

Customizing the DELL INSPIRON™ Mini 9 for Embedded Applications

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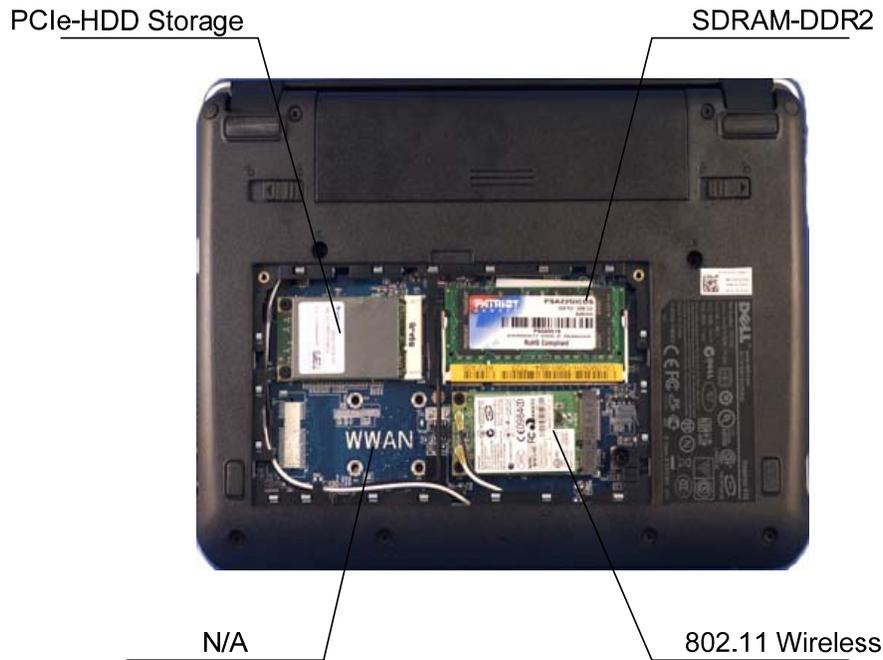
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After a stint with ARM technology, Intel has come out with a new Intel Architecture (x86) processor that is a real game changer. The Intel® ATOM™ targets low-power systems where only non-x86 processors were considered viable before. A whole new class of devices is being created with the introduction of the ATOM™ processor. The first members of this new class of devices are the netbooks and mobile internet devices with Dell being one of the first with the introduction of the Mini 9. Small and ultra-light, the Mini 9 provides the power to run today's Intel Architecture applications and provides connectivity support to access e-mails and the Internet from just about anywhere. The Mini 9 is already a hit with consumers, educators, techno-geeks, and business travelers who all like the performance and portability in such a small form factor. Like so many new electronic devices, there are some who are customizing their Mini 9s to get more out of this small, powerful platform. In this article, we will bring together the information that is circulation out on the web and look at different ways to customize your Mini 9.

Hardware

The Intel® Atom™ N270 Processor (1.6GHz, 512KB L2 Cache, 533MHz FSB) is at the heart of the Mini 9. The chipset is the Mobile Intel® 82945GSE Graphics and Memory Controller with Intel® Integrated Graphics Media Accelerator 950.

Inside the Mini 9, there are two PCI Express slots for the flash drive and wireless cards, and there is a SODIMM connector for the RAM.



The Mini 9 comes with a basic set of RAM and flash drive support:

- RAM: 1GB,DDR2,533MHZ,1 DIMM
- Solid State hard drive (SSHD): 16GB Solid State Drive (mini-card Module/PATA)

Since the graphics controller uses the same RAM as the OS, upgrading the RAM to 2GB (DDR2 533MHz) is possible since the 82945GSE supports up to 2GB of RAM on single channel. SODIMM memory type PC4200 (533Mhz) or PC5300 (667Mhz) will work. Increasing the RAM will provide better overall performance, especially if you are running Windows XP. The Ubuntu Linux, that is the other OS option, has been reported to be customized for 1GB of RAM. If you want 2GB of RAM for Ubuntu Linux, the current recommendations are either recompile the kernel or install a full version of Ubuntu Linux (<http://www.ubuntu.com>).

For productivity or entertainment, more storage space is a must. The Mini 9 supports 3 USB ports so connection to external drives are possible, but increasing the internal PCI-e SSD card is also possible if you don't want to carry extra storage devices. There are PCI-e SSD drives up to 64GB in size. [Jkkmobile.com](http://www.jkkmobile.com) mentioned an online store to purchase these higher capacity cards: <http://www.mydigitaldiscount.com>. Swapping out the drive will require a re-install of the OS, however.

WiFi and BlueTooth are the wireless connectivity solutions. Wireless broadband can be connected via USB, but [Jkkmobile.com](http://www.jkkmobile.com) came up with a work around to add an internal modem: <http://www.youtube.com/watch?v=4RpWAcYxQ9c>. The only drawback to this work around is the loss of WiFi.

Any change in hardware will affect the battery life of the system. If you increase the RAM, drive size, or connect an external USB hard drive, battery performance will be less than advertised. Finally, there are skins available for the Mini 9. A couple of online stores with skins available are: www.skinit.com and http://stores.ebay.com/3acp_Inspiron-mini-9_W0QQcolZ4QQdirZ1QQfsubZ304639016QQftidZ2QQtZkm

Operating System

The Mini 9 supports two operating systems: Ubuntu Linux and Windows XP Home. The Ubuntu Linux comes with a custom shell and several entertainment and productivity applications. It has been noted on the Mini 9 customer feedback forum that if you increase the RAM to 2GB, the kernel would have to be recompiled, or a full version of Ubuntu Linux must be installed. The Linux OS doesn't need much modification, since all the right productivity software is installed for the person who wants connectivity and the ability to make presentations. Here is one person experiences with the Mini 9 and Linux: <http://techexplorer.com/2008/11/04/using-my-dell-mini-9-for-presentations/>.

The RAM / hard drive changes discussed above are really for Windows XP Home. Adding 2GB and uncompressing some files will make the system run faster. Increasing the drive size would provide more space for other applications. With more drive space, one could install Windows Vista...who are we kidding, just stick with Windows XP Home. You can perform all the standard changes to Windows XP Home:

- Splash screen – Create your own custom splash screen to appear on boot. Create a boot.bmp file that is 640x480 4BPP (16 Colors). Place the file in the \Windows directory. Change the Boot.ini file and add the switches /noguiboot /bootlogo.
- Change the logon screen or Graphical Identification and Authentication interface (GINA) – There are a few solutions to change the look and feel of the logon screen. The first is FrontMotion (<http://www.frontmotion.com/FMLogin/index.htm>), which provides an animated look and feel. The second is StarDock's LoginStudio™

(<http://www.stardock.com/products/logonstudio/>). Finally, you can create your own GINA solution - <http://msdn.microsoft.com/en-us/magazine/cc163803.aspx>.

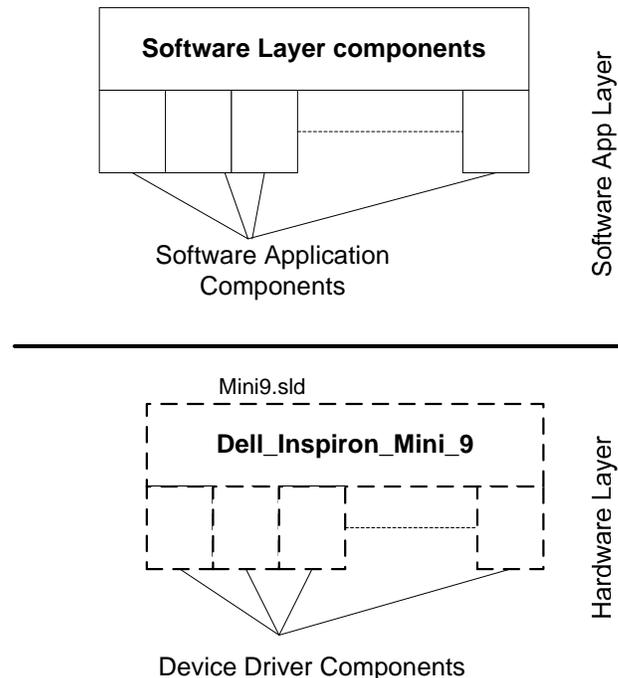
- Shell – Any application can be the shell. The current shell with the start bar and desktop is known as Explorer.exe. You can change the shell to a different application by changing the Value for the following registry key:

Key: HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\Winlogon\Shell
Type: REG_SZ

Value: Explorer.exe (or this can be a different default application. The applications should be placed in the \Windows folder or you can enter a path.)

Be careful changing the shell since you may still want access to Control Panel and other applications. This should be used when you create a custom application to be the shell. The custom application should provide the basic access to applications and administrative tools.

A device the size of the Mini 9 can be used in a host of dedicated applications. Field test equipment, control systems, video conferencing / wireless router, or network security access applications are just a few ideas. Windows XP Embedded is an ideal choice to create custom images. The SLD file that accompanies this article contains a sample platform macro component that can be used as a basis for Windows XP Embedded development.



The SLD is not complete, but it does provide the necessary hardware components to boot an image. You will need to extract the drivers from the Mini 9 platform's XP Home image. Here is how to use the SLD to create a bootable USB flash disk:

1. Download and Unzip the SLD.
2. Open the SLD with Component Designer.
3. Using the file resources of each component as a guide, extract the files from Mini 9's XP Home image. A USB flash disk is the best way to copy the files to the development machine.
4. Put the files in the appropriate repository directory.
5. Using Component Database Manager, import the SLD into the database

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6. Open Target Designer and create a new configuration.
7. Add the **Dell_Inspiron_Mini_9** platform macro component to the configuration.
8. Add the **Runtime Quick Start Helper Macro** to the configuration.
9. Add the **USB Boot 2.0** (or the update) to the configuration.
10. Add **Device Manager** and **System Control Panel** components to the configuration.
11. Run Dependency Check with auto-resolve enabled.
12. Build the image.
13. Insert an empty USB 2.0 flash disk
14. **Open** a command window
15. If developing on Windows XP Pro, run the **UFDprep.exe** utility found under \Program Files\Windows Embedded\utilities:

c:\>ufdprep <drive>, where <drive> is the drive letter for the USB flash disk you want to format

Note: *If you are developing in Windows Vista, then you don't need to run UFDprep.exe. Windows Vista lays down the correct boot sector, but you must rename the image's NTLDR to BOOTMGR or the image will fail to boot.*

16. Once the format has completed, **copy** the XPe image in the c:\Windows Embedded Images directory to the USB flash disk.
17. **Undock** the USB flash disk.
18. **Plug** the USD flash disk in the Mini 9 computer.
19. Boot the computer and enter the BIOS setup screen by hitting the 2 key, and check that the **BIOS** boot settings have the USB flash key as the first hard drive to boot. Let the computer boot through **FBA**. Once FBA completes you will have an XPe image that boots and runs on the Mini 9.

The SLD file is incomplete and will require more development to include all components to support the various features of the Mini 9.

Office Solutions

The Mini 9 is a great system to take on one-day trips; especially if there is a presentation to be made. The Ubuntu Linux configuration comes with OpenOffice (OpenOffice.org) that allows you to create and edit documents, spreadsheets, and presentation files. The Windows XP Home configuration comes with Microsoft Works and PowerPoint viewer. A key user model on a trip is to have the ability to make any last minute changes to a presentation. PowerPoint Viewer won't allow you to make changes to your PowerPoint presentations. Microsoft® Office 2007 can be installed to replace Works and PowerPoint Viewer, but the impact of an Office 2007 installation on storage space would be a limiting factor. As we were first setting up my Mini 9, an alternative office solution appeared when Java Updater signaled that an update was needed for the Java runtime. OpenOffice adds a word processor, spreadsheet, and presentation applications. It doesn't come with personal information management applications like calendar and contacts, but you can add a module from OpenOffice.org, keep Works installed, or depend on a separate smart phone device for the contacts.

Future

Speaking of smart phone, when Windows CE first arrived over 10 years ago, technology was coming together to make mobile computing a modern reality. Maybe in a few years, a powerful platform like this could also be your mobile phone as well – just add cell connection, OLED technology, and maybe a Windows® SideShow™ device.

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