THE DEVELOPMENT OF IRMIS AND ITS APPLICATION AT LANSCE
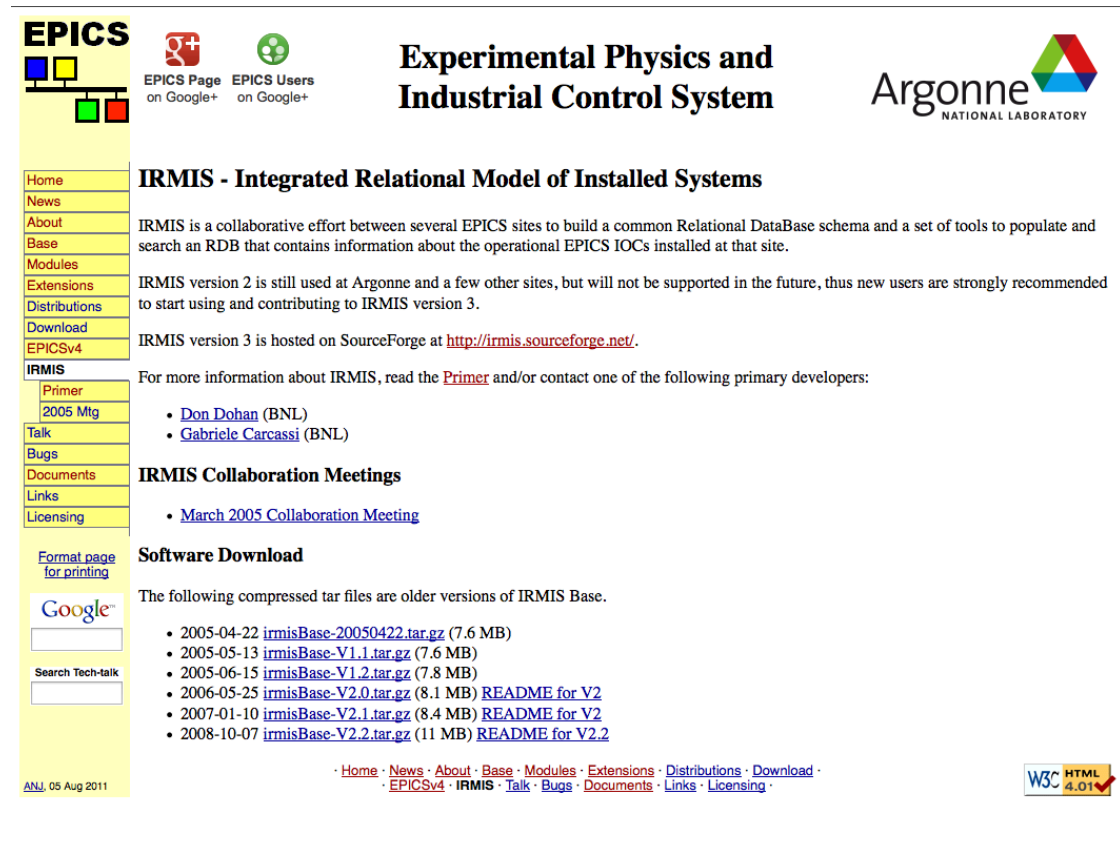
Kanglin Xu

John Faucett

May 25, 2016

Contents

- **IRMIS brief**
  - APS IRMIS 2
  - IRMIS 3
- **LANSCE-RM device database system**
  - Development environment and toolkits
  - LANSCE IRMIS and extended subsystems
- **LANSCE daily log and archive management system**
- **Screenshots of implementation of IRMIS at LANSCE**
  - IRMIS web application
  - Extensions
  - Mobile device friendly applications
- **Future work**

IRMIS 2 was developed by Argonne National Lab. Today it covers many aspects of EPICS control systems including IOCs, PVs, cables, models and etc.

- **IRMIS 2 basically has**
  - RDB modules and schema
  - PV crawler for loading PVs from database
  - GUI Application by Java
- **Stable and used at APS**
- **But NOT supported by IRMIS community anymore**

IRMIS 3 was started by Donald Dohan of Brookhaven National Laboratory. It will cover pretty much every aspect related to EPICS information and data.

- **A variety of tools and frameworks with different programming languages like Java, Python, Matlab, Groovy and etc.**

- **Collaborated work in BNL, MSU, SNS and Canadian Light Source**

- **But how is its status, still ongoing ?**
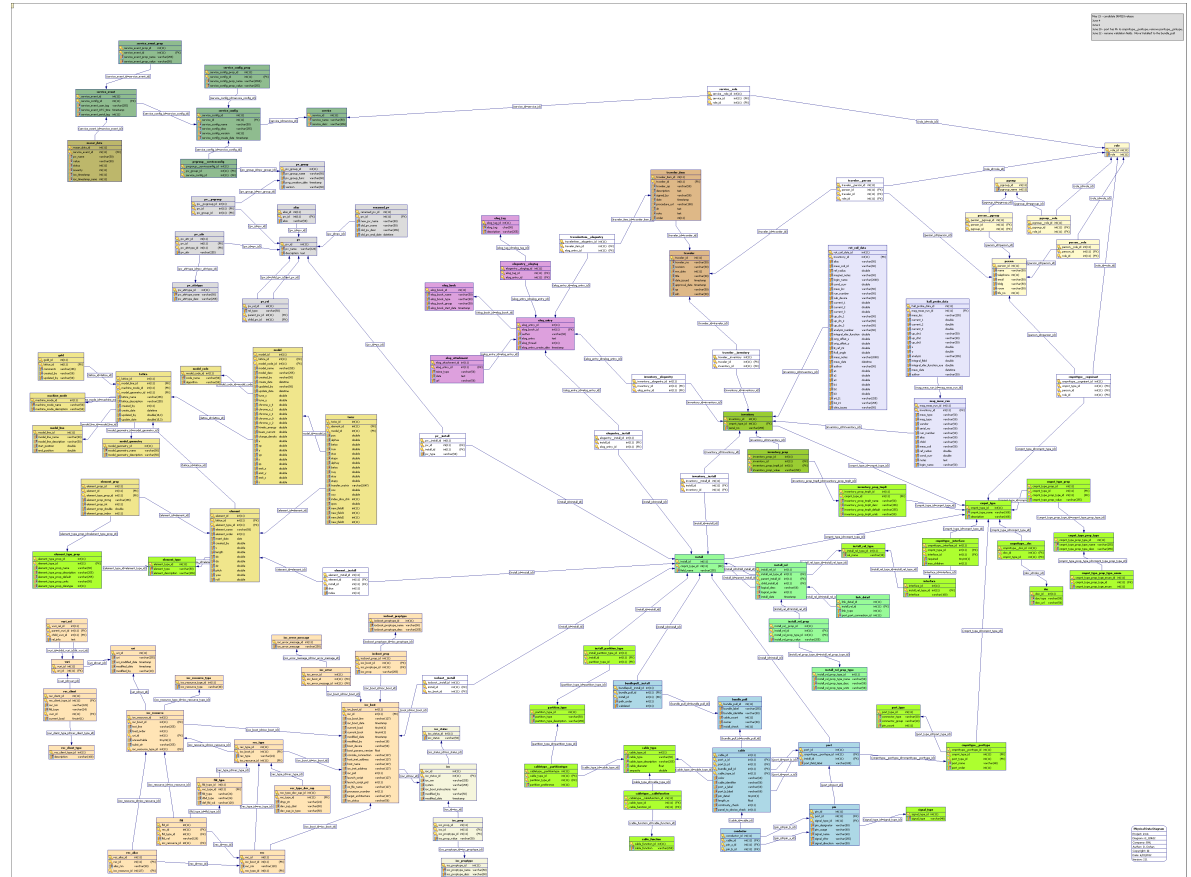
LANSCE-RM Device Database System is a site IRMIS implementation to install, manipulate, track, and search the data and information for LANSCE control systems.

- **IRMIS 2 Schema and tables**
- **IRMIS 2 PV Crawler**
- **Application based upon REST – Representational State Transfer**
- **More schema other than those covered by IRMIS**
- **More applications and features**

The LANSCE-RM Device Database System is developed by using many popular open source software, tools and frameworks.

- **LAMP open source software packages**
  - Refer to the first letters of **L**inux, **A**pache, **M**ySQL and **P**HP, **P**ERL or **P**ython
- **Python Django framework for the server side**
  - Pure python
  - MVC pattern
  - Free admin interface and user authentication ready
- **SQLAlchemy SQL toolkit for database interface**
- **jQuery javascript library for the front-end client side and AJAX implementation**
  - jQuery GUI framework for some special UI requirements
  - jQuery Mobile framework used for developing mobile-friendly pages
- **Elasticsearch to provide powerful full-text search server**

The system has many more extensions and sub-systems for the LANSCE control system other than a local and site IRMIS implementation.

- **The PV system including the schema and crawler based upon RIMIS 2 posted on the EPICS web site as mentioned.**
  - PV search and report generator
  - PV history including those changed and deleted
- **LANSCE wire scanner information system**
  - Wire scanner and actuator general info like locations, chassis, IP and etc.
  - Configuration and initial parameters
- **LANSCE daily log and archive management system**
  - Auto archiving to save operators' work and time
  - Full-text search for historic data
- **LANSCE switch and network device system**
- **Legacy RICE channels system for timed/flavor data**
- **cRIO wiring and connecting information system**

The LANSCE daily log and data archive management system provides a mechanism to manage dynamic information and data.

- **At LANSCE, the status of control systems and accelerator tuning parameters required and need to be archived every day**

- **A variety of data collection and archives from around 50 applications developed using Java, scripts, Tcl/Tk or EDM toolkits**
  - The text data printed by operators
  - The waveforms captured by screenshots
  - Comments and notes taken for future reference

- **All the work manually, so**
  - Low efficiency and inconsistency
  - Time-consuming
  - extra knowledge and effort
  - Unsearchable for future
  - Different formats from different operators

The LANSCE daily log subsystem consists of data and screen capturer, database, full-text search engine and web applications.

- **The data and screen capturer**
  - A "crawler" to collect data and store it into data
  - An application to print or generate hard copies of texts and screens
  - Loads and runs around 50 applications automatically so operators do not need to go through each program and run it by hand
  - Can be started at anytime or within any time period through Linux cron jobs
- **MySQL database to store the text files or screens permanently**
  - More schema and tables designed and implemented for this purpose
- **Elasticsearch full-text engine also used to search for the comments and notes input**
  - Recall that we mention that the operators need to take notes on the sheet.
- **The REST web application for the front site too**

Screenshots of implementation of IRMIS at LANSCE: PV Search Page - Similar to the APS IRMIS 2 Java Application

Screenshots of implementation of IRMIS at LANSCE: PV search result based upon the previous slide – similar to the APS 2 Java application

Ajax call to avoid to change the URL and refresh the whole page, and get each PV details easily and quickly.

39 PVs Match the previous search pattern

Click the the Record row to get the detailed FIELD/ VALUE pairs

Screenshots of implementation of IRMIS at LANSCE: PV REPORT TEMPLATE – Dynamically Generate a PV Report with FIELDS at Users' Choice

Users can select up to 8 field types to be included in the following report.

Other than FIELD types, IOC list, Rec Type list and text patterns are similar to PV search.

Screenshots of implementation of IRMIS at LANSCE: PV report generated dynamically

Default Field Types

Users-selected field types at the previous slide

Can sort the results based on the FIELD clicked at both ASC and DESC directions

DJANGO pagination used

AJAX calls to get the complete FIELD/VALUE pairs at the next slide and to send you an XLS spreadsheet file created dynamically.

Screenshots of implementation of IRMIS at LANSCE: PV report generated dynamically - Continued

Click the radio button of 01JC001L05 to get the its field pairs in the grey box;
And then click "Channel Info" button, we can get the white pop-up dialog with detailed info.
Both are AJAX calls without leaving and refreshing the page.

Screenshots of implementation of IRMIS at LANSCE: Mobile device friendly pages
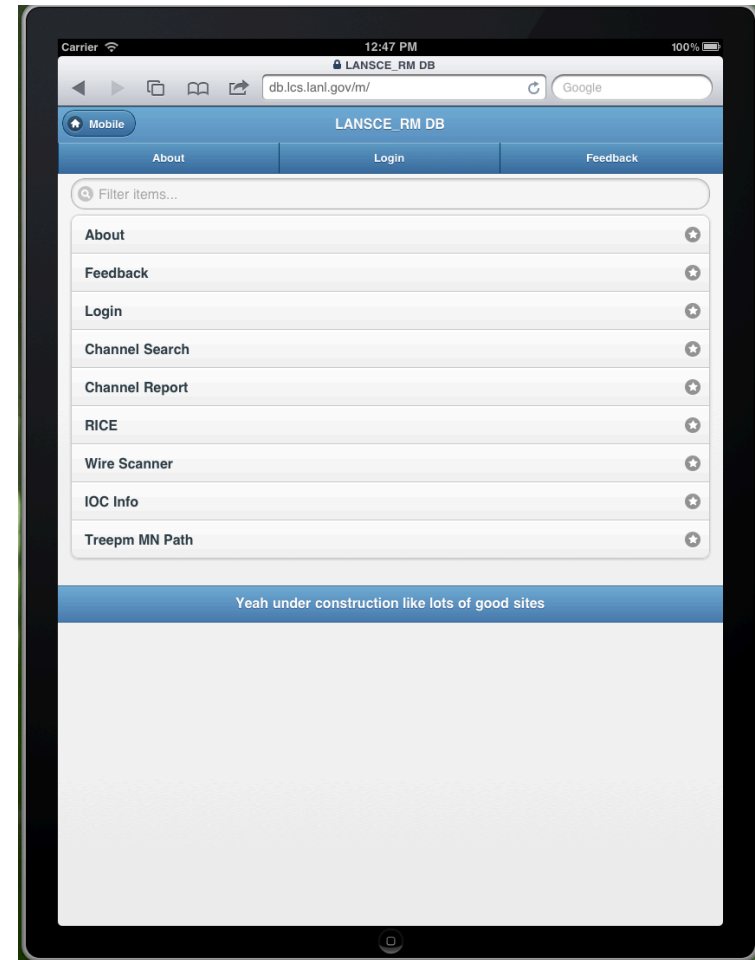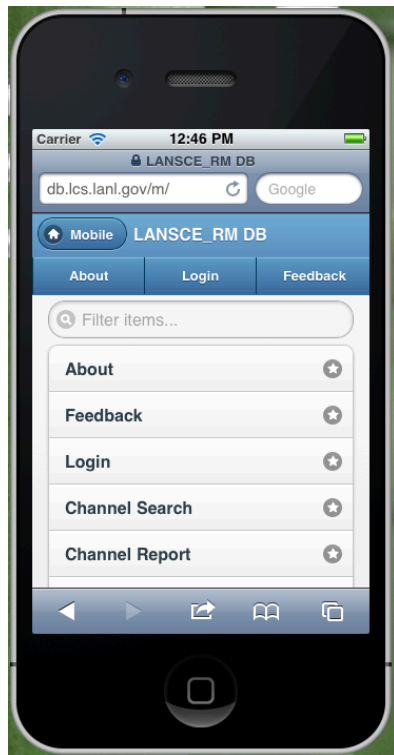
Screenshots of implementation of IRMIS at LANSCE: Mobile device friendly pages - continued

Dynamically change FIELD to be displayed - field Chn type, IOC, DESC or INP

Future Works

- **IRMIS 3 implementations at LANSCE**

  - New database schema

  - New crawler for IRMIS 3

  - Applications based upon IRMIS 3 schema

- **LANSCE daily log and archive management systems**

  - Collect the dynamic data and status information via channels

  - Associated the system with IRMIS

- **Uncertain frankly, particularly for IRMIS 3**