= Itanium =

Itanium (/ a??te?ni?m / eye @-@ TAY @-@ nee @-@ ?m) is a family of 64 @-@ bit Intel microprocessors that implement the Intel Itanium architecture (formerly called IA @-@ 64) . Intel markets the processors for enterprise servers and high @-@ performance computing systems . The Itanium architecture originated at Hewlett @-@ Packard (HP) , and was later jointly developed by HP and Intel .

Itanium @-@ based systems have been produced by HP (the HP Integrity Servers line) and several other manufacturers . As of 2008 , Itanium was the fourth @-@ most deployed microprocessor architecture for enterprise @-@ class systems , behind x86 @-@ 64 , Power Architecture , and SPARC . The Poulson processor was released on November 8 , 2012 . While Intel said in April 2015 that it continued to work on Poulson 's successor , Kittson , as of February 2016 Poulson was the most recent processor available , Hewlett @-@ Packard was the only customer ; even HP had introduced Xeon @-@ based machines , and it appeared that Kittson would be the last Itanium .

= = History = =

= = = Development : 1989 ? 2000 = = =

In 1989 , HP determined that Reduced Instruction Set Computing (RISC) architectures were approaching a processing limit at one instruction per cycle . HP researchers investigated a new architecture , later named Explicitly Parallel Instruction Computing (EPIC) , that allows the processor to execute multiple instructions in each clock cycle . EPIC implements a form of very long instruction word (VLIW) architecture , in which a single instruction word contains multiple instructions . With EPIC , the compiler determines in advance which instructions can be executed at the same time , so the microprocessor simply executes the instructions and does not need elaborate mechanisms to determine which instructions to execute in parallel . The goal of this approach is twofold : to enable deeper inspection of the code at compile time to identify additional opportunities for parallel execution , and to simplify processor design and reduce energy consumption by eliminating the need for runtime scheduling circuitry .

HP believed that it was no longer cost @-@ effective for individual enterprise systems companies such as itself to develop proprietary microprocessors , so it partnered with Intel in 1994 to develop the IA @-@ 64 architecture , derived from EPIC . Intel was willing to undertake a very large development effort on IA @-@ 64 in the expectation that the resulting microprocessor would be used by the majority of enterprise systems manufacturers . HP and Intel initiated a large joint development effort with a goal of delivering the first product , Merced , in 1998 .

During development , Intel , HP , and industry analysts predicted that IA @-@ 64 would dominate in servers , workstations , and high @-@ end desktops , and eventually supplant RISC and Complex Instruction Set Computing (CISC) architectures for all general @-@ purpose applications . Compaq and Silicon Graphics decided to abandon further development of the Alpha and MIPS architectures respectively in favor of migrating to IA @-@ 64 .

Several groups developed operating systems for the architecture , including Microsoft Windows , OpenVMS , Linux , and UNIX variants such as HP @-@ UX , Solaris , Tru64 UNIX , and Monterey / 64 (the last three were canceled before reaching the market) . By 1997 , it was apparent that the IA @-@ 64 architecture and the compiler were much more difficult to implement than originally thought , and the delivery of Merced began slipping . Technical difficulties included the very high transistor counts needed to support the wide instruction words and the large caches . There were also structural problems within the project , as the two parts of the joint team used different methodologies and had slightly different priorities . Since Merced was the first EPIC processor , the development effort encountered more unanticipated problems than the team was accustomed to . In addition , the EPIC concept depends on compiler capabilities that had never been implemented

before , so more research was needed .

Intel announced the official name of the processor , Itanium , on October 4 , 1999 . Within hours , the name Itanic had been coined on a Usenet newsgroup , a reference to Titanic , the " unsinkable " ocean liner that sank in 1912 . " Itanic " has since often been used by The Register , and others , to imply that the multibillion @-@ dollar investment in Itanium ? and the early hype associated with it ? would be followed by its relatively quick demise .

= = = Itanium (Merced) : 2001 = = =

By the time Itanium was released in June 2001 , its performance was not superior to competing RISC and CISC processors . Itanium competed at the low @-@ end (primarily 4 @-@ CPU and smaller systems) with servers based on x86 processors , and at the high end with IBM 's POWER architecture and Sun Microsystems ' SPARC architecture . Intel repositioned Itanium to focus on high @-@ end business and HPC computing , attempting to duplicate x86 's successful " horizontal " market (i.e. , single architecture , multiple systems vendors) . The success of this initial processor version was limited to replacing PA @-@ RISC in HP systems , Alpha in Compaq systems and MIPS in SGI systems , though IBM also delivered a supercomputer based on this processor . POWER and SPARC remained strong , while the 32 @-@ bit x86 architecture continued to grow into the enterprise space , building on economies of scale fueled by its enormous installed base .

Only a few thousand systems using the original Merced Itanium processor were sold , due to relatively poor performance , high cost and limited software availability . Recognizing that the lack of software could be a serious problem for the future , Intel made thousands of these early systems available to independent software vendors (ISVs) to stimulate development . HP and Intel brought the next @-@ generation Itanium 2 processor to market a year later .

= = = Itanium 2 : 2002 ? 2010 = = =

The Itanium 2 processor was released in 2002 , and was marketed for enterprise servers rather than for the whole gamut of high @-@ end computing . The first Itanium 2 , code @-@ named McKinley , was jointly developed by HP and Intel . It relieved many of the performance problems of the original Itanium processor , which were mostly caused by an inefficient memory subsystem . McKinley contained 221 million transistors (of which 25 million were for logic) , measured 19 @.@ 5 mm by 21 @.@ 6 mm (421 mm2) and was fabricated in a 180 nm , bulk CMOS process with six layers of aluminium metallization .

In 2003 , AMD released the Opteron , which implemented its own 64 @-@ bit architecture (AMD64) . Opteron gained rapid acceptance in the enterprise server space because it provided an easy upgrade from x86 . Intel responded by implementing x86 @-@ 64 in its Xeon microprocessors in 2004 .

Intel released a new Itanium 2 family member , codenamed Madison , in 2003 . Madison used a 130 nm process and was the basis of all new Itanium processors until Montecito was released in June 2006 .

In March 2005 , Intel announced that it was working on a new Itanium processor , codenamed Tukwila , to be released in 2007 . Tukwila would have four processor cores and would replace the Itanium bus with a new Common System Interface , which would also be used by a new Xeon processor . Later that year , Intel revised Tukwila 's delivery date to late 2008 .

In November 2005 , the major Itanium server manufacturers joined with Intel and a number of software vendors to form the Itanium Solutions Alliance to promote the architecture and accelerate software porting . The Alliance announced that its members would invest $ 10 billion in Itanium solutions by the end of the decade .

In 2006 , Intel delivered Montecito (marketed as the Itanium 2 9000 series) , a dual @-@ core processor that roughly doubled performance and decreased energy consumption by about 20 percent .

Intel released the Itanium 2 9100 series , codenamed Montvale , in November 2007 . In May 2009 ,

the schedule for Tukwila , its follow @-@ on , was revised again , with release to OEMs planned for the first quarter of 2010 .

= = = Itanium 9300 (Tukwila) : 2010 = = =

The Itanium 9300 series processor , codenamed Tukwila , was released on February 8 , 2010 , with greater performance and memory capacity .

The device uses a 65 nm process , includes two to four cores , up to 24 MB on @-@ die caches , Hyper @-@ Threading technology and integrated memory controllers . It implements double @-@ device data correction , which helps to fix memory errors . Tukwila also implements Intel QuickPath Interconnect (QPI) to replace the Itanium bus @-@ based architecture . It has a peak interprocessor bandwidth of 96 GB / s and a peak memory bandwidth of 34 GB / s . With QuickPath , the processor has integrated memory controllers and interfaces the memory directly , using QPI interfaces to directly connect to other processors and I / O hubs . QuickPath is also used on Intel processors using the Nehalem microarchitecture , making it probable that Tukwila and Nehalem will be able to use the same chipsets . Tukwila incorporates four memory controllers , each of which supports multiple DDR3 DIMMs via a separate memory controller , much like the Nehalem @-@ based Xeon processor code @-@ named Beckton .

= = = Itanium 9500 (Poulson) : 2012 = = =

The Itanium 9500 series processor , codenamed Poulson , is the follow @-@ on processor to Tukwila and was released on November 8 , 2012 . According to Intel , it skips the 45 nm process technology and uses a 32 nm process technology ; it features eight cores , has a 12 @-@ wide issue architecture , multithreading enhancements , and new instructions to take advantage of parallelism , especially in virtualization . The Poulson L3 cache size is 32 MB . L2 cache size is 6 MB , 512 I KB , 256 D KB per core . Die size is 544 mm ² , less than its predecessor Tukwila (698 @.@ 75 mm ²) .

At ISSCC 2011 , Intel presented a paper called , " A 32nm 3 @.@ 1 Billion Transistor 12 @-@ Wide @-@ Issue Itanium Processor for Mission Critical Servers . " Given Intel 's history of disclosing details about Itanium microprocessors at ISSCC , this paper most likely refers to Poulson . Analyst David Kanter speculates that Poulson will use a new microarchitecture , with a more advanced form of multi @-@ threading that uses as many as two threads , to improve performance for single threaded and multi @-@ threaded workloads . Some new information was released at Hot Chips conference .

New information presents improvements in multithreading , resiliency improvements (Intel Instruction Replay RAS) and few new instructions (thread priority , integer instruction , cache prefetching , data access hints) .

In Intel 's Product Change Notification (PCN) 111456 @-@ 01 , it listed 4 models of Itanium 9500 series CPU , which was later removed in a revised document . The parts were later listed in Intel 's Material Declaration Data Sheets (MDDS) database . Intel later posted Itanium 9500 reference manual .

The models are :

= = = Kittson = = =

Rumours of a successor to Poulson coded @-@ name Kittson began to circulate in 2012 ? 13 , at first associated with a forthcoming 22 nm shrink , later walked @-@ back in the face of declining Itanium sales to a less @-@ ambitious 32 nm node . Intel has never confirmed the formal specifications for Kittson , but has confirmed that it continues to work on the project as recently as April 2015 . Meanwhile , the aggressively multicore Xeon E7 platform has begun to displace Itanium @-@ based solutions in the Intel roadmap. on 2016 @-@ 07 @-@ 21 HPE announced in Computer World that Kittson would be released mid @-@ 2017

= = Market share = =

In comparison with its Xeon family of server processors , Itanium has never been a high @-@ volume product for Intel . Intel does not release production numbers . One industry analyst estimated that the production rate was 200 @,@ 000 processors per year in 2007 .

According to Gartner Inc . , the total number of Itanium servers (not processors) sold by all vendors in 2007 , was about 55 @,@ 000 . (It is unclear whether clustered servers counted as a single server or not .) This compares with 417 @,@ 000 RISC servers (spread across all RISC vendors) and 8 @.@ 4 million x86 servers . IDC reports that a total of 184 @,@ 000 Itanium @-@ based systems were sold from 2001 through 2007 . For the combined POWER / SPARC / Itanium systems market , IDC reports that POWER captured 42 % of revenue and SPARC captured 32 % , while Itanium @-@ based system revenue reached 26 % in the second quarter of 2008 . According to an IDC analyst , in 2007 , HP accounted for perhaps 80 % of Itanium systems revenue . According to Gartner , in 2008 , HP accounted for 95 % of Itanium sales . HP 's Itanium system sales were at an annual rate of $ 4.4Bn at the end of 2008 , and declined to $ 3.5Bn by the end of 2009 , compared to a 35 % decline in UNIX system revenue for Sun and an 11 % drop for IBM , with an x86 @-@ 64 server revenue increase of 14 % during this period .

In December 2012 , IDC released a research report stating that Itanium server shipments would remain flat through 2016 , with annual shipment of 26 @,@ 000 systems (a decline of over 50 % compared to shipments in 2008) .

= = Hardware support = =

= = = Systems = = =

By 2006 , HP manufactured at least 80 % of all Itanium systems , and sold 7 @,@ 200 in the first quarter of 2006 . The bulk of systems sold were enterprise servers and machines for large @-@ scale technical computing , with an average selling price per system in excess of US $ 200 @,@ 000 . A typical system uses eight or more Itanium processors .

By 2012 , only a few manufacturers offered Itanium systems , including HP , Bull , NEC , Inspur and Huawei . In addition , Intel offered a chassis that could be used by system integrators to build Itanium systems .

By 2015 , only HP supplied Itanium @-@ based systems .

= = = Chipsets = = =

The Itanium bus interfaces to the rest of the system via a chipset . Enterprise server manufacturers differentiate their systems by designing and developing chipsets that interface the processor to memory , interconnections , and peripheral controllers . The chipset is the heart of the system @-@ level architecture for each system design . Development of a chipset costs tens of millions of dollars and represents a major commitment to the use of the Itanium . IBM created a chipset in 2003 , and Intel in 2002 , but neither of them developed chipsets to support newer technologies such as DDR2 or PCI Express . Currently chipsets for Itanium supporting such technologies are manufactured by HP , Fujitsu , SGI , NEC , and Hitachi .

The " Tukwila " Itanium processor model had been designed to share a common chipset with the Intel Xeon processor EX (Intel 's Xeon processor designed for four processor and larger servers) . The goal was to streamline system development and reduce costs for server OEMs , many of which develop both Itanium- and Xeon @-@ based servers . However , in 2013 this goal was pushed back to " evaluated for future implementation opportunities " .

= = Software support = =

Itanium is or was supported by the following operating systems :
Windows family
Windows XP 64 @-@ Bit Edition (unsupported)
Windows Server 2003 (unsupported)
Windows Server 2008 (only " Mainstream support " has ended)
Windows Server 2008 R2 (only " Mainstream support " has ended , but means can 't be bought ; not supported in successor : Windows Server 2012)
Linux distributions
Debian (dropped in 8 " Jessie ")
Gentoo
SUSE 's SLES (dropped support in SLES 12)
Red Hat Enterprise Linux (dropped support in RHEL 6)
TurboLinux
FreeBSD (support status : " Tier 2 through FreeBSD 10 . Unsupported after . ")
NetBSD (Development branch only)
HP @-@ UX 11i , an Intel 64 (x86 @-@ 64) port was proposed , but later canceled .
OpenVMS I64 , an Intel 64 (x86 @-@ 64) port is being developed .
NonStop OS , an Intel 64 (x86 @-@ 64) port was developed .
Bull GCOS 8
NEC ACOS @-@ 4
Microsoft announced that Windows Server 2008 R2 would be the last version of Windows Server to support the Itanium , and that it would also discontinue development of the Itanium versions of Visual Studio and SQL Server . Likewise , Red Hat Enterprise Linux 5 (first released in March 2007) was the last Itanium edition of Red Hat Enterprise Linux and Canonical 's Ubuntu 10 @.@ 04 LTS (released in April 2010 , now discontinued) was the last supported Ubuntu release on Itanium . HP will not be supporting or certifying Linux on Itanium 9300 (Tukwila) servers .

In late September 2012 , NEC announced a return from IA64 to the previous NOAH line of proprietary mainframe processors , now produced in a quad @-@ core variant on 40 nm , called NOAH @-@ 6 .

HP sells a virtualization technology for Itanium called Integrity Virtual Machines .

To allow more software to run on the Itanium , Intel supported the development of compilers optimized for the platform , especially its own suite of compilers . Starting in November 2010 , with the introduction of new product suites , the Intel Itanium Compilers were no longer bundled with the Intel x86 compilers in a single product . Intel offers Itanium tools and Intel x86 tools , including compilers , independently in different product bundles . GCC , Open64 and Microsoft Visual Studio 2005 (and later) are also able to produce machine code for Itanium . According to the Itanium Solutions Alliance over 13 @,@ 000 applications were available for Itanium @-@ based systems in early 2008 , though Sun has contested Itanium application counts in the past . The ISA also supported Gelato , an Itanium HPC user group and developer community that ported and supported open source software for Itanium .

= = = Emulation = = =

Emulation is a technique that allows a computer to execute binary code that was compiled for a different type of computer . Before IBM 's acquisition of QuickTransit in 2009 , application binary software for IRIX / MIPS and Solaris / SPARC could run via type of emulation called " dynamic binary translation " on Linux / Itanium . Similarly , HP implemented a method to execute PA @-@ RISC / HP @-@ UX on the Itanium / HP @-@ UX via emulation , to simplify migration of its PA @-@ RISC customers to the radically different Itanium instruction set . Itanium processors can also run the mainframe environment GCOS from Groupe Bull and several x86 operating systems via instruction set simulators .

= = Competition = =

Itanium is aimed at the enterprise server and high @-@ performance computing (HPC) markets . Other enterprise- and HPC @-@ focused processor lines include Oracle 's and Fujitsu 's SPARC processors and IBM 's POWER microprocessors . Measured by quantity sold , Itanium 's most serious competition comes from x86 @-@ 64 processors including Intel 's own Xeon line and AMD 's Opteron line . Since 2009 , most servers were being shipped with x86 @-@ 64 processors .

In 2005 , Itanium systems accounted for about 14 % of HPC systems revenue , but the percentage has declined as the industry shifted to x86 @-@ 64 clusters for this application .

An October 2008 Gartner report the Tukwila processor stated that " ... the future roadmap for Itanium looks as strong as that of any RISC peer like Power or SPARC . "

= = Supercomputers and high @-@ performance computing = =

An Itanium @-@ based computer first appeared on the list of the TOP500 supercomputers in November 2001 . The best position ever achieved by an Itanium 2 based system in the list was # 2 (while now all systems have dropped off the list) , achieved in June 2004 , when Thunder (LLNL) entered the list with an Rmax of 19 @.@ 94 Teraflops . In November 2004 , Columbia entered the list at # 2 with 51 @.@ 8 Teraflops , and there was at least one Itanium @-@ based computer in the top 10 from then until June 2007 . The peak number of Itanium @-@ based machines on the list occurred in the November 2004 list , at 84 systems (16 @.@ 8 %) ; by June 2012 , this had dropped to one system (0 @.@ 2 %) , and no Itanium system remained on the list in November 2012 .

= = Processors = =

= = = Released processors = = =

The Itanium processors show a progression in capability . Merced was a proof of concept . McKinley dramatically improved the memory hierarchy and allowed Itanium to become reasonably competitive . Madison , with the shift to a 130 nm process , allowed for enough cache space to overcome the major performance bottlenecks . Montecito , with a 90 nm process , allowed for a dual @-@ core implementation and a major improvement in performance per watt . Montvale added three new features : core @-@ level lockstep , demand @-@ based switching and front @-@ side bus frequency of up to 667 MHz .

= = = Future processors = = =

During the HP vs. Oracle support lawsuit , court documents unsealed by Santa Clara County Court judge revealed in 2008 , Hewlett @-@ Packard had paid Intel Corp. around $ 440 million to keep producing and updating Itanium microprocessors from 2009 to 2014 . In 2010 , the two companies signed another $ 250 million deal , which obliged Intel to continue making Itanium central processing units for HP 's machines until 2017 . Under the terms of the agreements , HP has to pay for chips it gets from Intel , while Intel launches Tukwila , Poulson , Kittson and Kittson + chips in a bid to gradually boost performance of the platform .

= = = = Kittson = = = =

Kittson is planned to follow Poulson . Kittson , like Poulson , will be manufactured using Intel 's 32 nm process . Few other details are known beyond the existence of the codename and the binary and socket compatibility with Poulson and Tukwila , though moving to a common socket with x86 Xeon " will be evaluated for future implementation opportunities " after Kittson .

= = Market reception = =

= = = High @-@ end server market = = =

When first released in 2001 , Itanium 's performance was disappointing compared to better @-@ established RISC and CISC processors . Emulation to run existing x86 applications and operating systems was particularly poor , with one benchmark in 2001 reporting that it was equivalent at best to a 100 MHz Pentium in this mode (1 @.@ 1 GHz Pentiums were on the market at that time) . Itanium failed to make significant inroads against IA @-@ 32 or RISC , and suffered further following the arrival of x86 @-@ 64 systems which offered greater compatibility with older x86 applications .

In a 2009 article on the history of the processor ? " How the Itanium Killed the Computer Industry " ? journalist John C. Dvorak reported " This continues to be one of the great fiascos of the last 50 years " . Tech columnist Ashlee Vance commented that the delays and underperformance " turned the product into a joke in the chip industry . " In an interview , Donald Knuth said " The Itanium approach ... was supposed to be so terrific ? until it turned out that the wished @-@ for compilers were basically impossible to write . "

Both Red Hat and Microsoft announced plans to drop Itanium support in their operating systems due to lack of market interest ; however , other Linux distributions such as Gentoo and Debian remain available for Itanium . On March 22 , 2011 , Oracle Corporation announced that it would no longer develop new products for HP @-@ UX on Itanium , although it would continue to provide support for existing products . Following this announcement , HP sued Oracle for breach of contract , arguing that Oracle had violated conditions imposed during settlement over Oracle 's hiring of former HP CEO Mark Hurd as its co @-@ CEO , requiring the vendor to support Itanium on its software " until such time as HP discontinues the sales of its Itanium @-@ based servers " , and that the breach had harmed its business . In 2012 , a court ruled in favor of HP , and ordered Oracle to resume its support for Itanium . In June 2016 , Hewlett @-@ Packard Enterprise (the corporate successor to HP 's server business) was awarded $ 3 billion in damages from the lawsuit .

A former Intel official reported that the Itanium business had become profitable for Intel in late 2009 . By 2009 , the chip was almost entirely deployed on servers made by HP , which had over 95 % of the Itanium server market share , making the main operating system for Itanium HP @-@ UX . On March 22 , 2011 , Intel reaffirmed its commitment to Itanium with multiple generations of chips in development and on schedule .

= = = Other markets = = =

Although Itanium did attain limited success in the niche market of high @-@ end computing , Intel had originally hoped it would find broader acceptance as a replacement for the original x86 architecture .

AMD chose a different direction , designing the less radical x86 @-@ 64 , a 64 @-@ bit extension to the existing x86 architecture , which Microsoft then supported , forcing Intel to introduce the same extensions in its own x86 @-@ based processors . These designs can run existing 32 @-@ bit applications at native hardware speed , while offering support for 64 @-@ bit memory addressing and other enhancements to new applications . This architecture has now become the predominant 64 @-@ bit architecture in the desktop and portable market . Although some Itanium @-@ based workstations were initially introduced by companies such as SGI , they are no longer available .

= = Timeline = =

1989 :
HP begins investigating EPIC .
1994 :

June : HP and Intel announce partnership .
1995 :
September : HP , Novell , and SCO announce plans for a " high volume UNIX operating system " to deliver " 64 @-@ bit networked computing on the HP / Intel architecture " .
1996 :
October : Compaq announces it will use IA @-@ 64 .
1997 :
June : IDC predicts IA @-@ 64 systems sales will reach $ 38bn / yr by 2001 .
October : Dell announces it will use IA @-@ 64 .
December : Intel and Sun announce joint effort to port Solaris to IA @-@ 64 .
1998 :
March : SCO admits HP / SCO Unix alliance is now dead .
June : IDC predicts IA @-@ 64 systems sales will reach $ 30bn / yr by 2001 .
June : Intel announces Merced will be delayed , from second half of 1999 to first half of 2000 .
September : IBM announces it will build Merced @-@ based machines .
October : Project Monterey is formed to create a common UNIX for IA @-@ 64 .
1999 :
February : Project Trillian is formed to port Linux to IA @-@ 64 .
August : IDC predicts IA @-@ 64 systems sales will reach $ 25bn / yr by 2002 .
October : Intel announces the Itanium name .
October : the term Itanic is first used in The Register .
2000 :
February : Project Trillian delivers source code .
June : IDC predicts Itanium systems sales will reach $ 25bn / yr by 2003 .
July : Sun and Intel drop Solaris @-@ on @-@ Itanium plans .
August : AMD releases specification for x86 @-@ 64 , a set of 64 @-@ bit extensions to Intel 's own x86 architecture intended to compete with IA @-@ 64 . It will eventually market this under the name " AMD64 " .
2001 :
June : IDC predicts Itanium systems sales will reach $ 15bn / yr by 2004 .
June : Project Monterey dies .
July : Itanium is released .
October : IDC predicts Itanium systems sales will reach $ 12bn / yr by the end of 2004 .
November : IBM 's 320 @-@ processor Titan NOW Cluster at National Center for Supercomputing Applications is listed on the TOP500 list at position # 34 .
November : Compaq delays Itanium Product release due to problems with processor .
December : Gelato is formed .
2002 :
March : IDC predicts Itanium systems sales will reach $ 5bn / yr by end 2004 .
June : Itanium 2 is released .
2003 :
April : IDC predicts Itanium systems sales will reach $ 9bn / yr by end 2007 .
April : AMD releases Opteron , the first processor with x86 @-@ 64 extensions .
June : Intel releases the " Madison " Itanium 2 .
2004 :
February : Intel announces it has been working on its own x86 @-@ 64 implementation (which it will eventually market under the name " Intel 64 ") .
June : Intel releases its first processor with x86 @-@ 64 extensions , a Xeon processor codenamed " Nocona " .
June : Thunder , a system at LLNL with 4096 Itanium 2 processors , is listed on the TOP500 list at position # 2 .
November : Columbia , an SGI Altix 3700 with 10160 Itanium 2 processors at NASA Ames Research Center , is listed on the TOP500 list at position # 2 .

December : Itanium system sales for 2004 reach $ 1.4bn.
2005 :
January : HP ports OpenVMS to Itanium
February : IBM server design drops Itanium support .
June : An Itanium 2 sets a record SPECfp2000 result of 2 @,@ 801 in a Hitachi , Ltd . Computing blade .
September : Itanium Solutions Alliance is formed .
September : Dell exits the Itanium business .
October : Itanium server sales reach $ 619M / quarter in the third quarter .
October : Intel announces one @-@ year delays for Montecito , Montvale , and Tukwila .
2006 :
January : Itanium Solutions Alliance announces a $ 10bn collective investment in Itanium by 2010 .
February : IDC predicts Itanium systems sales will reach $ 6.6bn / yr by 2009 .
June : Intel releases the dual @-@ core " Montecito " Itanium 2 9000 series .
2007 :
April : CentOS (RHEL @-@ clone) places Itanium support on hold for the 5 @.@ 0 release .
October : Intel releases the " Montvale " Itanium 2 9100 series .
November : Intel renames the family from Itanium 2 back to Itanium .
2009 :
December : Red Hat announces that it is dropping support for Itanium in the next release of its enterprise OS , Red Hat Enterprise Linux 6 .
2010 :
February : Intel announces the " Tukwila " Itanium 9300 series .
April : Microsoft announces phase @-@ out of support for Itanium .
October : Intel announces new releases of Intel C + + Compiler and Intel Fortran Compiler for x86 / x64 , while Itanium support is only available in older versions .
2011 :
March : Oracle Corporation announces that it will stop developing application software , middleware , and Oracle Linux for the Itanium .
March : Intel and HP reiterate their support of Itanium .
April : Huawei and Inspur announce that they will develop Itanium servers .
2012 :
February : Court papers were released from a case between HP and Oracle Corporation that gave insight to the fact that HP was paying Intel $ 690 million to keep Itanium on life support .
SAP discontinues support for Business Objects on Itanium .
September : In response to a court ruling , Oracle reinstitutes support for Oracle software on Itanium hardware .
2013 :
January : Intel cancels Kittson as a 22 nm shrink of Poulson , moving it instead to its 32 nm process .
November : HP announces that its NonStop servers will start using Intel 64 (x86 @-@ 64) chips .
2014 :
December : HP announces that their next generation of Superdome X and Nonstop X servers would be equipped with Intel Xeon processors , and not Itanium . While HP continues to sell and offer support for the Itanium @-@ based Integrity portfolio , the introduction of a model based entirely on Xeon chips marks the end of an era .