1.0. SYSLINUX installation

CRUX supports the installation of SYSLINUX as one of the alternative boot managers. If planning on using SYSLINUX it will need to be selected during the installation.

1.0.1. Attention

It is important to know in advance which type of configuration will be used. One should take note whether the disk is setup as DOS or GPT and whether the system boots through UEFI or Legacy.

It is also important to note that even though UEFI does support DOS partition tables, some manufactures do not. So it is recommended to use GPT over DOS.

1.0.2. Installation

The configuration of SYSLINUX is broken up into different subsections so please make sure to choose the one that is appropriate for the systems configuration.

- DOS and Legacy
- DOS and UEFI
- GPT and Legacy
- GPT and UEFI

The files required for SYSLINUX are located under /usr/share/syslinux/. Although one can copy the entire directory over or select extra features, this document will not go into it and only focus on a basic installation. For further reading it is recommended to checkout SYSLINUX's extensive howto.

Note:
SYSLINUX is not limited to a single directory and choosing a different location is perfectly acceptable; however, for simplicity this installation will be using /boot/.

1.0.2.1 DOS partition table and Legacy

To install SYSLINUX on a Legacy system the boot partition **MUST** be flagged as bootable.

The following steps are required.

- Create the location for the SYSLINUX's configuration
- Copy the relevant files over
- Create and edit the configuration file
- Install SYSLINUX
- Write to the master boot record (MBR)

Precaution:
When using dd to write to the master boot record it would be wise to have a backup, as incorrect use of dd could cause the partition table to be wiped and/or loss of data.

```
# mkdir -p /boot/syslinux
# cp /usr/share/syslinux/ldlinux.c32 /boot/syslinux/
# vi /boot/syslinux/syslinux.cfg
# extlinux --install /boot/syslinux
# dd bs=440 count=1 conv=notrunc if=/usr/share/syslinux/mbr.bin of=/dev/sda
```

1.0.2.2 DOS partition table and UEFI

Steps are as follows:

- Create the location for the SYSLINUX's configuration
- Copy the relevant files over
- Create and edit the configuration file

```
# mkdir -p /boot/EFI/BOOT/
# cd /boot/EFI/BOOT/
# cp /usr/share/syslinux/efi64/ldlinux.e64 .
# cp /usr/share/syslinux/efi64/syslinux.efi BOOTX64.EFI
# vi syslinux.cfg
```

* For using efibootmgr refer below to subsection 1.0.4

1.0.2.3 GPT partition table and Legacy

To install SYSLINUX on a Legacy system the boot partition **MUST** be flagged as bootable.

Steps are as follows:

- Create the location for the SYSLINUX's configuration
- Copy the relevant files over
- Create and edit the configuration file
- Install SYSLINUX
- Write to the master boot record (MBR)

Precaution:
When using dd to write to the master boot record it would be wise to have a backup, as incorrect use of dd could cause the partition table to be wiped and/or loss of data.

```
# mkdir -p /boot/syslinux
# cp /usr/share/syslinux/ldlinux.c32 /boot/syslinux/
# vi /boot/syslinux/syslinux.cfg
# extlinux --install /boot/syslinux
# dd bs=440 count=1 conv=notrunc if=/usr/share/syslinux/mbr.bin of=/dev/sda
```

1.0.2.4 GPT partition table and UEFI

Steps are as follows:

- Create the location for the SYSLINUX's configuration
- Copy the relevant files over
- Create and edit the configuration file

```
# mkdir -p /boot/EFI/BOOT/
# cd /boot/EFI/BOOT/
# cp /usr/share/syslinux/efi64/ldlinux.e64 .
# cp /usr/share/syslinux/efi64/syslinux.efi BOOTX64.EFI
# vi syslinux.cfg
```

* For using efibootmgr refer below to subsection 1.0.4

1.0.3. Writing the configuration file

SYSLINUX uses syslinux.cfg as its main configuration file. The example below shows a very simple configuration. The first line in the configuration asks SYSLINUX to show a prompt so that the user can send extra commands or choose another kernel if configured. Pressing the tab key will display a list of available choices. The second line specifies the length of time SYSLINUX should wait in 10ths of a second. Any keys pressed on the keyboard will cancel the timeout. The third line specifies the default label to boot. So in this case the default label is CRUX.

Below the word LABEL are the settings that point to the location of the bootable kernel and an append line that allows extra commands to be sent to the kernel.

Note:
It is important to remember that if there is no need for the use of the APPEND line, as it may have been configured in the kernel already, or if there is no INITRD to load then they should be removed from the configuration entirely. Do not leave APPEND or INITRD with nothing following it as the system will not boot.

The bootable kernel location is relative to the location of the configuration file. So if the configuration is located in /boot/syslinux and the bootable kernel is located in /boot/ then the entry following LINUX would be **..vmlinuz**

If multiple INITRD images are to be loaded then they are separated by a comma **with no spaces** and also relative to the location of the configuration file.

```
PROMPT 1
TIMEOUT 10
DEFAULT CRUX

LABEL CRUX
LINUX ../vmlinuz
APPEND root=/dev/sda2 rw
INITRD ../intel-ucode.cpio,../i915-firmware.cpio.xz
```

1.0.4 UEFI and efibootmgr

In most cases the above configuration for UEFI will work without any issues; however, whether by choice or out of necessity the use of efibootmgr may be required. By default UEFI looks for \\EFI\\BOOT\\BOOTX64.EFI so if syslinux.efi is in another location or named differently the user may need to run the following command pointing to the location of syslinux.efi or whatever it has been named.

The following command will modify the system's UEFI and add an entry for a nonstandard EFI image name or location.

efibootmgr -c -d /dev/*[DISK]* **-p** *[PARTITION]* **-l** *[LOCATION]**[TO]**[SOME.EFI]* **-L** *[MENU LABEL]* **-v**

As an actual example using the original SYSLINUX UEFI configurations written about earlier, one would simply configure the system's UEFI with the following command.

```
# efibootmgr -c -d /dev/sda -p 1 -l \\EFI\\BOOT\\BOOTX64.EFI -L CRUX -v
```

Note:
If the partition is mounted under /boot it is important to note that UEFI reads directly from the partition so the mount point must be left out.

For example:

```
/boot/                                    \\
/boot/syslinux                            \\syslinux\\
/boot/EFI/BOOT/                           \\EFI\\BOOT\\
```