CS4S18 Systems - Netbook.

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Summary

1 - Introduction

1.1 - Definition

A netbook is a low-cost, small, light, portable computer. They are designed to run web-browser, instant messaging software, office applications (word processor, spreedsheet and presentation program mainly) and not graphics software, 3D software... only light software. They have Wifi to easy connect on Internet. Netbook are created to focus on main activities on a computer.

The price of the first netbook was 300€ but now it's between 300 and 400€. Atom based netbook was started at 400€ (For the Asus EEE PC 1000HE for example). Now for the new generation of netbook, it's 350€, even if a lot's of them have the same hardware as the previous generation !

1.2 - Users and needs

When Asus, have launch the EEE PC 701, the first netbook, the slogan was “Easy to learn, Easy to work, Easy to play”. The target of this market is people who just want to do simple tasks on there computer, simply, so it can be as children as old people. We can understand that netbook are more a secondary portable computer to go on Internet and communicate than the primary computer. Netbook are “connected” computer. They include 802.11g Wifi network card by default.

Netbook are really focus on special needs, and nothing more:

Students, I think, are one of the main target of netbook. It's affordable and sufficient for a large part of use. There is only the screen which can be too little (physically and poor resolution) to be comfortable.

Businessman who travel a lot can use easily a netbook in a plane or a train to do some office stuff, and synchronize their work with a 3G connectivity or by virtual private network in an other firm.

Commercials can use netbook to be more efficient. They can use presentation program to sell a product, spreedsheet to calculate administrative things, plan meetings...

Technicians can use them too to assist people on site. A technician connect this netbook to a machine and see with a specialized software where is the problem. It's use by a French firm to help and monitor all this regional branch in the domain of weighty measure with precision.

Teachers, who can use them to made presentation everywhere, with no software compatibility problem for made presentations.

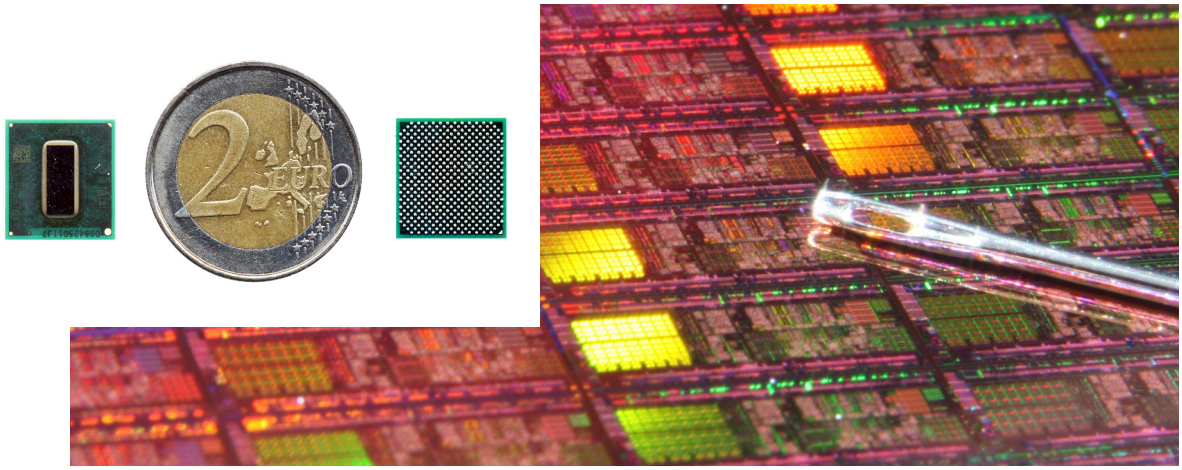
The old peoples are concerned too, but it's because of Linux I think. With a simple graphic user interface like the first Xandros, it's possible for them to write email, use video messaging... Some french people have done that (They are geeks) to keep in touch with family.

Photographers, to watch and apply basic settings to pictures with specialized software. To delete pictures “on site” when they are too bad. To drop pictures and make free space on the memory card.

Geeks, who just need a netbook. They can transform it into a web/FTP server under Debian, with integrated battery (no power cut). Doing wardriving to find the best hotspot with Backtrack operating system. Watch japan anime and favorite series in streaming. Be connected to a network attached device to listening music and synchronize files...

For every people who just need a low-cost secondary portable computer. Also, you can save your documents and synchronize your files, like this coursework, in a safe place with services like Dropbox (multi-platform) or Ubuntu One. The cost of ownership is low and cheap in case of steal.

2 - Hardware



The Atom 'Silverthorne' compare to a coin of 2€

The principal part of a microprocessor, called a "die" (here: plenty of Atom die on a wafer)

In 2009, netbook's hardware is typically a Intel Atom microprocessor at 1,6Ghz, 1GB of RAM, 160GB of hard drive space storage, a 1024x600 10 inches display, 54Mbps Wifi network card (802.11g), a little keyboard, a small touchpad, a VGA output, a SDHC card reader port, 3 USB port and 5-6 hours of battery life. There is no optical drive. Netbook hardware is focus on what is really used. These characteristics are really the same in a lot's of netbook in the market due to license limitations by Intel and Microsoft. AMD and Via, two other microprocessor manufacturers try to equip netbook with there own products. Concurrence begins to come and some device are available with these microprocessors.

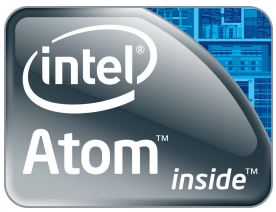
2.1 - History

Even if there is older concept which are near the netbook concept, the first netbook on the market is the Asus EEE PC 701. It's a Celeron 630Mhz powered netbook, with a 7 inches screen. The microprocessor was overcloked by many users and the second Asus netbook, the EEE PC 900 was released with the same microprocessor but at 900Mhz, the full speed. Next the Intel Atom 1,6Ghz become standard.

The 7 inches screen was chosen by Asus because it was at a low price. All portable DVD player use it so the price going down. Then, 8.9 display appears and 10 inches too. 8.9 is the format of a A5 paper. But this screen have a short life. The 10 inches screen became the standard. It allow to use a keyboard more easy to use. 11 and 12 inches screens appears with a 1366x768 resolution for "high-end netbooks".

2.2 - Processors

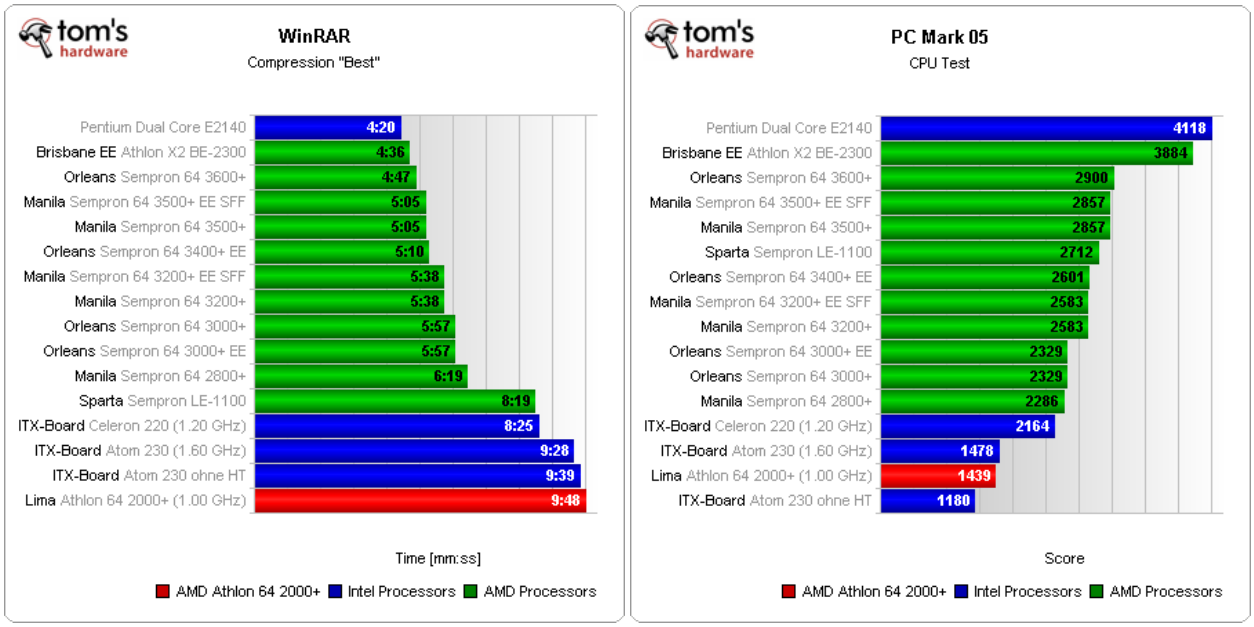
The main architecture of netbook processors is x86. There is 3 manufacturers: Intel, with the Atom; AMD, with the Athlon Neo and Via, with the Nano. Other type of architecture are planed for the future are rare in netbook offers. Processors and platform are the main part of concurrency between processors manufacturers but Intel have the leadership in netbook market. Netbook manufacturers provide the Atom processors mainly.



The Atom microprocessor is the older and the leader, AMD and Via arrived late so the Atom is at the first position on the market. It's a ultra-low-voltage CPU develop at the origin for The One Laptop per Child project. And some OLPC-like devices have the same market for non-emergent country. The Atom processor is half powerful as a Intel Pentium M as the same frequency: “For example, the Atom N270 found in many netbooks such as the Eee PC can deliver around 3300 MIPS and 2.1 GFLOPS in standard benchmarks, compared to 7400 MIPS and 3.9 GFLOPS for the similarly clocked (1.73GHz) Pentium M 740.” (http://en.wikipedia.org/wiki/Intel_Atom).

Netbook delivers with Atom are only single core and only x86, not x86-64 so you can't have a 64 bits operating system on it. There is two code name for Atom, Silverthorne and Diamondville. The first is the most energy efficient, with a thermal design power maximum of 2.4W, the second, 4W. It's very impressive but the environment at the beginning of the platform consume 10W. Intel have released a more energy efficient chipset, the GMA 500 code name “Poulsbo” with a TDP less than 5W but it's not easy to install Linux based OS on it and the chpset use a Parrallel ATA interface (and not a Serial ATA interface). “Ubuntu is the Linux distribution that best supports GMA500” says Wikipedia. Nvidia, a graphic chipset, can be added to netbook and allow them to play game, support hardware Adobe flash technology, use on many “Website 2.0” and watch HD movies.

For the moment, it's a market on similar desktop platform. Intel sell the Atom with the chipset as the same price than the Atom alone so a Nvidia Ion platform is a little more expensive than a basic Intel platform, but that is a problem on a low-cost market.

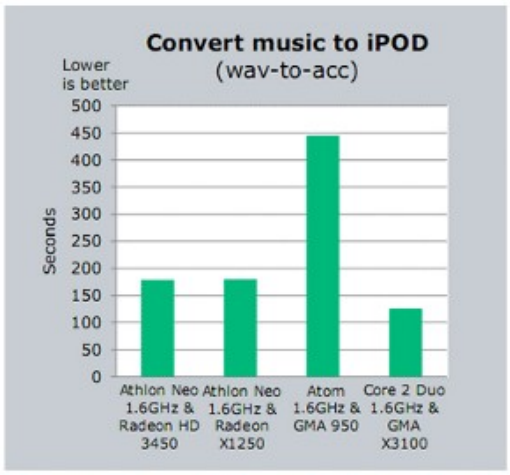


Benchmarks let see us than the Atom is a back to the past in term of performance

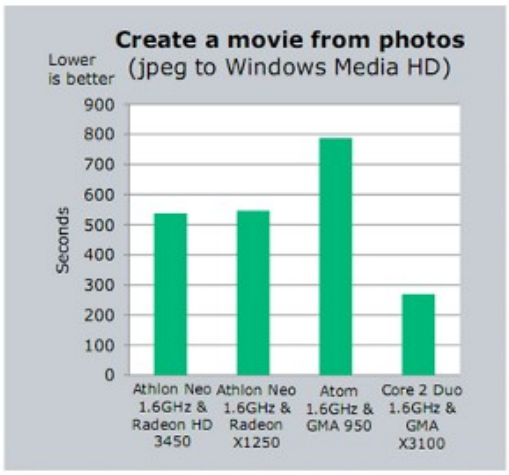
The Nvidia Ion chipset can be provided with netbooks and offer, with the Atom processor, an experience more interesting than 2 years old expensive ultra-portable. Consumers must define their needs and choose the better between Atom+Ion netbook and an affordable CULV notebook. Example: between an Acer Timeline 1810TZ and an HP Compaq Mini 311c. For the moment, the offer in Ion netbook is not wide but redefine the ultra-portable market and add multimedia possibilities even for netbook.

The Athlon Neo is a new CPU based on mobile branch Turion CPU by AMD. This CPU is made in 65nm (Intel is doing better with 45nm) so the TDP is higher, 15W, that can have an inpact on the battery life time. Performances are better and the platform is concerning about gaming with a little graphics card really better than the GMA of Intel. So you can doing more things with it than the Intel platform, video game (a little) and watch films in high definition due to the graphic card capability. One of the first netbook which use Athlon Neo is the MSI Wind U210 at 338.9€, with a ATI Radeon Xpress X1250 graphic card. The battery life is maximum 5 hours real with this netbook.

A HP Pavillon DV2 can read Blu-Ray disk and use an external monitor without issues, but the DV2 netbook exists in 3 or 4 versions and the more powerful is necessary.

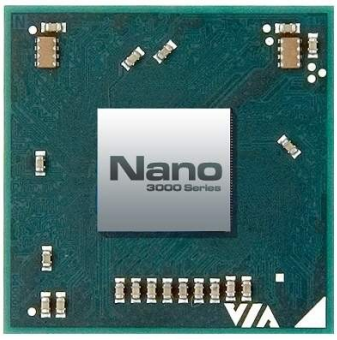


Price	0%	-7%	-36%	140%
Perform.	0%	0%	-148%	30%



Price	0%	-7%	-36%	140%
Perform.	0%	-1%	-148%	50%

Performances comparison in multimedia applications between a AMD Athlon Neo and a Intel Atom



The Via Nano is an interesting 64bits CPU, like The AMD Athlon Neo and is more powerfull than a Atom too: “Benchmark Results: The CPU test in 3DMark06 showed that the VIA Nano L2100 processor at 1.8GHZ easily beat the Intel Atom 230 processor at 1.6GHz. The 99 point difference in the CPU score was enough to make the VIA Nano L2100 nearly 21% faster than the Intel Atom 230 processor. A score of 576 isn't anything out of this world, but for sub $70 platforms it's nothing to laugh at.“ on legitreviews.com. A Via Nano ULV U2250 1,3Ghz is used in the Samsung NC20 netbook and looks like any another Atom based netbook for the others features, 1GB of RAM, 160GB of hard drive disk, etc... but it cost 434€ ! It have a 12 inches 1280 x 800 display, bluetooth 2.0 an 6 cells 5200mAh battery, it's great but too much expensive I think for the target. It can be choice only for the screen and the price approach classic notebook and Core 2 Duo ULV based notebook.

2.3 - I/O, connectivity and its limitations

The main problem on a netbook, is the keyboard, which is a percentage of a normal keyboard, around 80% (with a 10.2 inches display on a netbook). After the market try to search the better ratio between screen/keyboard/dimensions, the 10.2 inches is now the reference. It's the easiest way to type on a keyboard without made a lots of mistake due to key too little.

The touchpad is really little, but I think that not a really problem, people who have the habits to use it can adapt the speed and precision and people who use a mouse will probably continue... in spite of waste space in the bag.

It's a fact, there is often 3 USB ports, 2 for USB key (or external drive or camera, for sharing data) for example and one for the mouse if you need it.

There is also the old-fashion VGA port, because chipset of netbook doesn't support better and was conceive too fast on old guaranteed technologies. Normally, this port on this type of product is used for presentation, so it's a good choice, we can see this port everywhere.

Then, we found a HDHC card reader, very useful for save photography on the internal hard drive of the netbook. You can save easily your photography because you can handle easily your netbook! On the first netbook, the Asus EEE PC 701, it was a way to increase the available memory space.

To finish, there is a Kensington Port, it's a port where you attach a cable if eventually someone want to steal your netbook. This is definitely the better aspect of a netbook, if your hard drive is encrypted and your data safe and synchronize (on FTP, cloud or USB Key), you don't care about lost a netbook, it's better than if someone steal your 2500€ ultra-portable notebook !

Don't forget than there is no optical drive, you need to buy an external drive to reinstall Windows, and it's useless if you are under Linux, with a USB key, you can do that too. Not provide an optical drive is a good way to made economy on the price, on the battery, on the weight and because we don't use it often, we don't need it !

2.4 - Network and storage

All netbooks comes with 54Mbps Wifi and Ethernet port (100Mbps). Just to go on Internet, it's sufficient.

At the beginning, netbook where provided with solid state disk. From 2 to 20GB. The 2GB edition of the Asus EEE PC 701, called surf, has been canceled due to a poor demand. The 4GB is present and model with 8, 12 and 20GB where provided during the second generation of netbook. After, and with Windows XP, netbook where sell with 80 and rapidly 160GB of classic hard drive disc.

It's trivial to change a 2,5 inches SATA HDD, but not a SSD. But, some manufacturers have proposed mini-PCIe SSD, from 8 to 64GB, with respectable performances for price. But now, it's hard to update this netbook and the cost of this mini-PCIe SSD is not, for me, in the spirit of netbook, this devices increase the price too much.

Some manufacturers offers try to sell online 'cloud' storage account with 1 year free.

3 - Software

3.1 - History

The first netbook, the Asus EEE PC 701, was running a Linux base operating system, Xandros. It was impossible to use Microsoft Windows Vista on a netbook so Microsoft have decided to extend the availability of Windows XP. This operating system is obsolete and now, new netbooks use Windows 7. The market for Linux on netbook is decreasing. People want Windows and aren't feel comfortable to use Linux, install programs,...

3.2 - Operating systems

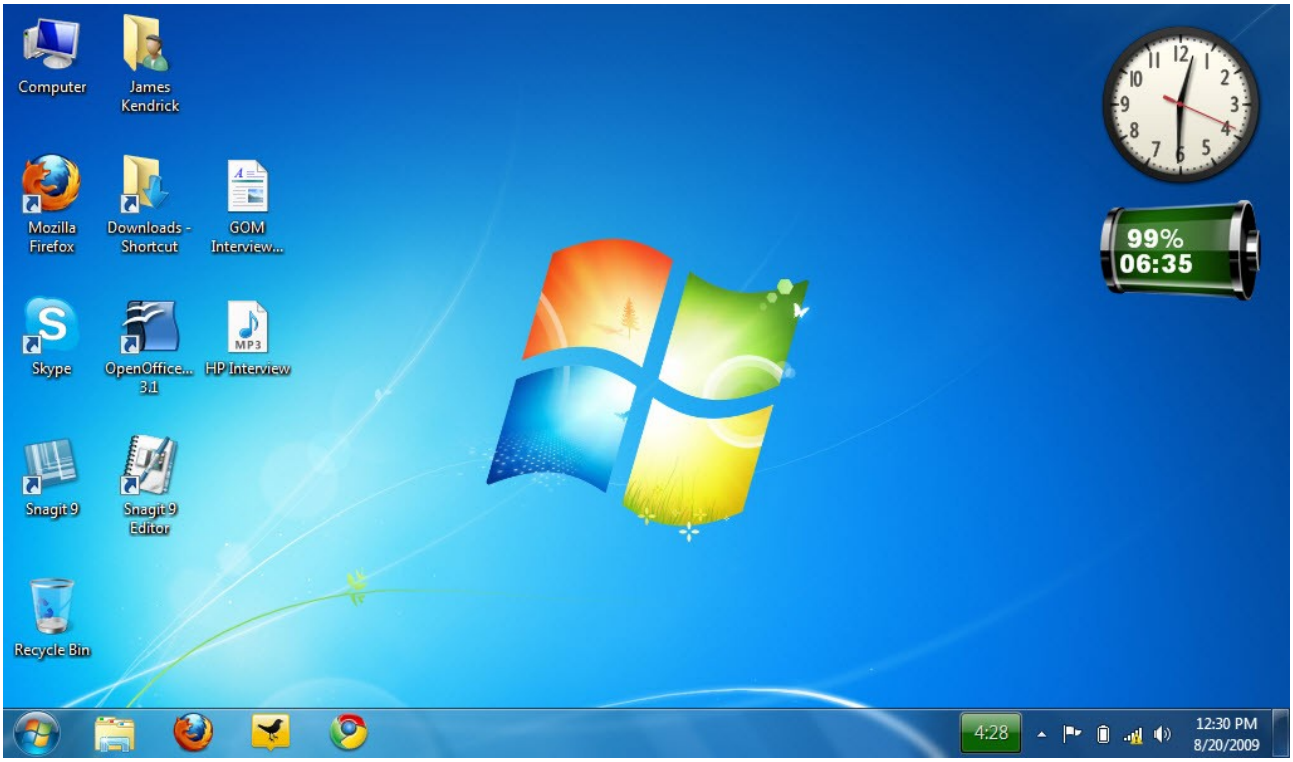
Xandros: It's the first operating system for netbook but had never be used by consumers. People prefer use another Linux based distribution. They were problems about update and license because free open source software and proprietary (and closed) software are mixed. The aim of this distribution is to be simple. This system have a 20 seconds boot time. Today, this OS is not installed on every netbook.

Xandros

Windows XP: It's the main operating system in netbook now. Now, over 90% of netbook is powered by Windows XP. Microsoft have seen the success of the Asus EEE PC 701 with 300 000 units sold the first year (2007) and have decided to be present in this market. The advantage of Windows XP is to be well known by users and compatible with a lot's of stuff, including peripherals like camera, printers... Windows XP was a solution at short time, but a problem at long time, for both Microsoft and users. Today, this OS is on this end, replace by Windows 7 Starer.

Windows 7: It's the future of netbook. Windows Vista was unable to be used on a netbook, but 7 can. There is Windows 7 Starter edition which is more specialize for support netbook, and come with many limitations: Up to 2Ghz microprocessor, 1GB of RAM, 10,2 inches screen, 250GB of hard disk space or 64GB of solid state disk. Every netbook which want to have more than that must have a Family Premium license of Windows 7. So now, we can see this new generation of netbook in store.

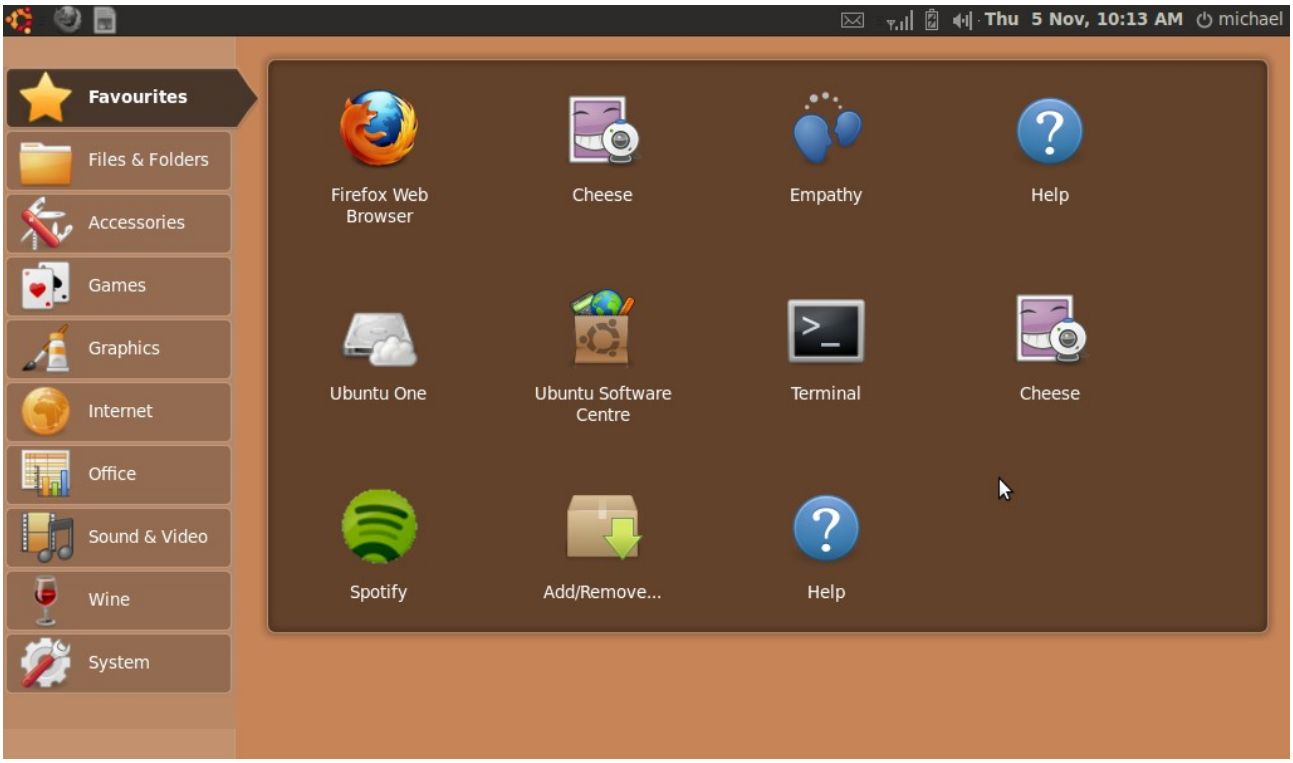
Windows 7 define the new generation of netbook hardware, due to license and Intel, which have the main part of the hardware market (in this sector). Windows 7 Starter will probably become the main operating system in a lot's of netbook.



Windows 7

Ubuntu Netbook Remix, Eeebuntu and Easy Peasy: All these Ubuntu based operating system are a great alternatives to Windows. They aren't commercialize with new netbook, and, except for the Dell Inspiron Mini 10 and the Toshiba NB100, you have to install it by yourself. Ubuntu is the most popular version of Linux based OS and Canonical ave develop officially Ubuntu Netbook Remix. There is a launcher as desktop, an application to manage little resolution display and classic Linux applications: Firefox, Evolution (Classic on Ubuntu), OpenOffice.org, Empathy (Thy have change, it was Pidgin previously). All netbooks based on Linux operating system are well adapt to a 1024x600 screen. See screenshots on next page.

Ubuntu Netbook Remix 9.04



Ubuntu Netbook Remix 9.10

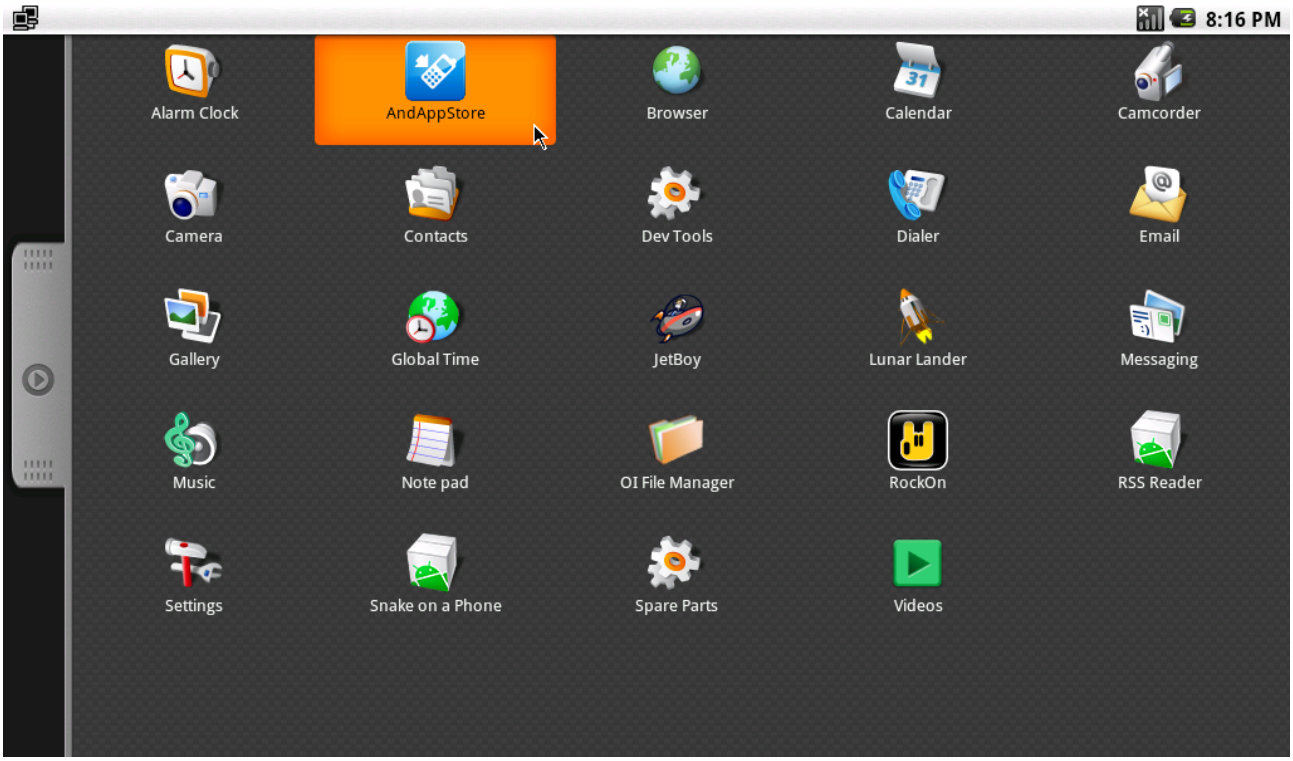
Moblin 2.0: This Linux based operating system is mainly developed by Intel. Netbook base on it will appears at Dell store and Acer replace Linpus Lite by it. Moblin 2.0 provide Myzone, to see user's latest activities, a custom toolbar which allow to personalize content on the screens, a specific web-browser based on Mozilla

technology and a media player for pictures, sounds and video. With Ubuntu Netbook Remix, it's one of the most attractive alternative. Canonical works on Moblin too and have develop Ubuntu Moblin Remix. Intel insist to place his operating system in netbook market. Next generation of hardware is like the actual in term of performances and its a limit for Windows.

Moblin 2.0

Ubuntu Moblin Remix

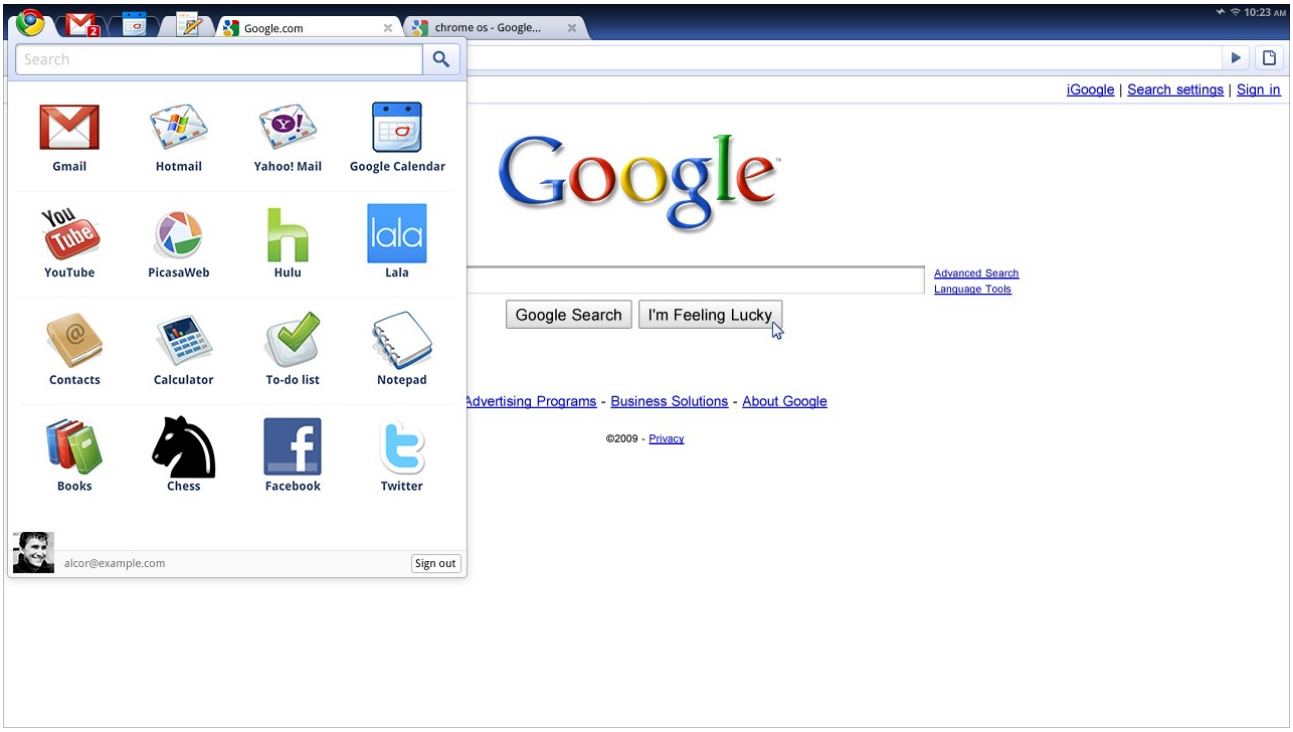
Android: It's an operating system made by Google on Linux based. It works on many platforms: ARM, MIPS, Power and x86. It' more for smartphone than netbook, but the world between them is tight. So you can do on a netbook some smartbook traditional applications: SMS, MMS, GPS, multi-touch... with catalog for applications called Android Market. I think that running this OS on a netbook is no a great idea. The OS looks like close for any applications if not on the store and the announce of Chrome OS sounds like Google cut the link between smartphone and netbook. Android is like Chrome, a Google centric OS. On this moment, you can buy just one netbook with Android, the Acer Aspire One D250-0DQb (too long...) with Windows 7 in dual boot.



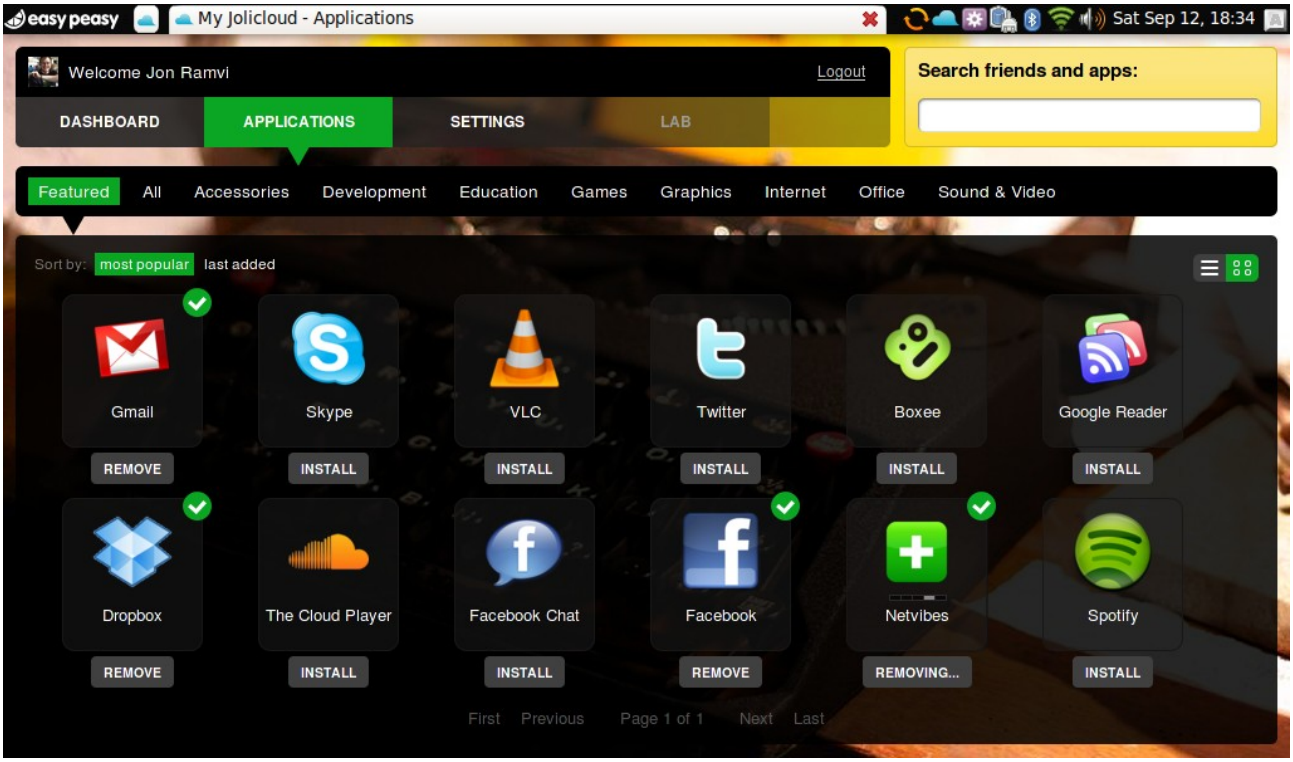
Android (x86 version)

Chrome OS: Chrome is an OS made by Google based on Linux and Chrome web browser. In fact, the web browser is the operating system. So it's an operating system oriented web-applications and use only applications certified by Google. S you can't install everything you want. It's work offline with Google Gears and offer the really base for an OS: e-mail via Gmail, office tools via Microsoft Office Web Apps (and not Google Docs...) and instant messaging. Like Android, it seems close to a lots of application if Google doesn't approved them. Today, it's not release with a netbook but will come in 2010 as pre-installed OS on a solid state disk. The time to boot is between five and 10 seconds, like a specialized appliance. Wait and see ! Screenshot on the next page.

Jolicloud: It's an OS based on Ubuntu (another one !) which have an interface looking like Ubuntu Netbook Remix 9.04. It appears like a system mix between Android, with a store for applications and icons for them (like on the i-Phone too) and a general OS like Ubuntu. A great deal between free open source and proprietary (but always free as don't pay for it) world. But this OS announced by Tariq Kim (a French guy !) will probably arrive too late if it want to have a great market part. It's a OS compatible with touchscreen and all netbook made. And like Chrome OS, user's data are stored on the cloud.



Chrome OS



Jolicloud

4 - In the future

There are several announces about future technologies that will be used in netbooK. CPU will become probably 64 bits and dual-core, and not necessarily more powerful with Intel. Graphics capabilities will be enhanced to allow users to do more with a netbook, first of all, watch HD videos. The display will probably pass at 1366x768 pixels to watch HD movies in good conditions. Technically, Intel have announced the Atom code name PineView D, available in single and dual core with a half TDP by comparison with the actual Atom. This CPU doesn't need any fan. It can be really great with a SSD. With no sound noise and a cold CPU, it can be very comfortable to use a netbook everywhere you want. The “Cedar Trail” Atom platform, in 2011, will support DDR3 RAM , DirectX 10.1 (to play games) and read HD Blu-Ray movies natively (There is no indication about an optical drive integration). The “Pine Trail” platform is announced for 11 of January (CES Las Vegas).

I don't have speak about ARM processor, it's because there is nothing on the market which use this type of processor! But ARM or MIPS CPU will probably arrive at the same time as the Google Chrome OS. That allow Google to create some netbook really cheaper. Normally, this type of CPU is used in smartphone. There will be probably more concurrence due to Google, ARM, Via and AMD CPU and the demand for another OS than Windows 7. I hope than people will try other OS. Price will probably decrease to 250-300€ (Near the same in Pounds). There is only one reference about touchscreen in a netbook, the Asus EEE PC T91MT. This type of use will probably arrive because many OS can use that function easily. So, I can say that graphical user interface will be adapt to small screen too, with a better ergonomy. So we can imagine tablet PC with only a touchscreen.

There is a really little limit between the netbook, the smartphone and the ultra-portable notebook market. Smartphone will attack the netbook market later due to a high price for the same features, except that you can phone with ! But ultra-portable market is really interesting for peoples who wants more than a netbook. You can have, now, a powerful Acer 1810TZ-414G25n which is provided with a Pentium Dual-Core SU4100 1.3Ghz, 4GB of RAM, 250GB of hard drive disk space, a 11,6 inches 1366x768 display powered by a GMA 4500MHD. And the best: 8 hours of battery for 490€ (450€ without Windows 7 Family Premium). It's a big attack to the netbook market. On the classic notebook market, low cost products are more powerful but appears cheaper.

More the time pass, and more the netbook concept is not low-cost, manufacturers are engaged in a run to offer more and more features in a netbook. The good thing is that allow to decrease price of technology but there is no really offers for low-cost products. The market in 2009 is evaluated at 35 millions of netbooks sold, 2010 for 2010 and 135 in 2013. We can hope than a variety of manufacturers will support other hardware and decrease prices for a future wider market god for consumers.

Prices are from 300€ to 500€, the market became wide in just 2 years and perhaps we can talk about range of netbook in the future, with really cheaper netbook, and other with more features, like touchscreen will be the high-range of this market. Perhaps, we can have too, a netbook with only touchscreen (and no keyboard) like TechCrunch want to do (project aborted for rights reasons) and an Apple tablet which can provide officially Mac OS X on a netbook.

Its important to well know users need and chose the good product, the range of devices and platform is very large in powerfulness term (not only on the market netbook), from something like a half Pentium M (or first Pentium 4) to i7M quad core... Public is not aware about differences between an Atom and a i7 processors, advices are really necessary !

5 - Conclusion

Netbook are not rules by the hardware, but really by the software, and the operating system. There is real opportunities to change it and try something more adapted than Windows. Peoples need to discover other operating systems as they do for change habits from notebook or desktop computers. It's not so complicated !

A netbook is really a good choice for people who have the need of it. It seems normal but there is a lot's of misunderstood. I have see that netbook are sell like notebooks and many people are not aware about there limited capabilities. So many non geek users are not satisfied about their products. There is a lack of information in many store about that.

Netbook manufacturers don't have understand that customer needs is to have a low cost portable computer and add functions like 3G, bluetooth, TV decoder, real SSD... instead of decrease the price. And new “high-end” netbook are at the same price as ultra-portable computers.

I'm interesting by “small notebook” since I've seen the JVC Mini Note. With a Intel Pentium 3 933Mhz, 256MB of RAM, 8.9 inches display (in 1024x600), 30GB of hard drive disk space and USB 2.0 port (not 1.1 !). But it was too expensive, 2500€. It was provided with a Pentium 3 but all the other notebook where provided with Pentium 4. I don't understand why he doesn't appear in history of netbook spirit as well as Psion, Toshiba Libretto or Fujitsu Lifebook B112 (and B114) !

For my part, I don't have buy a netbook, but I think that the most interesting netbook was the Asus EEE PC 1000HE (See my first page), because it have standard hardware, so it's support by Linux based operating system without major problems. It have a comfortable 10 inches non glossy display and a really efficient keyboard, near a normal keyboard. And 9 hours of battery life (The battery is movable, not like the new Asus 1008P Seashell, and you can have more battery life with Bluetrade 9800 mAh battery, 12 hours, incredible). It have 160GB of hard drive space and I prefer that to a solid state disk. Because I can put a lot's of music on it, and because it's more adapted to my needs. I think a solid state disk is useless (for the moment) in a netbook, there is no performances we waiting for (it's more like a USB key than a real SSD) and you can't replace the SSD because memory ships are fixed on the motherboard or you can't upgrade this component as well as a hard drive disk (in fact, a 2,5 inches SATA form factor drive). Also, I prefer used a Linux based operating system because I don't want to install antivirus, antispyware and firewall on a low computer. When I was the most interesting to buy a netbook, there is only Windows XP and I don't want to use a old-fashion OS near to its end.

Te secondhand market is interesting to by a netbook. Because you can have a standard hardware netbook for nearly 100£ (I talk about French secondhand market !) with the same price as a new netbook. The first Asus EEE PC 701 is at 80€ (88£) on the secondhand market.

6 - Sources

Netbook: do consumers know what they are purchasing ?

http://www.npd.com/lps/Netbook/

Don't miss that! Netbook for photographers, in french, with videos and interviews:

http://www.blogeee.net/2009/12/un-netbook-au-service-dun-photographe-une-video-a-voir-absolument-si-vous-etes-amateur-de-photo/

http://www.blogeee.net/2009/01/le-dell-inspiron-9-au-service-dun-photographe-pro/

http://www.richard-olier.dyndns.org/blog/#param=id_204

The same in English:

http://www.robgalbraith.com/bins/multi_page.asp?cid=7-9320-9876

Explanations about Windows Starter on one of the most prestigious French website about technologies ;) :

http://www.pcinpact.com/actu/news/52475-windows-7-starter-netbooks-conditions.htm?vc=1#vc

A specialized French website about netbook, this guy have started his blog in November the year before the EEE PC 701 was introduce. It's the first source of information about netbook in french:

http://www.blogeee.net

Athlon Neo performances (in French):

http://www.generation-3d.com/actualite-Amd-Athlon-Neo-pulverise-un-Atom-,ac13902.htm

Intel Atom 230 versus VIA Nano L2100:

http://www.legitreviews.com/article/757/1/

http://www.silicon.fr/fr/news/2008/08/05/le_via_nano_surclasse_l_intel_atom

Intel Atom versus Athlon and Intel Atom performance in general:

http://www.tomshardware.com/reviews/Atom-Athlon-Efficient,1997-11.html

http://reviews.cnet.com/laptops/gateway-lt3103u/4505-3121_7-33721171-2.html?tag=txt;page

Netbook versus notebook (in French):

http://www.bestofmicro.com/actualite/test/388-9-portable-notebook-netbook.html

http://www.blogeee.net/2009/12/asus-ul30a-contre-eeepc-1201n-un-duel-en-images/

Netbook World Summit (with datas about the market):

http://www.silicon.fr/fr/news/2009/11/29/netbooks___un_marche_a_135_millions_d_unites_en_2013

http://www.netbookworldsummit.org/

The futur of Atom CPU (in French):

http://www.blogeee.net/2009/11/atom-cedar-trail-pour-2011-32-nano-directx-10-1-et-video-hd-au-menu/

http://www.clubic.com/actualite-306932-intel-pine-trail-atom-n450-processeur-basse-conso.html

http://www.blogeee.net/2009/12/Intel-et-nvidia-en-passe-de-definir-les-2-netbooks-types-du-marche-2010/

Review of the JVC Mini Note, for me, the same spirit as netbook (except the price...):

http://www.trustedreviews.com/laptops/review/2005/01/24/JVC-Mini-Note-Ultra-Portable-Notebook/p1

One of the first French e-commerce website, see prices:

http://www.materiel.net/ctl/PC_Portables/#prods

Another one:

http://www.ldlc.com/cat/451.html

I read a lot's of French magazine like “PC Update” and “Hardware Magazine”, so I have knowledges from here which I well remembered:

http://www.techage.fr

I have used a lot Wikipedia, in English and French, to remember me exact specifications and the variety of operating system:

http://en.wikipedia.org/wiki/Netbook

http://fr.wikipedia.org/wiki/Netbook

http://en.wikipedia.org/wiki/List_of_Netbook_Distributions

http://en.wikipedia.org/wiki/Ubuntu_Netbook_Remix

http://en.wikipedia.org/wiki/Easy_Peasy

http://en.wikipedia.org/wiki/Moblin

http://en.wikipedia.org/wiki/Android_(operating_system)

http://en.wikipedia.org/wiki/Google_Chrome_OS

http://en.wikipedia.org/wiki/Jolicloud

Final mark awarded _____

UNIVERSITY OF GLAMORGAN
Assessment Cover Sheet and Feedback Form
2009/10

Module Code: CS4S18	**Module Title:** Principles of Computing	**Lecturer:** C. W. Morris
Assignment No: 3	**No. of pages in total including this page:**	**Word Count:**
Assignment Title: Computer System Specifications		
Tasks: See last sheet		

Section A: Record of Submission

Record of Submission and Plagiarism Declaration

I declare that this assignment is my own work and that the sources of information and material I have used (including the internet) have been fully identified and properly acknowledged as required in the referencing guidelines provided.

Student Number: 07209525

You are required to acknowledge that you have read the above statement by writing your student number(s) above.

Details of Submission

Note that all work handed in after the submission date and within 5 working days will be capped at 40%. No marks will be awarded if the assignment is submitted after the late submission date unless mitigating circumstances are applied for and accepted.

- IT IS YOUR RESPONSIBILITY TO KEEP A RECORD OF ALL WORK SUBMITTED.
- An electronic copy of your work should be submitted via Blackboard.
- Work should also be submitted to the member of academic staff responsible for setting your work.
- Work not submitted to the lecturer responsible may, **exceptionally**, be submitted (on the submission date) to the reception of the Faculty of Advanced Technology, which is on the 2nd floor of G block (Room G221) where a receipt will be issued.

Mitigating Circumstances: if there are any exceptional circumstances which may have affected your ability to undertake or submit this assignment, make sure you contact the Faculty Advice Shop on 01443 482540 (G221).

Section B : Marking and Assessment		
This assignment will be marked out of 100% This assignment contributes to 33% of the total module marks.		It is estimated that you should spend approximately 15 hours on this assignment.
Date Set: 25/11/09	**Submission Date: 13/01/10**	**Feedback Date: Normally within 20 working days of submission**

Learning Outcomes		
This assignment addresses the following learning outcome(s) of the module: Explain the organisation and operation of a typical modern desk-top/multimedia system and understand the roles of hardware, software, data and information.		
Marking Scheme	**Marks Available**	**Marks Awarded**
1. Introduction uses and standards	20	
2. I/O, connectivity and its limitations	20	
3. Processors and storage	20	
4. Operating systems	20	
5. Conclusions and the future	20	