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Linux OS comparison according to 64 bits processor

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Content

Linux OS comparison

This study tries to compare 3 major Linux Operating System according to IRAM situation. Then, hardware comparison is made between 2 available mother card and benchmarks results are show comparing standard processors and 64 bits configurations. Finally a short bench will be done showing Ethernet gigabit performances using the test configuration (PC 64 bits running Fedora C3, with 2 Go of DDRAM and an Ethernet interface card at 1 Gbits/sec).

Actually two Unix operating systems are in usage at IRAM: HP-UX and RedHat. HP-UX is at the end of its life and only RedHat is really used. Until December 2003 and 9.0 release, RedHat is well supported and completely free. Since that date RedHat is divided into two projects: RedHat Enterprise and Fedora. Because RedHat Enterprise become not free and the free continuation named Fedora is not well known, we are trying to search the best way to continue with Linux solution.

Actually 6 major free Linux OS are used by the community. They are classified by decreasing order (in term of distribution downloaded through the Net):

- MandrakeLinux
- Fedora Core (RedHat evolution)
- Knoppix
- Debian GNU/Linux
- Gentoo Linux
- Suse Linux

To simplify this study and because Knoppix is mainly used to recover from crash (only bootable from CD), we will compare: MandrakeLinux, Fedora Core and Debian GNU/Linux.

1 Brief comparison

1.1 Mandrake Linux

MandrakeLinux, started by Gaël Duval, is a distribution that has experienced enormous rise in popularity since its first release in July 1998. The developers took the Red Hat distribution, changed the default desktop to KDE and added an easy-to-use installer, breaking the myth that Linux is hard to install. Mandrake's hardware detection features and disk partitioning utilities are considered by many to be the best in the industry and many users found themselves running Mandrake where other distributions failed to provide the required usability.

MandrakeLinux has since matured to become a popular distribution among those new to Linux and among home users looking for an alternative operating system. The Mandrake development is completely open and transparent with new packages appearing in the so-called "cooker" directory on a daily basis. When a new release is entering a beta stage, a cooker snapshot is accepted as the first beta. The beta testing process used to be short and intensive, but starting with version 9.0, it has become longer and more thorough. The beta mailing lists are extremely busy, but you are still likely to receive a very fast response to any bug or concern that you report.

The result of this type of development is a cutting edge release - a highly up-to-date Linux distribution. As a trade-off, the users are likely to notice more bugs and perhaps less stability than with other distributions. Many people find this trade-off acceptable on their desktops - they get the very latest software and the occasional application crash is something they can live with.

Pros: User-friendly, graphical configuration utilities, enormous community support, NTFS partition resizing.
Cons: Some releases are buggy, the releases are initially made available to MandrakeClub members only.
Software package management: RPM

Free download: FTP installation available immediately after release, ISO images only after a delay lasting several weeks

1.2 Fedora Core

For many, the name Red Hat epitomizes Linux, as it is probably the best-known Linux company in the world. Founded in 1995 by Bob Young and Marc Ewing, Red Hat, Inc. has only recently started showing signs of profitability, due to services and its Red Hat Enterprise Linux product line. However, Red Hat Linux 9 was the last version in the Red Hat Linux product line, which was replaced by Fedora Core in late 2003. While Fedora is officially sponsored by Red Hat, it is developed with community participation, has a short life-span and serves mainly as a testing base for Red Hat Enterprise Linux.

What is so special about Red Hat Linux and Fedora Core? It is a curious mix of conservative and leading-edge packages put together on top of many knowledge-intensive utilities developed in-house. The packages are not the most up-to-date; once a new beta version is announced, the package versions are frozen, except for security updates. The result is a well-tested and stable distribution, the beta program and bug reporting facility are open to the public and there are several mailing lists. Red Hat Linux has become a dominant Linux distribution on servers around the world.

One other reason for Red Hat's success is the variety of popular services the company offers. The software packages are easy to update via Red Hat Network, a free repository of software and valuable information. A vast range of support services and enterprise Linux products are available from the company and, while not always cheap, you are virtually assured of an excellent support by highly skilled support personnel. The company has even developed a certification program to further popularize its distribution - the RHCE (Red Hat Certified Engineer) training and examinations are now available in most parts of the world. All these factors have contributed to the fact that Red Hat is now a recognized brand name in the IT industry.

Pros: Widely used, excellent community support, lots of innovation.
Cons: Limited product life-span of the free edition, poor multimedia support, concerns over the Red Hat to Fedora transition
Software package management: RPM
Free download: Yes

1.3 Debian GNU/Linux

Debian GNU/Linux, started by Ian Murdock in 1993, is a completely non-commercial project; perhaps the purest form of the ideals that started the free software movement. Hundreds of volunteer developers from all over the world contribute to the project, which is well managed and strict, assuring a quality distribution known as Debian.

At any time during the development process, there are three branches in the main directory tree - "stable", "testing" and "unstable" (also known as "sid"). When a new version of a package appears, it is placed in the unstable branch for first testing. If it passes, the package moves to the testing branch, which undergoes rigorous testing lasting many months. This branch is only declared stable after a very thorough testing. As a result of this, the distribution is possibly the most stable and reliable, albeit not the most up-to-date. While the stable branch is perfect for use on mission critical servers, many users prefer to run the more up-to-date testing or unstable branches on their personal computers.

Debian's other main claim to fame is the reputation for being hard to install, unless the user has an intimate knowledge about the computer's hardware. Compensating this failing is "apt-get", a convenient installer for Debian packages. Many Debian users joke that their installer is so bad, because they only need it once - as soon as Debian is up and running, all future updates of any scale can be accomplished via the apt-get utility.

Pros: 100% free, excellent web site and community resources, well-tested, painless software installation with apt-get.
Cons: Archaic installer, the stable version tends to be out-dated.

Software package management: DEB
Free download: Yes

2 Comparison inside IRAM context

Avantages	Mandrake	Fedora Core 3	Debian sarge
Cost:	IRAM must be a member to the club (~100 euros)	Free	Free
Compatibility with RedHat 9.0	Based under RedHat and very similar today	Simple evolution of RedHat	Other concept
Package management	RPMs. Very well distributed.	RPMs. Very well distributed.	DEB. More specific using APT package.
Stability.	Less stable because rapidly including new release. Very good for new technologies like Laptop, not needed for servers or Desktop.	Stable and well adapted for Desktops.	Very stable but using old packages. Very well for servers but not adapted for Laptops or recent Desktops.
Installation	Very easy	Like RedHat (easy with graphical interface).	More difficult. Manually configure each kernel modules with their specific options.
Hardware support	Very Good because highly up-to-date.	Good for Desktop with some problem for new Laptops.	Good for server but need to be customize to support new hardware, limiting standard installations.
64 bits processor	**Yes Intel/AMD**	**Yes Intel/AMD**	**Yes Intel/AMD**
Net distribution:		1 DVD iso image	7 CDs iso images or 1CD+network installation.
Time to install without customization:		20’	45’
Time to customize:		15 ‘	30’
CrossOver support:		From internet	From internet
VMWare support:		From internet	From internet
TeX/Latex support:		By default	Customization
Blas support:		By default	Customization
Lapack support:		By default	Customization
Acroread support:		From internet	Customization
Wine support:		From internet	Customization
Gcc release:		3.4.2	3.3.4
Firewall support:		By default: IPTABLES	Customization
NIS support:		By default	Customization
Sendmail support:		By default: 8.13.1-2	Customization
Named support:		Customization	Customization
Disk statistics		By default: hdparm	
Partitioning support:		By default: fdisk	By default: fdisk
ACL support:		By default	Not supported
Graphic environment		Gnome	Gnome
Printing environment		CUPS	CUPS
Web server		Apache	From internet
Web navigator		FireFox/Mozilla 1.7.3	Mozilla 1.7.3
Mail browser		Evolution Mail	Mozilla
Package activation tools		chkconfig	
Package installation tools		Rpm 4.3.2-21	Apt-get
USB Key support:		By default	To configure

3 Available mother cards for 64 bits processors Dec, 13 2004

Socket	Chipset	Constructor	Model
939	VIA K8T800Pro	Asus	A8V Deluxe
		MSI	K8T Neo2-FIR
		MSI	K8T Neo2-F
	NVIDIA nForce3 Ultra	MSI	K8N Neo2 Platinum
940	VIA K8T800	Asus	SK8V
	« «	MSI	K8T Master2-FAR
	nVidia nForce3 PRO150	Asus	SK8N

Mother card	SK8V	K8T Master2-FAR	SK8N
CPU	-One 940-pin socket. -Supports the AMD Athlon 64 FX and Opteron 100 series CPU Built-in 1MB L2 cache. -AMD64 architecture enables simultaneous 32 and 64-bit computing	-One 940-pin socket -Supports AMD Athlon 64 FX 51 series, Opteron 100 (1-way) or 200 (2-ways) CPU.	-One 940-pin socket -Supports AMD Athlon 64 FX Opteron 100 or 200 series CPU Built-in 1MB L2 cache. -AMD64 architecture enables simultaneous 32 and 64-bit computing
Front Side Bus	Scalable HyperTransport	800MHz HyperTransport FSB	Scalable HyperTransport
Chipset	VIA K8T800 VIA VT8237 (North/South Bridge interconnect)	VIA K8T800 VIA VT8237 (North/South Bridge interconnect)	NVDIA nForce 3 pro150
Memory	-Dual-Channel memory architecture. -4 x 184-pin DIMM Sockets support max. 8GB Registered ECC and non-ECC PC3200 / PC2700 / PC2100 DDR SDRAM memory. - Maximum 8Go if using PC2700 or PC 2100, 4Go else.	-144-bit DDR at 200, 266, 333MHz, 400MHz. -Supports DIMM sizes from 64MB (128Mb x 16 DRAMs) to 2GB on each DIMM slot. -Supports 4 DDR DIMMs upto 8GB (Registered Memory only) -Supports interleaving memory within DIMMs. -ChipKill ECC allows continuous correction of 4-bit errors in a failed x 4 memory device. -For Single AMD® Athlon-64 FX 51 series, it will support Registered Memory up to DDR 400 -For Single orDual AMD Opteron Series, it will support Registered Memory up to DDR 333 DDR 400 Registered ECC Memory Validation -Samsung M312L3223EG0-CCC 256MB Registered PC3200 LP -Samsung M312L6420EG0-CCC 512MB Registered PC3200 LP	-Dual-Channel memory architecture. -4 x 184-pin DIMM Sockets support max.8GB Registered ECC PC3200 / PC2700 / PC2100 / PC1600 DDR SDRAM memory. - Maximum 8Go if using PC2700 or PC 2100, 4Go else.
Expansion Slots	-1 x AGP 8X -5x PCI -1 x ASUS Wi-Fi slot for optional wireless LAN upgrade	-1 x AGP Pro slot -4 x PCI 32-bit/33MHz slots	-1 x AGP 8X -5x PCI
Storage/RAID	South Bridge	South Bridge	

	-2 x ATA133/100 -2 x SATA, RAID0, RAID1, RAID 0+1 -Promise R20378 RAID controller -1 x ATA133 supports two hard drives -2 x Serial ATA	-2 x ATA 100/133 -2 x SATA, RAID0, RAID1, RAID 0+1-	-2 x ATA133 /100 -2 x SATA RAID0, RAID1, RAID 0+1 -Promise R20378 RAID controller -1 x ATA133 supports two hard drives.
Audio	-ADI AD1985, 6-channel CODEC -S/PDIF out interface		-Realtek ALC650 6-channel CODEC -S/PDIF out interface
LAN	3COM 3C940 Gb Ethernet LAN	Broadcom BCM5705 Gigabit LAN controllers	Integrated 10/100 LAN controller + RealTek RTL8201BL PHY
IEEE 1394	VIA VT6307 controller with 2 IEEE1394 ports		TI TSB43AB22A controller with 2 IEEE1394 ports
USB	8 USB2.0 ports	8 USB2.0 ports	6 USB2.0 ports
Special Features	AI NET AI BIOS ASUS MyLogo2 ASUS POST Reporter ASUS C.P.R. ASUS EZ Flash Support S/PDIF out interface ASUS CrashFree2 BIOS ASUS Instant Music ASUS Multi-language BIOS ASUS Q-Fan		ASUS MyLogo2 ASUS EZ Flash Support S/PDIF out interface ASUS CrashFree2 BIOS ASUS Q-Fan
Overclocking Features	-ASUS JumperFree -Memory, Vlink voltage adjustable -SFS(Stepless Frequency Selection) from 200 MHz up to 300MHz at 1MHz increment		-ASUS JumperFree -Memory, AGP voltage adjustable -SFS(Stepless Frequency Selection) from 200 MHz up to 300MHz at 1MHz increment
Back Panel I/O Ports	1xSerial 4xUSB 1xParallel 1xRJ45 1xIEEE1394 1 x PS/2 Keyboard 1 x PS/2 Mouse 1x Audio I/O 1x SPDIF OUT	2xSerial 4xUSB 1xParallel 1 x PS/2 Keyboard 1 x PS/2 Mouse 1 x floppy port 2 x IDE ports 2 x SATA ports	1xSerial 4xUSB 1xParallel 1xRJ45 1xIEEE1394 1 x PS/2 Keyboard 1 x PS/2 Mouse 1x Audio I/O
Internal I/O Connectors	-2x USB2.0 connector supports additional 4 USB 2.0 ports -20-pin ATX power connector -4-pin ATX 12V power connector -CPU /chassis/Power Fan connectors -COM2 connector -CD/ AUX audio in -IEEE 1394 connector -GAME port connector -SPDIF_OUT connector	-Power connectors (24+8 SSI) -Front panel connector -4 3-pin cooling fan locking header(2 for system & 2 for CPUs) -3-pin Clear CMOS header with a jumper -Stacked Mouse and keyboard ports -USB header (Front), Stacked 2 USB (Rear) -RJ-45 with LEDs -Stacked 2 serial and 1 parallel ports	-1xUSB2.0 connector supports additional 2 USB 2.0 ports -20-pin ATX power connector -4-pin ATX 12V power connector -CPU /chassis Fan connectors -COM2 connector -CD/ AUX audio in -IEEE 1394 connector
BIOS	-4Mb Flash EEPROM -AMI BIOS with enhanced	-4Mb Flash EEPROM -Advanced power management	-4Mb Flash EEPROM -AMI BIOS with enhanced

	ACPI,DMI,PnP,Green -ASUS EZ Flash, ASUS Mylogo2, ASUS Q-Fan, SM BIOS 2.3, Crash-Free BIOS2	capabilities Including ACPI/OnNow and LPC bus to connect peripherals such as super. -- PCI 2.2 compliant, VPD, and DMI -PnP 1.0A, SMBIOS 2.3, ACPI 1.0A, 2.0 -Supports PXE boot protocol -APM 1.2, WOL -PC2001 system design compliant - IO APIC controller.	ACPI,DMI,PnP,Green -ASUS EZ Flash, ASUS Mylogo2, ASUS Q-Fan, SM BIOS 2.3, Crash-Free BIOS2
Industrial Standard	PCI 2.2, USB2.0	PCI 2.2, USB2.0	PCI 2.2, USB2.0
Manageability	WOL by PME, WOR by PME		WOL by PME, WOR by PME
Support CD	-drivers -ASUS PC Probe -Trend Micro PC-cillin 2002 anti-virus software		-drivers -ASUS PC Probe -Trend Micro PC-cillin 2002 anti-virus software

4 Benches on several machines

Machine	Gre34 (Desktop)	Iralx7 (Desktop)	Datasrv1	Pctcp61	Pctcp00
CPU	Opteron 146 2Ghz L1 : 64 Ko L2: 1024 Ko	Barthon XP 2500+ L1 : 64 Ko L2: 512 Ko	P4 1.8 Ghz L1: 64 Ko L2: 512 Ko	Athlon XP1800 L1 : 64 Ko L2: 256 Ko	P4 1.8 Ghz L1: 64 Ko L2: 512 Ko
Mother card	SK8N	A7N8X-X			
Memory	2x512 Mo DDR 333 Mhz ECC PC2700 Infinneon	3x1024 Mo DDR 266 Mhz ECC PC2700 Samsung	2x512 Mo DDR 266 Mhz ECC PC2100 Samsung	2x256 Mo DDR 266 Mhz	3x256
Disk	Maxtor 6Y120P0 TCR:3036 M 2.0s = 1516.71 MB/s TBR: 172 M 3.0s = 57.17 MB/s	Maxtor 6Y120P0 TCR: 128 M 0.3 s = 426.67 MB/s TBR: 64 M 1.22s = 52.46 MB/s	Fujitsu 60 Go TCR: 128 M 0.3 s = 426.67 M/s TBR: 64 M1.22s = 52.46 M/s	IBM IC35L060 TCR 128 M 0.44 s = 290.91 MB/s TBR: 64 M 1.47s = 43.54 MB/s	

Unix bench

Machine	Gre34 32bits	Gre34 64bits	Diff gre34-64/iralx7 %/*ecart freq cpu*	Iralx7	Datasrv1	Pctcp61	Pctcp00
Arithmetic Test (type = double)	250.8	253.1	+2.8/*+28.5*	237.7	136.2	185.3	89.6
Dhrystone 2 using register	**441.5**	**460.6**	**+21.3/+51.6**	**379.2**	213.8	301.2	**190.9**
Execl Throughput	573.5	925.5	-49.7/-37.1	1695.8	386.6	1.8	2.9
File Copy 1024 bufsize 2000	416.2	642.0	+27.2/+59	466.7	211.1	271.3	240.1
File Copy 256 bufsize 500	292.5	508.6	+2.2/+27.7	438.9	136.2	242.9	251.8
File Copy 4096 bufsize 8000	**602.4**	**940.1**	**+91.5/+139.5**	**474.2**	372.1	307.6	**261.5**
Pipe Throughput	266.1	596.4	-62.2/-52.7	1271.2	205.6	610.6	279.2
Process Creation	848.1	982.6	+10.3/+37.8	801.6	374.0	543.5	297.6
Shell Scripts (8 concurrent)	668.8	892.2	+31.9/+64.9	676.2	602.7	43.8	70.0
System Call Overhead	361.2	1240.7	+60.2/+99.7	694.9	120.4	512.9	136.8
FINAL SCORE	**437.0**	**680.7**	**+23.8/+54.8**	**508.6**	241.4	165.4	**120.0**

Nbench

Machine	Gre34 32bit	Gre34 64bit	Diff gre34-64/iralx7 %/*ecart freq cpu*	Iralx7	Datasrv1	Pctcp61
Memory index	17.627	17.528	+23.8/+54.8	14.158	8.154	11.614
Integer index	16.331	16.713	+44.7/+80.9	11.549	7.151	9.471
Floating-point index	22.235	22.323	+11.3/+38.6	20.056	11.590	15.921

After recompiling with appropriate options, I can get better performances.
Average gain on Gre34 64bits/iralx7 32bits : 25.9% , compare with virtual 2Ghz processor: 57.3%.

5 Test of transfer rate using 1 Gigabit Ethernet link

Transfers are made by transferring big and small files between the PC in test and our NetApp FAS270 file server. Those 2 machines are connected on our new gigabit Ethernet switch and the link between the switch and the PC use the default cabling and is longer than 30 meters.

	NetApp file serveur -> PC	PC -> NetApp file serveur
Large files (> 1 Go)	42.7 Mo/sec	39.4 Mo/sec
Small files (< 100 Ko)	9.9 Mo/sec	10.7 Mo/sec

Difference between large and small files transfer is due to the NFS protocol which is configured using TCP network layer to avoid asynchronous problems encountered with RedHat release 9.0.
Performances must be compared to transfers made on local hard disks which are theorically about: 50 Mo but in fact near 45 Mo/sec on a 120 Go disk.

Infos journalistiques

Le gain des processeurs 64 bits est, pour l'heure actuelle, dû quasi exclusivement à la hausse du nombre de GPR et pas à la taille des registres en eux-mêmes.

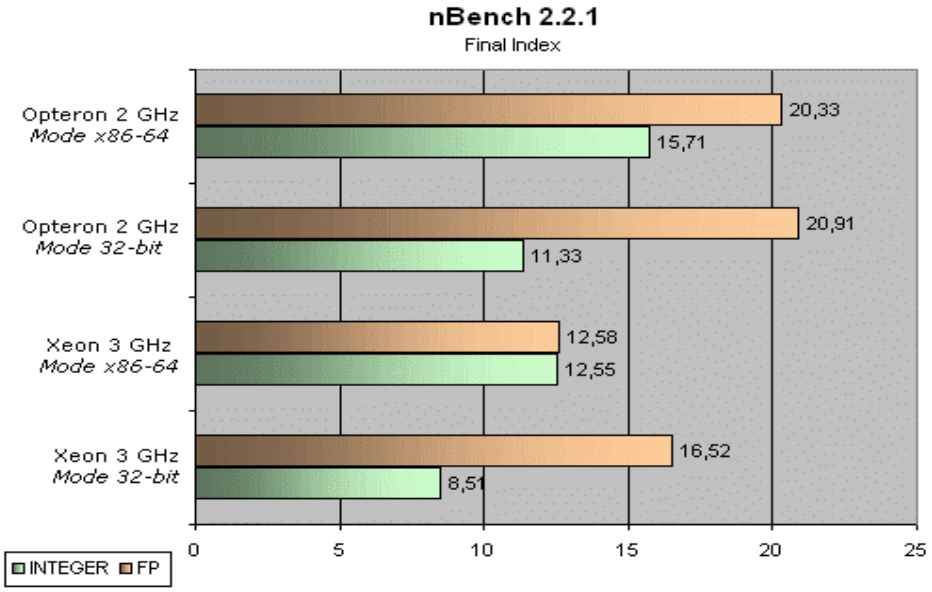
- **nBench 2.2.1**

nBench est un portage de la version 2 du benchmark "ByteMark" de Byte's magazine. Ce benchmark, conçu en 1997, est clairement représentatif des applications anciennes, où les développeurs ne pensaient pas à paralléliser leur code. Pour ce test, nous avons compilé ce benchmark en mode x86-64 et en mode 32 bits classique, puis nous avons exécuté le test a partir des exécutables compilés (que nous avons également mis à disposition ici en version 32 et 64 bits). Voyons tout de suite les résultats bruts :

nBench 2.2.1	Numeric sort	String sort	Bitfield	FP Emulation	Fourier
Nocona 3 GHz (32-bit)	820	105,08	3,69	73,97	15307
Nocona 3 GHz (64-bit)	985	127,84	3,89	134,84	13720
Opteron 2 GHz (32-bit)	1191	177,53	**4,24**	93,96	**20131**
Opteron 2 GHz (64-bit)	**1570**	**181,77**	4,07	**149,39**	18157

nBench 2.2.1	Assignment	idea	huffman	Neural Net	Lu Decomp
Nocona 3 GHz (32-bit)	**25,03**	1695,9	1359,6	19,05	538,41
Nocona 3 GHz (64-bit)	24,31	2878,9	**1733,8**	16,62	541,92
Opteron 2 GHz (32-bit)	21,801	3308,1	1183,9	27,2	1052,4
Opteron 2 GHz (64-bit)	21,22	**3710,1**	1534,5	**27,34**	**1059,2**

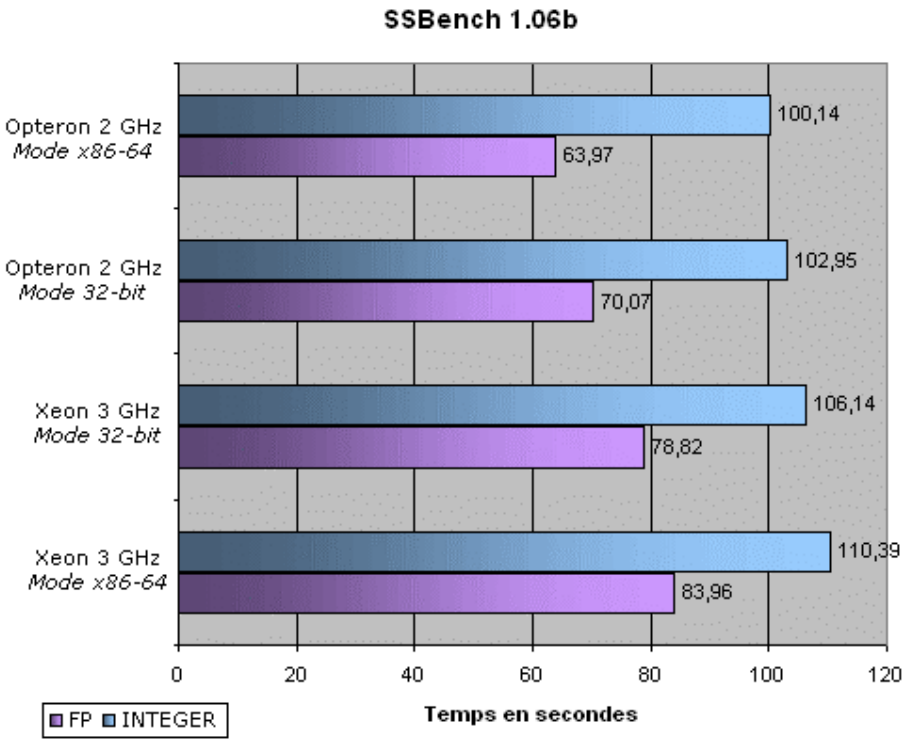
Comme on le voit ici, c'est l'Opteron qui domine la marche, à part dans deux tests. Concernant le 64-bit, on voit qu'il peut, selon les cas, soit apporter un fort gain en performance, soit entraîner une légère perte. Cette légère perte peut s'expliquer de la façon suivante : Dans le cas où l'augmentation des GPRs n'est pas utilisé au compilateur, la perte peut être entraînée par la saturation du cache avec des registres qui font maintenant deux fois la taille des GPR 32 bits classiques. Ainsi, stocker la valeur "1" d'un GPR en cache consomme 32 bits en mode 32 bits, mais 64 bits en mode x86-64. Ce qui entraîne une diminution de la taille utile du cache dans ce cas. nBench fournit, a la fin du test, un récapitulatif sous forme d'un score en entier (Integer) et en flottant (Floating point).



Ce test démontre bien la suprématie de l'architecture K8 face au P4 sur d'anciennes applications. Pour parler de l'Opteron, on peut dire que le passage en mode x86-64 sur ce type d'application influe beaucoup sur les performances entière (logique, vu l'augmentation des GPR) et à un effet nul ou légèrement négatif sur les performances flottantes (ce qui est également logique vu que le FPU est traitée en SSE dans ce mode). Concernant le Xeon Nocona, si le gain 32 -> 64 bits en entier est de 47.5% (contre 38.7% sur Opteron), on peut s'étonner de la perte impressionnante de performances en FPU, puisque celle-ci est de 25%. Selon toute vraisemblance, cette chute est due encore une fois au compilateur, puisque le passage de registres x87 vers des registres SSE ne semble pas avoir été faite correctement.

- **SSBENCH 1.06b**

Continuons maintenant avec SSBench, que l'on peut trouver sur cette page. Ce benchmark est une suite de 8 tests entiers et 8 tests flottant et utilise des methodes de calcul plus récente que nBench. Encore une fois, nous avons compilé ce programme en version 32 et 64 bits. Vous pouvez trouvez ces exécutables ici. Voyons les résultats :



Sur ce test, le gains sont très limités sur Opteron (moins de 5%) et carrément négatif sur Xeon. En effet, le Nocona se comporte mieux en mode 32 bits qu'en mode x86-64, où il subit une perte d'environ 5%. Preuve que, selon les tests, le mode 64 bits n'a pas toujours l'effet escompté et peu très bien ne rien apporter. Concernant le Xeon, c'est encore une fois le compilateur qui permettra d'obtenir des résultats comparables entre AMD64 et EM64T. GCC ayant bénéficié d'un temps de développement bien plus long sur le premier que sur le second.

- **NPB 3.1**

NPB, ou NAS parallel Benchmark, est encore une fois un test de calcul scientifique, cette fois développé par pas moins que la NASA. Comme pour les autres tests, nous avons compilé ce programme en 32 et 64 bits. Malheureusement, la politique très restrictive d'utilisation de ce logiciel nous empêche de mettre les binaires en download. Toutefois, les sources sont disponibles sur le site de la NASA, plus précisément ici. Nous avons compilé les 10 tests de la suite NPB3.1-OMP avec la commande "make suite". Toutefois, il est

nécessaire de dire un mot sur le fichier de configuration qui se trouve dans config/suite.def . Ce fichier permet de configurer la complexité des calculs, ceux-ci allant de quelques secondes à plusieurs jours. Nous avons donc choisi la suite "A" pour tous les tests. Voyons les résultats commentés :

NPB-OMP 3.1 "A"	BT Bench	CG Bench	EP Bench	FT Bench	IS Bench
Nocona 3 GHz (32-bit)	875,79	**606,72**	6,56	561,32	48,95
Nocona 3 GHz (64-bit)	1074,72	510,17	6,11	479,22	48,95
Opteron 2 GHz (32-bit)	1089,81	346,08	7,33	**586,56**	**93,01**
Opteron 2 GHz (64-bit)	**1231,02**	328,76	**7,61**	517,77	92,51
Gain 32 bit -> 64 bit / Intel	***22,71%***	***-15,91%***	***-6,86%***	***-14,63%***	***0,00%***
Gain 32 bit -> 64 bit / AMD	***12,96%***	***-5,00%***	***3,82%***	***-11,73%***	***-0,54%***
Gain Intel 32 -> AMD32	*24,44%*	*-42,96%*	*11,74%*	*4,50%*	*90,01%*
Gain Intel 64 -> AMD64	*14,54%*	*-35,56%*	*24,55%*	*8,04%*	*88,99%*

NPB-OMP 3.1 "A"	LU Bench	LU-HP Bench	MG Bench	SP Bench	UA Bench
Nocona 3 GHz (32-bit)	789,05	598,45	660,18	642,25	**6,91**
Nocona 3 GHz (64-bit)	**793,03**	632,69	711,77	690,12	6,17
Opteron 2 GHz (32-bit)	686,66	602,78	638,77	631,03	6,5
Opteron 2 GHz (64-bit)	770,18	**709,72**	**798,23**	**810,87**	6,4
Gain 32 bit -> 64 bit / Intel	***0,50%***	***5,72%***	***7,81%***	***7,45%***	***-10,71%***
Gain 32 bit -> 64 bit / AMD	***12,16%***	***17,74%***	***24,96%***	***28,50%***	***-1,54%***
Gain Intel 32 -> AMD32	*-12,98%*	*0,72%*	*-3,24%*	*-1,75%*	*-5,93%*
Gain Intel 64 -> AMD64	*-2,88%*	*12,17%*	*12,15%*	*17,50%*	*3,73%*

Comme on le voit, les résultats sont partagés. le mode x86-64 apporte parfois quelque chose (résultats en vert), parfois une perte de performance (résultat en rouge). Au final, le Nocona fini premier 3 fois sur 10 tests, dont seulement une fois grâce à l'EM64T. Par contre, l'Opteron finit 4 fois premier grâce au 64 bit sur 7 succès. Nous avons récapitulé ici les résultats :

Moyenne des gains 32 -> 64 bits / Intel	-0,39%
Moyenne des gains 32 -> 64 bits / AMD	8,13%
AMD Vs Intel : 32 Bits	6,45%
AMD Vs Intel : 64 bits	14,32%

Comme on le voit, les gains du passage au 64 bits sont de -0.39% sur Intel et 8.13% sur plate-forme AMD. Sur ce benchmark, l'Opteron 2 GHz est 6.45% plus performant que le Xeon 3.0 GHz en mode 32 bit et 14.32% en mode 64 bits. Ces mauvais résultats peuvent encore s'expliquer par le compilateur. Cette fois, il s'agit du compilateur Fortran. A noter que si l'on reproduit ces tests avec les librairies Fortron optimisées d'Intel, le Xeon 3.0 GHz, finit devant l'Opteron avec un gain de 37% en 32 bit et ... 195% en 64 bit ! Preuve que le compilateur jour beaucoup sur l'application exécutée par la suite...