

JRA1 - Data Acquisition Status Report

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Draft version, incomplete



Outline

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- Conclusions & Outlook

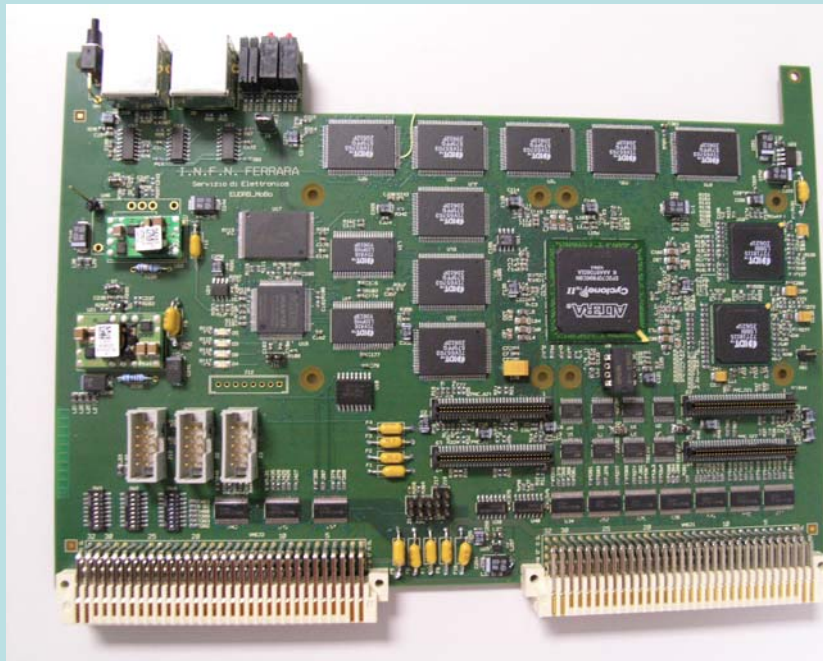


System Level Overview

QuickTime™ and a decompressor are needed to see this picture.



EUDRB by INFN Ferrara



mother board built around an ALTERA Cyclone II FPGA (clock rate: 80MHz) and hosting the core resources and Interfaces (VME64X slave, USB2.0, EUDET trigger bus)

NIOS II, 32 bit “soft” microcontroller (clock rate: 40Mz) implemented in the FPGA for

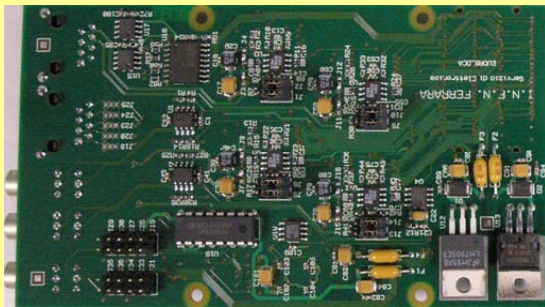
- on board diagnostics
- on-line calculation of pixel pedestal and noise
- remote configuration of the FPGA via RS-232, VME, USB2.0

Two readout modes:

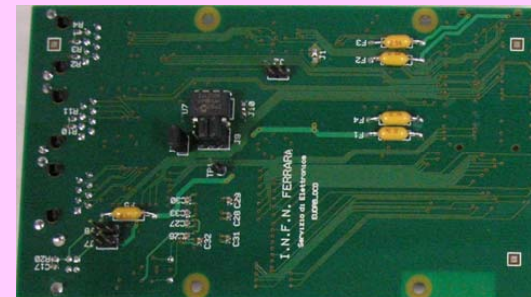
Zero Suppressed readout to minimize the readout dead-time while in normal data taking.

Non Zero Suppressed readout of multiple frames for debugging or off-line pedestal and noise calculations

analog daughter card based on the successful LEPSI and SUCIMA designs clock rate up to 20 MHz



digital daughter card drives/receives control signals for the detectors and features a USB 2.0 link



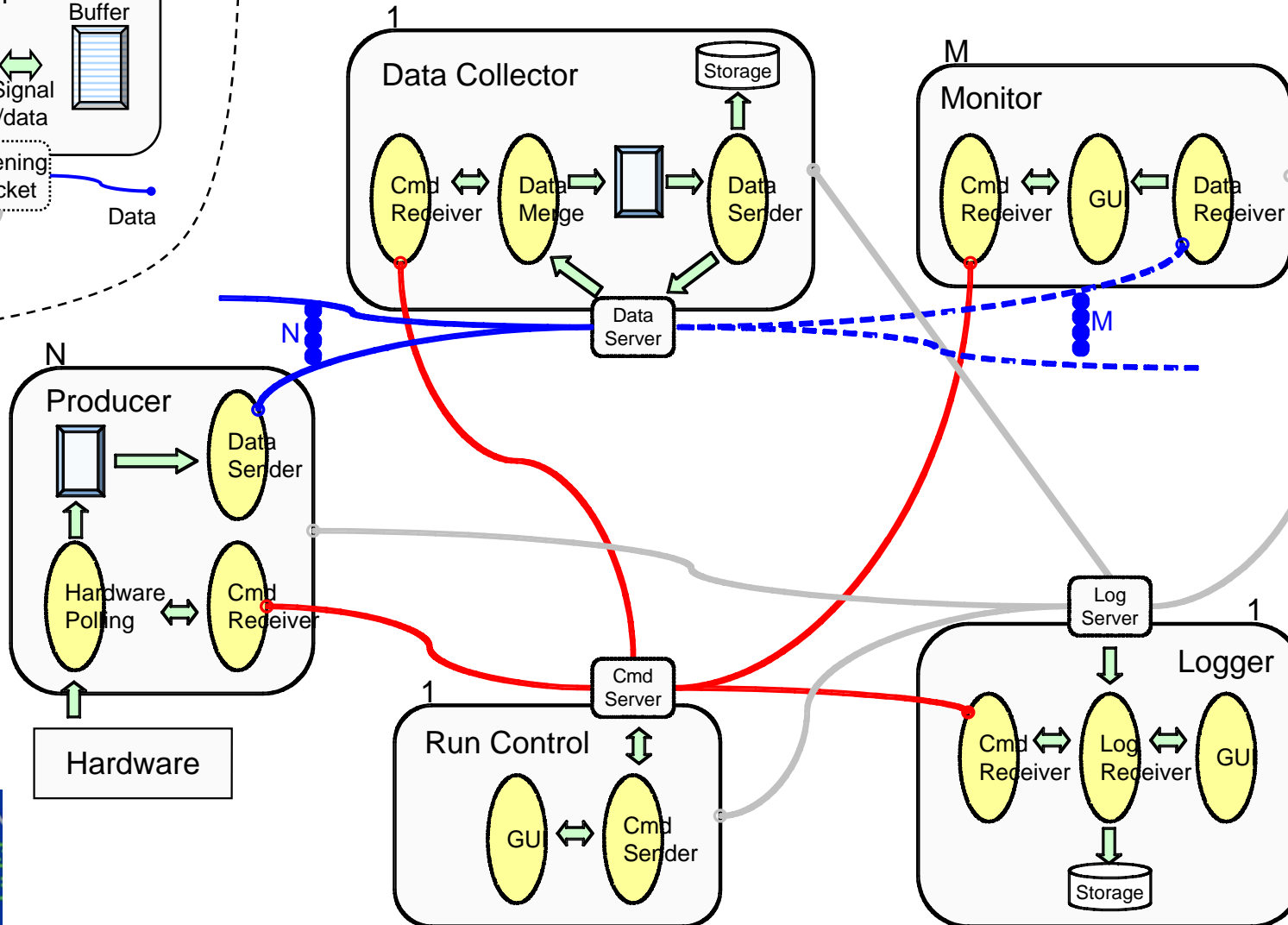
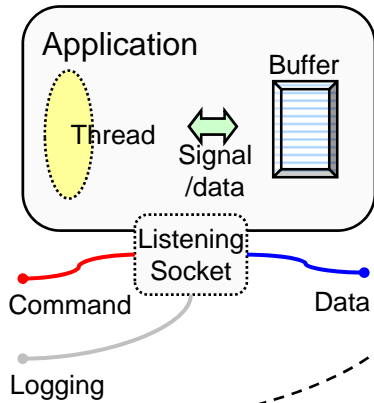
Triager Logic Unit

- Simple Handshake via Trigger/Busy/Reset on RJ45 LVDS lines (or TTL-Lemo)
- Timestamp and event-number via USB

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

DAQ-Architecture JRA1

Key:



JRA1 DAQ Key Features

- Platform independent (Linux, MacOS X, Windows under Cygwin) and highly modular
- current suite of ILC software (LCIO/Marlin etc) also runs under MacOS, but no official support yet
- DUTs can **(and should)** be easily integrated in our DAQ, simple examples and help is provided
- SVN Repository and Documentation at:

<http://projects.hepforge.org/eudaq/>



screenshot DAQ



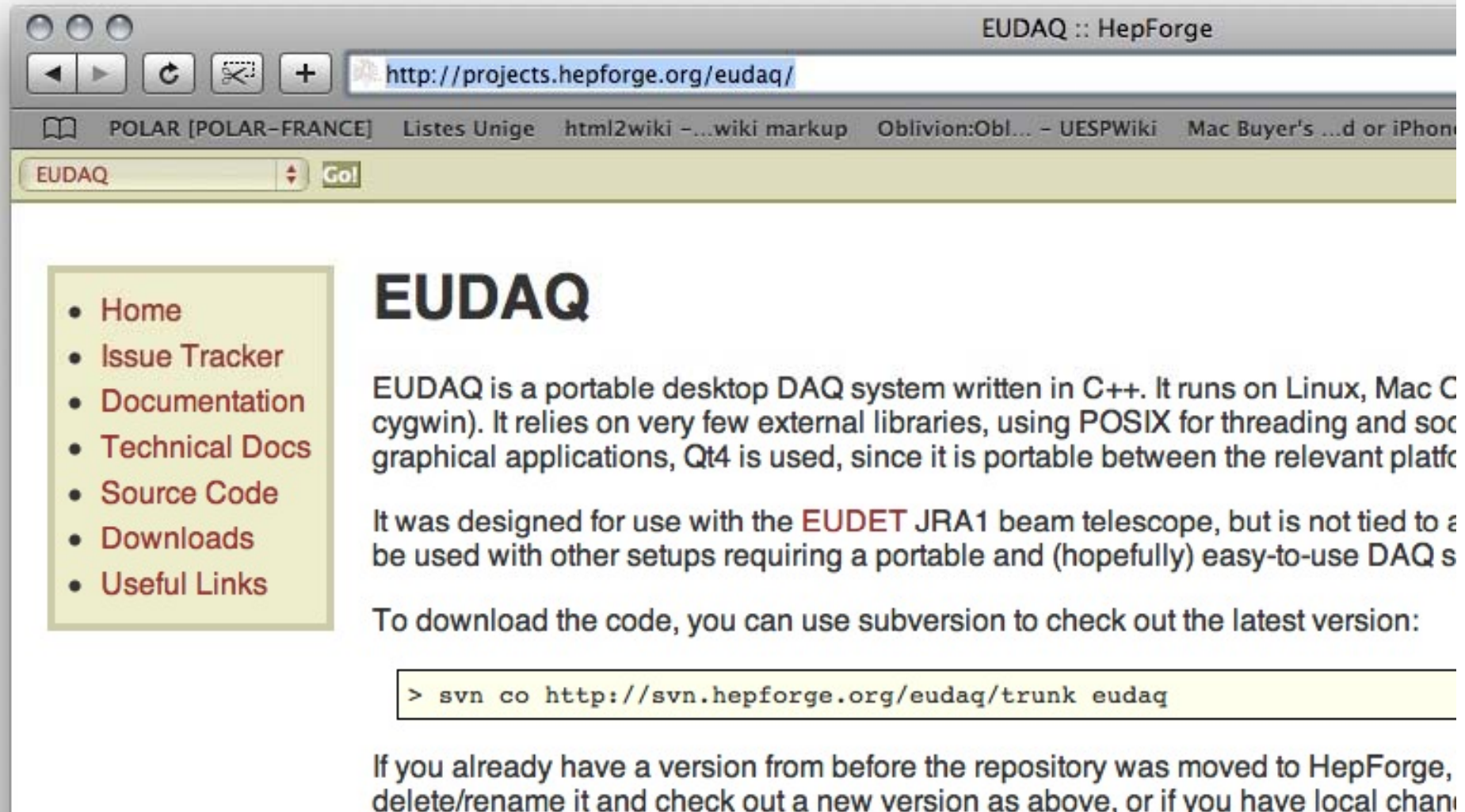
Analysis chain

- Proprietary raw format on DAQ-PC
- RAW data processed to LCIO on the GRID
- Data analysis using MARLIN processors
 - EUTelescope module
 - Track fitting
- still to add a picture/graph



Documentation...

- SVN, Doxygen and Bugtracking on hepforge:



The screenshot shows a web browser window titled "EUDAQ :: HepForge" with the URL <http://projects.hepforge.org/eudaq/>. The browser's address bar and search bar are visible. The page content includes a navigation menu on the left with links to Home, Issue Tracker, Documentation, Technical Docs, Source Code, Downloads, and Useful Links. The main content area features the heading "EUDAQ" followed by a description of the system as a portable desktop DAQ system written in C++ that runs on Linux, Mac OS X, and Cygwin. It mentions the use of POSIX for threading and sockets, and Qt4 for graphical applications. The text also states that EUDAQ was designed for the EUDET JRA1 beam telescope but is not tied to it. A section on downloading the code via subversion is provided, with a code block showing the command:

```
> svn co http://svn.hepforge.org/eudaq/trunk eudaq
```

 Finally, a note advises users to delete or rename any existing local versions and check out a new one from the repository.

EUDAQ

EUDAQ is a portable desktop DAQ system written in C++. It runs on Linux, Mac OS X, and Cygwin. It relies on very few external libraries, using POSIX for threading and sockets, and graphical applications, Qt4 is used, since it is portable between the relevant platforms.

It was designed for use with the **EUDET** JRA1 beam telescope, but is not tied to it and can be used with other setups requiring a portable and (hopefully) easy-to-use DAQ system.

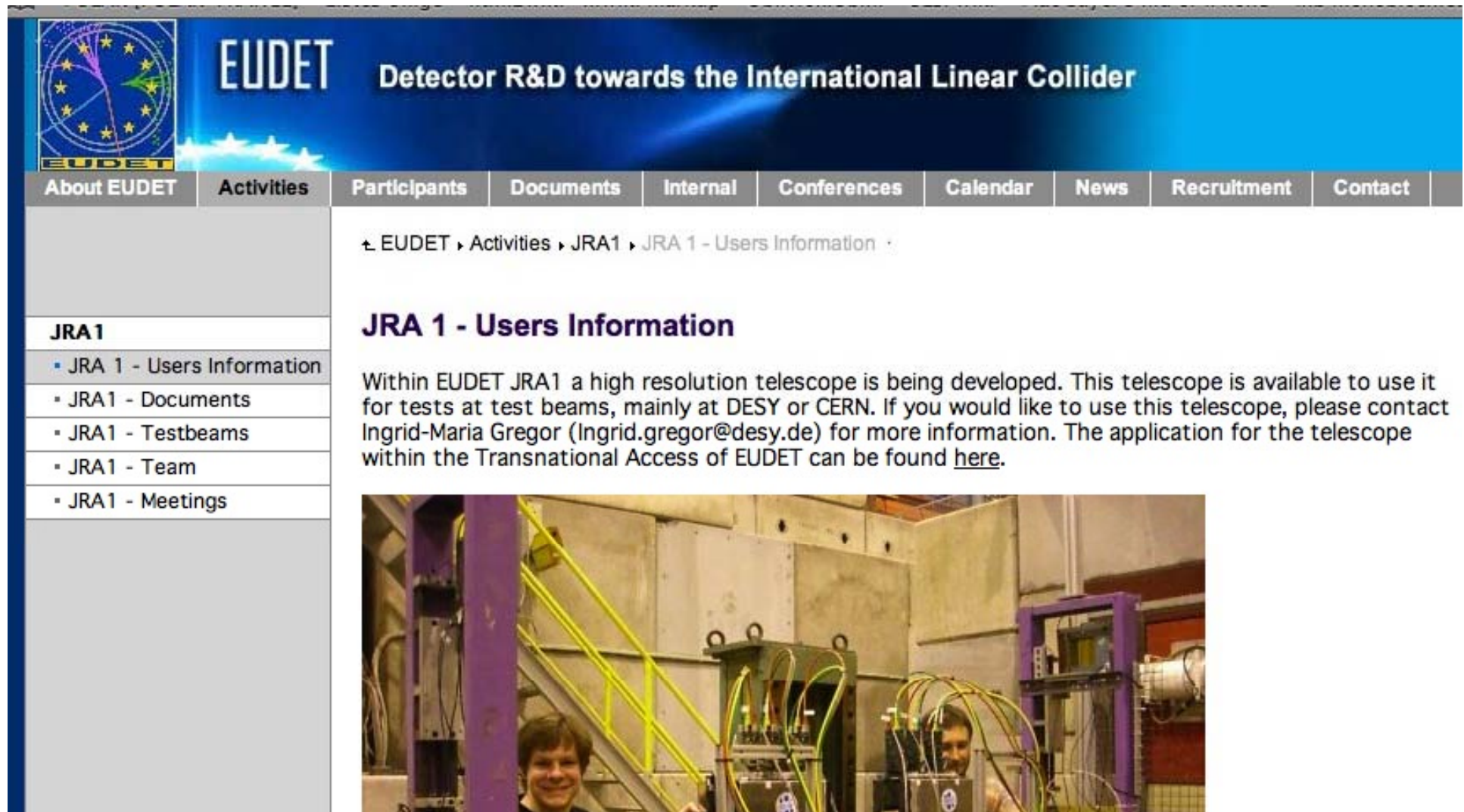
To download the code, you can use subversion to check out the latest version:

```
> svn co http://svn.hepforge.org/eudaq/trunk eudaq
```

If you already have a version from before the repository was moved to HepForge, delete/rename it and check out a new version as above, or if you have local changes

...Documentation...

- User information on www.eudet.org:



The screenshot shows the EUDET website interface. At the top left is the EUDET logo, which features a circular design with stars and a central figure. To the right of the logo, the text 'EUDET' is displayed in large white letters, followed by the tagline 'Detector R&D towards the International Linear Collider'. Below this is a navigation menu with tabs for 'About EUDET', 'Activities', 'Participants', 'Documents', 'Internal', 'Conferences', 'Calendar', 'News', 'Recruitment', and 'Contact'. The 'Activities' tab is selected, and a breadcrumb trail reads 'EUDET > Activities > JRA1 > JRA 1 - Users Information'. The main content area is titled 'JRA 1 - Users Information' and contains a paragraph of text: 'Within EUDET JRA1 a high resolution telescope is being developed. This telescope is available to use it for tests at test beams, mainly at DESY or CERN. If you would like to use this telescope, please contact Ingrid-Maria Gregor (Ingrid.gregor@desy.de) for more information. The application for the telescope within the Transnational Access of EUDET can be found [here](#).' Below the text is a photograph of two people, a woman and a man, standing in a laboratory setting. They are surrounded by complex scientific equipment, including a large structure with yellow railings and various cables and components.

- ...with following topics:

- **"Data Taking Manual"** ([link](#))
This manual is intended to enable unexperienced users to take data using the pixel telescope.
- **EUDET running with DUT**([link](#))
This page summarises special commands for the case of DEPFET and MIMOROMA being the DUT.
- **DUT table movement**([link](#))
The DUT is mounted on an x-y-table, that can be moved from outside the experimental area with the MAC used for data taking.
- **Some Remarks for the DAQ PC**([link](#))
This page summarises the necessary actions after the restart of the MAC for setting up a Parallels Desktop with Linux and correct network connections.
- **Boot setup for the MVME6100**([link](#))
A description of the boot setup for the MVME6100.
- **"JRA1- Data Acquisition System"** ([link](#))
This memo describes the data acquisition system, giving an overview of actual hardware and software developments.
- **"EUDAQ Software"** ([link](#))
The DAQ software for the pixel telescope and some technical documentations can be found on the web page mentioned above.
- **"JRA1 Trigger Logic Unit"** ([link](#))([link](#))
These memos describe the JRA1 trigger logic unit.
- **"EU Telescope Software"**



Milestones

- put list of old and upcoming DAQ milestones, and comment



Open Questions...

- VME-Speed
 - Readout speed via VME currently limited at ~70 Hz for 6 sensor planes, aim is 1 kHz
 - single sensor readout in **xxx** us, but change of sensor board takes **xxx** ms
 - driver issue, will be investigated in the coming months



...Open Questions...

- EUDRB Firmware validation
 - improved firmware with new features ('rolling' raw frames, synchronized readout)
 - needs validation and careful bug checking
 - some timing/noise issues under investigation



...Open Questions

- Code documentation
 - automatic documentation generation in place via Doxygen
 - needs more comments in the code
 - target date: March 2009



Conclusions...

- Multiplatform DAQ, easy to use
- DUT integration at different levels possible
 - Trigger level, with separate DAQs
 - Full integration, with combined file-writing
- Full integration of DUTs:
 - DEPFET
 - Mimoroma
- Integration at trigger level:
 - ISIS
 - DHCAL
- Stable and good performance
- Full analysis chain from Raw data via LCIO to the GRID, DUTs can profit as well (DEPFET)



...and Outlook

- Readout for Mimosa26 in preparation
 - EUDRB with new digital daughterboard (baseline)
 - commercial digital board from CAEN (under evaluation)
- Still to address:
 - VME readout speed
 - some more debugging
 - code documentation
- (Nearly) ready for running through 2009/2010, already 2008 successful 'servicing' for users

