ESA Round Table 2006 on Next Generation Microprocessors for Space Applications
ESTEC Noordwijk, The Netherlands, 12-13 September 2006

Overview of the AT697 Development

André L. R. Pouponnot
European Space Agency
ESTEC, Noordwijk, The Netherlands
tel: +31 71 565 3685
email: Andre-Louis.Pouponnot@esa.int

LEON2-FT Development Objectives

- Provide to the European space community a ***guaranteed access*** to a high performance processor for space applications
- 100 MIPS and 20 MFLOPS performance targets
  - more than a fourfold improvement with respect to the TSC695F
- Low power consumption (less than one Watt)
- Compatibility with previous generations of ERC32 processors
  - The LEON2-FT is based on the SPARC V8 architecture
- It shall include built-in fault-tolerance features to prevent erroneous operations from SEE induced errors

LEON2-FT Development Overview

The LEON2-FT Development is divided in 5 phases.

Preliminary Development:

- Phase 0 = Feasibility Study
- Phase 1 = Demonstrator
- Phase 2 = Prototype

Flight Development:

- Phase 3 = Consolidation and Design
- Phase 4 = Manufacturing, Characterisation, and Evaluation

The LEON1-FT Demonstrator (C697E)

Phase 1 Objectives:

- Validate the basic functionalities using the LEON1-FT core
- Validate the SEE fault-tolerant mechanisms
- The demonstrator includes only the core functions of the microprocessor (Integer Unit and Floating Point Unit)
- It was implemented on the 0.35 micron radiation-tolerant CMOS process of ATMEL (AT56KRT) and using the commercial libraries.

The LEON-2FT Prototype (AT697E)

Phase 2 Objectives:

- Implement the complete design of the final product
- Validate the complete functionalities using the LEON2-FT core and the additional cores (such as the PCI core, DSU, etc)
- Validate the SEE fault-tolerant mechanisms on the complete design
- Perform a complete characterisation including full radiation testing
- It was implemented on the 0.18 micron commercial CMOS process of ATMEL and using the commercial libraries.

The LEON2-FT Flight (AT697F)

Phase 3 & 4 Objectives:

- Implement the complete design of the final product
  - on the ATMEL AT58KRHA 0.18 micron CMOS radiation-hard process
  - using the ATMEL ATC18RHA radiation-hard libraries
- Perform the complete characterisation including full radiation testing
- Perform the Contractor internal qualification of the final product
- Perform the Evaluation of the final product

LEON2-FT Development Status

- The Phase 1 and the Phase 2 have been executed by ATMEL in the frame of the ESA contract 15036/01/NL/FM.
- The Phase 2 (prototype development) is now completed and the results will be presented next by ATMEL
- The Phase 3 and the Phase 4 (flight development) will be executed in the frame of the ECI ESA contract 19083/NL/FM (Call-of-Order No. 002)
- The plan for the Phase 3 and the Phase 4 for the development of the flight version of the LEON2-FT will be presented later today by ATMEL
- The radiation characterisation and the evaluation will be performed under a CNES contract

Overview of the LEON2-FT Development Flow

Note that in order to correct some design deficiencies and to improve some functionalities at the request of the European user community, the VHDL model of the AT697E will be updated and revalidated for the AT697F