

# Avraham “Abe” Bernstein | Master S/W Engineer | Abbrev CV

Version: 0.5.3-arm-abbrev

Last update: 2017-09-25T12:50:05Z

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**cv-full:** [HTML](#), [DOCX](#), [PDF](#)

**cv-abbrev:** [HTML](#), [DOCX](#), [PDF](#) **[this file]**

## 1.0 Summary

I am an experienced computer scientist and S/W architect. I have devised innovative solutions to many S/W problems for a wide range of fields, including

- cybersecurity
- cryptography
- bioinformatics
- factory automation
- VLSI CPU design
- telecommunications
- blind vision
- accessibility
- transportation vehicle route guidance
- automated testing

I have worked for a number of organizations, large and small, and helped them realize improvements in their product performance, often putting them in the front rank in their field. I have acquired expert knowledge in a number of fields, often liaising with noted experts, and have been able to quickly apply this knowledge to improve the competitive position of the companies and their products. I have a keen interest in computer languages, both practical and theoretical. I have created a number of [domain specific languages \(DSL\)](#) that were instrumental in greatly simplifying seemingly intractable problems.

In order to understand how I design S/W, see the following appendices:

- [Programming Language Preferences and Musings](#)
- [Domain Specific Languages](#)
- [How To Write Correct, Maintainable, Secure, and Easy-to-Test Code](#)

## 2.0 Work Experience

### 2017-present: Cybersecurity Consultant

*@Self-Employed, Jerusalem:*

Keys: cybersecurity, architect, algorithms, obfuscation, compiler, C/C++, javascript, WASM

1. I am developing an [obfuscating compiler](#) for C/C++ and for [Web Assembly \(WASM\)](#). Still in stealth mode.
2. I am a security mentor for the Jerusalem [Mass Challenge](#) start-up hub.

### 2011-17: Security Policy Mngr & Architect: Cybersecurity: OTT Internet Pay TV System

*@Viaccess-Orca, Ra'anana - a subsidiary of @Orange France, and @Discretix/SansaSecurity, Netanya recently acquired by @ARM:*

Keys: cybersecurity, DRM, architect, algorithms, anti-reverse engineering, obfuscation, LLVM compiler, cryptography, C/C++, TCL, Python, bash, Android root detection, Linux, ELF edit, IOS

1. The product was an [Over-The-Top \(OTT\)](#) Internet pay TV system. We provided the S/W infrastructure to our customers, the legacy (i.e. satellite and cable) pay TV operators, so they could also provide an OTT service to their subscribers in order that they could try to compete with [Netflix](#). The system was designed for small screen Android and IOS devices, i.e. up to 10 inches. We used [DRM](#) to encrypt the content.
2. I was responsible for security policy and architecture. I worked closely with the product management and the S/W development team leader in order to determine security requirements, their costs and benefits, and was the architect of their implementation. In many cases the security features were very complex, so I first needed to create a working proof-of-concept, before finalizing their specifications.
3. Originally the exclusive focus of security was protecting the devices from leaking content and keys, i.e. from being reverse engineered. We relied heavily on the premise that we refused to play on "rooted" Android devices or "jail-broken" IOS devices.
4. But as time went by, rooted Android devices became inexpensive and ubiquitous in the consumer market. Therefore due to declining royalties, the major studios (e.g. Disney, Sony, Warner Bros., etc.) were economically forced to allow playback on rooted devices. Therefore additional security had to be implemented on the back-end web servers, e.g. to check whether or not a subscriber downloaded an unusually high number of hours of content, or whether the subscriber had simultaneous downloads from different IP addresses. I designed a secure data logging system in order to better understand how subscribers were using the system, and in order to detect piracy. Given that we had tens of millions of

subscribers, the economic challenge was to minimize communication costs of the logs.

5. I specified the anti-reverse engineering and [obfuscation](#) programming frameworks and libraries in C/C++.
6. My typical development methodology was to first build a prototype for desktop Linux, secondly as a standalone [CLI](#) application on the target device, and finally to hand over a working prototype to the development team. Whenever possible I preferred to test on virtual machines.
7. The challenges of implementing obfuscation are that (1) the other programmers should not be concerned about it because their focus must be on writing correct code, and (2) the resulting increase in size and reduction in run-time speed must not noticeably reduce the usability/functionality of the application. In general the aim of obfuscation is to provide “good enough security” that will deter 95% of potential attackers, and when combined with regular application updates will force an attacker to begin his next reverse engineering attempt from scratch.
8. All secure code modules on the device were implemented as native libraries written in C/C++. Usually offline utilities were implemented in Python.
9. See [more details](#).
10. **At the end of my 6 year tenure there were 40M subscribers, and no security breaches.**

## **2016-16: Cybersecurity Consultant: Protection of a Small Business with Extremely High Security Concerns**

*@Anonymous, Jerusalem:* See [details](#).

Keys: cybersecurity, privacy, anonymity, WordPress, static web site, Cloudflare, Windows, Android, Google Docs, Google Drive

## **2010-11: VP R&D: Transportation: Urban Traffic Vehicle Route Guidance Algorithms**

*@TeleQuest (defunct), Jerusalem:* See [details](#).

Keys: urban vehicle route guidance, architect, algorithms, Java, AWS

## **2009-09: S/W Architect & Developer: Bioinformatics: PCR Algorithm**

*@Syntezza Molecular Detection (defunct), Jerusalem:* See [details](#).

Keys: bioinformatics, PCR, algorithms, architect, mathematical programming, C, Python

## **2004-09: Cybersecurity Researcher for a CA Satellite Pay TV System**

*@Cisco-NDS, Jerusalem:* See [details](#).

Keys: cybersecurity, DRM, algorithms, cryptography, anti-reverse engineering, obfuscation, LLVM compiler, VM, QEMU, RPC, automated testing, S/W quality, C/C++, TCL, Python, Linux, bash, Win32

## **2002-03: CTO & S/W Architect: Accessibility: Enabled Blind to “See” Maps**

*@Virtouch (defunct), Jerusalem:* See [details](#).

Keys: accessibility, blind, architect, algorithms, GIS, MapML, HTML, SVG, javascript, XSLT, XML Schema, XSLT, C, TCL

## **1999-2002: Mngr & S/W Architect: Network: Utilities for a “Wireless” Cable Modem and Router System**

@Vyvyo (defunct), Jerusalem: See [details](#).

Keys: network, architect, algorithms, SNMP, SNMP-agent, NMS, automated testing, C, TCL, embedded

## **2001-01: S/W Architect & Developer: Network: Network Management System (NMS) for a FSO Device**

@MRV-Jolt (defunct), Jerusalem: See [details](#).

Keys: network, architect, SNMP, SNMP-agent, NMS, Java, C, TCL

## **2001-01: Consultant: Network Management System (NMS) for a Cable Modem & Gateway System**

@One Path Networks - Foxcom, Jerusalem: See [details](#).

Keys: SNMP, NMS

## **2000-01: S/W Developer: Communications: Win32 Asynchronous TCP/IP DLL for a Visual Basic Project**

@Inex-Zamir, Jerusalem: See [details](#).

Keys: TCP/IP communications, C, Visual Basic, Win32, soft real-time

## **1998-99: S/W Architect & Developer: Compiler: GCC Compiler Port for a 128-Core Stack Machine**

@Fourfold Technologies (defunct), Jerusalem: See [details](#).

Keys: gcc C compiler, architect, algorithms, DSL, C/C++, FORTH, LISP, TCL

## **1997-98: S/W Architect & Developer: Factory Automation: Conoscopic Interferometer Workstation**

@Newport-Optimet: See [details](#).

Keys: measurement workstation, architect, algorithms, DSL, C, TCL, OpenGL, Win32, soft real-time

## **1996-97: Lecturer: Win32 Internals Course**

@M.E.R., Jerusalem:

Keys: lecturer, Win32, C

## **1996-96: Consulting S/W Engineer: Win32 Improve Performance of a Soft Real-Time Biofeedback Application**

@MindLife-UltraMind, Jerusalem: See [details](#).

Keys: Win32, soft real-time, C

## **1996-96: Consulting S/W Engineer: Win32 Device Driver for a Frame Grabber**

@Visionix-Cefar, Jerusalem:

Keys: Win32, soft real-time

### **1995-96: CTO & S/W Architect: US DOD Mil-Spec Automated Testing: Night Hawk Fire Control System**

*@Pitkha Outsourcing (defunct), Jerusalem for @Elbit-Elop, Rechovot: See [details](#).*

Keys: automated testing, mil-spec, architect, DSL, C/C++, lex/yacc BASIC compiler, Win32, soft real-time

### **1995-95: Lecturer: Introductory University Computer Science Course on Database Theory**

*@Michlala College Bayit Vegan, Jerusalem:*

Keys: lecturer, database, SQL

### **1991-94: CTO & S/W Architect: VLSI: Simulator & S/W Toolchain For DSPG PINE CPU**

*@Pitkha Outsourcing (defunct), Jerusalem for @DSP Group, Givat Shmuel: See [details](#).*

Keys: VLSI simulator, S/W Development Toolchain, architect, algorithms, DSL, C/C++, lex/yacc, assembly, Win32

### **1989-91: S/W Architect & Developer: Factory Automation: Shop Floor Production Control (SFPC) System: BARI II**

*@Digital Equipment Corporation (DEC) (defunct), Herzliya for @Iscar, Tefen: See [details](#).*

Keys: factory automation SFPC, architect, algorithms, DSL, Pascal, SQL, VAX/VMS

### **1988-88: S/W Architect & Developer: Accessibility: Quadriplegic PC Accessibility**

*@Cubital (defunct), Herzliya - a charity project funded by the company and their CEO [Itzhak Pomerantz](#) in cooperation with the Beit Levinson Rehabilitation Hospital, and the IDF Rehabilitation Unit: See [details](#).*

Keys: accessibility, Prolog, PC-DOS

### **1987-88: S/W Developer & VAX/VMS Sysadmin: 3D Printer: Solider**

*@Cubital (defunct), Herzliya: See [details](#).*

Keys: 3D printing, C, sysadmin, VAX/VMS

### **1986-87: S/W Developer: Soft Real-Time RS232 Z80 Communication Driver: Data Collection & Access Control Terminal**

*@Elde (defunct), Jerusalem:*

Keys: data collection terminal, C, RS232, Z80, embedded, real-time

### **1985-86: S/W Developer: Factory Automation: Leather Sewing Workstation**

*@Orisol, Lod: See [details](#).*

Keys: sewing workstation, DSL, algorithms, AutoCad, C, awk, PC-DOS

## **1984-85: S/W Developer & VAX/VMS Sysadmin: Hebrew/English Word Processor: Glyph**

*@John Bryce, Jerusalem:*

Keys: word processor, C, sysadmin, VAX/VMS

## **1983-84: S/W Developer: Real-Time: Data Collection Terminal & Lavi Fighter Plane Radar**

*@DSI (defunct), Givatayim for @Elta/IAI, Ashdod: See [details](#).*

Keys: data collection terminal, PL/M, 8080, RTOS, fighter plane radar, Jovial, embedded, real-time

## **1981-83: S/W Developer & IBM CP/CMS Assistant Sysadmin**

*@Mitre Corp, McLean VA: See [details](#).*

Keys: APL, PL/1, sysadmin, IBM CP/CMS

## **1979-80: Programmer & Economist**

*@JWWA.com, an economic consulting firm in the Washington DC area: See [details](#).*

Keys: electric utility economics, Fortran, IBM MVS

## **1977-78: Intervenor/Economist**

*@Ontario Energy Board (OEB), Toronto: See [details](#).*

Keys: electric utility economics

# **3.0 Education**

## **3.1 Formal Education**

### **1979: York University, Canada: MA Economics & Applied Mathematics**

See [details](#).

### **1977: University of Toronto - Rotman School of Management (MBA Program): No Degree**

See [details](#).

### **1976: University of Toronto: BA Economics & Applied Mathematics**

See [details](#).

## **3.2 Continuing Education**

Today the field of computer science is changing so rapidly that one's formal education has a half-life of less than 5 years. Therefore in order to maintain my state-of-the-art professional edge, I am involved in an intensive effort of continuing education. See [details](#).

# **4.0 Spoken Languages**

1. English (5/5)
2. Hebrew (4/5)

## 5.0 Computer Languages, SDKs, and Operating Systems

Language knowledge in order of expertise, based upon my current frequency of usage:

1. C, TCL, bash + posix text utilities, e.g. awk, sed, etc.
2. C++, python, make, html5, css, markdown, pandoc, jinja2
3. flex, bison, llvm, javascript, java, yaml, json, go
4. forth, lisp, prolog, apl, fortran, opengl, svg, xml schema, relax ng, xslt, perl, C#

*Note that I write compilers and [Domain Specific Languages \(DSL\)](#), so learning a new language takes me only a few days.*

O/S knowledge in order of expertise, based upon my current frequency of usage:

1. Linux
2. Android
3. Win32
4. IOS

## 6.0 Patents Under Development

- **Bioinformatics:** (a) An extremely accurate and simple noise reduction and normalization algorithm to improve the accuracy of the standard [PCR Ct](#) calculation, and (b) an [Artificial Intelligence \(AI\)](#) methodology for measuring the quantity of DNA in a bioassay where [inhibition](#) makes it impossible to estimate the Ct because no underlying [logistic function](#) (= a flat “S” shaped curve) exists.
- **Cryptography:** A set of non-linear cryptographic primitives using [Hamming weight](#)-like [data dependent permutations](#) which overcomes the well known limitation of using Hamming weights because they have a [binomial distribution](#).

## 7.0 Personal

I was born in Canada in 1956. I have lived in Jerusalem Israel since 1983. I am married with 4 children, 2B + 2G, plus many grandchildren. I take physical fitness seriously. Once upon a time I was a judoka, and a classical guitarist. I was an IDF reserve soldier for 15 years, where I served as a combat soldier in the infantry in the Jordan Valley. In spite of the fact that I joined the army when I was 32 years old (Hebrew: *Shlav Betnik*), functionally, but unofficially, I served in the capacity of deputy company commander (Hebrew: *Samech Mem Pe*) which provided me with the opportunity to achieve rich personal growth, and enabled me to learn important managerial and leadership skills.

## Colophon

- **Generator:** This document was generated using the [Pandoc](#) universal document converter extended [Markdown](#) engine, along with the [Jinja2](#) macro/template preprocessor. See the source code at my [github site](#).