

LISA Pathfinder

RTEMS (<http://www.rtems.com>) is an Open Source RTOS providing a powerful development and run-time environment that promotes the production of efficient real-time embedded applications.

Features:

- Scalable Architecture
- Modified GPL License
- Multiple APIs - Classic, POSIX
- Event-driven multitasking
- Priority-based, preemptive scheduling
- Responsive Interrupt Management
- Optional Rate Monotonic Scheduling
- Priority Inheritance and Ceiling Protocols
- Intertask communication and synchronization
- Homogeneous and heterogeneous multiprocessor systems
- Reentrant ANSI C Library
- Add-on libraries including Python, Lua, and Tcl
- High performance BSD TCP/IP Stack
- Protocols: TCP, UDP, BOOTP, ARP, ICMP
- Servers: FTPD, HTTPD, TELNETD
- Clients: DHCP, NTP, DNS, TFTP

Processors Supported:

M680x0	ix86	Coldfire	ARM
M683xx	Pentium	MIPS	Blackfin
PowerPC	SuperH	SPARC	H8
NIOS2		SPARC64	

Available Services:

- Training
- Standard Support
- Legacy Support
- RTEMS Application Assistance
- Board Support Package Development
- Application Design and Development
- Ports to New Architectures
- System Architecture Design

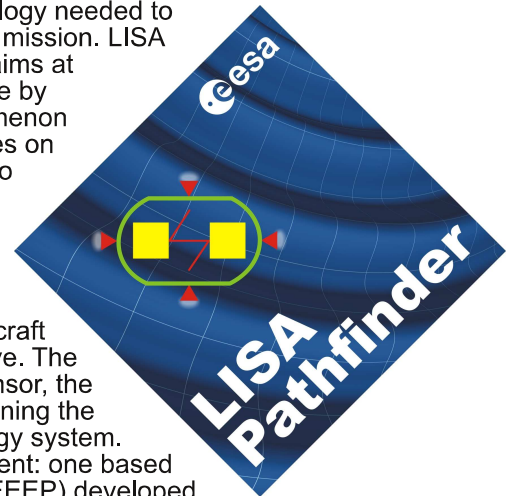
On-Line Applications

Research (OAR) Corporation

7047 Old Madison Pike
Suite 320
Huntsville, AL 35806
<http://www.oarcorp.com>
Phone: 256-722-9985
Fax: 256-722-0985

The LISA Pathfinder will test the technology needed to develop the ambitious ESA/NASA LISA mission. LISA (Laser Interferometer Space Antenna) aims at improving our knowledge of the universe by detecting gravitational waves, a phenomenon predicted by Einstein in 1916. LISA relies on technologies that are yet to be tested, so could not be built without its precursor LISA Pathfinder.

LISA Pathfinder does not possess a classical payload with which to perform its scientific investigation, for the spacecraft as a whole is used to pursue its objective. The core of the experiment is the inertial sensor, the LISA Technology Package (LTP), containing the proof masses and the accurate metrology system. Two micro-propulsion systems are present: one based on Field Emission Electric Propulsion (FEEP) developed in Europe and one based on Colloidal thrusters, developed in the USA and provided by NASA. The inertial sensor and the two micro-propulsion systems are controlled by two drag-free control software packages, one residing in the European on-board computer and one provided by JPL, called the Disturbance Reduction System (DRS), residing on a dedicated computer.



RTEMS is used on the data management unit (DMU) provided by EADS Astrium. This computer has two redundant 32-bit processor modules each with the the ATMEL ERC32SC SPARC microprocessor. This provides approximately 18 MIPS of computing power. This system also provides interfaces to the spacecraft and payload via a MIL-1553 bus, HDLC and SpaceWire links.

The LISA Technology Package (LTP) DMU is an element of the LTP optical metrology subsystem. It is used for post-processing the Fourier transform signals that encode the positions and attitudes of the test masses in the LTP. The DMU is used also to control and command the LTP units and communicates with LISA Pathfinder on-board software and ground control MTL (Mission Time Line) commanding.

The launch of LISA Pathfinder is planned for 2011. This allows in-flight demonstration of the LISA technology and provides timely feedback for the LISA mission.

References:

- Lisa Pathfinder Mission Home Page
- <http://sci.esa.int/science-e/www/area/index.cfm?fareaid=40>
- Flight Software Workshop 2010 - Keynote Day 2 on Lisa
- <http://flightsoftware.jhuapl.edu/>
- EADS Astrium Integrated Control and Data System Electronics (ICDE)
- <http://www.astrium.eads.net/node.php?articleid=2024>
- RTEMS Wiki Page
- http://wiki.rtems.org/wiki/index.php/LISA_Pathfinder

