US Patent 8,943,576, filed 2012.

7. *Enhancing Interrupt Handling in a Virtual Environment*, US Patent 8,892,802, filed 2012.
8. *Automatic Sash Configuration in a GUI Environment*, US Patent 8,627,228, filed 2009.
9. *Multilevel Support in a Nested Virtualization Environment*, US Patent 8,490,090, filed 2011.
10. *Improving Performance in a Nested Virtualized Environment*, US Patent 8,458,698, filed 2010.
11. *Method and system for visualizing shared route information*, US Patent 8,417,447, filed 2009.
12. *Method and a Computer Program Product for Indexing files and Searching Files*, US Patent 8,219,544, filed 2008.
13. *Streaming faceted search*, US Patent 8,078,628, filed 2008.
14. *Information retrieval with unified search using multiple facets*, US Patent 8,024,324, filed 2008.