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Difference Between Intel Core 2 Duo vs Dual Core vs Pentium D

Queries Solved:
Difference between Intel Dual Core VS Core 2 Duo (http://www.ialwayscapital.com/2009/05/what-is-core-2-duo.html)
Which one is Fast & Better Performer Intel Pentium D VS Core 2 Duo VS Dual Core
Comparison between Dual Core VS Core 2 Duo in simple language.

Huh ! Confused about the difference between Pentium D vs Dual Core vs Core Duo vs Core 2 Duo ? Well here is the explanation.
(http://lh5.ggpht.com/_LcG3XjAC3Eg/SmZZNGV2OOI/AAAAAAAAANA/eyuLoF0hNMs/s1600-h/image%5B39%5D.png)

First of all let me tell you that **Dual Core is a name of "class" or architecture of processors** which refers to any processor (weather its Intel or AMD) with two cores on the same chip. Whereas Intel Core or Intel Core2Duo is a registered trademark [™] of the Intel Corporation. Many peoples (even geeks) sometimes gets confusion betweenCore 2 Duo (http://www.ialwayscapital.com/2009/05/what-is-core-2-duo.html) & Dual Core or Dual Core & Core Duo. The fact is all the above mentioned processors are Dual Core processors.

What is Dual Core Architecture :

Once upon a time when human realized that in a normal atmosphere its not possible to increase the CPU Clock speed above standard levels because of too much heat generated by CPU, Both Intel & AMD have hit the Clock speed boundary line. Heat is enemy of any processor and high (http://lh3.ggpht.com/_LcG3XjAC3Eg/SmZZPcPTMQI/AAAAAAAAANI/JMQbDvtka7I/s1600-h/image%5B44%5D.png)clock speed means high heat and that means errors or "BOOM". Desperate need of more speed (faster processing) is the basic reason of why technology turned or shifted to Dual Core. So rather then increasing the clock speed of Processor it was decided to put two CPUs in One. That is what we call Two Cores or Dual Core. Nowadays Quad Cores (4 cores) and even Dual Quad Cores (8 Cores) are there in market.

In a layman's tongue here's an example. Let's say a single core (Pentium 4) is a two lane road with traffic running at 100kmph, and a Dual Core is a four lane road with a traffic running at 100kmph, and a Quad core is eight lanes running at 100kmph. All lanes (cores) are running at the same speed, but more lanes (cores) can pass a lot more traffic (Information or Data) than a single.

Dual core technology refers to two individual microprocessors on a single die cast chip. This is essentially two processing units (CPUs) in one. The advantage of a dual core chip is that tasks can be carried out in parallel streams, decreasing processing time.

Now lets see the difference & Compare all of them line by line as per their release sequence. Intel (http://lh5.ggpht.com/_LcG3XjAC3Eg/SmZZR3uTutI/AAAAAAAAANQ/Emzli2tqQJM/s1600-h/image%5B13%5D.png)has, several dual core processors mentioned below.

1. Intel Pentium D – The early model for desktops. CPU comprised two dies, each containing a single core residing next to each other on a multi chip module.

Pentium D is slower than any one of the below, It consumes higher power and so it gives more heat and even its not good in terms of Over Clocking.

2. Intel Core Duo – The Core brand refers to Intel's 32-bit mobile dual-core x86 CPUs that derived (http://lh6.ggpht.com/_LcG3XjAC3Eg/SmZZTvTdUTI/AAAAAAAAANY/JUdth2Pzyl0/s1600-h/image%5B18%5D.png)from the Pentium M branded processors. The Core brand comprised two branches: Duo (dual-core) and Solo (Duo with one disabled core, which replaced the Pentium M brand of single-core mobile processor). Core Duo was Intel's first dual-core CPU for laptops. It's a whole new architecture, using two cores on a single die, which simply, gives you two chips in one package. Running at lower speeds than the old Pentium line.

The Core Duo conserves substantial power & racketing up clock speed while offering what was, at the time, record-breaking performance.

3. Intel Core 2 Duo – The **Core 2** brand refers to a range of Intel's consumer 64-bit x86-64 Single, Dual and Quad Core CPUs based on the Intel Core micro architecture. The (http://lh4.ggpht.com/_LcG3XjAC3Eg/SmZZVi9TsrI/AAAAAAAAANg/2dfqzJHuAE8/s1600-h/image%5B22%5D.png)single and Dual Core models are single die, whereas the Quad Core models comprise of two dies, each containing two cores, packaged in a multi-chip module.

Core 2 Duo processors are much popular these days, It has more powerful Dual Core chip, The best performer, It consumes less power in comparison to any of the above mentioned CPU. No over heating issues, it runs cool and a perfect Over Clocker. Once "I" overclocked my Core 2 Duo E6750 (2.66Ghz) to 4 Ghz on air with Sunbeam Core Contact Freezer. System was completely stable and temps were awesome.

4. Intel Pentium Dual Core -The Pentium Dual Core, which we found to be an excellence choice for overclockers on a low budget, is based on the popular Core 2 architecture. In fact, the processor cores are the same, but the CPU comes with only 1 MB L2 cache instead of 2 MB or even 4 MB. In addition, some features, such as Intel's Virtualization (http://lh4.ggpht.com/_LcG3XjAC3Eg/SmZZXcm4ZeI/AAAAAAAAANo/L4jj2_zVff0/s1600-h/image%5B26%5D.png)Technology (VT) are disabled. The result is a castrated Core 2 Duo processor, using the small cache size and limited to 1.6 to 2.0 GHz clock speed at FSB 800 system speed.

Intel Pentium Dual Core are based on either the 32-bit *Yonah*(T2060, T2080, and T2130 for notebooks with 1mb L2 cache) or 64-bit *Allendale* (E2140, E2160 and E2180 for desktops with 1mb L2 cache)

Later on Aug 2008, the 45nm E5200 *Wolfdale* Launched for mobile or desktop computerswith larger 2mb L2 cache and 2.5 Ghz clock speed. This model is highly suggested in terms of over clocking. The best over clocker in such cheap price, with some enthusiasts reaching over 6GHz clock speed using Liquid Nitrogen cooling.

Intel Dual Core processors are downgraded version of Core 2 Duo, less expensive with smaller cache, but still very adequate for general mainstream computer use. In terms of performance its more or less equal to Core 2 Duos. Intel launched it with very low cost to grab the lower end market. Intel Pentium Dual Core Processors are less power consumer (65W) in comparison of Pentium D (130W). Though it has a smaller L2 cache, it has proven to be much faster than the Pentium D under the test of CPU hungryapplications.

Queries Solved:
What is the difference between Intel Core 2 Duo (http://www.ialwayscapital.com/2009/05/what-is-core-2-duo.html) *vs Quad Core ?*
Performance difference between Intel Dual Core and Quad Core !
Compare Quad Core vs Dual Core vs Core 2 Duo for general purpose & multitasking.

In our previous post, We covered a wonderful and informative article explaining the difference between Intel Core 2 Duo & Intel Dual Core & Intel Pentium D (http://www.ialwayscapital.com/2009/07/difference-between-intel-core-2-duo-vs.html). Dual Core is a name of Class or Architecture of processors which refers to any processor weather its Intel or AMD with two cores on a same chip. Intel registered at trademark for name Intel Core or Intel Core2duo. The overall and final fact is, all the above mentioned processors are Dual Core Processors and have Dual Core architecture (http://www.ialwayscapital.com/2009/07/difference-between-intel-core-2-duo-vs.html#dualcore)except Quad Core which has 4 cores in a single chip.

A Dual Core processor contains two cores & a Quad Core contains four Cores, In a very near future we may see Multi Core Processors with 16 or 32 Cores in a single package. (http://lh5.ggpht.com/_LcG3XjAC3Eg/SqOZUTrAmjI/AAAAAAAAAX8/AvrEL5HfJO8/s1600-h/image%5B5%5D.png)Multi Core or Quad Core processors are widely used for Multitasking, across many application like for general purpose, networking apps, Digital signal processing & most used for graphics applications. Quad Core or Multi Core processor's performance solely depends on application/software algorithms and implementation. Unless the software algorithm wont allow you to use Multi Core, you may not see any performance difference comparing to Dual Core or Core 2 Duo. Performance gains are limited by the fraction of software that can be parallelized to run on multiple cores simultaneously. Take an example :

If automatic virus scan starts while you are watching your favourite movie, Theapplication running the movie is far less likely to be starved of processor power, whereas the antivirus program will be assigned to a different processor core than the one running the movie. A Dual Core may handle the situation, but what if your favourite Movie is in HD (High Definition) or Blue Ray format !! Quad Core or Multi Core processor wont let you down in such cases. The largest boost in performance will likely to be noticed in improved response time while running CPU hungry applications, like antivirus scan, searching for file and folders, ripping HD movies, large File conversions. I remember once i had around thousand contacts added in my Yahoo ID and i was in favour to save archive of each and every chat with each and every contact. After a year when i thought to backup all archive it was a real headache and ages of waiting to bind all the folders and files in to one Winrar file though the compression ratio was 0%. Why ? Because there were thousands of files and folders and while binding them tosingle file takes a whole CPU power. (Well its not only cpu responsible, Hard Disk data transfer rate & ram i have is also making a important

role here). Same waiting will be there while extracting the same file. Anyways it took era to complete the job, this could have been little fast if i used Quad Core based system with faster Hard drive and top performer RAM.

Though operating system (OS) support is more important, but adjustments to existing software are required to maximize utilization of performance boost provided by multi-core processors. Also, the ability of multi-core processors to increase applicationperformance depends on the use of multiple threads within applications. The situation is improving day by day as now of we have less choices left. The Crytek (http://en.wikipedia.org/wiki/Crytek) has developed similar technologies for CryEngine 2, which powers their game, *Crysis (http://en.wikipedia.org/wiki/Crysis)*. Emergent Game Technologies' Gamebryo engine includes their Floodgate technology which simplifies multicore development across game platforms.

These days Quad Core 2.4GHz CPU costs near about the same as Dual Core 3.0GHz, Lets see the performance difference as mentioned by Xbit Labs review (http://www.xbitlabs.com/articles/cpu/display/core2quad-q6600.html).

Application	Dual Core 3.0 GHz	Quad Core 2.4GHz	Improvement
Excel 2007 (Less is Better)	39.9	24.4	63%
WinRAR 3.7 (Less is Better)	188	180	5%
Photoshop CS3 (High is Better)	70	73	-4%
Microsoft Movie Maker 6.0 (High is Better)	73	80	-9%
PCMark05 (High is Better)	9091	8853	-3%
SysMark 2007, E-Learning (High is Better)	167	140	-16%
SysMark 2007, Video Creation (High is Better)	131	151	15%
SysMark 2007, Productivity (High is Better)	152	138	-9%
SysMark 2007, 3D (High is Better)	160	148	-8%
Quake 4 (High is Better)	136	117	-15%
F.E.A.R. (High is Better)	123	110	-10%
Company of Heroes (High is Better)	173	161	-7%
Lost Planet (High is Better)	62	54	-12%
Lost Planet "Concurrent Operations" (High is Better)	62	81	30%
DivX 6.6 (High is Better)	65	64	0%
Xvid 1.2 (High is Better)	43	45	5%
H.264 QuickTime Pro 7.2 (High is Better)	189	188	0%
iTunes 7.3 MP3 encoding (Less is Better)	110	131	-16%
3ds Max 9 SP2 (High is Better)	4.95	6.61	33%
Cinebench 10 (High is Better)	5861	8744	49%

As we see in chart, only rendering and encoding tasks showing some performance gains, and in rest of the war, dual core beats the quad core. Results of Excel 2007 and Lost Planet concurrent operations are surprising due to possible reason of software engineering and algorithms.

Conclusion : Dual Core's higher Clock speed wins in battle for general purpose, Multi Core CPUs are not better in performance unless Multi tasking job is given or software algorithm is supported. Its a nature of technology to be upgraded every moment, you cant ignore that, what really matters is what you are going to do with your processor.

What a Quad Core processor will do is add an additional two cores to the system, if anapplication can take advantage of the more advanced multi-threading abilities of a quad-core system, you will likely see some performance advantage. If the applicationwill not, you will not see any extra performance unless the quad core processor of choice outclasses the dual core processor, for example the newest Intel Core i7 975, compared to a dual core Pentium D, will be faster at any application, due to other reasons (like more efficient interface to the memory). If you can afford the quad core with no problems, I don't see any solid reason to avoid such a purchase, it won't damage performance, shouldn't raise the power consumption up too much, and with more SMP friendly applications (like video encoding, or playing back HD video content), you will see a healthy performance advantage over a single or dual core CPU.