User guide to IPC/DEBIAN-8A-32 – a 32-bit Debian Linux by Syslogic
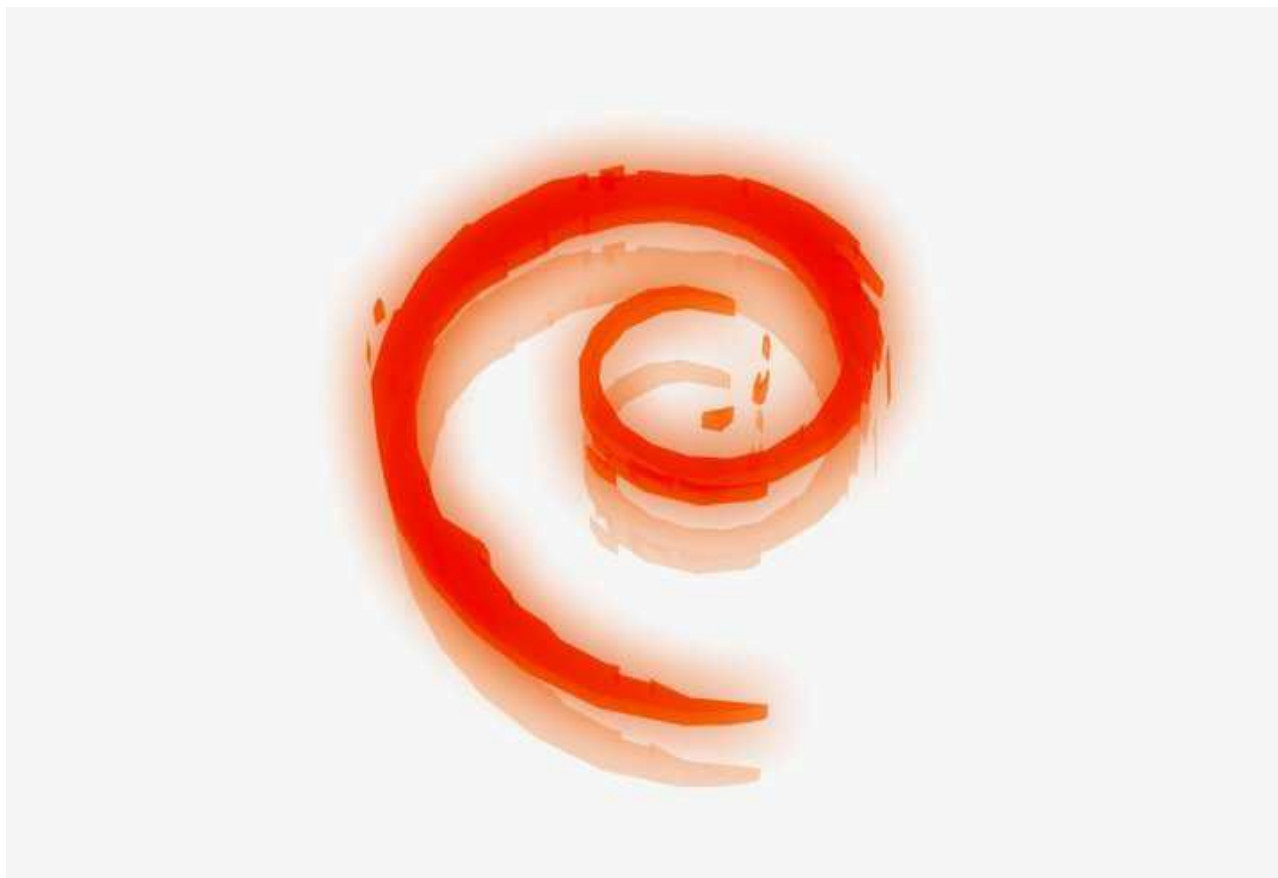
Revision	Date	Author	Modification
1.0	23.08.2016	S. Mutter	IPC/DEBIAN-8A-32 v1.0
1.1	07.07.2017	S. Mutter	Added Note about License of integrated Java SE Platform Products

Contents

1.1 Abstract

This guide describes how to use the IPC/DEBIAN-8A-32 GNU/Linux.

This Linux has been compiled, configured and optimized by Syslogic to run on Intel Atom E3825 and E3845 based industrial computers by Syslogic.

Syslogic has chosen this Linux distribution because of the quality of its releases and the easy-to-use package management system (especially APT). Moreover, Debian uses an open development and testing process. It is developed by volunteers from around the world and supported by donations through Software in the Public Interest, Inc., a non-profit umbrella organization for free software projects.

1.2 Sources of information

This guide focuses on the specific parts of IPC/DEBIAN-8A-32 for the Syslogic products; the "Debian Linux Anwenderhandbuch" http://debiananwenderhandbuch.de/ (only German version available) covers more Debian-specific details.

Platform / architecture	Syslogic product(s)
Intel Atom E38xx	IPC/SL8xxx-xxxx
	IPC/ML8xxx-xxxx
	IPC/S8xxx-xxxx
	IPC/M8xxx-xxxx
	IPC/RSL8xxx-xxxx
	TFT/Hx150PU8xxx-xxxxx
	TFT/Hx121PU8xxx-xxxxx
	TFT/Hx104PU8xxx-xxxxx

Table 1 – Supported CPU boards

Syslogic product(s)	Description
IPC/REL12-1Ax	Relays board
IPC/DIO32-1Ax	Digital IO board
IPC/BM8EXP-101E IPC/BM8EXP-102E IPC/BM8EXP-103E	Expansion Boards for BM8
CPN/LTEMPE-1A	LTE/HSPA+/GSM Module Mini PCI Express, uBlox TOBY EU/APAC

Table 2 – Supported expansion boards

2 Getting started quickly

2.1 System preparation

If the IPC/DEBIAN-8A-32 compact flash card has been delivered to you separately, open your industrial computer and plug the flash card into the corresponding socket on the CPU board. Connect a keyboard, a VGA monitor, and a mouse (optional).

2.2 Booting

The Linux loader GRUB starts after the Bios screen. GRUB will list the installed kernel versions in a blue menu, one per line. Press the return key or wait 5 seconds to launch the default kernel. The preinstalled Kernel is the 4.4.11-rt17-syslogic, a customized 32-bit Kernel.

2.3 Login, user, and password configuration

IPC/DEBIAN-8A-32 automatically logs in the user root on terminals tty1, …, tty6. This behavior can be changed by editing the line "ExecStart=-/sbin/getty/ --noclear -a root %I $TERM" in the file "/lib/system/system/getty@service" to "ExecStart=-/sbin/agetty --noclear %I $TERM".

In IPC/DEBIAN-8A-32 the following main accounts are preconfigured:

Username	Password	Description
netipc	netipc	Standard / normal user account
root	netipc	Root / administrator account

Table 3 – Preconfigured user accounts

2.4 Console keyboard configuration

To change the keyboard layout (as root):

```
root@debian:/# dpkg-reconfigure keyboard-configuration
```

Then follow the instructions of the console menu. To finish the configuration:

```
root@debian:/# setupcon
```

2.5 Time setup via the network time protocol (NTP)

In IPC/DEBIAN-8A-32, the system clock and the hardware clock are configured automatically via NTP, if the system is connected to the internet.

2.6 USB storage devices

USB storage devices are mounted under "/media/usb*" automatically after being attached.

All users are able to read from and write to the mounted device.

All users should unmount a USB storage device after reading from or writing to it with

```
netipc@debian:/# pumount /dev/sdb1
```

It might be necessary to adapt "/dev/sdb1" (the console command "dmesg" may be helpful).

2.7 Overview of the installed software

The Debian Linux image on the Compact Flash comprises:
- the Linux kernel "4.4.11-rt17-syslogic" optimized for and only runnable on Intel Atom processors; this kernel i. is RT-PREEMPT patched, ii. supports SMP with up to 256 processor cores, iii. comprises lincan 0.3.5, Intel i915 (Intel Atom E38xx-based graphics) and Syslogic-specific driver modules for the add-on hardware.
- Binutils and GNU Compiler Tools
- DHCP client
- Xorg Server 1.16.4
- "Fluxbox" graphical window manager
- "idesk" icon manager
- Textual file manager "Midnight Commander (mc)"

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- Firefox Web-Browser
- Google Chrome Web-Browser (Chromium)
- Network servers: Samba (Windows file sharing) / Apache (WWW) / FTP / Telnet / SSH / Cups
- A tool for automatic mounting of USB storage devices: usbmount
- NTP (Network Time Protocol) client "ntpdate"
- Java™ SE runtime environment – build 1.8.0_101 (installed under /usr/local/jre/)

2.8   Graphical desktop environment

2.8.1   Starting the Fluxbox

To start the graphical desktop environment:

```
netipc@debian:/# startx
```

The desktop that appears has three icons, "Shutdown" to shut down the system, "Internet" to start the web browser Firefox and "Console" to start xterm, a terminal emulator. By clicking the right button on the mouse or holding the touch for a second, the menu is opened.

2.8.2   Configure the Keyboard

To configure the Keyboard in the Window Manager:

```
netipc@debian:/# setxkbmap <language-shortcut>
```

To make the keyboard configuration permanent, change the line setxkbmap "ch,de" in the file ~/.fluxbox/startup.

2.8.3   Onscreen Keyboard

The onscreen keyboard "onboard" is preinstalled. It opens automatically on touch panels when a text field in the web browser is selected. It can be manually opened by pressing the icon on the desktop. When using a keyboard, onboard will automatically hide itself for a configurable time. If onboard should not be loaded automatically at startup of the fluxbox, the lines belonging to the onscreen keyboard in the file ~/.fluxbox/startup have to be commented out. On the next start of the fluxbox, the change takes effect. Other settings of the onscreen keyboard can be made by opening the preferences of the program. To get to the preferences, you can click on the symbol on the bottom on the right side.

2.9   Kernel sources, manuals, sample tools

On the IPC/DEBIAN-8A-32 root partition, various sample tools for add-on hardware and features by Syslogic are under "/SYSLOGIC/tests_demos". The kernel sources and manuals are available from the Syslogic web page.

3   Managing Debian

IPC/DEBIAN-8A-32's basic packet manager is "dpkg", whereas "aptitude" works on top of dpkg and resolves package dependencies. Apt-get has similar functionalities as aptitude, but does not come with a text menu.

3.1   dpkg

dpkg –l	List installed packages
dpkg –l "*"	List all (available and installed packages)

The resulting package list shows the version number and the installation status of the packages:

rc	hotplug	0.0.20040329-26	Linux Hotplug Scripts
ii	iamerican	3.1.20.0-4.3	An American English dictionary for ispell
….			

The first row is the packet action:

u=unknown, i=install, r=remove (delete without config), p=purge (delete with config)

The second row is the current packet status:

n=not installed, i=installed, c=not installed anymore (but configfiles ok), u=unpacked, but unconfigured, f=failed configuration, h=half installed

dpkg –i packet.deb	Install packet.deb
dpkg –r packet.deb	Remove packet.deb, keep configuration files
dpkg –P packet.deb	Remove packet.deb, also delete configuration files
dpkg-reconfigure packet.deb	Reconfigure packet.deb
dpkg –S 'filename'	Search for package that contains 'filename'
dpkg –s packet	Show packet status
dpkg –L packet	Show files of a packet

3.2   aptitude

Aptitude can be used to install or remove single packages or package groups.

aptitude	Runs the text menu based aptitude front end
aptitude search *keyword*	Search in all available packages for a keyword
aptitude show package	Show all package infos
aptitude update	Update the package list
aptitude install package	Install a package
aptitude remove package	Remove a package (without config. files)
aptitude purge package	Remove a package (with all config. files)
aptitude clean	Clears the package cache (/var/cache/apt/archives)
aptitude autoclean	Clears old packets from the package cache

The following keys are useful inside the text menu based aptitude front.

u	update the package lists
/	search for packages
n	continues searching
+	install / update the selected package
-	remove the selected package
q	quit

3.3   apt-get and apt-cache

The command apt-get can be used like aptitude to install or remove single packages or package groups. Apt-cache can be used to find packages and dependencies.

apt-cache search	Search in all available packages for a keyword
apt-cache show package	Show all package infos
apt-get update	Update the package list

apt-get install package	Install a package
apt-get remove package	Remove a package (without config. files)
apt-get purge package	Remove a package (with all config. files)
apt-get clean	Clears the package cache (/var/cache/apt/archives)
apt-get autoclean	Clears old packets from the package cache

3.4 Optional software packages

Use internet search machines, aptitude or apt-cache search to look for specific software. The installation of some popular packages is described below in this section.

3.4.1 MySQL Server

Install latest version of MySQL Server for Debian (approx. 120MB):

```
root@debian:/# aptitude install mysql-server
```

3.4.2 Tomcat6

Install version 6 of Tomcat for Debian (approx. 100MB):

```
root@debian:/# apt-get install tomcat6
```

3.5 Language

To change the language, use

```
root@debian:/# dpkg-reconfigure locales
```

4 Kernel arguments and GRUB

Kernel arguments enable / disable kernel features. To add arguments, choose a kernel in the GRUB menu, hit "e", and navigate the cursor with the arrow keys to the end of the line "linux /boot/vmlinuz…" where a kernel argument is entered. Some useful kernel arguments are listed in the table below.

Kernel argument	Description
video=x:<Resolution>	x is the screen (VGA-1, HDMI-A-1, DP-1,…) <Resolution>: Screen Resolution (640x480) or e.g.: video=VGA-1:d to disable screen
console=x	Put system console on serial port, e.g.: console=ttyS0,57600,8,n,1
8250.nr_uarts=x	x is the number of UARTs (if more than 4)

Table 4 – Some useful kernel arguments

Kernel arguments are permanently active when added to the file "/etc/default/grub":

```
root@debian:/# nano /etc/default/grub
```

Add your kernel argument to the line

```
GRUB_CMDLINE_LINUX="new kernel argument"
```

Now invoke GRUB's configuration update with

```
root@debian:/# update-grub
```

5   Network setup

In IPC/DEBIAN-8A-32, all ethernet interfaces are preconfigured for automatic IP address assignment based on DHCP. Changes to this configuration, for example assigning static IP addresses, are made through the file /etc/network/interfaces.

Example: /etc/network/interfaces

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

auto eth0 eth1


##############################################################
# automatic network configuration (DHCP)
# uncomment to enable, comment out to disable
##############################################################

iface eth0 inet dhcp
iface eth1 inet dhcp


##############################################################
# static network configuration
# uncomment to enable, comment out to disable
##############################################################

#iface eth0 inet static
#    address    192.168.1.40
#    netmask    255.255.255.0
#    network    192.168.1.0
#    broadcast 192.168.1.255
#    gateway    192.168.1.1

#iface eth1 inet static
#    address    192.168.2.41
#    netmask    255.255.255.0
#    network    192.168.2.0
#    broadcast 192.168.2.255
#    gateway    192.168.2.1
```

After connecting a network to an RJ45 ethernet connector, the "ifplugd" daemon runs automatically the "ifdown", then the "ifup" command, thereby automatically configuring the particular ethernet port. After unplugging, ifplugd runs "ifdown" configuring thereby the port for no IP.

6 Graphical desktop environment

6.1 Default window manager fluxbox

The window manager works on the top of the X server and implements features for graphical operation similar to Windows or OSX.

IPC/DEBIAN-8A-32 features the light-weight window manager "fluxbox" and the desktop icon manager "idesk". Their configuration files are located under "~/.fluxbox" and "~/.idesktop".

To add an icon to the desktop, an image for the icon needs to be placed inside the configuration folder of idesk and a lnk-file. The exact functionality can be seen from the three predefined icons.

7 Serial port configuration

The Kernel of IPC/DEBIAN-8A-32 automatically detects and configures the serial ports. This can be overruled by the "setserial" tool.

Note:

When serial ports share interrupt lines, communication may hang. To solve this, configure in the BIOS setup the affected serial ports to use an interrupt line which is not used by any other device (check this with the command "cat /proc/interrupts" and in the user manual of your Syslogic computer).

7.1 Console on a serial port

In IPC/DEBIAN-8A-32, writing the following command

```
root@debian:/# systemctl enable serial-getty@ttyS0.service
```

provides system access through COM1 with a terminal program from a remote computer at a rate of 9600 bauds.

8   TCP/IP networking

8.1   Accessing files on WINDOWS from IPC/DEBIAN-8A-32

To e.g. copy files from a Windows computer into the IPC/DEBIAN-8A-32 filesystem, setup a "shared directory" inside Windows by right-clicking on the folder and choosing "Properties", then the "Sharing" tab. Choose "Advanced Sharing" check the "Share this folder" box and press "Permissions" and change them accordingly.
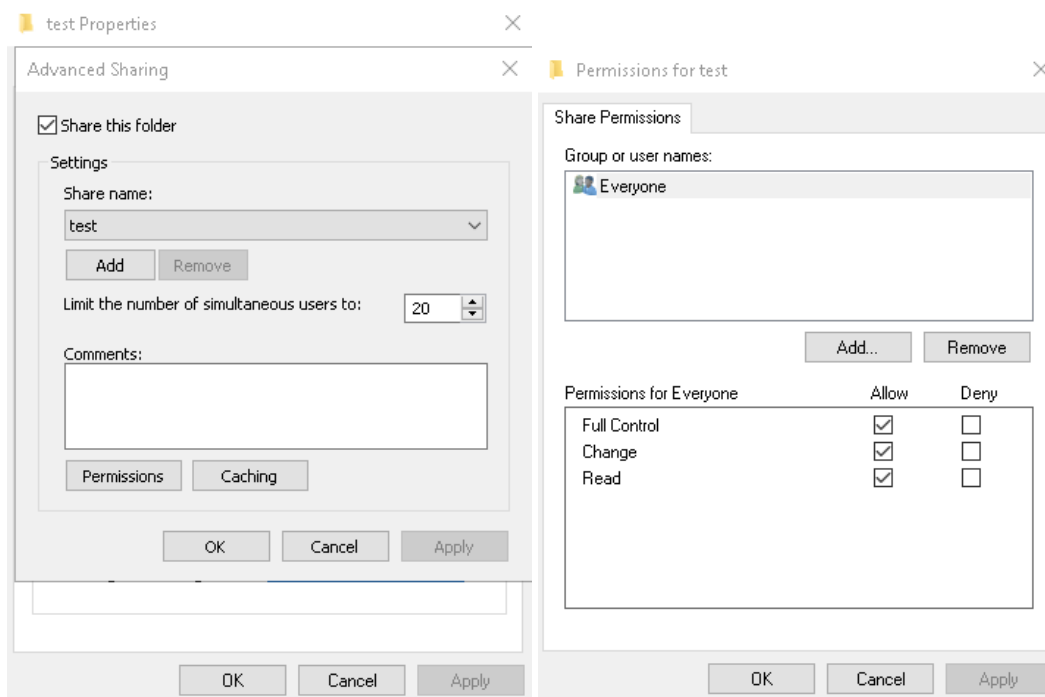
Figure 1 – Setting up a Windows Shared folder

Inside IPC/DEBIAN-8A-32, you can bind the share to the directory "/mnt/winhost" with

```
root@debian:/# mount -t cifs //192.168.1.153/test /mnt/winhost -o username=<Username>,password=
```

You will then be asked for the password and after that you are able to access the files.

Note that, 192.168.1.153 has to be replaced by the IP address of the Windows computer.

8.2   Accessing files on IPC/DEBIAN-8A-32 from Windows

The so-called "Samba" server is pre-installed and pre-configured on IPC/DEBIAN-8A-32. It enables full access to IPC/DEBIAN-8A-32's file system from a Windows computer. To do this, open the link \\192.168.1.214\syslogic_root inside a Windows explorer and type the username „root" and the password „netipc". Use the IP address of your IPC/DEBIAN-8A-32.

The Samba server is configured through the "/etc/samba/smb.conf" file.

8.3   Exchange files with SCP

To copy a file from IPC/DEBIAN-8A-32 to another Linux system with IP address e.g.192.168.1.228 and user root,

```
netipc@debian:/# scp /filename root@192.168.1.228:/location
```

8.4   Remote shell with SSH

The secure shell (SSH) is a network protocol that allows encrypted data exchange. SSH is typically used for executing shell commands on remote computers.

Assuming that your industrial computer has the IP 192.168.1.228, remotely login onto it with

```
host:/# ssh root@192.168.1.228
```

and password "netipc".

The output of a graphical application, e.g. "firefox", on the remote industrial computer can be forwarded to the local computer with the option "-X":

```
host:/# ssh –X root@192.168.1.228
host:/# firefox
```

9 Virtual host

A multicore desktop-PC running a (virtual) IPC/DEBIAN-8A-32 may be handy for compiling tasks.

9.1 Installation

To run the virtual computer, download and install the freely available VirtualBox (https://www.virtualbox.org/).

Next, download the "*DEBIAN-8A-xxx.vdi*" file from the Syslogic web page to your PC (requires ~1.5 GB of free HDD space); the write permission on the file must be re-enabled afterwards. After starting the VirtualBox, click on the "new"-button on the left top to create a new virtual computer. Choose the .vdi file as a virtual SATA disk. Now launch the virtual computer by clicking on the "Show" button.

Note:
You must click into the virtual computer window in order to use the mouse inside it. To avoid mouse trapping, the "VirtualBox guest additions" are already installed on the virtual computer.

9.2 USB performance

If you encounter poor USB performance inside the virtual IPC/DEBIAN-8A-32,
1. install the "Virtualbox Extension Pack" from https://www.virtualbox.org/,
2. in the Virtualbox window, click through "File → Preferences → Extensions" and finally press the „add package" button ,
3. choose the extension package you just downloaded.

This procedure will enable virtual USB 3.0 ports.

9.3 Shared folders

Inside the virtual IPC/DEBIAN-8A-32, "shared folders" enable you to mount folders from the computer hosting the virtual computer. To use this feature, add the shared folders inside the "Shared Folders" section in the Virtualbox window of your virtual computer.

10 Linux system deployment

10.1 Backup

To create a backup of a compact flash card,

1. start your virtual IPC/DEBIAN-8A-32
2. insert the flash card into the reader
3. click on / activate the USB device (corresponding to the flash card reader) in the lower right corner of the VirtualBox window to bind it as e.g. /dev/sdb to the virtual IPC/DEBIAN-8A-32
4. compress /dev/sdb into a file inside the virtual IPC/DEBIAN-8A-32 with

```
host:/# dd if=/dev/sdb | gzip –9 > myimage.gz
```

The "-9" option means maximum compression.

As the free disk space on the flash card may have randomly assigned bits, the compression result may be poor. You can fill up the free disk space with zeros "0x00" with

```
host:/# dd if=/dev/zero of=myzerofile.bin
```

before using "dd" above; this will lead to better compression ratios.

To write the image file to another flash card with the same or larger storage space,

```
host:/# dd if=myimage.gz | gunzip | dd of=/dev/sdb
```

10.2 Backup of the master boot record

Before applying changes to a flash card, e.g. updating the GRUB bootloader, you might want to back up the master boot record (MBR) of the card. The following command reads the MBR and writes it into the file *bootsector.bin*.

```
host:/# dd if=/dev/sdb of=bootsector.bin bs=1 count=446
```


To write back the MBR,

```
host:/# dd if=bootsector.bin of=/dev/sdb bs=1 count=446
```

Note that, the MBR size is 512 bytes. It suffices to consider only the first 446 bytes, since the remaining bytes represent the partition table, and the latter may differ between flash cards.

10.3 Deploying a system image in archive format

Note:
Please double-rethink before acting, since any mistake in the commands below and above might ruin your operating system or data!

Syslogic provides system images in archived format (compressed tar). Such an image contains the complete IPC/DEBIAN-8A-32 system.

In the installation guide below, substitute all occurrences with the actual device node for the compact flash card reader on your system. Further, it is assumed that the first partition /dev/sdb1 becomes the root partition. Also create an empty directory for mounting partitions, e.g. /mnt/compactflash.

Step 1: Preparing the compact flash card

Partition the flash card with one of the following commands,

```
host:/# fdisk /dev/sdb
host:/# parted /dev/sdb
```

If your application consumes lots of runtime memory, it is recommended to create a swap partition; the latter's size can be chosen to be equal to the amount of RAM.

Follow the on-screen instructions. Choose type "Linux" (type 83h) for the root partition and set its bootable flag; choose type "Linux Swap" (type 82h) for the swap partition.

Step 2: Create filesystem and initialize swap disk

Initialize (format) the system partition and initialize the swap partition with

```
host:/# mkfs.ext4 /dev/sdb1
host:/# mkswap /dev/sdb2
```

Step 3: Copy base image

Mount the system partition of the compact flash card with

```
host:/# mount /dev/sdb1 /mnt/compactflash
```
Mount the product medium (assumed device node /dev/sdc) with

```
host:/# mount /dev/sdc /media/cdrom
```
Unpack the base image with

```
host:/# tar xvf /media/cdrom/flash_image/DEBIAN8A-32_v1.0.tar.bz2 –C /mnt/compactflash
```

Step 4: Install bootloader

Install the bootloader

```
host:/# grub-install --root-directory=/mnt/compactflash /dev/sdb
host:/# chroot /mnt/compactflash update-grub
```
The message "grub-probe: sending ioctl 1261 to a partition!" can be ignored.

Step 5: Finishing

Unmount the compact flash and the product medium

```
host:/# umount /mnt/compactflash
host:/# umount /media/cdrom
```
Now, the compact flash and the medium can be safely removed from their drives.

10.4   How to install the Debian 8 image on a flash memory using the Virtual Machine

Step1: Prepare the VM and the files

Set up and start the Virtual Machine provided by Syslogic as a download from the web page with the Virtual Box of Oracle (tested Version: 5.0.24 r108355) as described in the IPC Debian 8 user guide. Get the compressed tar-file (DEBIAN_8A_32_v1.0.tar.bz2) of the Debian 8 image as well from the web page.

Step 2: Activate the Card Reader

Activate the CFast Card Reader of the Flash Memory inside the VM
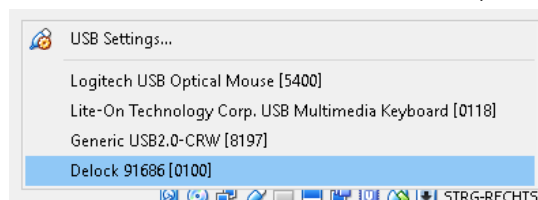
Step 3: Go to the scripts

Change the Folder to /SYSLOGIC/writeImage by

```
root@debian:/# cd /SYSLOGIC/writeImage/
```

Step 4: Write the image to the flash

Run the script prepare_medium.bash by

```
root@debian:/SYSLOGIC/writeImage# ./prepare_medium.bash <path_to_image> /dev/sdb
```

path_to_image: points to the compressed tar-file of the Debian 8 image

/dev/sdb: device that should be written (normally /dev/sdb, if no other USB-device is connected)

If the writing of the image is successful, a message will appear. The flash card can now be used with your system.

The image is a compressed tar-File (DEBIAN_8A_32_v1.0.tar.bz2) that can be downloaded from the Syslogic web page. The virtual machine is as well on the web page. If you want to create a compressed tar-file image of your flash as backup, this can be done with the script

```
root@debian:/SYSLOGIC/writeImage# ./pack_linux_root.bash <mountpoint of the flash> <path_to_image that is created>.tar.bz
```

mountpoint of the flash: for example /media/usb0/ (check with command mount)

Note:

When you get the error "/dev/sdb1 is mounted; will not make a filesystem here!", the flash memory should be disabled in the virtual machine and be newly formatted outside of the virtual box, for example on the windows host by using the disk management. Then it should work again to write the image to the flash.

---

11 Linux kernel

11.1 Building a kernel - the Debian way

The packages

```
host:/# aptitude install build-essential bzip2 fakeroot initramfs-tools kernel-package libncurses5-dev
```
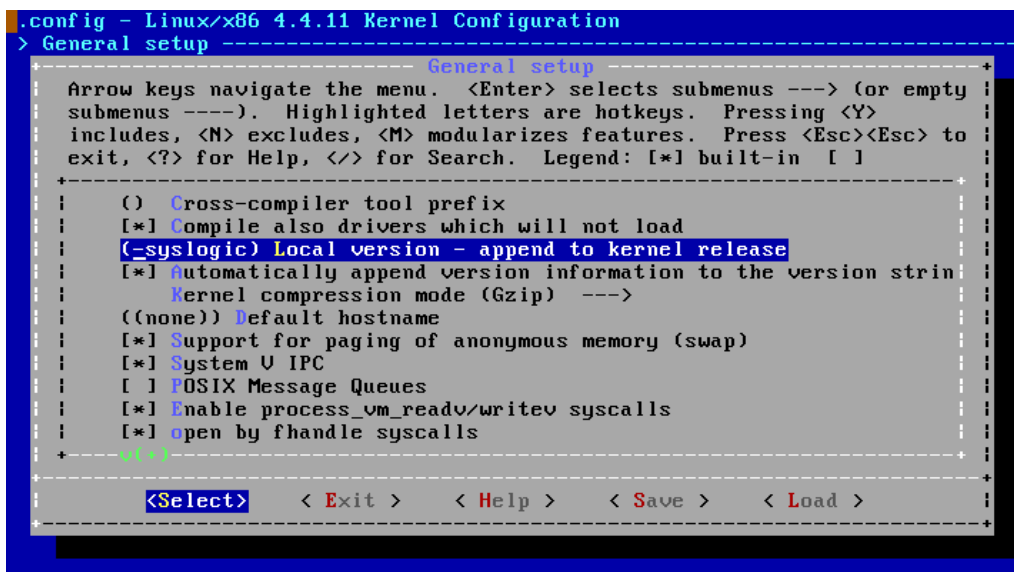
must be installed.

Extract the archive of the kernel source to /usr/src/, then configure the kernel

```
host:/# cd /usr/src/my_kernel
host:/usr/src/my_kernel# make menuconfig
```

adapting thereby "my_kernel" accordingly. A kernel configuration dialog will appear. Make your configuration, save it and exit the configuration dialog.

Note:

Make sure that you append a Local version to the kernel release as otherwise it is not possible to install a kernel with the same name as the one that is running on the industrial computer. This can be done in the configuration dialog as seen in the picture. The "-" has to be the first sign of your local version. To append this to the kernel name, the option "Automatically append version information to the version string" has to be chosen.

Figure 2 – Set Local version for the kernel

As user "root", build the kernel with

```
host:/usr/src/my_kernel# make-kpkg --initrd kernel_image
```

Depending on your configuration, this might take an hour or two on an industrial computer. Building on a (multi-core) desktop computer, even when done inside a virtualized Linux, is several times faster. The new kernel image will appear as a Debian binary .deb-file.

To install the kernel on the industrial computer, clean the kernel folder by

```
host:/usr/src/my_kernel# make clean
```

Then the source files can be packed into a tar file

```
host:/usr/src# tar –cjvf my_kernel.tar.bz2 my_kernel/
```

This .deb file and the compressed sources are copied to the industrial computer into the /usr/src/ folder. Decompress the source files with

```
root@debian:/usr/src/# tar –xvf my_kernel.tar.bz2
```

To deploy the new kernel on the industrial computer

```
root@debian:/usr/src/# dpkg –I linux-image-xyz.deb
```

The installer will then install and setup the kernel, resolve the module dependencies, build the initial ram disk and finally update the entries in the GRUB bootloader configuration. On the next reboot, the kernel can be chosen in the GRUB menu.

11.2 Building and installing the Syslogic modules

All modules driving Syslogic peripheral devices are integrated into the Syslog kernel tree under drivers/syslogic. Inside the configuration dialog, they can be enabled / disabled under "Device Drivers" → "SYSLOGIC support".

12 Real-time

All Syslogic Kernels are RT-PREEMPT patched; however, this does not simply imply that your system consisting of a Syslogic industrial computer running IPC/DEBIAN-8A-32 will meet all latency constraints in your specific application. A careful planning, measuring and testing of the whole application scenario is crucial.

The page https://rt.wiki.kernel.org/index.php/RT_PREEMPT_HOWTO describes how make use of RT-PREEMPT.

Inside IPC/DEBIAN-8A-32, the "cyclictest" tool is under "/SYSLOG/tests_demos/rt-tests".

13 Hints and notes

13.1 LVDS brightness on Intel Atom E38xx

On Intel Atom E38xx platforms, the brightness of an LVDS display is controllable through /sys/devices/pci0000:00/0000:00:02.0/backlight/acpi_video0/brightness after the Xorg server has been started. Adapt the brightness

```
root@debian:/# echo <0-100> > /sys/devices/pci0000:00/0000:00:02.0/backlight/acpi_video0/brightness
```

with a value between 0 and 100 (0 means screen off).

13.2 Backlight off function

To configure the time to turn the backlight of the LVDS display off, for the console the command

```
netipc@debian:/# setterm –blank <min> -powersave powerdown
```

sets the time until the screen is turned off in minutes. To make the change permanent, the corresponding line in the file "~/.profile" can be adapted. The preconfigured value is 5 minutes.

To configure the backlight off time of the LVDS display when running the Xserver, the command

```
netipc@debian:/# xset 0 0 <sec>
```

run in xterm sets the backlight off time in seconds. To make this change permanent, the corresponding line in the file "~/.fluxbox/startup" can be adapted. The preconfigured value is 5 minutes.

13.3 Wake on LAN

The "Wake on LAN" functionality is already given. After a system shutdown, it is possible to wake it up with the tool wakeonlan:

```
host:/# apt-get install wakeonlan
host:/# wakeonlan <MAC_address_ethernet_interface>
```

The MAC addresses of the ethernet interfaces can be seen by

```
netipc@debian:/# ifconfig
```

13.4 Set the Display Resolution

If the resolution of the console does not fit your purpose or the screen used, it is possible to set the screen resolution in the file /etc/default/grub. Best practice is to check while the Xserver is running the screens that are found by the system:

```
root@debian:/# xrandr
```

This command prints a list of screens connected and disconnected. For the connected screens, the possible resolutions are listed.

To change the resolution of the screen using the Xserver, the following command can be executed in the terminal:

```
root@debian:/# xrandr –output <Display> --mode <Resolution>
```

To change now the console resolution, you can add to the grub command line for example if the screen is HDMI1 (see section 4 for further information):

```
GRUB_CMDLINE_LINUX="video=HDMI-A-1:<Resolution>"
```

with the wanted screen resolution. If in the list printed by xrandr, multiple screens are wrongly detected, it is possible to disable them in the grub command line:

```
GRUB_CMDLINE_LINUX="video=DP2:d"
```

Note:

If the console does not fill the whole screen but only the upper left corner, the problem can be that multiple screens are seen by the system and the resolution is set to one matching all. Therefore it is necessary to disable them except for one. For this left one, the resolution can be set.

13.5   Configure the Touchscreen

To configure the touchscreen, open a terminal in the running Xserver and start the options menu with

```
root@debian:/# eGTouchU
```

In the menu that opens, it is possible to configure multiple characteristics of the touchscreen. As an example, you can configure how long you need to press on the screen, until the touch is seen as a right click.
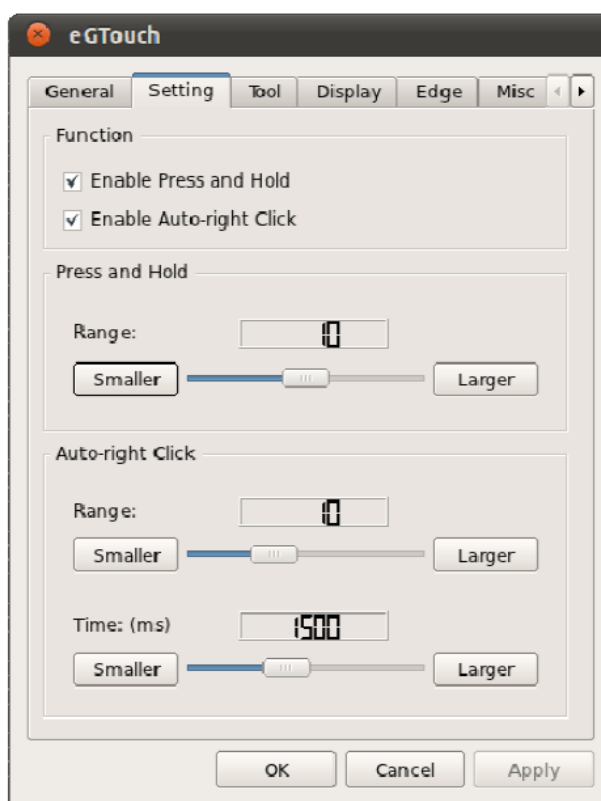

Figure 3 eGTouch Settings

13.6   Start Google Chrome (Chromium) as root

The web browser chromium cannot be started as root, only as normal user for security reasons. If nevertheless you want to start it as root, use the following command

```
root@debian:/# chromium –no-sandbox –user-data-dir
```

You will get an error message, but the web browser can be used as root.

14 Licensing Information

This document contains the licensing information for the CNF/DEBIAN8-8A-32 operating system. The components of the product contain several open source software that is subject to the following licenses:

Products	Components	Licensing Information
IPC/DEBIAN8-8A-32 CNF/DEBIAN8-8A-32	Debian 8 (Jessie)	General Public License Version 2 (GPLv2)
	Linux Kernel 4.4.11	General Public License version 2 (GPLv2)
	Realtime Patch 4.4.9-rt17 from kernel.org	General Public License (GPL)
	Packages of Debian 8	Apache-2.0, Artistic, BSD, GFDL, GFDL-1.2, GFDL-1.3, GPL, GPL-1, GPL-2, GPL-3, LGPL, LGPL-2, LGPL-2.1, LGPL-3
	Sylsogic Modules (idregs, pfmon, tsens, watchdog, dio32, rel12)	General Public License (GPL)
	Universal Linux CAN-bus device driver (lincan)	General Public License (GPL)
	Pericom PI7C9X795x/PI7C9X895x UART Device Driver	General Public License (GPL)
	Onscreen Keyboard "onboard"	General Public License Version 3 (GPLv3)
	Syslogic Test Demos and Tools	General Public License (GPL)
	eGalax Touchsreen Driver	Owned by eGalax_eMPIA Technology Inc. (only binaries available)
	Java SE Runtime Environment	Oracle Binary Code License Agreement for Java SE

Table 5 Licenses used by the components of the Operating System

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Note:

The Java SE from Oracle is under the Oracle Binary Code License Agreement (BCLA). When downloading it, you accept this license. If you use the binaries for dedicated Applications in Embedded Systems (Section 1 Definitions of the BCLA), this License does not apply anymore. Instead then the Java Binary and Redistribution Agreement (Java BLRA) applies. This License comes with costs and is not included in this Debian package.

14.1 General Notice

The Syslogic operating system CNF/DEBIAN8-8A-32 is a customized version of the official debian 8 release. To meet the requirements of the open source licenses that the product contains, Syslogic will make all required source code available for the customer. The used debian packages are all part of the main debian 8 distribution and are therefore free software.

The additional drivers, except for the Touchscreen Driver and the Java Runtime Environment, added to the product are subject to the General Public License (GPL). The source code is provided. This also counts for the software packages developed by the company Syslogic. The eGalax Touchscreen Driver is owned by the company eGalax eMPIA Technology Inc. and only the binaries are provided. The Java SE Runtime Environment is licensed by the Oracle Binary Code License Agreement for Java SE.

The customer is allowed to modify, copy and use the delivered product in the terms given by the licenses of the components.

15   Contact Information / Disclaimer

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