

Dell™ Latitude™ E4300 ultraportable notebook competitive analysis

Executive summary

Dell Inc. (Dell) commissioned Principled Technologies (PT) to test the performance and features of two 13-inch ultraportable notebook systems:

- Dell Latitude E4300
- Lenovo® ThinkPad® X301

(Note: Because HP offers no 13-inch business class ultraportable, Dell did not include them in this test.)

We wanted to find out which system had

- the longer-lasting battery (standard shipping battery and maximum available battery)
- better performance
- the faster charge time
- the faster boot time

As our Key findings state, the Dell Latitude E4300 beat the Lenovo ThinkPad X301 on every measure. The Test methodology section provides detail on our tests and Appendix A details the system configurations.

KEY FINDINGS

- With each system's standard 6-cell battery, the Dell Latitude E4300 offered 44.6 percent longer battery life than the Lenovo ThinkPad X301—an additional 2 hours, 5 minutes (see Figure 1).
- With each system's maximum available battery, the Dell Latitude E4300 with 12 cells offered 77.0 percent longer battery life than the Lenovo ThinkPad X301 with 9 cells—an additional 5 hours, 32 minutes (see Figure 1).
- The Dell Latitude E4300 achieved a 55.7 percent better SYSmark 2007 performance score than the Lenovo ThinkPad X301 (see Figure 3).
- After 1 hour of charging, the Dell Latitude E4300's battery was 80.00 percent charged while the Lenovo ThinkPad X301's battery was only 73.33 percent charged, a difference of 9.1 percent (see Figure 4).
- The Dell Latitude E4300's 26.3 seconds to boot was 18.6 percent faster than the Lenovo ThinkPad X301's 32.3 seconds (see Figure 5).

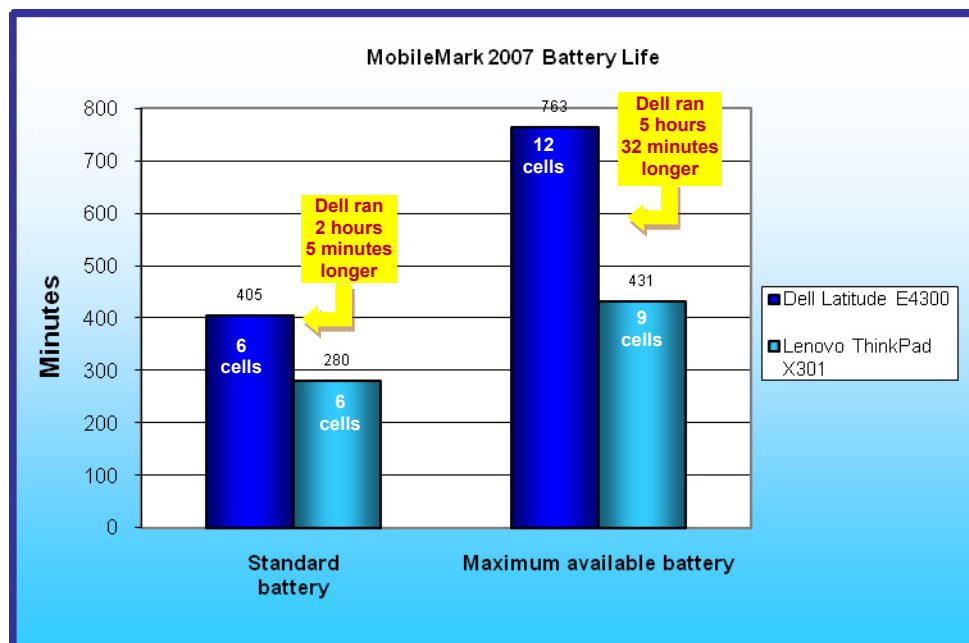


Figure 1: MobileMark 2007 Battery Life results, in minutes, for the two test systems with standard and maximum available battery. Higher numbers, indicating longer battery life, are better.

Battery life

We measured battery life using BAPCo's MobileMark 2007 v1.05. We tested each system in two configurations: with the standard 6-cell battery and with the maximum available battery at the time of purchase.

As figure 1 indicates, with the standard battery in each system, the Dell Latitude E4300 offered 44.6 percent longer battery life than the Lenovo ThinkPad X301, which translates to an additional 2 hours, 5 minutes of power. When we configured each system with the maximum available battery, the Dell

Latitude E4300 offered 77.0 percent longer battery life than the Lenovo ThinkPad X301, which translates to an additional 5 hours, 32 minutes of power. Figure 2 provides detailed information on the battery configurations.

System	Standard battery	Additional battery	Cells in maximum available battery configuration
Dell Latitude E4300	6-cell internal	6-cell slice	12 cells
Lenovo ThinkPad X301	6-cell internal	3-cell module bay	9 cells

Figure 2: Battery information for the two test systems.

Overall performance

We measured overall performance using BAPCo's SYSmark 2007 Preview v1.05. The Dell Latitude E4300 achieved a score of 151, 55.7 percent better than the Lenovo ThinkPad X301's score of 97 (see Figure 3). Lenovo offers one processor option for the ThinkPad X301, an Intel Core 2 Duo SU9400 (1.4GHz, 3MB L2, 800MHz FSB). Dell offers two processor options for the Latitude E4300. PT configured the Latitude with the slower of these two options, the Intel Core 2 Duo SP9300 (2.26GHz, 3MB L2, 1066MHz FSB).

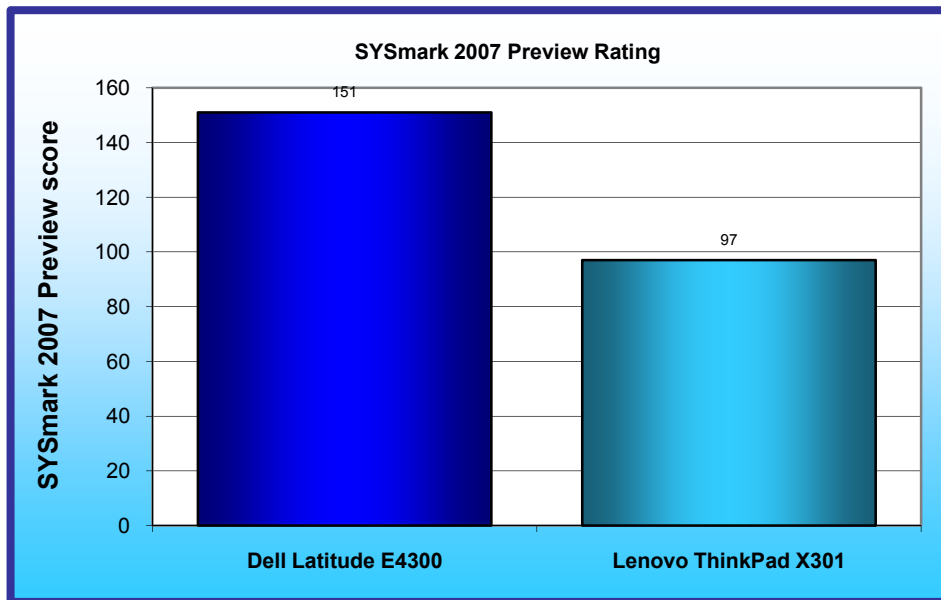


Figure 3: SYSmark 2007 Preview results for the two test systems. Higher performance results are better.

Percentage battery charge after one hour

To see how quickly the two systems charged, we measured the percentage of battery charge for the 6-cell internal battery after one hour with the system turned off. The Dell Latitude E4300 achieved 80.00 percent, a 9.1 percent improvement over the Lenovo ThinkPad X301's 73.33 percent charge (see Figure 4).

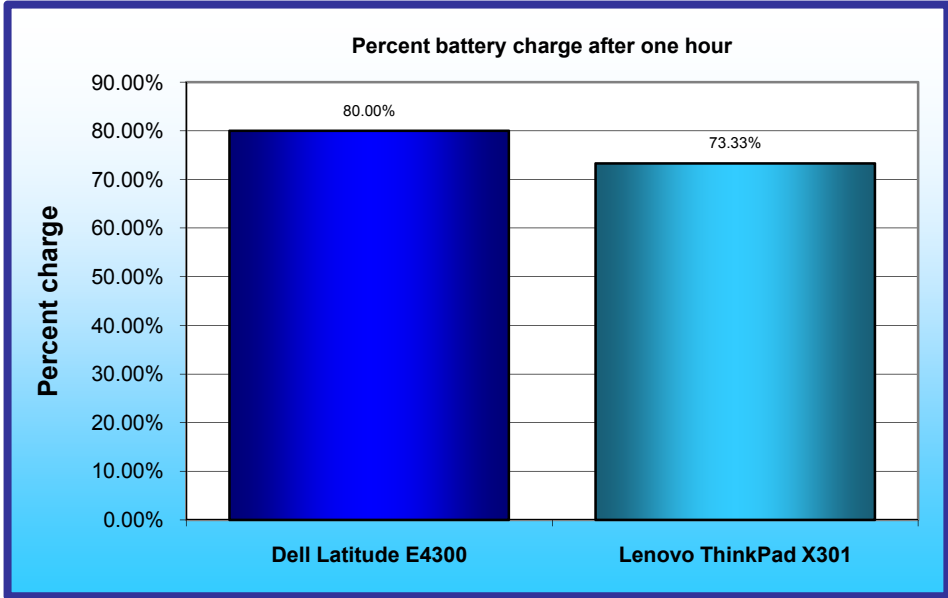


Figure 4: Percentage battery charge for the standard battery for the two test systems. Higher percentage charge is better.

Boot time

We also measured the time each system needed to boot to a login screen. The Dell Latitude E4300's 26.3 seconds to boot was 18.6 percent faster than the Lenovo ThinkPad X301's 32.3 seconds (see Figure 5).

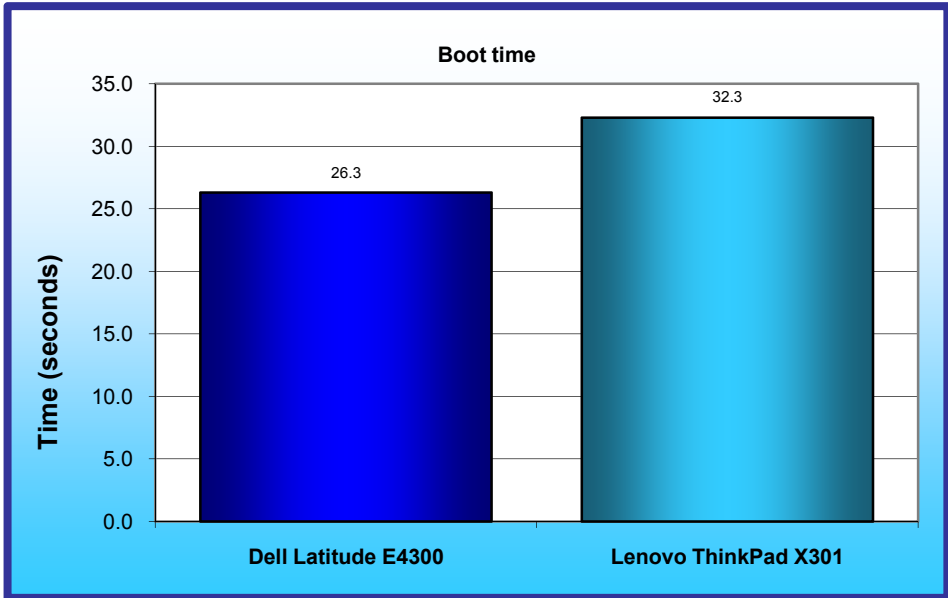


Figure 5: Time each system needed from pressing the power button to a login screen. Lower is better

Summary of results

Figure 6 summarizes our results.

Test	Raw test results		Comparative ratings	
	Dell Latitude E4300	Lenovo ThinkPad X301	Dell Latitude E4300	Lenovo ThinkPad X301
MobileMark 2007 1.05 Battery Life rating for standard battery configuration (minutes; higher is better)	405	280	1.446	1.00
MobileMark 2007 1.05 Battery Life rating for maximum available battery configuration (minutes; higher is better)	763	431	1.770	1.00
SYSmark 2007 Preview v1.05 rating (higher is better)	151	97	1.557	1.00
Percentage charge after 1 hour (higher is better)	80.00%	73.33%	1.091	1.00
Time to boot to a login screen (seconds; lower is better)	26.3	32.3	0.814	1.00

Figure 6: Raw test results and comparative ratings for the test systems. In all instances except time to boot, higher numbers are better.

Test methodology

Creating the base test image

With the exception of MobileMark 2007, and SYSmark 2007, which required us to remove conflicting applications, PT conducted all testing on the original factory image.

We powered on each notebook, and if a notebook vendor required us to respond to specific system preparation steps, we did so until the Windows desktop appeared. Once each installation was complete, PT ran Windows Update and installed all updates available as of 9/18/2008, including Service Pack 3 for Windows XP if that update was not already on the system. At that point, PT used Symantec's Ghost product to create an image of the disk with that out-of-box software setup. Those images facilitated repeatable testing and experimenting. We made them by following this process:

1. Insert a bootable Ghost CD.
2. Power down the computer.
3. Attach an external USB hard disk.
4. Power on the computer.
5. At the Symantec Ghost screen, click OK.
6. Select Local→Disk→To Image.
7. Click OK.
8. Select the Primary disk, and click OK.
9. Select the external hard disk in the copy image to drop-down box, name the file `BASE`, and click Save.
10. At the Compress Image dialog, select Fast.
11. At the Proceed dialog, select Yes.
12. When the ghost image is complete, click OK, and exit Ghost.
13. Power down the computer.
14. Disconnect the USB hard disk.
15. Reboot the computer.

Preparing to measure battery life with MobileMark 2007 v.1.05 and to measure charge time

We conditioned the battery prior to testing. To do so, we performed two complete drains of the battery, starting from a battery at 100 percent charge. To expedite the draining process, we ran the MobileMark 2007 Productivity

2007 test until the battery completely discharged. We recorded the room temperature at the beginning of each official run.

Antivirus software conflicts

MobileMark 2007 is not compatible with any virus-scanning software, so we uninstalled any such software that was present on the notebook PCs before we installed the benchmark.

Pre-installed software conflicts

MobileMark 2007 installs the following applications, which its test scripts employ:

- Adobe Photoshop 6.0.1
- InterVideo WinDVD 6.0
- Macromedia Flash 5.0
- Microsoft Excel 2002
- Microsoft Outlook 2002
- Microsoft PowerPoint 2002
- Microsoft Word 2002
- Netscape Communicator 6.01
- Network Associates McAfee VirusScan 5.13
- WinZip Computing WinZip 8.0

If any of these applications are already on the system under test, they will cause problems with the benchmark due to software conflicts. To avoid any such issues, before we installed the benchmark, we uninstalled all conflicting pre-installed software applications, including different versions of any of the programs MobileMark 2007 uses.

Installing MobileMark 2007 v.1.05

1. Reset the notebook to the base image using Symantec's Ghost product.
2. Turn off the wireless network adapter by using the external toggle switch.
3. Insert the MobileMark 2007 Install DVD in the notebook PC's DVD drive.
4. At the Welcome screen, click Next.
5. Accept the license agreement, and click Next.
6. At the Ready to Install the Program screen, click Install.
7. After installing MobileMark, run the BAPCo Auto-configuration tool, v.1.3.2 to set the power options.
 - a. Insert the Auto-configuration tool in the notebook PC's DVD drive.
 - b. Double-click BAPCo_AutoConfig.exe.
 - c. Type **M** to choose MobileMark 2007.
 - d. Type **3** to choose the changes that produce the best possible scores, as follows:
 - i. Set Critical battery alarm to 0%.
 - ii. Set Low battery alarm to 0%.
 - iii. Disable screen saver.
 - iv. Stop and disable Windows Update.
 - v. Disable desktop cleanup wizard.
 - vi. Disable Windows Security Center warnings.
 - vii. Disable Windows Firewall.
 - viii. Disable incoming Remote Desktop connections.
 - ix. Disable Windows Error Reporting to Microsoft.
 - x. Disable Windows Defender.

Displaying brightness and power settings

Because the brightness of a notebook's display affects its battery life, BAPCo required that, before we tested with MobileMark 2007, we made sure the brightness of the notebook's monitor was greater than or equal to 60 nits on a completely white screen while the notebook was unplugged and running on battery power. The measurement follows the standards from the Video Electronics Standards Association (www.vesa.org/Standards/summary/2001_6a.htm).

We complied with this standard for all the tests we ran by setting each notebook PC's brightness as close to 60 nits as we could without going below that brightness level. We used the following procedure, which assumes we began with the notebook plugged into the power supply, to meet this requirement before we started each test.

1. To create a completely blank, white screen, open Microsoft Paint by clicking Start→All Programs→Accessories→Paint.
2. Open the Attributes by pressing Ctrl+E.
3. Enter dimensions that are larger than the current screen resolution. For example, if the screen resolution is 1280 x 800, enter 1600 for Width and 1200 for Height.
4. Click OK.
5. Press Ctrl+F to view the bitmap image and render the screen totally white.
6. Wait 45 minutes to allow the screen to warm.
7. Unplug the notebook from the power supply and measure the display's brightness using a luminance meter in the center of the screen. (We used the Gossen Mavolux5032C.)
8. If the reading is below or significantly greater than 60 nits, use the notebook's keyboard screen-brightness-adjustment keys to bring the display as close to 60 nits as possible, then retest.
9. Allow the notebook to run on battery for 10 minutes, re-measure the display, and adjust the brightness up or down as necessary.
10. Verify that the notebook saved the brightness setting by plugging in the system, unplugging it, and taking another reading. If the notebook did not save this setting, use its power-management application(s) to set the brightness appropriately, and save that setting.

Conditioning the battery

1. Plug the AC power adapter into the notebook PC, and completely charge the battery.
2. Install MobileMark 2007, following the steps outlined in the Installing MobileMark 2007 section above.
3. Double-click the MobileMark 2007 icon on the desktop.
4. Highlight the Productivity 2007 item in the left panel.
5. Type a name for this test in the Project Name field at the top-right panel, and click Next Step.
6. If MobileMark lists no problems or warnings, click Next. If it does list any problems or warnings, close MobileMark 2007, and correct the problem(s) before proceeding.
7. Unplug the AC power adapter. The Productivity 2007 test begins immediately.
8. The test is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.
9. Repeat steps 3 through 8 for the second conditioning run and all official runs.
10. Plug the AC power adapter into the notebook PC, and completely charge the battery for the Measuring battery life with MobileMark 2007 v.1.05 test.

Measuring battery life with MobileMark 2007 v.1.05

We performed the following steps to run the MobileMark Productivity 2007 benchmark:

1. Double-click the MobileMark 2007 icon on the desktop.
2. Select the Productivity 2007 test by highlighting it in the left panel.
3. Type a name for this test in the Project Name field in the top right panel, and click Next Step.
4. If MobileMark lists no problems or warnings, click Next. If it does list any problems or warnings, close MobileMark 2007, and correct the problem(s) before proceeding.
5. Unplug the AC power adapter. The test begins immediately.
6. The Productivity 2007 test is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.

We executed the Productivity 2007 test three times on each system configuration and used the average result of each set of three as the representative score for that test.

1. Configure the notebook with the standard battery and the BAPCo recommendations for running MobileMark 2007.
2. Execute the Productivity 2007 test three times in this configuration.
3. Configure the notebook with the maximum-sized battery available at the time of purchase and the BAPCo recommendations for running MobileMark 2007.
4. Execute the Productivity 2007 test three times in this configuration.

Getting the MobileMark 2007 results

After each MobileMark test completed, we plugged the AC power adapter into the notebook PC and turned on the system. MobileMark 2007 started automatically after the system booted, analyzed the test scores, and opened the Test Results Viewer with the results from the last test.

To submit these results to BAPCo, we saved the test results directory. To do so, we performed the following steps:

1. Browse to the C:\Program Files\BAPCo\MobileMark 2007\results directory.
 - a. Select My Computer.
 - b. Select Local Disk (C:).
 - c. Select the Program Files directory.
 - d. Select the BAPCo directory.
 - e. Select the MobileMark2007 directory.
 - f. Select the results directory. (Note: The name of the directory for the Productivity 2007 results is the name you gave the test in Step 6 of the MobileMark Productivity 2007 process.)

Measuring battery charge time

This test measures the amount of charge the 6-cell battery attains in 1 hour with the notebook powered off. This test requires a wall clock for marking the start and end points. This test also requires the battery meter icon present in the system tray.

1. With the battery completely drained, note the time, and plug the AC power adapter into the notebook PC.
2. Allow the notebook PC to charge for 1 hour.
3. After 1 hour, remove the battery from the notebook PC, and power it on.
4. Allow 2 minutes for the operating system to load, and re-insert the battery.
5. Immediately move the mouse cursor over the battery meter icon in the system tray, and record the percentage battery charge.
6. Discharge the batteries, and repeat steps 1 through 5.

We executed this test three times and used the average result of each set of three as the representative score for that test.

Measuring system performance with BAPCo SYSmark 2007 Preview v1.05

We performed the following steps to set up and run this test.

Setting up the test

1. Reset the system to the base test image.
2. Purchase and install SYSmark 2007 Preview v1.05 from:
<https://www.bapcostore.com/store/product.php?productid=16165&cat=251&page=1>
3. At the Welcome to InstallShield Wizard screen, click Next.
4. At the License Agreement screen, select I accept the terms in the License Agreement, and click Next.
5. At the Choose Destination Location screen, click Next.
6. At the Ready to Install the Program screen, click Install.
7. When the installation is complete, click Finish.

Running the test

1. Disable the User Account Control.
 - a. Click Start→Control Panel.
 - b. Under the User Accounts and Family Safety settings, click Add or remove user account.
 - c. In the pop-up User Account Control dialog, click Continue.
 - d. Click the Go to the main User Accounts page link.
 - e. Under Make changes to your user account, click Turn User Account Control on or off.
 - f. In the pop-up User Account Control dialog, click Continue.
 - g. Uncheck the Use User Account Control to help protect your computer box, and click OK.
 - h. In the pop-up You must restart your computer to apply these changes dialog, click Restart Now.

2. Launch SYSmark 2007 Preview by double-clicking the desktop icon.
3. Click Run on the left side.
4. Select Official Run, choose 3 Iterations with conditioning run, and enter a name for that run.
5. When the benchmark completes and the main SYSmark 2007 Preview menu appears, click the Save FDR button to create a report.
6. Record the results.

Measuring boot time

This test measures the time from a user's pressing the power button to the logon screen's appearing.

Notes: This test requires a stopwatch and a password-protected user account. Before running this test, we reset the notebook to the base image using Symantec's Ghost product.

Verifying that a password exists



1. Click Start→Control Panel.
2. Click User Accounts, and click the Computer administrator account.
3. If the second choice in the User Accounts dialog box reads Change my password, a password exists.
4. If the first choice in the User Accounts dialog box reads Create my password, no password exists and you should create one:
 - a. Click Create a password.
 - b. In the Type a new password field, type `password`.
 - c. In the Type the new password again to confirm field, type `password`.
 - d. Click Create Password.
 - e. Click Yes, Make Private.

Running the test

1. Close all Windows Explorer windows and applications.
2. Turn the computer off for at least 2 minutes.
3. Prepare the stopwatch.
4. Simultaneously press the power button and start the stopwatch.
5. Stop the stopwatch when the logon screen appears.

Appendix A. Test system configuration information

As per Dell's request, PT purchased the notebook systems for this test. Figure 7 presents detailed configuration information for the systems.

System	Dell Latitude E4300	Lenovo ThinkPad X301
		
General		
Processor and OS kernel: (physical, core, logical) / (UP, MP)	1P2C2L / MP	1P2C2L / MP
Number of physical processors	1	1
Single/Dual-core processors	Dual	Dual
System power management policy	MobileMark 2007	MobileMark 2007
Processor power-saving option	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	12-1/8" x 8-3/4" x 1-1/4"	12-1/2" x 9-1/8" x 1"
System weight with shipment battery	3 lb. 12.3 oz.	3 lb. 1.5 oz.
System weight with extended battery	4 lb. 6.1 oz.	3 lb. 8.5 oz.
CPU		
Vendor	Intel	Intel
Name	Core 2 Duo mobile	Core 2 Duo mobile
Model number	SP9300	SU9400
Stepping	6	6
Socket type and number of pins	Socket P (478)	Socket P (478)
Core frequency (GHz)	2.26	1.40
Front-side bus frequency (MHz)	1,066	800
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 cache	6 MB (shared)	3 MB (shared)
Platform		
Vendor	Dell Inc.	Lenovo
Motherboard model number	0WR116	2777CTO
Motherboard chipset	Intel GL40/GM45/GS45/PM45	Intel GL40/GM45/GS45/PM45
Motherboard revision number	07	07
System/Motherboard serial number	8W8MPH1	L3-A1146 08/10
BIOS name and version	Dell A03 (10/10/2008)	Lenovo 6EET19WW (1.00g) (07/30/2008)
BIOS settings	Default	Default
Memory module(s)		
Vendor and model number	Elpida EBJ11UE6BASA-AE-E	Qimonda IMSH1GS14A1F1C-10F
Type	PC3-8500F	PC3-8500S
Speed (MHz)	533	800
Speed running in the system (MHz)	533	800

System	Dell Latitude E4300	Lenovo ThinkPad X301
Timing/Latency (tCL-tRCD-tRP-tRASmin)	7-7-7-20	7-7-7
Size (MB)	2,048	2,048
Number of memory module(s)	2 x 1,024	2 x 1,024
Chip organization (single-sided, double-sided)	Double-sided	Double-sided
Hard disk		
Vendor and model number	Samsung SSD MCBQE64GHMPP-MVA	Samsung MCCOE64G8MPP-0VA
Size (GB)	64	64
Type	SATA	SATA
Controller	Intel ID2917	Intel ID2917
Driver	Ricoh Company 6.0.2.3 (2/24/2007)	Intel 8.2.4.1005 (7/22/2008)
Operating system		
Name	Windows XP Professional	Windows XP Professional
Build number	2600	2600
Service pack	Service Pack 3	Service Pack 3
File system	NTFS	NTFS
Kernel	ACPI Multiprocessor PC	ACPI Multiprocessor PC
Language	English	English
Microsoft DirectX version	DirectX 9.0c	DirectX 9.0c
Graphics		
Vendor and model number	Mobile Intel GMA 4500MHD	Mobile Intel GMA 4500MHD
Type	Integrated	Integrated
Chipset	Mobile Intel 4 Series Express Chipset	Mobile Intel 4 Series Express Chipset
BIOS version	1659.0	1654.1
Total available graphics memory (MB)	1,024	1,024
Resolution	1,280 x 800 x 32 bit	1,440 x 900 x 32 bit
Driver	Intel 6.14.10.4980 (8/25/2008)	Intel 6.14.10.4957 (6/11/2008)
Sound card/subsystem		
Vendor and model number	Intel High Definition Audio HDMI	Conexant High Definition Smart Audio 221
Driver	Intel 5.10.0.1046 (7/30/2008)	Conexant 3.53.0.0 (5/28/2008)
Ethernet		
Vendor and model number	Intel 82567LM Gigabit Network Connection	Intel 82567LM Gigabit Network Connection
Driver	Intel 9.50.14.2 (4/4/2008)	Intel 9.52.10.1001 (8/22/2008)
Wireless		
Vendor and model number	Intel WiFi Link 5300 AGN	Intel WiFi Link 5300 AGN
Driver	Intel 12.0.0.82 (7/8/2008)	Intel 12.1.0.14 (08/28/2008)
Optical drive(s)		
Vendor and model number	HL-DT-ST DU10N	NA
Type	DVD/CD-ROM	NA
Interface	SATA	NA
Dual/single layer	Dual	NA
USB ports		

System	Dell Latitude E4300	Lenovo ThinkPad X301
Number	2	3
Type	2.0	2.0
eSATA port		
Number	1	0
IEEE 1394 ports		
Number	1	0
Monitor		
LCD type	WXGA	WXGA
Screen size (inches)	13.3	13.3
Refresh rate (Hz)	60	60
Battery 1		
Type	Internal	Internal
Model number	Dell XX327	Lenovo 42T4522
Size (length x width x height)	8-1/4" x 2-1/2" x 3/4"	10" X 3-1/4" X 1/2"
Rated capacity	5.0 Ah x 11.1 V = 56 Wh	4.0 Ah x 10.8V = 43.2 Wh
Cell count	6	6
Weight (oz.)	11.8	10.4
Battery 2		
Type	Slice	Module bay
Model number	Dell HW900	Lenovo 42T4520
Size (length x width x height)	11-3/4" x 7-7/8" x 1/2"	5" x 5" x 1/8"
Rated capacity	4.3 Ah x 11.1 V = 48 Wh	2.12 Ah x 11.2 V = 23.7 Wh
Cell count	6	3
Weight	1 lb. 5.6 oz.	6.3 oz.
AC adapter		
Vendor	Dell	Lenovo
Watts (W)	65	65

Figure 7: Detailed system configuration information for the test systems.

About Principled Technologies

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Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.



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