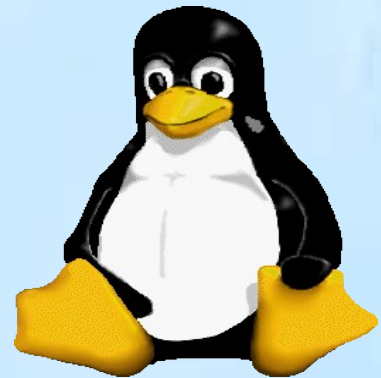# Guide to improve the Linux of Acer Aspire One

www.gentoo.org
The Linux Meta Distribution

2010-04-28 by urs@linurs.org
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1st preliminary edition still in preparation

Guide to improve the Linux of Acer Aspire One

Contents

Foreword

In this document the AAO means Acer Aspire One. The smaller and cheaper AAO models come without any hard disk and with Linux installed. Unfortunately the Linux installed is very restricted and can not be easily expanded. It even looks that they have spent a lot of energy to prevent people like me to customize the AAO to their needs. I want to synchronize data on the AAO with my other computers, I want to install certain programs that I like, so I was forced to look for some alternatives.

Selling a PC with Linux, means giving support. As Linux Administrator you are allowed to do all kind of things that could result in completely crash. This means, the one who sold a Linux PC needs to be prepared to give a lot of support. In this point of view I fully understand that the AOO Linux from Acer has turned on some restrictions. However certain people like me would like to be full administrators on their computers!

About this document

In this document I use the term AAO Linpus for the Acer version of Linpus, there is the original Linpus version that works on all kind of PC's and does not do all the nasty things that AAO Linpus does.

When I bought my AAO I used the cheapest version available to me that time, since I planned to install myself a Linux distribution on it. My AAO is an Model No: ZG5

This guide shows some tricks how to have it more open and how to install other Linux distributions to the AAO. The final goal is to have a SD card that holds Gentoo Linux and leaves the original Linpus Linux on the internal SSD.

This guide assumes that the reader has certain Gentoo Linux know how. For further help checkout http://www.gentoo.org, my book http://www.linurs.org/pdf/linux.pdf or the newest version of this document http://www.linurs.org/pdf/Aspire%20one.pdf.

1. Small improvements and things to know

1.1. Help on the net
Lot of hints can be found:
http://www.aspireoneuser.com/
http://helpdesk.acer.com.au
Some here:
http://www.reghardware.co.uk/hands_on/
http://www.reghardware.co.uk/2008/09/05/ten_aspire_one_tips/
And finally
www.acer.com
Goto Support & Downloads, under driver download there are some applications that can be added.

1.2. Open the Terminal

`Alt` + `F2` and click on run in terminal check box, press `enter` and opens the shell.
If you type in `su` then the shell opens asking for the root password.

Or a more straight forward way is go to "Files" > "My Document" to open the file manager, than under menu item "File" click to "Terminal".

1.3. Working as root

To work as root you have to use the password that got set when the AAO got turned on the first time. Open the terminal type `su` and type the root password to bring you in the console or type `thunar` to get the file manager as root.

1.4. Getting the whole menu

With the terminal open, type `su` and give the root password. Type `xfce-setting-show`, then click the "Desktop" icon, then click the tab "Behavior" and click on check box "Show desktop menu on right click". Now when you click into the desktop you get the well known menu with much more commands. There is also a system command where you find the command Add/Remove Software.

1.5. Rotating the screen

I use the AAO as book, but books are usually not landscape.
Open a terminal and type `xrandr -o right`
`xrandr -o normal` to go back
It works nicely but the touch pad can not be rotated. Luckily when you have a USB mouse.

2. Networking

Type `hostname` in the console and you will see that the hostname is localhost. To integrate the Aspire One to a network it obviously requires an other name. It could easily be modified by `hostname <new hostname>` however it is not volatile. The FAQ Acer help points to a file that does not exist anymore.

Note: The a files /etc/HOSTNAME, and /etc/hosts however get always overwritten.

The file /etc/sysconfig/network is the place to change

HOSTNAME=localhost.localdomain

to

HOSTNAME=aspire.localdomain

however at boot a nasty messages appears.

Next problem is that the DHCP server inside my ADSL router does not show the host name. The host name of the Aspire One needs to be known, since the IP address is not always the same.
(Except if the router allows to reserve a IP address for the MAC address of the Aspire One).
Add in our host computer /etc/hosts the aspire to the list of known hosts.
Do `ping aspire`.

Conclusion: To have networking install an other Linux distribution (not the AAO Linpus, maybe the original Linpus).

3. Recovering

In critical moments when some test made the system unrecoverable you can restore the internal disk. You need to attach an external CD/DVD drive via USB (verify that you do not use a DVD in a CD only drive). The cheapest way is open your desktop PC and use the one inside. Assuming it is a IDE drive, buy a IDE to USB adapter, remove the IDE cable and plug in the IDE to USB adapter. Leave the power cable attached to the desktop. Now power up the desktop and then the AAO boots up from the DVD (when the BIOS is set for that or press `F 1 2` to show the boot device list menu).

3.1.Recovering from a buggy test

If you know what you did and what you have to remove, but the AAO doesn't boot anymore.
Boot from a USB CD drive running e.g. http://www.knoppix.org version 5.0
Before you start working too much, set the proper keyboard layout. In the lower right corner there is a US flag, click there go into the keyboard setting window and do your changes.
The hdc1 icon has been popped up on the desktop, left mouse click it, to set the permissions so all can write it and also remove the read only check box under the device tab. Then double click the icon to open konqueror the KDE file manager.

To work as root, go into the terminal and type `su`. There is no root password. But you can set one with `passwd`. Having and knowing a root password, konqueror can be started in super user mode (= as root). It is in the menu "System" > "More Applications". Now you should be able to perform all writes to system files to recover from your faulty test.

3.2.Using the acer recovering DVD

You can either restore the AAO via recovery CD or create a USB boot stick for the and future recoveries. The boots stick must be <=4GByte and >=2GByte as stated in the recovery instructions. http://www.linpus.com holds some ISO images to burn a

recovery DVD for the AAO that might have a newer version. Practical test showed that it works well, however USB sticks larger than 2GByte must be used.

4. Adding Hardware to the AAO
http://www.mk-electronic.com/ has spare parts.

4.1.Plug in stuff

USB Hard disks or Sticks can be easily added to the AAO and the BIOS supports booting from it. The AAO service manual can be obtained from the Internet showing how to open the AAO. However AAO's without hard disks can not be equipped later on with a hard disk since the connector is not soldered onto the motherboard. The internal SSD seems to have its proprietary connector, so an upgrade is probably not possible. Therefore the cleanest way to expand the AAO is using the SD card slot on the lower left corner of the AAO, it is marked with the text "Storage Extension". Drawbacks are you can not boot from there and AAO Linpus is configured in a way that it automatically writes stuff there.

4.2.Batteries

The batteries and the Windows operating system are having the most impact to the price of a Netbook. My low cost Acer Aspire One ZG5 comes with a 10.8V 2200mAh standard capacity battery pack, no Windows and no hard disk. The battery does not last for a whole day business trip. Luckily there are other sizes available, but not at a very low price:

Available capacities:
4400mAh (2 * capacity of the original)
6600mAh (3 * capacity of the original)
7800mAh (3.5 * capacity of the original)

When the batteries are left in the Netbook they become quickly empty:
   • 1 day powered off the 2200mAh battery went from 100% to 72%

- Same battery charged and removed from the Netbook, almost 1 week later 94%

And even worse, if the AAO is unused for a while the battery gets completely discharged and the AAO is no more able to charge it. This is why I can not recommend the AAO to anybody. There are some tricks to recover:

1st trick:

- Unplug power adapter and remove battery
- Press power button for 2 min
- Insert battery and plug in power adapter

2nd trick:

- Turn on AOO without battery and wait 5 min
- Plug in the batteries

The batteries used are smart batteries that have a complex electronics inside that can be read via SMBus:

```
cat /proc/acpi/battery/BAT1/info
cat /proc/acpi/battery/BAT1/state
```

A source where to order is:
http://www.distrelec.ch
http://www.batteryupgrade.ch/

When concerning to use bigger batteries, it should also be concerned to use less power therefore `emerge powertop` and look at http://www.linuxpowertop.org/

4.3.Solid state media and lifetime concerns

A lot of discussion is going on regarding installation to solid state media as the internal SSD, USB sticks and Flash cards (as MMC/SD cards). Luckily, there is also a lot of development going on and many things once written might be outdated and no more true.

Solid state media have limited life time due to the limited numbers of write cycles. Mostly it is forgotten that also mechanical hard disks have a limited life time too. The installation of Linux to a MMC/SD card seems not critical, since after a couple of years I probably decide to buy a bigger and cheaper MMC/SD card, this will probably be happen before it reaches its life time. In the past I used a small 20GByte USB hard disk having installed Linux. I had to repair it twice due to a broken USB cable. So a 32GByte USB stick that has half the price of what I spent for the hard disk has become an option.

However, to not jeopardize lifetime of solid state media, I avoid frequent writes to those media, so I avoid using swap space on Flash media. Swap has been invented to

expand RAM to Harddisk space. Instead of using swap on solid state media as a hard disk, it is probably better to upgrade the RAM.

Installing Gentoo on a SD card and using the internal SSD just for boot (=read only) is a good concept regarding lifetime of the solid state media. However, currently I use the original swap partition of the internal SSD.

The SDHC card I use is a 32GByte SD Optima from PNY with the speed of up to 20MByte/s read and up to 8 Mbyte/s write. For SD cards see: http://www.sdcard.org/home/

5. Install the original Linpus

Installing linpus lite from http://www.linpus.com that is more open than linpus from acer can be done easily. But need to be fine tuned (WLAN does not work and probably other stuff as well). Maybe Linpus offers in the future a version customized for the AAO.

6. Install Gentoo Linux on a MMC/SD card

Larger MMC/SD cards are now affordable. To have a full blown KDE Gentoo desktop system running and have space for the future a 32GByte MMC/SD card is recommended. Gentoo Linux http://www.gentoo.org could also installed on the internal SSD, however 8GByte would be used up quickly and a hybrid version with some files on the MMC/SD card and some on the internal SSD would be the result. Finally Linpus would be lost. Linpus can be used as a backup Linux during the setup of Gentoo. It probably takes a while until everything runs on Gentoo as desired with all the required device drivers. During setup of Gentoo it is helpful to find out how Linpus deals with the AAO. Since Gentoo is a meta Linux distribution that can be updated on a daily base to have all the time actual versions, it might be happen that some features get lost after updates, so when you need something urgently that runs, switch back to linpus.

Finally for simple tasks as browsing the Internet AAO Linpus works fine.

Some links:
http://www.gentoo-wiki.info/Acer_Aspire_One_A110L
http://richard.bergmair.eu/aa1gentoo/

Since the BIOS does not support to boot from the MMC/SD slot, the internal SSD will be used to boot. This means, it will hold the boot loader and the kernels. The 1GByte swap space that the SSD offers can also be used for Gentoo. After the kernel has booted it can use the Linux kernel device driver included in the kernel to access the MMC/SD card.

Note: The evolution has created different SD (Secure Digital) card standards. Originally there were the Multi Media Cards (MMC) that got superseded by SD cards. Standard SD cards are available up to 4GByte. High Capacity SDHC Cards go up to 32GByte. Small and older SD card readers can not handle large MMC/SD cards. SDXC are eXtended Capacity cards that will support to 2TByte. Luckily the Acer supports SDHC cards up to 32GByte. Small and older SD Card readers might not be able to read such SDHC cards.

Note: It is not foreseen that SDXC cards can be read by SDHC, so it creates a limit for 32GByte for the aao slot.

6.1.The Storage Expansion MMC/SD slot on the AAO

The MMC/SD card slot on the lower right corner is foreseen to expand the internal SSD. This is done under Linpus via a volume manager that automatically merges both discs MMC/SD card and internal SSD. This can be considered nice, but it is annoying when a clean standalone Linux version is considered to be installed on the MMC/SD card.

Instead of trying to make Linpus behave differently it is easier to follow the following strategy:
- When installing things to the MMC/SD card under Linpus, use the slot on the right.
- When working and booting Gentoo or work with Linpus use the left MMC/SD slot.

Type `fdisk -l` to see what you have:
/dev/sda1 is the internal SSD the * shows that this is a bootable disk
/dev/sda2 is also the internal SSD but this is the swap partitions

/dev/mcblk0p1 is the MMC/SD card ready to get Gentoo Linux! The dev file could also be something as /dev/mcblk1p1, since it is incremented when cards get plugged in and out.

6.2.Prepare the boot loader

Aspire boots with grub, but there seems to be a grub version that does not show the menu to select different boot configurations. Rename the acer grub directory to grubacer. However avoid to shut down, since it will not boot anymore. Copy grub binaries over from a Gentoo PC (standard pentium) to a newly created grub directory and use grub.conf from linpus. Delete the hiddenmenu line and give a timeout=5 for 5 seconds. Copy over the splash image from the grubacer, however it does not work, since the splash.xpm.gz contains a subdirectory inside. Therefore unzip it, go to the splash.xpm subdirectory and `gzip splash.xpm` to get rid of the subdirectory. Then copy the new splash.xpm.gz to /boot/grub and delete the /boot/grub/splash.xpm

directory. Now during the next boot sequence grub pops up showing the Linux splash screen and the menu. Then the menu can be expanded to contain the lines booting gentoo Linux from the SD card, but also to still use Linpus on the acer internal SSD.

6.3.Install Gentoo

Gentoo can be installed using Linpus and plugging in the SD card on the right upper SD slot, so Linpus leaves it alone. Follow the installations from http://www.gentoo.org however skip the grub and kernel installation, since you have them already. Don't be worried you can update them later. Gentoo is a source code distribution where you have to compile for your CPU. During the Gentoo installation you need to know the compiler flags. Here they are:

```
CFLAGS="-march=i686 -O2 -pipe"
CXXFLAGS="${CFLAGS}"
```

It is wise to `emerge mc` the midnight commander during the installation when you are not a command line specialist. During installation of Gentoo use the desktop profile.

6.4.Instruction to activate and interrupt the Gentoo installation

Create on the SSD a mounting point /mnt/gentoo

Mount the MMC/SD card there, first find out what device is assigned `fdisk -l` then `mount /dev/mmcblk0p1  /mnt/gentoo`

Copy over the network environment

`cp -L /etc/resolv.conf /mnt/gentoo/etc/`

Mount the current running kernel status

`mount -t proc none /mnt/gentoo/proc`
`mount the active device files`
`mount -o bind /dev /mnt/gentoo/dev`

Now tell the kernel to take the MCC/SD card instead of the internal SSD (Change root)

`chroot /mnt/gentoo /bin/bash`

Bring the library links in place

`env-update`

Restore the environmental variables

`source /etc/profile`

And finally get the prompt updated

`export PS1="(chroot) $PS1"`

To safely leave the chrooted environment:

`exit`
`cd`
`umount /mnt/gentoo/dev /mnt/gentoo/proc /mnt/gentoo`

6.5.Compiling the kernel for Gentoo

First you can use the same kernel as linus uses, but when having Gentoo, you like to customize it. When compiling the kernel there is the option in the general setup to create a local version. A string will be added to the name of the kernel, /lib/modules/<kernel><string> this string causes problem with modprobe (probably not just) on Gentoo (and not just for modprobe) so disable this kernel option when building a kernel.

6.6.Accessing the MMC/SD

There are drivers necessary to access the MMC/SD card. The drivers are mmc_core, mmc_block and sdhci. They are delivered with the kernel source under device drivers => MMC/SD card support => Secure Digital Host Controller Interface Support. The AAO has a kernel where those drivers are compiled as module. Therefore the kernel will not be able to access the sd card during boot and will stuck with kernel panics. The easiest way is to create a kernel with those modules built into it. This makes it also easy to use more up to date kernel sources.

An other small issue is that the MMC/SD card driver will not be ready when the kernel wants to access the files on it. Passing via grub the parameter rootdelay solves this issue.

Enable the kernel MMC/SD option UNSAFE_RESUME to not unmount the MMC/SD card when go into suspend mode. If it would unmount it, then when awake, it would re-mount it under an other device name and would obviously getting confused.

Note: If you want to read the SD/MMC card on a other computer be aware that many cheap SD/MMC card readers are not able to read 32GByte large SD/MMC cards.

6.7.Wired Ethernet

The AAO uses r8101, the Ethernet driver for the PCI express fast Ethernet controller from realtek. However this driver does not exist anymore in the newest linux kernels. Using http://www.knoppix.org the realtek r8169 driver got loaded instead and works fine.

6.8.Wireless

Using `lspci` shows that there is a Atheros AR242x wireless pci adapter. That uses the kernel module ath5k. Atheros 5xxx wireless cards support has to be added in the kernel to get the driver ath5k. An alternative would be ndiswrapper using the microsoft drivers.

Set the useflag madwifi since ath5k comes from the madwifi developers, then `emerge wireless-tools` (always required) and `emerge wpa_supplicant`.

Don't configure too much in /etc/conf.d/net it is actually ok when this file is completely empty. Just unmask and `emerge knetworkmanager` once started manually it has the option to restart automatically on next restart of KDE. There is also a start script /etc/conf.d/NetworkManager.

Now using KnetworkManager you have GUI for Wlan, but also for the wired network.

6.9.Webcam

Create a kernel with the uvc driver. AAO Linpus uses ucview, in the sunrise overlay there is an ebuild for it.

6.10.Configure X

In /etc/make.conf add

```
VIDEO_CARDS="intel"
```

The configuration works straight forward and a compiz desktop is even possible.

To configure the VGA port check `man intel` and modify /etc/X11/xorg.conf. Then type `xrand` that prints the configuration and `xrandr --auto` to enable the port. Note screens are not monitors, so when you have one screen it has to be linked to both ports. Since the aspire has a wide screen and probably an attached CRT not, one of the two devices has to adapt to the other one.

7. BIOS update

Early AAO BIOS versions had bugs, one was that empty batteries did not charge any more therefore it is highly recommended to make a BIOS update to v0.3309. A v0.3310 version is around but id does not come from the acer site and should have no improvement regarding batteries.

No Windows, no DOS just Linux and the BIOS update from acer comes with a DOS program? From http://www.fdos.org/bootdisks/ download and unzip a floppy image for FreeDos as FDSTD.288. FDSTD.288 is a FreeDos floppy image with 2.88MByte space, so the DOS utility should fit. Copy FDSTD.288 to /boot and add in your grub.conf (Note: /boot might not be necessary in the path, depending how your Linux is setup):

```
title=Freedos
root (hd0,0)
kernel /boot/memdisk
initrd /boot/FDSTD.288
```

memdisk is the floppy emulator and can be obtained by `emerge syslinux` and `cp /usr/share/syslinux/memdisk /boot`.

Now its worth to try out FreeDOS, boot it and you should find yourself in DOS. When done, the good old `Ctrl Alt Del` brings you back.

Reboot the PC in Linux and add the BIOS update utility to FreeDos. Create a mounting point `mkdir /mnt/floppy` and mount the image:
`mount -o loop /boot/boot/FDINSTALL.144 /mnt/floppy`
Now copy the DOS BIOS utility from Acer to the floppy image, reboot from FreeDos and update the BIOS.

When done it is wise to `mount -o loop /boot/boot/FDINSTALL.144 /mnt/floppy` and delete the BIOS update utility from there, since updating BIOS is a critical task that can badly hurt your PC when it crashes, or gets interrupted by a power failure.

8. Open issues

Please let me know when you run into problems urs@linurs.org
or to make me happy help me with the still open issues:
- Setting up the wireless slide switch and its yellow LED (`xev` shows its key code)
- WLAN can be turned off with the switch on the front side of the Aspire One, although you don't get a visual notification in the GUI. The Wireless LEDs DO work, with the addition of these lines to /etc/rc.local

```
# Make wifi lights blink
sysctl -w dev.wifi0.ledpin=3
```

```
sysctl -w dev.wifi0.softled=1
```

- Setting up blue keyboard symbols
- Optimizing network (give up quicker what not wired, connect better to wireless nodes)
- Again the pc hostname is set by something sometimes to dhcpc

9. Annex C: Bibliography

Books in German (Somehow, I found out that I do not have English books about Linux):

[1] Linux
Installation, Konfiguration, Anwendung
Michael Kofler ISBN 3-8273-1854-8

[2] Gentoo Linux
Die Metadistribution
Tobias Scherbaum ISBN 978-3-8266-1769-0

[3] C und Linux
Die Möglichkeiten des Betriebsystems mit eigenen Programmen nutzen
Martin Gräfe ISBN 3-446-22055-0

[4] Steuerungsaufgaben mit LINUX lösen; Eine Einführung anhand praktischer Beispiele
Andreas Zickner ISBN 3-7723-5109-3

[5] Messen, Steuern, Regeln mit Linux
Einsatzmöglichkeiten für Linux in Embedded Systems
Klaus-Dieter Walter ISBN 3-7723-4484-4

[6] Embedded Systeme mit Linux programmieren
GNU-Softwaretools zur Programmierung ARM-basierender Systeme
Edmund Jordan ISBN 3-7723-5599-4

[7] Linux
Das distributionsunabhängige Handbuch
Johannes Plötner Steffen Wendzel ISBN 3-89842-677-7

[8] Gentoo Linux
Installation – Konfiguration – Administration
Gunnar Wrobel ISBN 978-3-937514-34-5

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