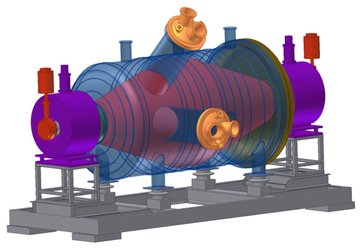
ADEI – Web 2.0 Data Manager for the KATRIN Neutrino Experiment



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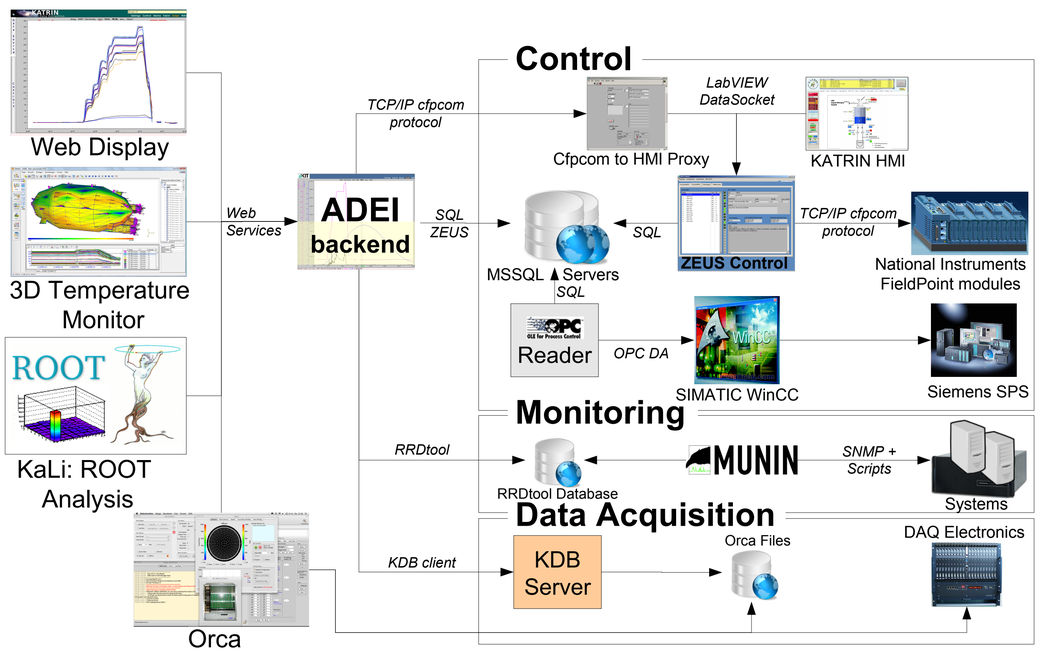
ADEI (Advanced Data Extraction Infrastructure) provides an easy access to the data of distributed data acquisition and control systems to the international collaborations of physics experiments.

ADEI Highlights

- General framework which can be easily applied to many experiments and extended to experiment's specific needs
- Provides uniform access to a distributed system of heterogeneous data sources
- Support for long running experiments and high data rates
- Fast and intuitive browser through experiment database
- Intelligent caching for optimal performance
- Platform independent programming interface
- Easy integration with major data analysis frameworks
- Successfully used in several projects since 2007

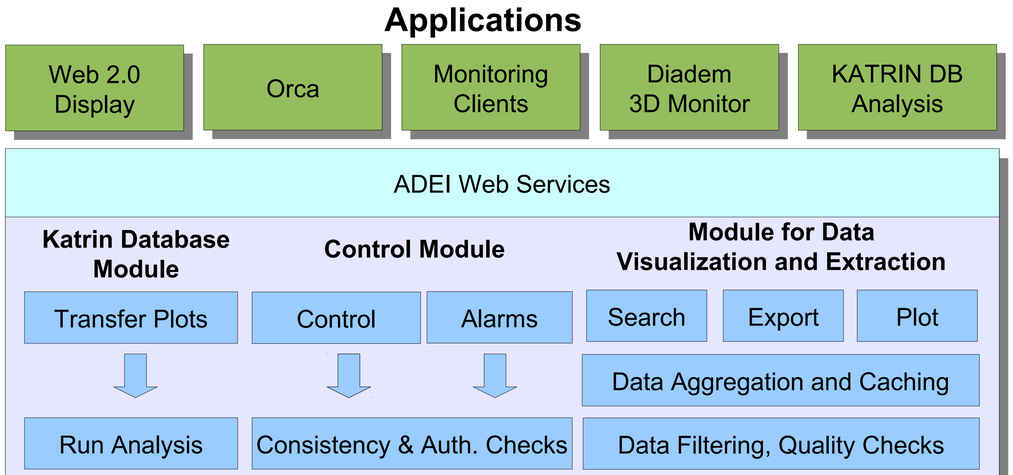
KATRIN Slow Control and Data Acquisition

- Distributed and heterogeneous: KATRIN consists of several subcomponents operated by multiple control systems.
- Long-running: The expected life time exceeds 10 years.
- Big-community: Members of KATRIN collaborations are working in Europe, United States, Russia.

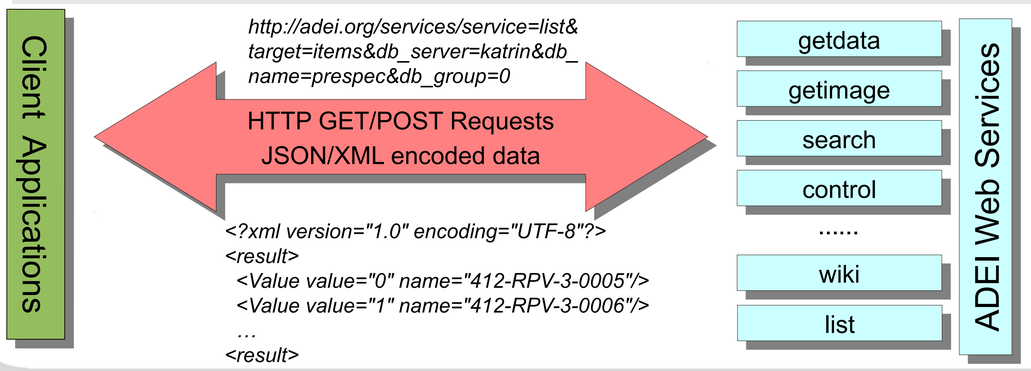


ADEI Architecture

- Pluggable data sources with customizable filtering support
- Cache to accelerate plotting of charts and data searches
- Simple web services abstracting data storage and control

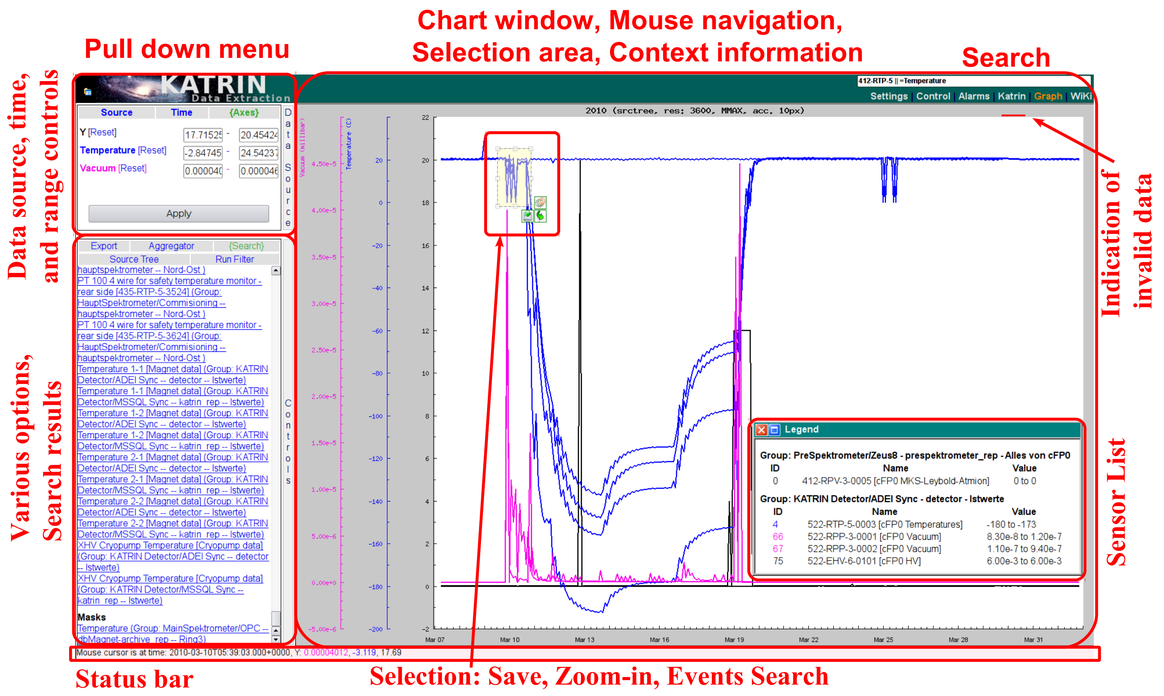


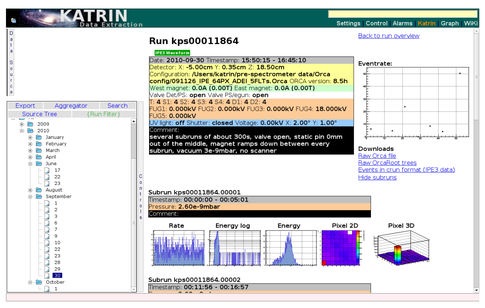
ADEI Web Services



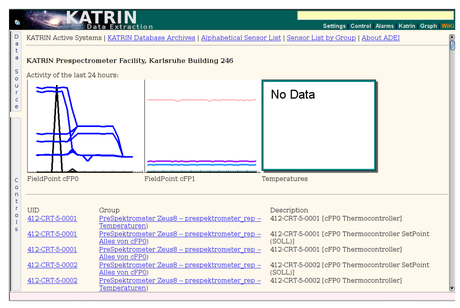
ADEI Web Display

- Fast & flexible navigation
- Support for gestures on multi-touch devices (iPhone, iPad)
- Works in all major browsers
- Display multiple plots and axes
- Multiple modes of aggregation
- Data filtering and interpolation
- Reporting of invalid data
- Bookmarking of data views
- KATRIN Event Browser
- Interface to KATRIN Slow Control
- Integrated WiKi engine with automatic previews, channel lists
- Flexible export subsystem supporting multiple formats: CSV, Excel, ROOT, TDMS, Matlab
- Search for data channels, runs, dates, and data values



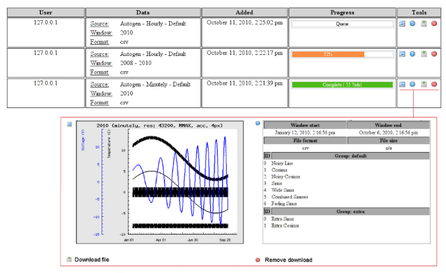


KATRIN Event Browser

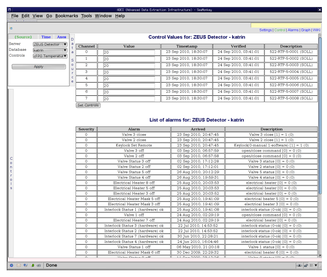


WiKi Engine

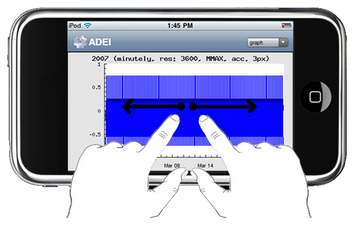
iPhone Support



Download Manager

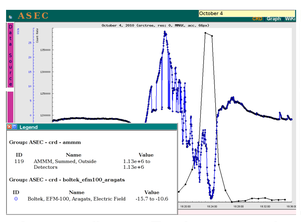


Control Subsystem

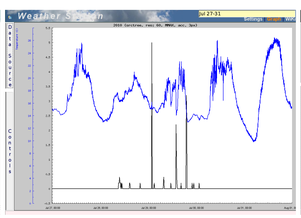


Gestures

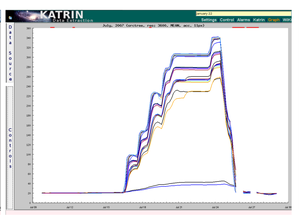
ADEI Applications



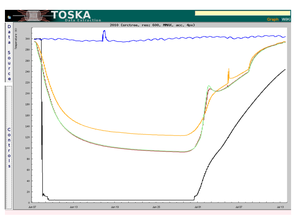
Aragats Space Environmental Center: Muon flux increase during the thunderstorm



Weather Tower at KIT: Temperature and perception in end of July

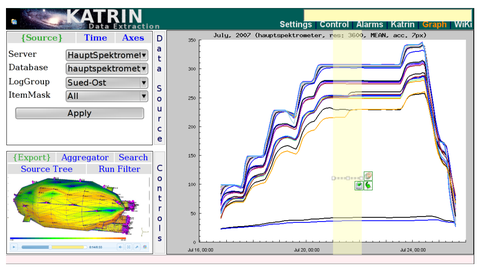


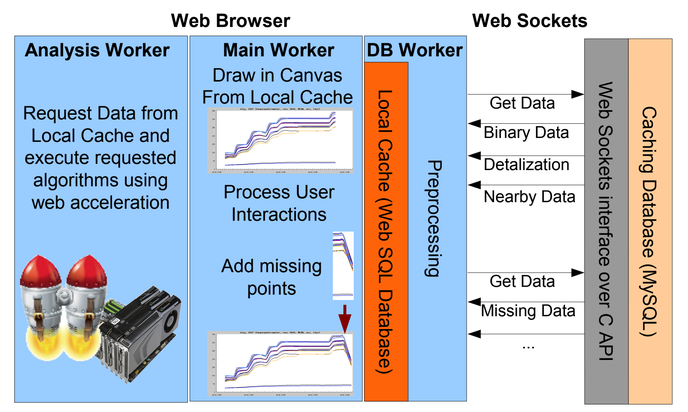
KATRIN Control System: Commissioning of main spectrometer



TOSKA (Test Facility for Fusion Magnets): Superconductivity Test

Vision: HTML5 and WebGL to enhance user experience





Top – Use ***Embedded Video Player*** and ***WebGL*** to visualize 3D objects and multidimensional data.
Right – Use multiple ***Web Workers*** to parallelize processing with JavaScript. *DB Worker* issues requests to database over persistent ***Web Sockets*** protocol and stores the data into the local ***Web SQL Database***.
Main Worker issues SQL queries to local cache and renders chart in **HTML Canvas**. Resource-intensive processing of the data on display (for example correlation of graphics) is executed by *Analysis Worker* which uses ***Mozilla JetPack***, ***Google Native Client***, or ***WebCL*** to achieve high performance.

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