



“When we started to understand how CoSy works, what immediately impressed us was how clean and extendable its software architecture is,” said Miguel Santana, head of the Embedded Software Development Tools department in ST’s Central R&D group, which worked closely with the MMDSP+ team.

With much of ST’s IP in optimization engine design already embodied in prototype compilers that the company had developed before starting to use CoSy, the ability to extract these optimization engines and retarget them for use in CoSy was of paramount importance.

“From our prototyping experience in the Central R&D group we had come to the realization that developing a highly efficient, fully validated, retargetable compiler environment from scratch takes around 50 man/years of effort,” said Santana. “What ACE did was provide us with 45 of those man/years straight out of the box, on top of which our small team of specialists was able to add its optimization engine knowledge in around one year.”

The result has been that the 48 MIPS of DSP processing initially required to execute the EFR codec has now been reduced to around 20 MIPS, which is considerably better than the 25 MIPS target that ST had set itself.

“With this number of MIPS, CoSy is generating compilers that are within 10% of the performance we think could be achieved by hand-crafted assembler code,” said Gentit.

### **About ACE . . .**

*ACE Associated Compiler Experts (a wholly owned subsidiary of ACE Associated Computer Experts, Amsterdam, The Netherlands) is a world leader in the production of compiler development tools for professional compiler developers. Its open CoSy compiler development system gives compiler developers the ability to achieve a similar leading edge position in the construction of better and faster optimizing compilers for architectures ranging from 4-bit DSPs to 256-bit VLIW processors.*

### **About CoSy . . .**

*The revolutionary CoSy compiler development system is used to construct compilers for various languages including C, Java and C++, for a wide range of architectures. The extensive use of generators leads to a more robust product with lower development costs, which in turn means that the time to market is appreciably shorter. The modular approach, covering isolated compiler component development, reuse of components and the specialization and focus of compiler development groups, leads in turn to lower development and maintenance costs.*

The excellent results achieved by combining CoSy with ST’s own optimization engines have enabled ST to develop a new hardware/software co-design methodology that allows new DSP architectures to be designed while taking into account the capabilities of the software compilation technology.

“We now design our hardware DSP architectures so that they make maximum use of the compiler’s capabilities as well as meeting the run-time requirements of the application software,” said Gentit. “That makes CoSy a very important part of our overall tool set.”

*“The extreme modularity of the software significantly simplified the autonomous development of ST-specific optimizations on top of CoSy, and did so in a very maintainable fashion.”*

Miguel Santana,  
head of the Embedded  
Software Development  
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