Codewarrior development studio

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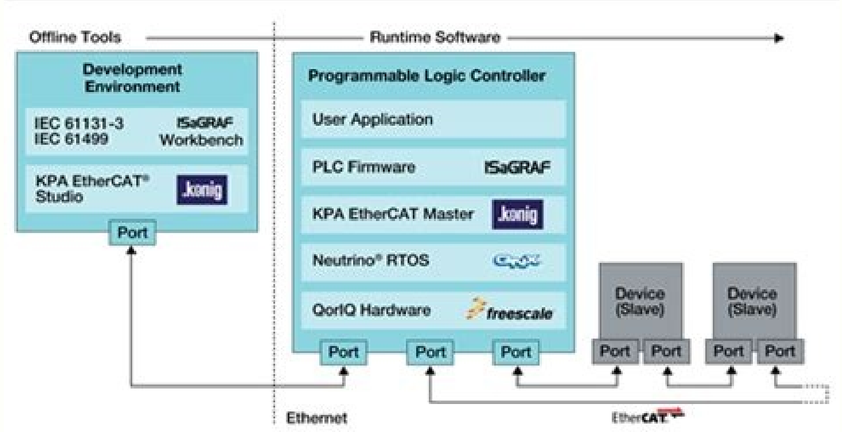

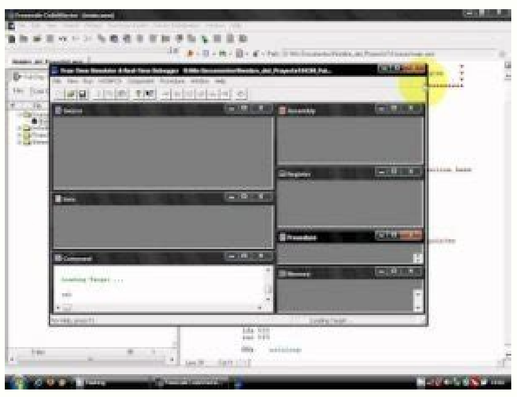

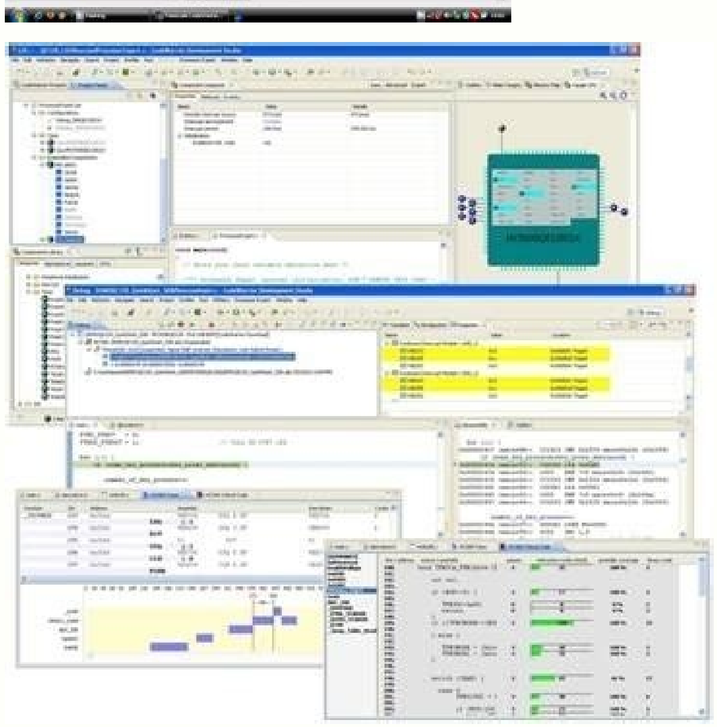

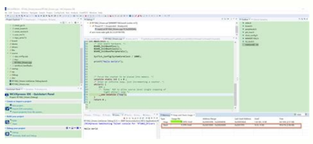

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Integrated software development environment This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources: "CodeWarrior" – news · newspapers · books · scholar · JSTOR (November 2011) (Learn how and when to remove this template message) CodeWarriorDeveloper(s)MetrowerksInitial releaseDecember 23, 1993; 28 years ago (1993-12-23)Operating systemMacOS, Mac OS X, BeOS, Windows, Linux, SolarisTypeSoftware development toolLicenseProprietaryWebsitewww.nxp.com/design/software/development-software/codewarrior-development-tools:CW_HOME CodeWarrior is an integrated development environment (IDE) published by NXP Semiconductors for editing, compiling, and debugging software for several microcontrollers and microprocessors (Freescale ColdFire, ColdFire+, Kinetis, Qorivva, PX, Freescale RS08, Freescale S08, and S12Z) and digital signal controllers (DSC MC56F80X and MC5680XX) used in embedded systems. The system was developed by Metrowerks on the Macintosh, and was among the first development systems on that platform to cleanly support both the existing Motorola 68k and the new PowerPC (PPC). During Apple's transition to the PPC, CodeWarrior quickly became the de facto standard development system for the Mac, rapidly displacing Symantec's THINK C and Apple's own Macintosh Programmer's Workshop. The purchase of NeXT in 1996 led to a decline in CodeWarrior's relevance as Mac programming moved to the NeXT platform's own developer tools. Metrowerks responded by porting CodeWarrior to Microsoft Windows and introducing compilers for a wider variety of platforms. It became a major part of the software stack for Motorola's varied lines of microcontrollers, and eventually led to them purchasing Metrowerks in 1999. It was widely used on most platforms based on PPC or other Motorola processors, as well as many games consoles. The product moved to Freescale Semiconductor when that company formed in 2004, and then to NXP when they purchased Freescale in 2015. Originally a single integrated product, now known as the "Classic IDE", the IDE was later replaced with Eclipse IDE. The current versions are 6.3 of the Classic IDE,[1] and 11.0 for the Eclipse IDE.[2] Languages supported are C, C++, and assembly language. Old versions CodeWarrior Professional Release 1 Prior to the acquisition of the product by Freescale, versions existed targeting Macintosh, Microsoft Windows, Linux, Solaris, PlayStation, PlayStation 2, GameCube, Nintendo DS, Wii,[3] Dreamcast, SuperH, M·CORE, Palm OS,[4] Symbian OS, and BeOS.[5] Metrowerks versions of CodeWarrior also included Pascal, Object Pascal, Objective-C, and Java compilers. Older versions of CodeWarrior can be used to develop on classic Mac OS. Classilla is built with Metrowerks CodeWarrior 7.1.[6] Release Name Editions Release Date Notes[7] CodeWarrior DR/1 Gold, Silver, Bronze 1993-12-23 Bronze supports 68k, Silver supports PPC, Gold supports 68k and PPC CodeWarrior DR/2 Gold, Silver, Bronze 1994-03-11 CodeWarrior DR/3 Gold, Silver, Bronze 1994-05-05 CodeWarrior 4 Gold, Silver, Bronze 1994-06-26 CodeWarrior 5 Gold, Bronze 1994-12-15 CodeWarrior 6 Gold, Bronze 1995-05-03 CodeWarrior 7 Gold, Bronze 1995-09-05 CodeWarrior 8 Gold, Bronze 1996-01-04 CodeWarrior 9 Gold 1996-05-11 CodeWarrior 10 Gold 1996-09-09 CodeWarrior 11 Gold 1996-12-31 CodeWarrior Pro 1 1997-06-04 Mac and Windows bundled CodeWarrior Pro 2 1997-10-23 First version to target Mach-O and Yellow Box on Rhapsody with support for Objective-C[8] CodeWarrior Pro 3 1998-04-07 CodeWarrior Pro 4 1998-09-10 Last to include Pascal[9] CodeWarrior Pro 5 Mac, Windows 1999-06-18 Last to run on 68k[10] CodeWarrior Pro 6 Mac, Windows 2000-09-09 Last to support 68k compiling[9][11] Pre-release support of Mach-O, and use Aqua user interface on Mac OS X.[12] CodeWarrior Pro 7 Mac, Windows 2001 First to run natively in Mac OS X and target Mach-O by default[11] CodeWarrior Pro 8 Mac, Windows 2002 Last to run on Classic Mac OS CodeWarrior 9 Mac 2003 CodeWarrior 10 Windows 2004 History CodeWarrior was originally developed by Metrowerks based on a C compiler and environment for the Motorola 68K, developed by Andreas Hommel and acquired by Metrowerks. The first versions of CodeWarrior targeted the PowerPC Macintosh, with much of the development done by a group from the original THINK C team. Much like THINK C, which was known for its fast compile times, CodeWarrior was faster than Macintosh Programmer's Workshop (MPW), the development tools written by Apple. CodeWarrior was a key factor in the success of Apple's transition of its machine architecture from 68K processors to PowerPC because it provided a complete, solid PowerPC compiler when the competition (Apple's MPW tools and Symantec C++) was mostly incomplete or late to the market.[13] Metrowerks also made it easy to generate fat binaries, which included both 68K and PowerPC code. Java support in CodeWarrior for Macintosh was announced for May 1996, slated for CodeWarrior 9.[14] Metrowerks took the approach to add Java tools support in CodeWarrior, including debugging, rather than write a new IDE.[15] In August 1996, Metrowerks announced CodeWarrior for BeBox,[5] a BeOS version of the IDE named BeIDE supplementing the PowerPC compiler that was already available to BeOS software developers. After Metrowerks was acquired by Motorola in 1999, the company concentrated on embedded applications, devoting a smaller fraction of their efforts to compilers for desktop computers. On 29 July 2005, they announced that CodeWarrior for Mac would be discontinued after the next release, CodeWarrior Pro 10. Metrowerks indicated that revenue share of the product fell from 22% to 5% in the last four years and the effort by the company to concentrate on the embedded development market. The demand for CodeWarrior had presumably fallen during the time Apple began distributing Xcode (its own software development kit for OS X) for free.[16] In addition, Apple's switch to Intel chips left Metrowerks without an obvious product as they had sold their Intel compiler technology to Nokia earlier in 2005.[citation needed] During its heyday, the product was known for its rapid release cycle, with multiple revisions every year, and for its quirky advertising campaign. Their "geekware" shirts were featured in the fashion pages of The New York Times.[17] Origin of the name During the 1990s, Apple Computer released a monthly series of developer CD-ROMs containing resources for programming the Macintosh. These CDs were, in the early days, whimsically titled using punning references to various movies but with a coding twist; for example, "The Hexorcist" (The Exorcist), "Lord of the Files" (Lord of the Flies), "Gorillas in the Disc" (Gorillas in the Mist), etc.[18] One of these, volume 9, was titled "Code Warrior", referring to the movie The Road Warrior. Later Apple dropped the whimsical titling in favor of a more sober "Developer CD series". Coincidentally the Metrowerks founder, Greg Galanos, an Australian, was also inspired by the movie and proposed the CodeWarrior name. Metrowerks subsequently used the name for their new developer product. CodeWarrior CD packaging was very much in the tradition of the Apple developer CDs, featuring slogans such as "Blood, Sweat, and Code" and "Veni, Vidi, Codi" in prominent lettering. Competing products such as Symantec's THINK C were more conventionally marketed. CodeWarrior Latitude Metrowerks foresaw as it had with the transition to PowerPC, a need to provide a must have developer tool to help developers transition from MacOS software to Apple's future operating system, codenamed Rhapsody.[19] In 1997, Metrowerks acquired the principal assets of The Latitude Group Inc. from David Hempling and his partners. Latitude was a software compatibility layer used to port Macintosh applications to the NeXT Computer and other UNIX systems.[20] Latitude presented itself as a library that implemented the Macintosh System 7 API in the same way that Lee Lorenzen's Altura Mac2Win software as well as Apple's own Quicktime for Windows SDK allowed Macintosh applications to be recompiled for Windows with minimal modifications. Latitude had previously been used successfully by Adobe to port Photoshop and Premiere to Silicon Graphics and Solaris workstations.[21] Metrowerks rebranded Latitude as CodeWarrior Latitude,[22] updated it for Rhapsody starting with Developer Preview 1 and then marketed it to Macintosh developers as a separate product for $399, alongside CodeWarrior Professional.[23][24] Latitude Developer Release 1 (DR1) was previewed at WWDC 1997 in the CodeWarrior Lounge. Latitude DR2 was released on Oct 27, 1997 and won an Eddy Award at the 1998 Macworld for Best Tool for New Technologies beating out Joy from AAA+ Software F&E and Visual Cafe for Macintosh 1.0.2 by Symantec.[25] At the time, Steve Jobs was heavily promoting the OPENSTEP API (renamed Yellow Box) in order to access the new features of the operating system. For C/C++/Pascal Macintosh developers, this presented a substantial hurdle because it was markedly different from the classic MacOS API that ran inside Blue Box and was Objective-C based. Latitude was for a short time coined as the "Green Box"[26] for obvious reasons and appeared to be another hit for Metrowerks and further solidify its dominance in the Macintosh developer tools market but Apple secretly had plans of its own. CodeWarrior's IDE for Rhapsody and CodeWarrior Latitude were both demonstrated at Worldwide Developers Conference in 1998 in the third party developer pavilion but were quietly discontinued at the show following Steve Jobs keynote address. Apple's announcement of its forthcoming Carbon API (codenamed "Ivory Tower") to appeal to developers who required a practical way to transition to the new operating system eliminated the need for any third-party solutions.[27] Metrowerks used Latitude internally to port CodeWarrior to run on Red Hat and SuSE Linux for commercial sale and additionally to Solaris under contract from Sun Microsystems. Both products utilized gcc command line compilers rather than Metrowerks own compiler technologies to promote adoption within the UNIX developer community. The final version of Latitude supported Solaris 2.3, SGI Irix 5.2 and Rhapsody DP2, dropping HP-UX support. References ^ "CodeWarrior for Microcontrollers (Classic IDE)". NXP Semiconductors. ^ "CodeWarrior for Microcontrollers (Eclipse IDE)". NXP Semiconductors. ^ Carless, Simon (2006-05-09). "CodeWarrior Named Official Toolset For Nintendo Wii". Gamasutra. Retrieved 2015-05-28. ^ Mark, Dave; Cloninger, Eric (March 1998). 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Vol. 13, no. 12. pp. 42–44. ^ "[MD1] Metrowerks Acquires Latitude". MacTech. 27 January 1997. Retrieved 25 August 2021. ^ "Developer Depot". MacTech (Advertisement). January 1998. p. 2. ^ Mark, Dave (January 1998). "CodeWarrior Latitude: Porting Your Apps to Rhapsody". MacTech. Vol. 14, no. 1. ^ "Eddy Tool Awards Winners Announced". MacTech. 6 January 1998. ^ "Metrowerks Green Box to plow Mac path to OpenStep APIs". InfoWorld. 25 April 1997. ^ Walsh, Jeff (12 May 1997). "Apple to woo developers with Rhapsody tools". InfoWorld. Vol. 19, no. 19. p. 15. External links Official website Retrieved from " 2Series of 32 bit CISC microprocessors This article is about the family of microprocessors. For the first such microprocessor in that family, see Motorola 68000. Motorola 68000 seriesDesignerMotorolaBits32-bitIntroduced1979; 43 years ago (1979)DesignCISCBranchingCondition codeEndiannessBigRegisters8 × 32-bit data registers7 × 32-bit address registersstack pointer (address register 7)8 × 80-bit floating-point registers if FP present The Motorola 68000 series (also known as 680x0, m68000, m68k, or 68k) is a family of 32-bit complex instruction set computer (CISC) microprocessors. During the 1980s and early 1990s, they were popular in personal computers and workstations and were the primary competitors of Intel's x86 microprocessors. They were best known as the processors used in the early Apple Macintosh, the Sharp X68000, the Commodore Amiga, the Sinclair QL, the Atari ST, the Sega Genesis (Mega Drive), the Capcom System I (Arcade), the AT&T UNIX PC, the Tandy Model 16/16B/6000, the Sun Microsystems Sun-1, Sun-2 and Sun-3, the NeXT Computer, NeXTcube, NeXTstation, and NeXTcube Turbo, the Texas Instruments TI-89/TI-92 calculators, the Palm Pilot (all models running Palm OS 4.x or earlier) and the Space Shuttle. Although no modern desktop computers are based on processors in the 680x0 series, derivative processors are still widely used in embedded systems. Motorola ceased development of the 680x0 series architecture in 1994, replacing it with the PowerPC RISC architecture, which was developed in conjunction with IBM and Apple Computer as part of the AIM alliance. Family members Generation one (internally 16/32-bit, and produced with 8-, 16-, and 32-bit interfaces) Motorola 68000 Motorola 68EC000 Motorola 68SEC000 Motorola 68HC000 Motorola 68008 Motorola 68010 Motorola 68012 Generation two (internally fully 32-bit) Motorola 68020 Motorola 68EC020 Motorola 68030 Motorola 68EC030 Generation three (pipelined) Motorola 68040 Motorola 68EC040 Motorola 68LC040 Generation four (superscalar) Motorola 68060 Motorola 68EC060 Motorola 68LC060 Others Freescale 683XX (CPU32 aka 68330, 68360 aka QUICC) Freescale ColdFire Freescale DragonBall Philips 68070 Improvement history 68010: Virtual memory support (restartable instructions) 'Loop mode' for faster string and memory library primitives Multiply instruction uses 14 clock ticks less 68020: 32-bit address & arithmetic logic unit (ALU) Three stage pipeline Instruction cache of 256 bytes Unrestricted word and longword data access (see alignment) 8× multiprocessing ability Larger multiply (32×32 -> 64 bits) and divide (64÷32 -> 32 bits quotient and 32 bits remainder) instructions, and bit field manipulations Addressing modes added scaled indexing and another level of indirection Low cost, EC = 24-bit address 68030: Split instruction and data cache of 256 bytes each On-chip memory management unit (MMU) (68851) Low cost EC = No MMU Burst Memory Interface 68040: Instruction and data caches of 4 KB each Six stage pipeline On-chip floating-point unit (FPU) FPU lacks IEEE transcendental function ability FPU emulation works with 2E71M and later chip revisions Low cost LC = No FPU Low cost EC = No FPU or MMU 68060: Instruction and data caches of 8 KB each 10 stage pipeline Two cycle integer multiplication unit Branch prediction Dual instruction pipeline Instructions in the address generation unit (AGU) and thereby supply the result two cycles before the ALU Low cost LC = No FPU Low cost EC = No FPU or MMU Feature map Year CPU Package Frequency (max) [in MHz] Address bus bits MMU FPU 1979 68000 64-pin dual in-line package (DIP), 68-pin LCC, 68-pin pin grid array (PGA)[1] 8–20 24 - - 1982 68010 64-pin DIP, 68-pin PLCC, 68-pin PGA[2] 8–16.67 24 68451 - 1984 68020 114-pin PGA[3] 12.5–33.33 32 68851 68881 - 68EC020 100-pin Quad Flat Package (QFP)[4] 16.7–25 24 - - 1987 68030 132-pin QFP (max 33 MHz), 128-pin PGA[5] 16–50 32 MMU 68881 68EC030 132-pin QFP, 128-pin PGA 25 32 - 68881 1991 68040 179-pin PGA,[6] 184-pin QFP[7] 20–40 32 MMU FPU 68LC040 PGA,[7] 184-pin QFP[7] 20–33 32 MMU - 68EC040 20–33[7] 32 - - 1994 68060 206-pin PGA[8][9] 50–75 32 MMU FPU 68LC060 206-pin PGA,[8][9] 208-pin QFP[10] 50–75 32 MMU - 68EC060 206-pin PGA[8][9] 50–75 32 - - Main uses The Sega Genesis used a 68000 clocked at 7.67 MHz as its main CPU. The 680x0 line of processors has been used in a variety of systems, from modern high-end Texas Instruments calculators (the TI-89, TI-92, and Voyage 200 lines) to all of the members of the Palm Pilot series that run Palm OS 1.x to 4.x (OS 5.x is ARM-based), and even radiation-hardened versions in the critical control systems of the Space Shuttle. However, the 680x0 CPU family became most well known as the processors powering advanced desktop computers and video game consoles such as the Apple Macintosh, the Commodore Amiga, the Sinclair QL, the Atari ST, the SNK NG AES/Neo Geo CD, Atari Jaguar, Commodore CDTV, and several others. The 680x0 were also the processors of choice in the 1980s for Unix workstations and servers such as AT&T's UNIX PC, Tandy's Model 16/16B/6000, Sun Microsystems' Sun-1, Sun-2, Sun-3, NeXT Computer, Silicon Graphics (SGI), and numerous others. There was a 68000 version of CP/M called CP/M-68K, which was initially proposed to be the Atari ST operating system, but Atari chose Atari TOS instead. Many system specific ports of CP/M-68K were available, for example, TriSoft offered a port of the CP/M-68K for the Tandy Model 16/16B/6000. Also, and perhaps most significantly, the first several versions of Adobe's PostScript interpreters were 68000-based. The 68000 in the Apple LaserWriter and LaserWriter Plus was clocked faster than the version used then in Macintosh computers. A fast 68030 in later PostScript interpreters, including the standard resolution LaserWriter IIntx, IIf and IIg (also 300 dpi), the higher resolution LaserWriter Pro 600 series (usually 600 dpi, but limited to 300 dpi with minimum RAM installed) and the very high resolution Linotronic imagesetters, the 200PS (1500+ dpi) and 300PS (2500+ dpi). Thereafter, Adobe generally preferred a RISC for its processor, as its competitors, with their PostScript clones, had already gone with RISCs, often an AMD 29000-series. The early 68000-based Adobe PostScript interpreters and their hardware were named for Cold War-era U.S. rockets and missiles: Atlas, Redstone, etc. Today, these systems are either end-of-line (in the case of the Atari), or are using different processors (in the case of Macintosh, Amiga, Sun, and SGI). Since these platforms had their peak market share in the 1980s, their original manufacturers either no longer support an operating system for this hardware or are out of business. However, the Linux, NetBSD and OpenBSD operating systems still include support for 68000 processors. The 68000 processors were also used in the Sega Genesis (Mega Drive) and SNK Neo Geo consoles as the main CPU. Other consoles such as the Sega Saturn used the 68000 for audio processing and other I/O tasks, while the Atari Jaguar included a 68000 which was intended for basic system control and input processing, but due to the Jaguar's unusual assortment of heterogeneous processors was also frequently used for running game logic. Many arcade boards also used 68000 processors including boards from Capcom, SNK, and Sega. Microcontrollers derived from the 68000 family have been used in a huge variety of applications. For example, CPU32 and ColdFire microcontrollers have been manufactured in the millions as automotive engine controllers. Many proprietary video editing systems used 68000 processors. In this category we can name the MacroSystem Casablanca, which was a black box with an easy to use graphic interface (1997). It was intended for the amateur and hobby videographer market. It is also worth noting its earlier, bigger and more professional counterpart, called "DraCo"(1995), The groundbreaking Quantel Paintbox series of early based 24-bit paint and effects system was originally released in 1981 and during its lifetime it used nearly the entire range of 68000 family processors, with the sole exception of the 68060, which was never implemented in its design. Another contender in the video arena, the Abekas 8150 DVE system, used the 680EC30, and the Trinity Play, later renamed Globecaster, uses several 68030s. The Bosch FGS-4000/4500 Video Graphics System manufactured by Robert Bosch Corporation, later BTS (1983), used a 68000 as its main processor; it drove several others to perform 3D animation in a computer that could easily apply Gouraud and Phong shading. It ran a modified Motorola Versados operating system. Architecture Motorola 68000 series registers 31 ... 23 ... 15 ... 07 ... 00 (bit position) Data registers D0 Data 0 D1 Data 1 D2 Data 2 D3 Data 3 D4 Data 4 D5 Data 5 D6 Data 6 D7 Data 7 Address registers A0 Address 0 A1 Address 1 A2 Address 2 A3 Address 3 A4 Address 4 A5 Address 5 A6 Address 6 Stack pointers A7 / USP Stack Pointer (user) A7' / SSP Stack Pointer (supervisor) Program counter PC Program Counter Status Register 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 (bit position) T S M 0 I 0 0 0 X N Z V C SR People who are familiar with the PDP-11 or VAX usually feel comfortable with the 68000 series. With the exception of the split of general-purpose registers into specialized data and address registers, the 68000 architecture is in many ways a 32-bit PDP-11. It had a more orthogonal instruction set than those of many processors that came before (e.g., 8080) and after (e.g., x86). That is, it was typically possible to combine operations freely with operands, rather than being restricted to using certain addressing modes with certain instructions. This property made programming relatively easy for humans, and also made it easier to write code generators for compilers. The 68000 series has eight 32-bit general-purpose data registers (D0-D7), and eight address registers (A0-A7). The last address register is the stack pointer, and assemblers accept the label SP as equivalent to A7. In addition, it has a 16-bit status register. The upper 8 bits is the system byte, and modification of it is privileged. The lower 8 bits is the user byte, also known as the condition code register (CCR), and modification of it is not privileged. The 68000 comparison, arithmetic, and logic operations modify condition codes to record their results for use by later conditional jumps. The condition code bits are "zero" (Z), "carry" (C), "overflow" (V), "extend" (X), and "negative" (N). The "extend" (X) flag deserves special mention, because it is separate from the carry flag. This permits the extra bit from arithmetic, logic, and shift operations to be separated from the carry for flow-of-control and linkage. While the 68000 had a 'supervisor mode', it did not meet the Popek and Goldberg virtualization requirements due to the single instruction 'MOVE from SR', which copies the status register to another register, being unprivileged but sensitive. In the Motorola 68010 and later, this was made privileged, to better support virtualization software. The 68000 series instruction set can be divided into the following broad categories: Load and store (MOVE) Arithmetic (ADD, SUB, MULS, MULU, DIVS, DIVU) Bit shifting (ASL, ASR, LSL, LSR) Bit rotation (ROR, ROL, ROXL, ROXR) Logic operations (AND, OR, NOT, EOR) Type conversion (byte to word and vice versa) Conditional and unconditional branches (BRA, Bcc - BEQ, BNE, BHI, BLO, BMI, BPL, etc.) Subroutine invocation and return (BSR, RTS) Stack management (LINK, UNLK, PEA) Causing and responding to interrupts Exception handling There is no equivalent to the x86 CPUID instruction to determine what CPU or MMU or FPU is present. The Motorola 68020 added some new instructions that include some minor improvements and extensions to the supervisor state, several instructions for software management of a multiprocessing system (which were removed in the 68060), some support for high-level languages which did not get used much (and was removed from future 680x0 processors), bigger multiply (32×32→64 bits) and divide (64÷32→32 bits quotient and 32 bits remainder) instructions, and bit field manipulations. The standard addressing modes are: Register direct Data register, e.g. "D0" Address register, e.g. "A0" Register indirect Simple address, e.g. (A0) Address with post-increment, e.g. (A0)+ Address with pre-decrement, e.g. −(A0) Address with a 16-bit signed offset, e.g. 16(A0) Register indirect with index register & 8-bit signed offset e.g. 8(A0,D0) or 8(A0,A1) Note that for (A0)+ and −(A0), the actual increment or decrement value is dependent on the operand size: a byte access adjusts the address register by 1, a word by 2, and a long by 4. PC (program counter) relative with displacement Relative 16-bit signed offset, e.g. 16(PC). This mode was very useful for position-independent code. Relative with 8-bit signed offset with index, e.g. 8(PC,D2) Absolute memory location Either a number, e.g. "$4000", or a symbolic name translated by the assembler Most assemblers used the "$" symbol for hexadecimal, instead of "0x" or a trailing H. There were 16 and 32-bit versions of this addressing mode Immediate mode Data stored in the instruction, e.g. "#400" Quick immediate mode 3-bit unsigned (or 8-bit signed with moveq) with value stored in opcode In addq and subq, 0 is the equivalent to 8 e.g. moveq #0,d0 was quicker than clr.l d0 (though both made D0 equal to 0) Plus: access to the status register, and, in later models, other special registers. The Motorola 68020 added a scaled indexing address mode, and added another level of indirection to many of the pre-existing modes. Most instructions have dot-letter suffixes, permitting operations to occur on 8-bit bytes (".b"), 16-bit words (".w"), and 32-bit longs (".l"). Most instructions are dyadic, that is, the operation has a source, and a destination, and the destination is changed. Notable instructions were: Arithmetic: ADD, SUB, MULU (unsigned multiply), MULS (signed multiply), DIVU, DIVS, NEG (additive negation), and CMP (a sort of comparison done by subtracting the arguments and setting the status bits, but did not store the result) Binary-coded decimal arithmetic: ABCD, NBCD, and SBCD Logic: EOR (exclusive or), AND, NOT (logical not), OR (inclusive or) Shifting: (logical, i.e. right shifts put zero in the most-significant bit) LSL, LSR, (arithmetic shifts, i.e. sign-extend the most-significant bit) ASR, ASL, (rotates through eXtend and not) ROXL, ROXR, ROL, ROR Bit test and manipulation in memory or data register: BSET (set to 1), BCLR (clear to 0), BCHG (invert) and BTST (no change). All of these instructions first test the destination bit and set (clear) the CCR Z bit if the destination bit is 0 (1), respectively. Multiprocessing control: TAS, test-and-set, performed an indivisible bus operation, permitting semaphores to be used to synchronize several processors sharing a single memory Flow of control: JMP (jump), JSR (jump to subroutine), BSR (relative address jump to subroutine), RTS (return from subroutine), RTE (return from exception, i.e. an interrupt), TRAP (trigger a software exception similar to software interrupt), CHK (a conditional software exception) Branch: Bcc (where the "cc" specified one of 14 tests of the condition codes in the status register: equal, greater than, less-than, carry, and most combinations and logical inversions, available from the status register). Of the remaining two possible conditions, always true and always false,

BRA (branch always) has a separate mnemonic, and BSR (branch to subroutine) takes the encoding that would otherwise have been 'branch never'. Decrement-and-branch: DBcc (where "cc" was as for the branch instructions), which, provided the condition was false, decremented the low word of a D-register and, if the result was not -1 ($FFFF), branched to a destination. This use of −1 instead of 0 as the terminating value allowed the easy coding of loops that had to do nothing if the count was 0 to start with, with no need for another check before entering the loop. This also facilitated nesting of DBcc. 68050 and 68070 This section does not cite any sources. Please help improve this section by adding citations to reliable sources. Unsourced material may be challenged and removed. (October 2013) (Learn how and when to remove this template message) Motorola mainly used even numbers for major revisions to the CPU core such as 68000, 68020, 68040 and 68060. The 68010 was a revised version of the 68000 with minor modifications to the core, and likewise the 68030 was a revised 68020 with some more powerful features, none of them significant enough to classify as a major upgrade to the core. There was no 68050, though at one point it was a project within Motorola. Odd-numbered releases had always been reactions to issues raised within the prior even numbered part; hence, it was generally expected that the 68050 would have reduced the 68040's power consumption (and thus heat dissipation), improved exception handling in the FPU, used a smaller feature size and optimized the microcode in line with program use of instructions. Many of these optimizations were included with the 68060 and were part of its design goals. For any number of reasons, likely that the 68060 was in development, that the Intel 80486 was not progressing as quickly as Motorola assumed it would, and that 68060 was a demanding project, the 68050 was cancelled early in development. There is also no revision of the 68060, as Motorola was in the process of shifting away from the 68000 and 88k processor lines into its new PowerPC business, so the 68070 was never developed. Had it been, it would have been a revised 68060, likely with a superior FPU (pipelining was widely speculated upon on Usenet). There was a CPU with the 68070 designation, which was a licensed and somewhat slower version of the 16/32-bit 68000 with a basic DMA controller, I²C host and an on-chip serial port. This 68070 was used as the main CPU in the Philips CD-i. This CPU was, however, produced by Philips and not officially part of Motorola's 680x0 lineup. Last generation The 4th-generation 68060 provided equivalent functionality (though not instruction-set-architecture compatibility) to most of the features of the Intel P5 microarchitecture. Other variants The Personal Computers XT/370 and AT/370 PC-based IBM-compatible mainframes each included two modified Motorola 68000 processors with custom microcode to emulate S/370 mainframe instructions.[11][12] An Arizona-based company, Edge Computer Corp, reportedly founded by former Honeywell designers, produced processors compatible with the 68000 series, these being claimed as having "a three to five times performance – and 18 to 24 months' time – advantage" over Motorola's own products.[13] In 1987, the company introduced the Edge 1000 range of "32-bit superminicomputers implementing the Motorola instruction set in the Edge mainframe architecture", employing two independent pipelines - an instruction fetch pipeline (IFP) and operand executive pipeline (OEP) - relying on a branch prediction unit featuring a 4096-entry branch cache, retrieving instructions and operands over multiple buses.[14] An agreement between Edge Computer and Olivetti subsequently led to the latter introducing products in its own "Linea Duo" range based on Edge Computer's machines.[15] The company was subsequently renamed to Edgcore Technology Inc.[16]:12 (also reported as Edgecore Technology Inc.[17]). Edgcore's deal with Olivetti in 1987 to supply the company's E1000 processor was followed in 1989 by another deal with Philips Telecommunications Data Systems to supply the E2000 processor, this supporting the 68030 instruction set and reportedly offering a performance rating of 16 VAX MIPS.[18] Similar deals with Nixdorf Computer and Hitachi were also signed in 1989.[19][20] Edge Computer reportedly had an agreement with Motorola.[17] Despite increasing competition from RISC products, Edgcore sought to distinguish its products in the market by emphasising its "alliance" with Motorola, employing a marketing campaign drawing from Aesop's fables with "the fox (Edgecore) who climbs on the back of the stallion (Motorola) to pluck fruit off the higher branches of the tree".[21] With the company's investors having declined to finance the company further, and with a number of companies having been involved in discussions with other parties, Arix Corp. announced the acquisition of Edgcore in July 1989.[20] Arix was reportedly able to renew its deal with Hitachi in 1990, whereas the future of previous deals with Olivetti and Philips remained in some doubt after the acquisition of Edgcore.[22] In 1992, a company called International Meta Systems (IMS) announced a RISC-based CPU, the IMS 3250, that could reportedly emulate the "Intel 486 or Motorola 68040 at full native speeds and at a fraction of their cost". Clocked at 100 MHz, emulations had supposedly been developed of a 25 MHz 486 and 30 MHz 68040, including floating-point unit support, with the product aiming for mid-1993 production at a per-unit cost of $50 to 60.[23] Amidst the apparent proliferation of emulation support in processors such as the PowerPC 615, in 1994, IMS had reportedly filed a patent on its emulation technology but had not found any licensees.[24] Repeated delays to the introduction of this product, blamed on one occasion on "a need to improve the chip's speech-processing capabilities",[25] apparently led to the company seeking to introduce another chip, the Meta6000, aiming to compete with Intel's P6 products.[26] Ultimately, IMS entered bankruptcy having sold patents to a litigator, TechSearch, who in 1998 attempted to sue Intel for infringement of an IMS patent.[27] TechSearch reportedly lost their case but sought to appeal, also seeking to sue Intel for "libel and slander" on the basis of comments made by an Intel representative who had characterised TechSearch's business model unfavourably in remarks to the press.[28] After the mainline 68000 processors' demise, the 68000 family has been used to some extent in microcontroller and embedded microprocessor versions. These chips include the ones listed under "other" above, i.e. the CPU32 (aka 68330), the ColdFire, the QUICC and the DragonBall. With the advent of FPGA technology an international team of hardware developers have re-created the 68000 with many enhancements as an FPGA core. Their core is known as the 68080 and is used in Vampire-branded Amiga accelerators.[29] Magnetic Scrolls used a subset of the 68000's instructions as a base for the virtual machine in their text adventures. Competitors Desktop During the 1980s and early 1990s, when the 68000 was widely used in desktop computers, it mainly competed against Intel's x86 architecture used in IBM PC compatibles. Generation 1 68000 CPUs competed against mainly the 16-bit 8086, 8088, and 80286. Generation 2 competed against the 80386 (the first 32-bit x86 processor), and generation 3 against the 80486. The fourth generation competed with the P5 Pentium line, but it was not nearly as widely used as its predecessors, since much of the old 68000 marketplace was either defunct or nearly so (as was the case with Atari and NeXT), or converting to newer architectures (PowerPC for the Macintosh and Amiga, SPARC for Sun, and MIPS for Silicon Graphics (SGI)). Embedded Main article: Microcontroller § Types There are dozens of processor architectures that are successful in embedded systems. Some are microcontrollers which are much simpler, smaller, and cheaper than the 68000, while others are relatively sophisticated and can run complex software. Embedded versions of the 68000 often compete with processor architectures based on PowerPC, ARM, MIPS, SuperH, and others. See also VMEbus, an external computer bus standard designed for the 68000 series References ^ cpu-world.com - Motorola 68000 microprocessor family 2012-11-17 ^ cpu-world.com - Motorola 68010 (MC68010) family 2012-11-17 ^ cpu-world.com - Motorola 68020 (MC68020) microprocessor family 2012-12-12 ^ cpu-world.com - Motorola MC68EC020FG16 2012-11-17 ^ cpu-world.com - Motorola 68030 (MC68030) microprocessor family, 2012-11-17 ^ cpu-world.com - Motorola 68040 (MC68040) microprocessor family, 2012-11-17 ^ a b c d "M68040 User's Manual" (PDF). freescale.com. Archived from the original (PDF) on 17 April 2016. Retrieved 2007-05-08. ^ a b c cpu-world.com - Motorola 68060 processor family, 2012-11-22 ^ a b c "M68060 User's Manual" (PDF). freescale.com. Archived from the original (PDF) on 23 August 2016. 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It integrates programming tools such as the Glade Interface Designer and the Devhelp API help browser. 08/07/2022 · Suitable for the development of native MS-Windows (x86) applications; Programming Languages Supported: C, C++, Objective-C, Fortran and others. 11. GNAT Programming Studio. GNAT Programming Studio is a highly advanced IDE that is available for you free of cost. S32 Design Studio for Arm ® 是一套附送的集成开发环境，适用于汽车和超可靠基于Arm的微控制器，为您的设计提供编辑、编译和调试功能。 S32DS for Arm为设计人员提供了一个简单的开发工具，它基于包括Eclipse IDE、GNU编译器集合(GCC)和GNU调试器(GDB)在内的开源软件，没有代码大小的限制。 Microsoft Visual C++ (anche noto come MSVC) è un ambiente di sviluppo integrato (IDE) di Microsoft per la programmazione nei linguaggi C, C++ e C++/CLI.. È orientato soprattutto allo sviluppo e al debug di codice C++ basato sulle API di Microsoft Windows, DirectX e Microsoft .NET.. Esiste sia in una versione stand-alone (Microsoft Visual C++ 2008 Express Edition) sia ... 17/10/2011 · Verified by FileInfo.com. 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