



DANIEL STENBERG

Embedded development, Networks, C, C++
Unix/Linux

Year of birth: 1970

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SUMMARY

Daniel has worked professionally with programming and development since 1991. He's focused on development of embedded systems in Unix-environments, close to the hardware, often with real-time requirements and Internet and TCP/IP-based client/server implementations.

Daniel has a long experience of embedded and real-time operating systems, a thorough competence within networking and computer communications and detailed knowledge about Linux, its kernel and writing device drivers for it, etc.

Daniel speaks and writes English with ease.

Daniel is open minded with a problem-solving attitude and way, he gets new problems quickly and with engagement.

Daniel is a dedicated user and fan of open source. He develops, participates in and maintains a range of open source projects since many years.

Focus: development and implementation on Linux and embedded systems.

PERSONAL

Daniel rather spends his spare time hacking on curl, socializing with his family or playing "innebandy".

PROJECTS

Company A

Responsible for architecture and software design in a project doing 10 Gigabit Ethernet monitoring

Company B

Development of software for RFID-readers. Embedded Linux drivers och applications.

Company C

Developed Linux drivers for C's graphics accelerator.

Company D

Designed and developed software in a HW-based NiosII-equipped subtitle-box for TV-production.

Company E

Wrote uclinux-drivers for Nios II for a train switch.

curl and libcurl

Lead developer and maintainer of the very portable and powerful tool for data transfers using 19 different application layer Internet protocols.

Rockbox

One of the founders and lead developers of the alternative firmware and application suite for portable music and media players.

METHODS, TECHNOLOGIES, TOOLS

Real-time Operating Systems: OS-9/386, pSOS, VxWorks, OSE, eCos, Rockbox

Assemblers: 6502, 680x0, 80x86, ARM, StrongARM, Hitachi SH703x, PowerPC, Nios2

Operating Systems: Linux, SunOS4, Solaris, AIX, Dell Unix, NT, NetBSD, HP-UX

Programming Languages: C, C++, Assembler, Perl, Tcl, awk, bourne shell

Network: Detailed knowledge about Ethernet, IP, TCP, UDP, HTTP, HTTPS, FTP, SSH, DNS, POP3, IMAP, PPP, SCP, SFTP, etc.

Linux: Detailed knowledge. Drivers, kernel config, porting, debugging, cross-compiling, boot-up on embedded systems (with u.boot or custom bootloaders). Experience from Linux development on AMD64, Alpha, SPARC, StrongARM, Xscale, PowerPC, ARM9, MIPS, SH4, MicroBlaze, Nios II och x86.

Tools: gcc, gdb, emacs, CVS, Subversion, Mercurial, git, ClearCase, AXD-debugger, autoconf, automake, libtool, make

Applications: Installation and maintenance of: Apache, sendmail, BIND

INDUSTRIES

- IT Operations
- Networking / Network Equipment
- Medical Equipment
- Transportation / Vehicles
- Telecommunications
- Measuring equipment
- Digital Media / Video
- Home/Consumer Electronics

PREVIOUS ASSIGNMENTS

2011 Linux strategy, Technical and Open Source Expert for Company A1

Daniel developed an Embedded Linux Distribution strategy for A1. The telecom world is quickly moving away from old-style RTOS style solutions and towards more and more Linux. Daniel helped shaping A1's strategy on how to approach this and how A1 can remain an OS solution provider in a Linux-based telecom future. Planning, requirements, projecting and more. Using Daniel's technical expertise in embedded Linux as well as his long and in-depth experience with Open Source development and leading such projects.

2010 – 2011 Debugging and development of x86 simulation software for Company A2

Daniel worked on simulation software that simulates a complete system – CPU, busses, devices, chipsets, subsystems, graphics and everything. Its x86 support was in great need of improvements and then in particular the support for the x58-ich10 chipset. Daniel debugged and improved lowlevel simulation code, studied driver implementations, compared datasheets and wrote test cases.

2010 Design kernel drivers and HW interfacing for TCP streaming for Company A3

Daniel was responsible for the software driver specification and design in the Linux system made to become a 20 gigabit TCP and UDP video streaming server. He worked close to the hardware team to make sure throughput was maximized. The network parts were done "TCP offloaded" by dedicated FPGAs to avoid using the regular TCP/IP stack and the the disk reading was also offloaded to FPGAs using pNFS.

2010 Linux Kernel bugfixing and driver optimization for Company F

Company B sells support for their Linux distribution on Freescale's P4080-platform (multicore SoC with 8 PowerPC cores) to end customers. Daniel worked on making sure that the Linux 2.6.31 kernel with the RT patched applied worked flawlessly and that latency was kept to minimum. The work involved identifying what parts that needed to be fixed, and generally to optimize drivers for RT. As the P4080ds linux port was still early, some generic driver problems were also found and fixed. We partly used Virtutech's Simics tool, but mostly we debugged on P4080DS development boards.

2009 - 2010 Nios2-debugging and network development for Company G

Daniel began as an expert debugger to fix some serious problems in a short time for G's product XXXX: a network-attached device for adding subtitles and other graphics on-top of video streams. After that, he continued development to sort out and clean up the software and add missing functionality, etc. The target environment was an OS-less NiosII using an external Epson S1S60000 for all TCP / IP handling and Altera FPGAs for the graphics.

2009 uclinux Nios2 for Company H

Daniel was responsible for the software when a new nios2-based platform was developed for the customer's custom hardware. The product was an embedded device for industrial activities, with Ethernet and web server, etc.

2009 libssh2 additions for Company I

Daniel was involved in the design and worked on support for new cryptographic algorithms for libssh2 and keep-alive functionality for Company I, where another developer then did most of the implementations.

2009 libcurl additions for Company J

Designed and implemented support for data transmission over the protocols IMAP, POP3 and SMTP (all with support for TLS) in libcurl. Including documentation and test-cases for verifying the functionality.

2009 Linux/u-boot setup for Company K

Daniel setup, configured and wrote device drivers (USB, serial ports, graphics, etc.) for Linux and u-boot for a "Message Display" for the end customer. The target platform: a PXA270 (Xscale) - based embedded system with touch-screen.

2009 SSL certificate info for Company L

Daniel added features in libcurl to retrieve and export data from the chain of certificates that a server provides during a SSL/TLS handshake. The job involved detailed knowledge of SSL certificates, x509, the OpenSSL APIs, etc.

2008-2009 Ethernet monitoring for Company M

Daniel participated in the project that developed a new IP-based platform for network monitoring of 10 Gigabit network traffic. He was responsible primarily for the architecture / design and Linux drivers. The implementation was mostly on x86_64-based Linux servers with four CPU cores. Daniel also wrote, among other things, the implementations for analyzing many application-level protocols in the IP stack including FTP, HTTP, DNS, POP3, SMTP, IMAP, MMS etc.

2008-2009 libcurl/libssh2 support and development for Company N

Daniel assisted N's developer team to both use libcurl properly in their application for FTP and SFTP, but mostly he improved libssh2 and libcurl with respect to SFTP transfers and performance. Daniel also implemented support for OpenSSH's known-hosts concepts in libssh2.

2007 Linux development for Company O

Daniel was responsible for the further development of drivers and applications etc, as well as helped out with educating the new employee who would take over the job after him. Linux 2.6.16 on AT91. This project was a continuation on the previous assignment at O that ended in June 2006th

2007 Nios II uclinux for Company P

Daniel wrote drivers (SPI, UART, etc.) for the Nios II uClinux for a controller board used in a train switch. Two Altera Cyclone II FPGAs, each with a Nios II core running uClinux.

2007 MicroBlaze uclinux för Company Q

Daniel was responsible for the design and construction of software in the WARP project at Company Q. It aimed to develop an AMC card for uTCA. A Xilinx Virtex-5 FPGA with an embedded MicroBlaze core running uClinux, with Gigabit Ethernet, PCI Express, etc.

2007 Graphics drivers on ARM-Linux for Company R

Daniel brought the Linux drivers for XXX back to life and made them functional on R's custom board, including the adaptation to R's new low-level API. Much time was spent on to help with troubleshooting the hardware, as well as other adjustments such as new driver for Micrel's PHY KS87001 for U-Boot.

2007 Designed AT91 based Linux system for Company S

Daniel wrote the design specs for the software of S's new OTDR equipment (a fiber-based "smoke detector"), for which B made the hardware and FPGA. The system was based on the AT91RM9200 microcontroller and Linux 2.6.20.

2007 Demo and Opera browser on Mood 400 for Company T

Daniel wrote in a very short time a demo application with the primary purpose of running on T's settop box Mood 400. The demo application was based on Qt running on Linux / Qt embedded in both the Mood 300 (using a MIPS core), Mood 400 (ST7100-based, with SH4 core) and X11 host. It displayed multicast video, used alpha-blending, chroma keying, video resizing, Time-shifting etc. Daniel also worked on getting the browser Opera / directfb running on mood400.

2006 Demo board with XXX for Company U

Daniel served as mentor and technical expert to help B's software development get up to speed on a self-made AT91RM9200-based card, for development of of U-boot, Linux and the like. The board was based on a AT91RM9200EK design.

2006 Dualview for Company V

Daniel ported Linux 2.6.17.8 for a development board equipped with NEC's EMMA2SW uPD61125 microcontroller (dual MIPS cores at 187 MHz). The work included new drivers for a PCI controller and management of a NEC uPD720101 USB 2.0 Host Controller (via PCI). Busybox launched from initramfs. The card was, also equipped with two 353 Zarlink DVB-T tuners for receiving and recording digital TV.

2006 libssh2 non-blocking API for Company W

Daniel designed and implemented a new API for libssh2 to manage SCP and SFTP with a non-blocking API, intended to improve libssh2's behavior when used by libcurl.

2006 libcurl HTTP Pipelining for Company X

Daniel designed how HTTP Pipelining should be implemented in libcurl, reviewed code and adjusted the implementation made by an employee of X.

2005 – 2006 Hiper libcurl for Stiftelsen För Internetinfrastruktur

Daniel received the a grant from the IIS Internet Fund to further develop libcurl for high-performance transfers, with a focus on dealing with excessive amounts of simultaneous connections. The Hiper project launched in December 2005 and ended during the autumn 2006.

2005 – 2006 Linux and drivers for Company Y

Daniel was one half of the team working on the software when Y developed its RFID scanner "Generation 4". Daniel was responsible for the Linux setup/drivers, development environment / cross-compiler and Uboot 1.1.4. He wrote drivers and participated in designing and developing software. Target platform: AT91RM9200 (Atmel microcontroller with an ARM920T core) and Linux 2.6.X. The card was based on

the AT91RM9200EK design, albeit with a 16MB Intel Strata Flash rather than parallel, RFID-management/input via an Altera Cyclone FPGA, an external RTC etc.

2005 – Qtdemo for Company Z

Daniel built and customized Qt Embedded for Z's target, and wrote a simple graphics demo using the driver he wrote earlier. Target Platform PowerPC 405, Linux Kernel 2.6.11

2005 – Linux Framebuffer driver for Company AA

Daniel wrote a framebuffer driver for Linux for AA's FPGA-based graphics accelerator XXX. Target Platform PowerPC 405 (embedded in a Xilinx Virtex-II FPGA), Linux Kernel 2.6.11

2004 libcurl -support for Company BB

Daniel helped the Company BB's team of developers to use libcurl and to debug their application and similar. It also involved some amount of libcurl-debugging.

2003 – 2004 Company CC

CC developed within the project "Orion", a whole new generation of electronic distance meter and positioning equipment. The units consisted of several autonomous components. All parts had a CPU communicated over USB. Daniel developed software for OSE on an ARM7 CPU which among other things, controlled the servo motor, the "tracker" device, etc. Environment: Multi-ICE debugger hardware, AXD-debugger, CVS, Emacs, ARM's C and C++ compilers. The development was done on Windows 2000.

2002 "Web tablet" for Company DD

Daniel created a Linux based touch screen web tablet designed and meant for installation in flats. The concept was based on the Konq/e web browser on Qt/E using embedded Linux. The evaluation design was made with an Intel XScale PXA250 with an ARM core. The work included integration, modification, adaptation and cross-compiling of numerous open projects. Daniel also co-evaluated Linux vendors together with the customer: Montavista, SysGo and LynuxWorks.

2000 – 2002 Network switch for Company EE

EE develops network (fiber) switched that were based on StrongARM, that switched the DTM protocol (Dynamic synchronous Transfer Mode). Daniel developed the low level protocols and OS-close layers of the software stack. The work involved API and protocol design for code that run both on pSOS and NetBSD. Portable programming and kernel hacking. Did a lot of work as expert debugger.

2000 Company FF

Development of an access switch, of type "modem pool", based on Linux. Daniel led the development and was at times the only developer of Linux device drivers, modem communications, kernel hacking and modifying and understanding of PPP and its sub protocols. It also involved a lot of insight into the SMB protocol and several modifications of Samba were done.

Open Source projects: 1994 – today

Daniel has participated in and been the lead of many open source projects. A few of the primary ones are mentioned here.

2006 – libssh2

Daniel is the maintainer of the project. Libssh2 is a portable client-side SSH C library and it handles things such as SCP, SFTP, X11-forwarding, port-forwarding etc. <http://www.libssh2.org/>

2003 – c-ares

Daniel is the maintainer of the project. C-ares is a C library for asynchronous name resolving and general DNS lookups. It is used by several established programs such as libcurl, Wireshark and Second Life. <http://c-ares.haxx.se/>

2002 – Rockbox

Rockbox is a complete operating system and software suite for various portable music player. It runs on players manufactured by companies such as Archos, iriver, Apple, Cowon, Toshiba, Philips, Samsung, SanDisk and more. It runs on several CPU architectures including SH1, m68k, ARM and MIPS. Daniel has been involved in the core group since day one, and has been involved in almost all parts of development including research, investigation, design and development of OS / kernel, applications, simulator, build system, bug tracking, automated builds, etc. <http://www.rockbox.org/>

2000 – Subversion

Subversion is a well known and widely used version control system, primarily designed to replace CVS. Daniel was involved in the development and was part of the "core developer group" between 2000 and 2007. It supports local or networked access, diffs in both directions, full versioning of directories and "properties". Based on WebDAV for remote access, using Apache 2 server, etc.
<http://subversion.tigris.org/>

1997 – curl och libcurl

Daniel is the founder, maintainer and project manager. libcurl is a portable library for data transfers using one of the following protocols: HTTP, HTTPS, FTP, FTPS, SCP, SFTP, TFTP, TELNET, FILE, DICT, POP3, IMAP, SMTP, RSTP, LDAP or LDAPS. libcurl has "bindings" for more than 35 languages. curl is a powerful command line tool that uses libcurl and it supports FTP uploads, HTTP POST, cookies, certificates, etc. curl and libcurl builds and works on over 40 different combinations of CPU and OS. curl and libcurl is present in nearly all Linux distributions, hundreds of applications use libcurl and hundreds of companies use libcurl in commercial environments.
<http://curl.haxx.se/>

Some talks Daniel wrote and performed

Introduction to IPv6

Explanation of what IPv6 is, what the major differences between version 4 and version 6 are, what the main news is, how the IPv6 services will be different from today's IPv4 environments, etc.

Free and Open Source licenses

Survey of what certificates are and how they are based on copyright. Explains common concepts and features a detailed review of the five most common licenses (GPL, LGPL, MPL, BSD and MIT).

Open Source Project Management

With experiences and comparisons from among others the curl and Rockbox projects. An overview of principles that are common and different when comparing those projects and a discussion what characteristics and activities you may need from those when you lead your open source project.

Reverse Engineering to run free software on consumer electronics

With experiences and comparisons from the Rockbox project.

Distributed multiplatform testing for very portable programs

How we do it in the curl project. What works, what is difficult and what to think about when doing this.

Driver development on Linux

An overview with examples on how to implement a Linux driver, with example from a plain driver to a framebuffer graphics driver.