



SCI & OSL Technical Excellence Symposium 09



The Syslinux Project



Overview of a modern bootloader



Bootloaders aren't dead !

- Bootloaders are running on our systems for ages
- Lilo & Grub are, by far, the most known/popular
- But it looks like they didn't evolved since the dinosaur era
- *“ Their development is complete, not need to spend time on it”*
- *'The Syslinux Project'* has never been such active since the beginning (15 years ago)
- Many contributors joined the project since the past 2 years
- Why such activity ? Bootloaders aren't such sexy....

What's The Syslinux Project ?

- ❑ A collection of bootloaders
 - ❑ ISOLINUX for booting CDRoms (El Torito)
 - ❑ SYSLINUX for booting from a FAT filesystem
 - ❑ EXTLINUX for booting from an EXT3 filesystem
 - ❑ PXELINUX for booting over the network (PXE)
- ❑ Aims at booting systems from every possible media
- ❑ Developed since 1994 by Hans Peter Anvin (HPA)
 - ❑ Historical Linux Kernel Hacker
 - ❑ Co-maintainer of the x86 code
 - ❑ Co-webmaster of Kernel.org



What's The Syslinux Project ?

'The Syslinux Project' is made of

- A core layer
 - Low level operations
 - Memory management
 - Written in Assembly

- A com32 module framework
 - Easy-to-develop extensions
 - Written in C
 - Many libraries as helper
 - libjpeg, zlib, pci, dmi, ...

COM32, a modular approach

COM32 modules have crystallized contributions/contributors as

- ❑ No ASM skills required to add new features or bugfix
- ❑ High level API / libraries
- ❑ Everyone who knows C can contribute !
- ❑ Nicest COM32 modules
 - ❑ Menu / cmenu / vesamenu
 - ❑ Chainloading / ifcpu
 - ❑ Gfxboot (in progress) / rosh
 - ❑ Mboot / HDT
 - ❑ Lua scripting (to come)

Zooming on PXElinux

- ❑ PXE (Pre-Execution Environment) make systems booting on the LAN
 - ❑ Requires some
 - ❑ infrastructure (DHCP / TFTP)
 - ❑ A PXE-compliant Ethernet device
 - ❑ A bootstrap to execute
- ❑ PXElinux is *the* PXE bootstrap
 - ❑ Downloaded by the PXE ROM and then executed locally
 - ❑ It uses ROM's interface to use the network (no driver in PXElinux)
 - ❑ Have to load & execute *something* executable, typically a kernel
 - ❑ Memdisk is a special kernel to load disk images (floppy/HDD/iso)
- ❑ PXE and so PXElinux can only load data from the TFTP service
 - ❑ Very, very limiting... (slow, insecure, LAN bounded,)

gPXE, the *Waow* effect

- ❑ Etherboot project is known for building PXE ROM images
- ❑ Their newest project change the rules
- ❑ gPXE is a 100% OSS implementation of a PXE ROM
- ❑ In addition of the PXE specification, it adds many new '*interfaces*'
 - ❑ TFTP is no more alone !
 - ❑ FTP, HTTP, HTTPS, NFS, ISCSI, ... are new friends
- ❑ Beginning of a new booting era
 - ❑ No more LAN restriction
 - ❑ Booting content can be generated dynamically (cgi, ...)
 - ❑ Let's boot Windows 2008 server from an iscsi target
 - ❑ That's not new isn't ? Except it just uses regular hardware !
 - ❑ Int13h emulation, why not booting Windows 3.1 via ISCSI !?!



gPXElinux, a less intrusive transition

- ❑ gPXE is awesome but it have a huge drawback
- ❑ gPXE have to be flashed in place of the regular PXE ROM
 - ❑ Could be difficult on embedded systems as part of the BIOS
 - ❑ What about the warranty in case of failure ?
- ❑ While waiting for a broader adoption, we have a solution
- ❑ gPXElinux = gPXE + PXElinux
 - ❑ The original PXE ROM is loading gPXElinux.0 via TFTP
 - ❑ gPXElinux.0 installs itself in memory in place of the actual PXE ROM
 - ❑ gPXElinux.0 starts the built-in pxelinux.0
 - ❑ PXElinux is now loaded and have the benefits of the additional features of gPXE
 - ❑ gPXElinux can load FTP, HTTP, ISCSI content on a un-modified hardware setup



Boot Kernel.org, the universal boot

- ❑ And if« We could have a centralized repository for booting ? »
- ❑ Systems usually have PXE + some LAN / Internet connection
- ❑ Why should I have to
 - ❑ Go to a project site
 - ❑ Download some bootable content
 - ❑ Burn an image
 - ❑ Boot on it
 - ❑ Throw away the bootable media
- ❑ BKO service offer a menu of bootable content
 - ❑ Linux installers
 - ❑ Linux LiveCDs
 - ❑ Debugging Tools (HDT, Pxeknife, ...)

What's next ?

- ❑ Syslinux 4.x is currently under alpha
 - ❑ File system API in C
 - ❑ COM32 Relocatable
 - ❑ GFXBOOT as com32
- ❑ Syslinux 5.x
 - ❑ ELF Linker
 - ❑ Native TCP for PXELINUX (lwip)
 - ❑ End of support for COM16 modules
- ❑ Syslinux 6.x
 - ❑ EFI support

Conclusion

- Syslinux offer via its suite, innovative solutions to boot your system
- Can use any kind of bootable device to start your system
 - CDROM / USB / Network / Local drive
- Can be easily extended via its COM32 framework
- Can use the benefits of gPXE to extend booting options
 - Booting over Internet !

Bootloaders aren't dead ! Let's innovate !

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