LEON software support

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Software needs for Leon

- The software elements are:
  - Compilers environments (C, Ada, Java)
  - Operating systems (VxWorks, RTEMS, Linux)
  - Software Validation Environment (SVF) pure software or hardware in the loop

- There is a validated basis on Erc32, to be ported on Leon (few instructions more, different board support package, cache)

- The general policy for Leon software tools is to have two sources, ideally
  - a commercial off-the-shelf product
  - an Open source product
Compiler environments

C: open source supported by Gaisler [available]
  • C/erc32 compilers used by Aeolus, Lisa, Proba1, Smart1, H/P, Galileo...
  • C/Leon compiler used on Proba2

Ada: Raven, proprietary supported by Aonix [ongoing /end2006]
  • Aonix Ada/erc32 compilers used by: ATV, ERA, MSG, Envisat, Cryosat, Goce, etc.

GnatPro, open source supported by ACTCore [CCN issued /end2006]
  • gnatPro/erc32 compilers used by Terrasar
  • gnatPro/Leon to be used by Alcatel in ASSERT

Java: AeroVM, Aïcas, distributed by Astrium [on going]
  Perc/JRTK, proprietary supported by Aonix [on going /2007 + to be planned /end2007]
Other tools

Standard compiler test suite
[ERB available on some environments/Leon/2007]

Impact of cache on schedulability analysis
[on going /2006 + to be planned]
Operating systems

**VxWorks**: proprietary, ported on Leon by Gaisler, support status unknown

Less and less used since it has been banned by Astrium. VxWorks/erc32 used in Proba1, Smart1.

**RTEMS**: open source, supported in general by OAR but re-qualified on erc32 by each project in a particular version. Ported on Leon by Gaisler.

Attempt to concentrate the Leon support with Edisoft (Saab contribution) [on going /2007]

RTEMS/erc32 used on Aeolus, Lisa, H/P, Galileo, etc

RTEMS/Leon used on Proba2

**Linux**: open source, ported by Gaisler, and **realtime-Linux**, open source under port to Leon by Critical Software (Xluna) [on going /2007]

Intended use of realtime-Linux/Leon on payloads.
Software Validation Facility Policy

• Several areas of utilisation
  – Software validation (white box testing (SVF) non-real time)
  – System qualification (black box testing, integrated in a (EGSE) simulator, real-time)
  – Operations simulator (black-box, (soft) real time)

• Except for real-time performance and timing fidelity all other req’s can be served by the same product

• Two types of products needed
  – Software Emulators: non-real time
  – Hardware emulators: real-time
Software Validation Facility

Software target simulator:
- TSIM sold by Gaisler,
  Widely used, the only Leon solution for the moment (Proba2)
- SpaceBel target simulator (port of ERC32 techno to Leon): [on going /2007]
  SpaceBel sold some tenth of ERC32 license

Hardware in the loop:
- TSIM+HW acceleration [on-going/2007]
- HIL target emulator (Astrium, Saab, Terma) in view of SoC simulation: Leon2 FPGA + debug + API system simulators + API COCOS simulators [on going /2007]