

IV – CMP CAD SERVICE

CMP has signed agreements with several CAD tools vendors in order to distribute the tools to Universities, Research Laboratories or Industry. The licensing includes the support and maintenance provided by CMP. These CAD tools are linked to the technologies available through CMP by the different design kits that CMP distributes to the designers.

A – CAD Tools for integrated circuits

A.1 – Products offered to Academia.

ARM:

CMP and ARM signed in February 1999 an agreement which enables CMP to provide academic institutions with ARM products with special academic prices.

This collaboration has been strengthened in 2009 by adding Keil tools to the university program.

The complete portfolio is available in the CMP's web site at: <http://cmp.imag.fr/products/cad/?p=arm>.

CMP provides a full set of tools including:

The RealView Development Tools:

It provides the full set of software components required to build C and C++ application targeting the 32-bit ARM and 16-bit Thumb instruction sets. It based on the Eclipse IDE.

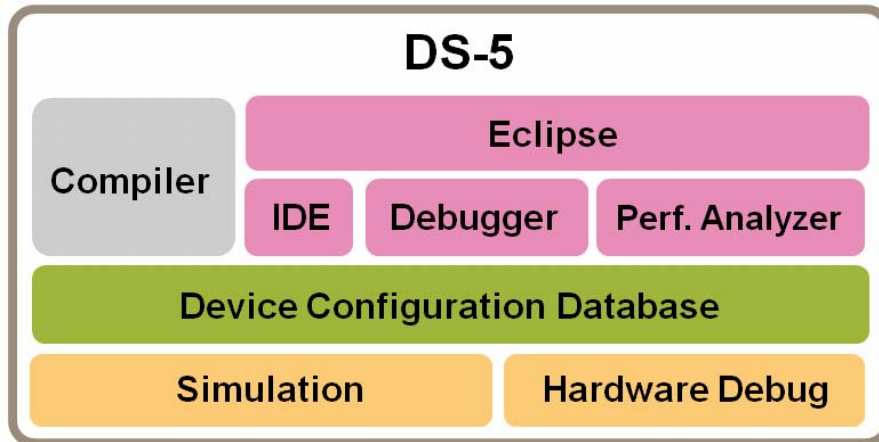
It has replaced the ADS (stand for ARM Development Suite) suite of tools. It might be always available under ARM approval. This year, ARM releases the RealView Development Suite 4.1 Standard and professional. The professional version supports a NEON Compiler, a Profiler with automatic optimization and the ARM Cortex A9 and new architecture.

Regularly, ARM provides patches free of charge to improve the support of new cores.

Feature	Standard	Professional
Standard Processor Support ARM7 - 9 - 10 - 11 Family ARM11MPC SecurCore Cortex-M0, M1 and M3 Series Cortex-R Family Cortex-A8	Yes	Yes
Advanced Processor Support Cortex-A9 - Cortex-A5 - Cortex-M4	No	Yes
RealView Debugger	Yes	Yes
ARM Compiler	Yes	Yes
ARM Workbench IDE	Yes	Yes
Flash programmer	Yes	Yes
Instruction Set Models	Yes	Yes
NEON Compiler	No	Yes
ARM Profiler	No	Yes
Real-Time System Model, created with ARM Fast Models ARM926EJ-S ARM1136JF-S ARM1176JZF-S Cortex-R4F Cortex-A8 Cortex-A9 (Single and Dual Core) Cortex-A5 Cortex-M3	No	Yes

NEW in 2010: The Development Studio 5 :

ARM DS-5 features an application and kernel space debugger with trace, system-wide profiler / performance analyzer, real-time system simulator, and compiler. These features are included in a customized, powerful and friendly Eclipse-based IDE. The tool suite makes it easy to develop and optimize Linux-based systems for ARM-powered systems, shortening development and testing cycles, and helping engineers to create resource-efficient software.



In 2010, two versions are available: The application Edition and the Linux Edition.

	DS-5 Application Edition	DS-5 Linux Edition	DS-5 Professional Edition
Eclipse IDE and Project Manager	✓	✓	✓
GNU Compiler for Linux	✓	✓	✓
Linux Application Debugger	✓	✓	✓
Streamline Performance Analyzer	✓	✓	✓
Real-Time System Models	✓	✓	✓
Boot Code and Driver Debug (JTAG)		✓	✓
ETB Trace		✓	✓
ARM Compiler			✓

The DS-5 Professional Edition will replace RVDS in 2011/2012.

Debugging Tools:

A JTAG-based or SWD-based (stand for Serial Wire Debug) debugging system (the RealView ICE) that interfaces between a source level symbolic debugger and an ARM microprocessor embedded in an ASIC; It may be coupled with RealView Trace which capture the compressed trace data from the trace port; the Trace Debug Tools via a high-speed Ethernet upload connection retrieve the information from the unit. The older cheaper Multi-ICE might be available under ARM approval.

Development Boards:

These platforms enable the integration of software and hardware IP; they reduce the development time and increase levels of confidence in the final silicon by allowing early prototyping of an environment similar to the final system. ARM offers versatile boards thanks to a broad choice of integrated cores and many options of configuration. The ARM7 to the ARM11 family are available on Core Tile, and the latest ARM Cortex A8 is available on platform Baseboard. Finally the new ARM Cortex A9 is available as a complete ecosystem and an Emulation board is available to allow you to customize your system following your needs.

The following table shows the full list of hardware development boards provided by CMP.

Hardware Platform Solutions	
<u>Versatile</u>	
Versatile Express	
V2F-1XV5-0302A	Logic Tile Express 3MG

V2M-P1-0303A	Motherboard Express uATX
V2P-CA9-0301A	Core Tile Express A9x4
Baseboard	
PB926-BD-0190BLF	Platform Baseboard for ARM926EJ-S
PBB76-BD-0232A	Platform Baseboard for ARM1176JZF-S
PBMPC-BD-0238A	Platform Baseboard for ARM11 MPCore
PBCA8-BD-0240A	Platform Baseboard for Cortex A8
AB926-BD-0221ALF	Application Baseboard for ARM926EJ-S
VEREB-BD-0228ALF	Emulation Baseboard
MPCM3-BD-0242A	Cortex M3 Prototyping board
Interface board for Application Baseboard	
ABIB2-BD-0222A	Interface Board 1 (AB-IB1)
ABIB2-BD-0223A	Interface Board 2 (AB-IB2)
Core tiles	
CTB36-BD-0219ALF	Core Tile for ARM1136JF-S (CT1136JF-S)
CT7TD-BD-0220ALF	Core Tile for ARM7TDMI (CT7TDMI)
CT926-BD-0218ALF	Core Tile for ARM926EJ-S (CT926EJ-S)
CTMPC-BD-0229ALF	Core Tile for ARM11 MPCore (CT11MPCore)
CTB56-BD-0230A	Core Tile for ARM1156T2F-S (CT1156T2F-S)
CTB76-BD-0237A	Core Tile for ARM1176JZF-S (CT1176JZF-S)
Logic Tiles	
LT160-BD-0235A	Logic Tile for XC4VLX160
LT200-BD-0236A	Logic Tile for XC4VLX200
LT330-BD-0239A	Logic Tile for XC5VLX330
INLT8-BD-0196BLF	LT-XC2V8000 (Xilinx VirtexII)
PCI Kit for versatile Platform Baseboard	
VPCIB-BD-0191A	66MHz 64-bit 3 slot PCI backplane and PSU
VPCIB-BD-0191ALF	66MHz 64-bit 3 slot PCI backplane and PSU

University Bundle Kit:

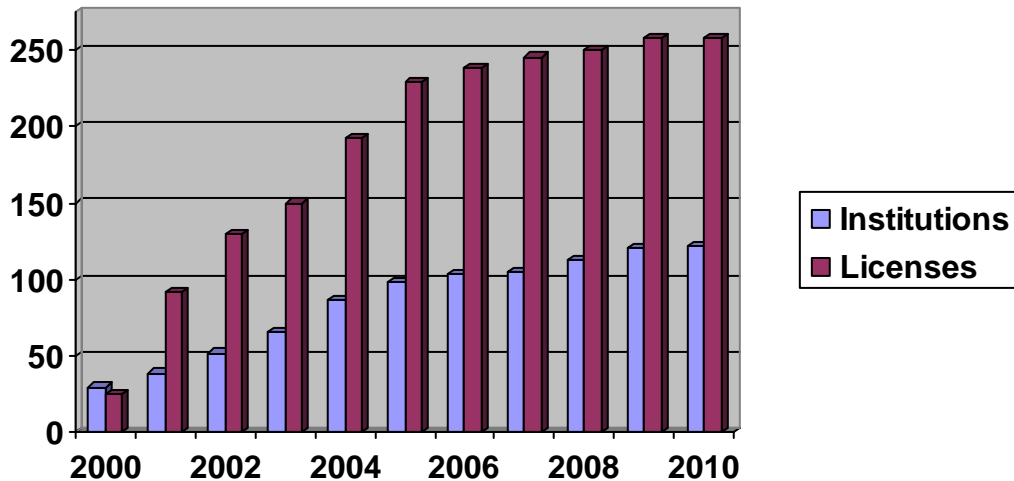
CMP distribute ARM tools in bundle for Universities.

The older, but appreciated, ARM kit: ADS v1.2 plus Multi-ICE v2.2 compose the first bundle (available on case-by-case basis).

RealView Development Suite plus RealView ICE plus RealView Trace is the most up-to-date university bundle. This bundle corresponds to the requirement needs of developers.

As an example, UFRIMA (the department of Computer Science of the Joseph Fourier University of Grenoble, France) introduced ARM development system tools to several computer science courses at the Joseph Fourier University. This concerns approximately three hundred students and was launched in 2002/2003.

The following diagram shows the evolution in number of institutions and number of ADS/RVDS Licenses distributed.



Fabrication of SoC including ARM cores:

In addition to the ARM software tools, CMP gives the possibility to get ARM cores fabricated in CMOS STMicroelectronics prototyping circuits. This service is provided to Universities with no additional cost. Three projects were realized from 2004. In particular a project from CEA-LETI was very successful. (FAUST, an asynchronous Network-on-Chip based architecture for Telecom Application. See the presentation in the 2005 CMP Activity Report, Appendix 1).

Presently, all ARM cores are available on 65nm CMOS from STMicroelectronics, and the ARM 946 on 130nm CMOS.

KEIL:

In 2009, CMP extend his agreement with ARM to distribute Keil Tools, a subdivision of ARM Holding. We provide academic institutions and research laboratories with KEIL products with special academic prices.

Keil is dedicated to microcontrollers based on ARM cores. It allows very low cost platforms for evaluation and development.

The complete portfolio is available in the CMP's web site at: <http://cmp.imag.fr/products/cad/?p=keil>.

CMP provides a full set of tools including:

Hardware Platform Solutions	
<u>Cx51 Keil 8051 Development Tools</u>	
8051 Board only	
MCBx51-ED	8051/251 Evaluation Board
MCBXC866-ED	Evaluation Board for Infineon XC86x
MCBXC866-ED	Evaluation Board for infineon XC88x
LPC Development Kits - for Philips 89LPC9xx Devices	
MCB900-ED	Evaluation Board for Philips LPC90x/91x/92x/93x (includes LPC900 Studio with 4K limited Compiler/Assembler/Debugger/Simulator)
EPM900-ED	Emulator/Programmer for Philips LPC90x/91x/92x/93x (includes LPC900 Studio with 4K limited Compiler/Assembler/Debugger/Simulator)
MCB950-ED	Evaluation Board for Philips LPC95x (includes LPC900 Studio with 4K limited Compiler/Assembler/Debugger/Simulator)
ARM Keil Development Tools for ARM7, ARM9, Cortex-M3 & Cortex-M0 & Cortex R4	
MCB1114-ED	Evaluation Board for NXP LPC1114 (Cortex-M0)
MCB1C114-ED	Evaluation Board for NXP LPC11C14 (Cortex-M0)
MCB1200-ED	Evaluation Board for NXP LPC1200 (Cortex-M0)
MCB1343-ED	Evaluation Board for NXP LPC1343 (Cortex-M0)

MCB1750-ED	Evaluation Board for NXP LPC1750
MCB1760-ED	Evaluation Board for NXP PC1760
MCB2100-ED	Evaluation Board for NXP LPC211x/LPC212x series
MCB2103-ED	Evaluation Board for NXP LPC2101/LPC2102/LPC2103
MCB2130-ED	Evaluation Board for NXP LPC213x series
MCB2140-ED	Evaluation Board for NXP LPC214x series
MCB2360-ED	Evaluation Board for NXP LPC236x series
MCB2370-ED	Evaluation Board for NXP LPC237x series
MCB2387-ED	Evaluation Board for NXP LPC2387 series
MCB2388-ED	Evaluation Board for NXP LPC2388 series
MCB2460-ED	Evaluation Board for NXP LPC246x series
MCB2470-ED	Evaluation Board for NXP LPC247x series
MCB2919-ED	Evaluation Board for NXP LPC2919 series
MCB2929-ED	Evaluation Board for NXP LPC2929 series
MCB9B500-ED	Evaluation Board for Fujitsu 9BF506 series (Cortex-M3)
MCBSTR7-ED	Evaluation Board for STM STR71x series
MCBSTR730-ED	Evaluation Board for STM STR73x series
MCBSTR750-ED	Evaluation Board for STM STR75x series
MCBSTR9-ED	Evaluation Board for STM STR91x series
MCBSTM32-ED	Evaluation Board for STM STM32x series
MCBSTM32E-ED	Evaluation Board for STM STM32E series (QVGA display)
MCBSTM32C-ED	Evaluation Board for STM STM32C series (QVGA display)
MCBSTM32EXL-ED	Evaluation Board for STM STM32F103ZE/ZG (Cortex-M3)
MCBTMPM330-ED	Evaluation Board for Toshiba TMPM330 series
MCBTMPM362-ED	Evaluation Board for Toshiba TMPM362 device (Cortex-M3)
MCBTMPM364-ED	Evaluation Board for Toshiba TMPM364 device (Cortex-M3)
MCBNUC1XX-ED	Evaluation Board for Nuvoton Cortex-M0 device family
MCBTMS570JLL	Evaluation Board for Texas InstrumentsTMS70 Cortex R4
C166 Keil C166 Development tools	
MCBXC-NET-ED	Evaluation Board for Infineon XC167 with 10/100Mbit Ethernet Interface 2 x CAN, OCDS, 2MB Flash Memory, 512kB high-speed RAM
Ulink USB-Jtag Adapter	
ULINK2-ED	USB/JTAG Adapter for Flash Programming and Debugging
ULINKPro-ED	High-Speed Debug and Trace Unit Requires MDK 4,02 or higher

Software Development Tools	
<u>Cx51 Keil 8051 Development Tools</u>	
PK51-ED	C51 Professional Developer's Kit (CA51 + uVision Simulator and target Debugger, LX51 Code Packing Linker Extended Device Support, In-System Debugging with ISD51 + Flash Monitor, RtxTiny2 Real-time OS, ULINK driver for ST uPSD and Infineon XC800, Driver for ADuC83x/84x)
CA51-ED	C51 Compiler/Assembler Kit (A51 Assembler + C51 Compiler)
<u>C251 Keil 251 Development Tools</u>	
DK251-ED	C251 Developer's Kit (CA251 + uVision simulator and target debugger)
CA251-ED	C251 Compiler Kit (A251 + C251 Compiler)
<u>ARM Keil Development Tools for ARM7, ARM9, Cortex-M3 & Cortex-M1</u>	
MDK-ARM-ED	MDK-ARM Microcontroller Development Kit - Standard Edition (C/C++ Compiler + Assembler + uVision IDE/Debugger/Simulator + RTX Kernel)
MDK-ARM-B-ED	MDK-ARM Microcontroller Development Kit - Basic Edition (256K C/C++ Compiler + Assembler + uVision IDE/Debugger/Simulator)

RL-ARM-ED	RL-ARM Real-Time Library (requires MDK-ARM) (RTX Source Code, File System, TCP/IP Networking, CAN and USB driver)
C166 Keil C166 Development Tools	
PK166-ED	C166 Professional Developer's Kit (CA166 + uVision Simulator and Target Debugger)
CA166-ED	C166 Compiler/Assembler Kit (A166 + C166 Compiler, EC++ Compiler, Run-Time Libraries, RTX166 Tiny Real-Time Operating System)
AR166-ED	Advanced RTX166 Real Time Operating System for C16x, XC16x and ST10 including Flash File System and TCP/IP Networking support

As an example, INSA (Institut National des Sciences Appliquées of Lyon, France) introduced ARM development system tools to several computer science courses. This concerns several classroom in 2009 in the platforms STM32 and MDK-ARM Classroom Edition.

Recommandation:

There is a broad choice of development platforms based on several ARM cores, here following a very short recommendation depending on your needs.

1 - Student Project:



A recommended platform which perfectly fits Student's projects:

Mbed is a tool for Rapid Prototyping with Microcontrollers based on the ARM Cortex M3.

Microcontrollers are getting cheaper, more powerful and more flexible, but there remains a barrier to a host of new applications; someone has to build the first prototype!

With mbed, we have focused on getting you there as quickly as possible.

2 - Development project:



The first development platform for the ARM Cortex-R4:

The Keil MCBTMS570 Development Kit introduces the Texas Instruments TMS570 ARM Cortex-R4 processor-based device, allowing you to create and test working programs for this advanced architecture.

The MCBTMS570 has a wide range of interfaces making it a great starting point for your next ARM project.

3 – Prototyping project:



For performance purpose, the ARM Cortex A9 quadricore is available for development and prototyping:

The Versatile Express family development platform provides an excellent environment for prototyping the next generation of system-on-chip designs.

Featuring :

- * Quad Cortex-A9 processor each with Neon (r0p1) at 400MHz
- * L1 Cache 32kInst and 32kData
- * L2 Cache 512K (PL310)
- * Debug via ETM and CoreSight

Package Leonardo Spectrum, ModelSim, HDLDesigner :

Leonardo Spectrum: this tool from Mentor Graphics is a logic synthesis, optimisation, retargeting and analysis tool developed to allow the use of technology-independent design methods for FPGA, cPLD and CMOS ASIC design.

ModelSim: this tool from Mentor Graphics is a complete VHDL, Verilog interactive simulator, waveform viewer, source code debugger, design hierarchy viewer and includes a C language interface.

HDL Designer: it provides comprehensive documentation and communication features in a common design environment. HDL Designer seamlessly integrates with ModelSim simulator for advanced simulation and debugging.

Evatronix:

CMP and Evatronix announce in January 2010 a partnership which enables CMP to provide academic institutions with Evatronix products with special academic prices.

Evatronix is a silicon Intellectual Property (IP) provider based in Poland. This partnership allows CMP to expand its service by including Evatronix IP in the MPW catalog.

Our service provides a full set of IP corresponding to a large scope of projects:

Processors:

- X51 series, Z80, 6502
- 68k series
- 80186 series
- DSPs

Interfaces:

- USB 2.0, OTG & Hub
- USB 3.0
- Ethernet MACs

Memory & storage:

- NAND flash
- SDIO host
- ATA / IDE host

Multimedia:

- JPEG 2000 encoder
- Video Controllers (HD, TV)
- I2S, SPDIF

Communication:

- HDLC
- SDLC
- I2C, SPI

The complete portfolio is available in the CMP's web site at: <http://cmp.imag.fr/products/cad/?p=evatronix>.

These IPs are available as firm core synthesized on CMP's supported technologies:

STMicroelectronics:

- HCMOS9GP 130nm CMOS
- CMOS065 65nm CMOS
- CMOS040LP 40nm CMOS

Austriamicrosystems:

- C35B4C3 0.35um CMOS

Universities and Research laboratories are eligible to special academic price and different business models are available as unique project, multiple projects.

Finally a commercial usage is possible with different quantities.

A.2 – Products offered to Academia and Industry.

Tanner EDA Tools:

CMP developed a full custom and standard cell design kit for 0.35 CMOS Austriamicrosystems and 65nm CMOS STMicroelectronics for digital and mixed signal circuits. These design kits are free of charge.

L-Edit base:

The L-Edit base package includes the layout editor, GDS/CIF read/write interface, Boolean layer generator, X-Sectional viewer, User Programmable Interface, and device generators for R and C components.

L-Edit Pro:

The L-Edit base package plus DRC, Extract to Spice, LVS and Place and Route.

Tanner Tools Pro:

The most complete set contains the both T-Spice Pro package and L-Edit Pro package. Furthermore, the package includes X-tools, a selection of advanced macros, Device Generators for MOS, R, C, and L components.

HiPer Silicon:

The Tanner Tools Pro package plus HiPer Verify plus Verilog-A and SDL router.

A.3 – Products from Universities.

These products have links in the CMP web site.

Alliance from LIP6 laboratory

ALLIANCE is a complete set of free CAD tools and portable libraries for VLSI design. It includes a VHDL compiler and simulator, logic synthesis tools, and automatic place and route tools. A complete set of portable CMOS libraries is provided. Alliance is the result of a twelve year effort spent at ASIM department of LIP6 laboratory of the Pierre et Marie Curie University (Paris VI, France). Alliance has been used for research projects such as the 875 000 transistors StaCS superscalar microprocessor and 400 000 transistors IEEE Gigabit HSL Router. For more information see: <http://www-asim.lip6.fr/recherche/alliance/>

MicroWind and DSCH from INSA Toulouse

Microwind3 is a friendly PC Windows tool (95, 98, NT, XP) for designing and simulating microelectronic circuits at layout level. The tool features full editing facilities (Cut, paste, duplicate, move, stretch), attractive views (MOS characteristics, 2D cross-section, 3D cross-section), atomic views and an on-line analog simulator. DSCH3 is the companion software for logic design. Based on primitives, a hierarchical circuit is built and simulated. Interactive symbols are used to friendly simulation, which includes delay and power consumption evaluation. A commercial and complete version of the tool is promoted by the company ni2designs (www.microwind.net). The light version of the tool is free for download. Several books have been published on the Microwind tool, more information may be found on www.microwind.org.

Magic from University of California at Berkeley

Magic covers all the back-end tools including layout editor, Place & Route, Design rule checking, Netlist extraction and Layout versus Schematic. For more information see: <http://www.research.compaq.com/wrl/projects/magic/magic.html>

B – CAD tools for MEMS

B.1 – CAD Tools from SoftMEMS

CMP distributes the SoftMEMS suite of tools for MEMS design to Universities, Research Laboratories and Industrial Companies. The suite includes PC based software tools (MEMS PRO VS, MEMS PRO CS and MemMaster Series Bundle) and Unix based software (MEMS Xplorer DS and MEMS Xplorer CS).

B.2 – Design kits from SoftMEMS

CMP has an agreement with SoftMEMS to distribute the design kits for PolyMUMPS, SOIMUMPS and MetalMUMPS for Tanner and Cadence to educational institutions and research laboratories in Europe and some other countries. They provide a complete design flow from schematic capture to layout generation and verification.