Porting EagleEye to a LLVM-based Toolchain

The main goal of this activity has been to improve the LLVM support for Sparc/LEON to make Clang a valid replacement or complement to GCC without sacrificing performance or features. The ESA EagleEye CSW reference SW and its dependencies have been used as input to the activity and was ported to LLVM/Clang. This demonstrates that LLVM/Clang can efficiently be used by flight software and thereby motivates an increased Technology Readiness Level (TRL) for LLVM/Clang on LEON.

As a result of this work Clang now supports multiple new optimizations and can for some benchmarks outperform GCC. The instruction timing has been updated for GR740, GR712RC, and GR716, and support has been added for flat register window mode. The LLVM integrated assembler has been extended to support additional mnemonics, aliases, and relocations. This has made it possible to process more assembly code originally written for the Binutils assembler.

In addition to EagleEye the work has focused on creating a LLVM-based toolchain for RTEMS. It is now in such a state that it can be used as direct replacement for the GCC toolchain. It is already available for ESA space projects as part of the precompiled LLVM/Clang-based toolchain for RTEMS-5 (RCC-1.3) and through open-source repositories.