Linux on three popular laptop computers

PORTABLE QUEST

We took three samples from the current crop of notebooks to see which performed best with Linux. **BY MIRKO DÖLLE**

Laptops present many challenges to the operating system. The chip sets and graphics adapters are typically vastly different from the models used in standard PCs. CPU and peripheral power saving features add more complexity. We investigated how well three current laptops by Acer, Dell, and Samsung performed under Linux.

These machines are designed to replace standard desktop PCs, so a resolution of more than 1024 x 768 pixels was one of our basic requirements. Additionally, we wanted the laptops to have DVD writers and high capacity hard disks.

We performed a standard Suse Linux 10 install on the laptops. We tested 3D functionality with Tuxracer, installing the proprietary ATI driver on the Dell Latitude D810 and the Samsung X50.

We used a typing tester to test battery performance. The tester presses a key at 60 characters per minute for 30 seconds, and then waits for 30 seconds. The tester then takes a break of 4 minutes and 30 seconds after five rounds, and then starts again. This simulates mobile operations, which are more typically concerned with revising existing documents. The test results and the technical features of the laptops are shown in the table labeled "Laptop Comparison."

Acer Travelmate 4652LMi

The Acer Travelmate 4652LMi is the cheapest candidate with a Centrino CPU, and it is surprisingly well equippped. The 15" display has a resolution of 1400 x 1050 pixels, and the Pentium M CPU is fairly fast, with a clock speed of 1.73 GHz. The removable DVD writer can handle all DVD formats, including double layer DVD + R. The only problem with the drive is that the spring mechanism fails to eject if the laptop is not dead level but points slightly to the right. In this case, you need to pull out the tray manually to remove the disk.

Low-Budget, but Good

The 80GB hard disk has a parallel ATA connector – Samsung is the only manufacturer to install an X50 SATA disk, which is more than twice as expensive. Acer also does without an expensive graphics adapter by ATI or Nvidia. This means that the Travelmate is not suitable for complex 3D games like Quake or Unreal – but it is fine for Tuxracer, thanks to the 3D support integrated in the graphics chip set. You can attach an external display to the DVI or VGA port, although the graphics adapter does not support dual-head operations. You can only view the same image on the monitor as on the internal display.

Acer does its own thing with respect to keyboard and mouse. The keyboard is slightly curved to support more ergonomic writing. Unfortunately, Acer moved the keys for angled brackets and the pipe key to the other side of the keyboard in the process – this will probably bother you, if you normally use a traditional PC keyboard, forcing you to look for the keys until you get used to the layout. The Acer laptop does not have a separate cursor block, but two keys with

Figure 1: The Acer Travelmate 4652LMi is not only the least expensive laptop in the test, but also has the best battery performance, and this makes it the winner.

currency symbols – unfortunately, these keys do not return scan codes, just like the four extra keys above the keyboard, and that makes them useless. The touchpad that Acer provides as a mouse replacement was the only one to have a wheel between the two keys, and what's more, the wheel supports both vertical and horizontal scrolling.

Good Battery Performance

The Acer Travelmate has good Linux support. Both Bluetooth and WLAN worked out of the box, and were easily set up with a few clicks during the Suse Linux 10 install. Two illuminated keys on the front of the laptop allow users to disable Bluetooth and WLAN separately – all the other test laptops collectively enabled or disabled all wireless interfaces at the same time.

The Acer's power management features worked for the most part, and this helped the Travelmate to a battery performance of four and a half hours. Eight hours looks like a reasonable proposition if you fit an extra battery in the drive bay. The graphics driver failed after enabling Suspend to RAM: although the laptop woke up, the screen was blank.

Dell Latitude D810

The display on the Dell Latitude D810 is the same size as the display on the Samsung, although it doesn't look quite as bright. Unfortunately, this affects the battery performance – the 80 watt hour power cell lasted three and a half hours in our typing test. An optional battery in the DVD drive bay should give you another two hours.

Exemplary Keyboard

The Dell machine really shone in the keyboard and mouse stakes. The keyboard not only has a separate cursor block, but also separate scroll keys above the numeric keys using a normal PC keyboard layout. Users accustomed to normal PC keyboards should find it easy to adapt to the Dell layout. Dell has both a touchpad and a trackpoint as mouse replacements, and that should keep both camps happy. One minor criticism: the Dell laptop just gives you two mouse buttons; it does not give you a wheel.

The Latitude demonstrated a few design flaws in mobile operations. The air vents for the CPU and graphics adapter are mainly underneath the machine and thus covered if you have the Latitude on your lap, or if you put it on a soft surface. The docking interface with its critical data signals and voltages is totally unprotected underneath the laptop – at least the Samsung X50 had two clips to prevent foreign bodies such as paperclips or staples short circuiting the device's PCI bus or causing some other kind of damage. And the unusual positions of the feet make the Dell difficult to use on uneven surfaces.

Wrong DVD Drive

According to the purchase order, the Dell Latitude D810 was supposed to have a DVD writer for plus and minus media. In fact, Dell only supplied a DVD-ROM/CD-RW combi-drive, which is normally not available with this model. We have no way of knowing if the drive will write dual layer DVDs, or if it can handle DVD-RAMs. Unfortunately, Dell uses two 512MB So DIMM memory modules, just like Samsung – and whereas both RAM slots are accessible via access covers underneath the Samsung X50, users can only access one of the Latitude's modules. Of course, this reduces the maximum memory capacity of the Dell laptop to 1536 MB rather than the 2048 MB claimed by the manufacturer.

WLAN and Bluetooth

The Latitude D810 uses a key combination of [Fn] + [F2] to enable the WLAN and Bluetooth wireless interfaces. However, the status LEDs above the keyboard do not always give a true indication of the current mode. For example, the Wifi LED stays on even if you have disabled wireless operations. In our lab, we noted that only the Bluetooth LED returned reliable results – WLAN and Bluetooth connections both worked while it was lit, and neither worked if it was unlit, although the Wifi LED was lit. There was no way of enabling Bluetooth and WLAN separately – a big disadvantage compared with the Acer Travelmate. At least the BIOS lets you select whether to enable the wireless interface on booting.

Achieving 3D hardware acceleration support for the ATI Radeon X600 chipset was not easy, as a binary driver was not available when this issue went to press. Suspend to RAM worked after the install, although it was not 100% stable:

Figure 2: The Dell Latitude D810 has a high-definition 15.4 inch display with a 1680 x 1050 pixel resolution; however the open docking port on the underside of the laptop is susceptible to damage.

the laptop failed to wake up on a couple of occasions.

Samsung X50 WMV 2130

The Samsung X50 is the most expensive of our test candidates, but it is also the only candidate with a premium quality magnesium case. This not only adds stability; it also makes the Samsung lighter: in fact, the X50 weighed about a pound less than the Acer.

The X50 is well-equipped. The display is a giant 1680 x 1050 pixels, and the 2.13 GHz Pentium mobile was the quickest CPU in the test. Also, the Samsung X50 was the only laptop in our test fitted with SATA laptop hard disks.

There were only three things we would criticize: the VGA connector for an external monitor is no longer state-of-the-art – a combined DVI port with an analog video signal or two display ports like the Acer Travelmate would have been more useful, especially considering the fact that the Samsung X50 supports dual-head operations with a separate image on the external and TFT displays. It is also quite difficult to add a memory extension, as Samsung uses two 512MB So DIMMs, rather than a 1GB module, and this blocks both RAM slots. It is also impossible to remove the DVD drive; some airlines may not let you use your laptop on board their planes. And this is a pity, as the the X50 comes with an AV Station multimedia system, which plays videos, DVDs, and music no matter what operating system you install.

Poor Battery Performance

The standard battery with a capacity of 50 watt hours kept the laptop going for about two and a half hours. The fact that the Samsung machine does not have a removable DVD drive, in contrast to the Travelmate, means that you can't install a second battery. Samsung does offer a bigger battery with a capacity of 80 watt hours, but the bigger battery sticks out at the back of the laptop, and it will not give you more than four hours of use.

The keyboard layout is fine, but the touchpad is a bit too small. Its height of 1.5 inches makes it about a third of an inch smaller than the other touchpads. And you have to subtract about a third of an inch for the scroll area at the side.

The Samsung X50 has good Linux support: Suse Linux 10.0 detected all the components, with the exception of the Flash card reader and the fingerprint scanner. Again, the four extra keys above the keyboard do not produce scan codes and remain unused. Power management was also quite tricky, with the laptop failing to wake up after enabling Suspend-to-RAM.

Suse 10.0 detected the graphics adapter correctly, thus supporting the 1680 x 1050 pixel display – 3D support and dual-head operations did not work. To enable these features, first download the ATI driver from [1] and install the driver manually.

Figure 3: The Samsung X50 has a bright and giant 1680 x 1050 pixel display which is probably what affects the battery performance.

Configuring the driver in Sax is tricky. You can set the display resolution to 1680 x 1050 and the size to 15.4 inches, but if you do, expect to need a restart to clear up the display. This also applies to dual-head operations.

Linux on Board

The preinstalled AV Station multimedia software is another of the Samsung X50's special features. In fact, AV Station is a miniature Linux distribution that you can launch via the extra keys above the keyboard when the laptop is powered off. The laptop takes less than 20 seconds to boot, and then AV station comes up with a neat GUI in which you can view images, listen to music, and watch movies.

The multimedia Linux distribution is hidden in an invisible 16 MB partition. Even the Suse Linux 10 fdisk tool honors the hidden flag and does not show the partition. However, fdisk by Busybox, as used by many rescue CDs, revealed the second partition.

The rescue system was unable to read the hidden partition, as the BIOS prevents access to it. In other words, there is no danger of deleting the multimedia system when you install Linux.

Preliminary results suggest that Samsung used Kernel 2.4.21 for its mini Linux and libdvdcss to play copy protected DVDs. Samsung offers the source for these packages at [2] to conform with the GPL, and that may make Samsung the first vendor to officially offer the controversial libdvdcss package.

Conclusions

Table 1 provides a comparison of the laptops we tested. The lowest price, a good set of hardware, the best battery performance, and good support for Linux take the Acer Travelmate 4652LMi to the top of the test, proving that a good laptop doesn't need to be expensive.

Samsung's X50 WMV 2130 takes second place: although it has a bigger display and a faster CPU than the winner, as well as a SATA hard disk, it does cost more than twice as much. We would recommend the Samsung X50 for road warriors, due to its flat design and low weight – but you will need the more powerful battery.

Excellent Linux support, a giant display, and good battery performance characterized the Dell Latitude. However, the Dell is far slower and heavier than the Samsung X50. This is why the Dell Latitude D810 takes third place in the test, losing out to the Samsung X50 by a narrow margin. ■

INFO

[1] ATI 3D HOWTO for Suse Linux: *http://www.suse.de/~sndirsch/ati-installer-HOWTO.html*

[2] Kernel sources and libdvdcss for Samsungs AV Station: *http://www.samsungpc.com/top_faq/58_faqanswer_%20avsnow_info.htm*

Table 1: Laptop Comparison

			
Vendor:	Acer	Dell	Samsung
Model:	Travelmate 4652LMi	Latitude D810 Advanced	X50 WVM 2130
CPU:	Pentium-M 740, (1,73 GHz)	Pentium-M 750, (1,86 GHz)	Pentium-M 770, (2,13 GHz)
Chip set:	Intel 915GM	Intel 915PM	Intel 915PM
RAM (max.):	512 MByte (2048 MByte)	1024 MByte (1536 MByte)	1024 MByte (2048 MByte)
Display			
Size (type):	15 Zoll (TFT)	15,4 Zoll (TFT)	15,4 Zoll (TFT)
Resolution:	1400 x 1050 Pixel	1680 x 1050 Pixel	1680 x 1050 Pixel
Brightness adjustable:	✔	✔	✔
Graphics adapter:	Intel 915GM	ATI Radeon X600	ATI Radeon X700
Video RAM:	128 MByte (shared)	128 MByte	128 MByte
3D | Dual-Head | external:	yes | no | VGA, DVI	yes | yes | VGA	yes | yes | VGA
Drivers			
Hard disk:	80 GByte, PATA	80 GByte, PATA	80 GByte, SATA
CD/DVD drive:	DVD±R/RW/RAM DL	DVD-ROM/CD-RW	DVD±R/RW/RAM
network Interfaces			
Ethernet:	✔	✔	✔
Chip | driver:	Broadcom BCM5788 | tg3	Broadcom BCM5751 | tg3	Broadcom BCM5788 | tg3
WLAN:	IEEE 802.11b/g	IEEE 802.11b/g	IEEE 802.11a/b/g
Disabling:	✔	✔	✔
Chip | driver:	Intel 2200BG | ipw2200	Intel 2200BG | ipw2200	Intel 2915ABG | ipw2200
Bluetooth:	✔	✔	✔
Modem:	✔	✔	✔
Linux support:	–	✔	✔
Keyboard and mouse			
Grade for keyboard layout:	4	2	3
Windows keys:	2	2	3
Separate cursor | scroll keys:	– | –	✔ | ✔	✔ | –
Scroll keys without [Fn]:	✔	✔	✔
Mouse replacement:	Touchpad	Touchpad, Trackpoint	Touchpad
Keys | scroll wheel:	3 | yes	2 | –	2 | –
Connectors			
USB | Firewire | Cardbus:	4 x USB 2.0 | 1 | 1	4 x USB 2.0 | no | 1	3 x USB 2.0 | 1 | 1
Monitor | Sound:	VGA, DVI | earphones, micro	VGA | earphones, micro	VGA | earphones, micro
PS/2 | serial | parallel:	– | – | –	– | ✔ | –	– | – | –
Ethernet | Modem | IR:	1 x RJ-45 | ✔ | ✔	1 x RJ-45 | ✔ | ✔	1 x RJ-45 | ✔ | –
Battery and mains adapter			
Battery type:	Lilo	Lilo	Lilo
Capacity:	63 Wh (14,8 V, 4300 mAh)	79 Wh (11,1 V, 7200 mAh)	53 Wh (11,1 V, 4800 mAh)
Performance:	4:44 h	3:23 h	2:30 h
Size | Weight:	34 x 4 x 28.5 cm | 2.9 kg	36.5 x 5 x 26 cm | 3.2 kg	36 x 3.5 x 27 cm | 2.5 kg
	Mains adapter, Power cable, Modem cable, Windows XP Pro (Recovery CD), Norton Antivirus, Manual, Mini-Guide	Floppy drive, Mini USB cable, Mains adapter, Power cable, Modem cable, Windows XP Pro (Recovery CD), Manual	Fingerprint sensor, Mains adapter, Power cable, Windows XP Pro (Recovery CD), Manual, Mini-Guide
Price:	1,250 Euros	1,975 Euros	2,700 Euros