IC@MS - MODULAR AND CONTAINERIZED WEB-BASED ALARM MANAGEMENT SYSTEM

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Abstract

IC@MS is a modular and containerized web-based alarm management software. Scientific facilities need alarm management tools to increase effective operation. Experience shows that control systems face unexpected issues, that should be tracked and archived. The mature control system may require the involvement of many engineers to access the alarm list and focus on the most important ones. IC@MS allows users to group alarms and focus on important ones, remotely via a web browser. It is not only the extension and web equivalent to the PanicGUI desktop application but due to its modular architecture, other 3rd party applications can be easily integrated. IC@MS is supporting both PyAlarm [1] and AlarmHandler [2], containerization makes deployment fast and effective. It introduces the different user roles that can limit functionalities for selected groups. The web-based alarm management software provides a better user-friendly user interface for everyday use with Integration with distributed directory services like Active Directory. IC@MS Web API that can be used by 3rd party applications.

IC@MS

Main advantages of using IC@MS:

1. Better user interface for everyday use,

2. Access through the web browser,

3. REST API,

4. Multiple access roles,

5. Integration with Active Directory (AD),

6. SMS, mobile or mail notifications,

7. Modular and containerized,

8. Fast and effective – tested with thousands of alarms.

The IC@MS provides the same functionalities as Panic GUI [3] but also extends it with some new functionalities like adding devices supporting different protocols (Figure 1). What is important, IC@MS can be integrated with both TANGO [4] and EPICS [5] control systems.

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KEY FEATURES

Key features of IC@MS:

- Alarms list,

- Management of existing alarms,

- Multiple sources of data: EPICS PV, HTTP, MQTT,

- New alarm definition,

- Alarms history browser,

- Multiple searching and filtering options,

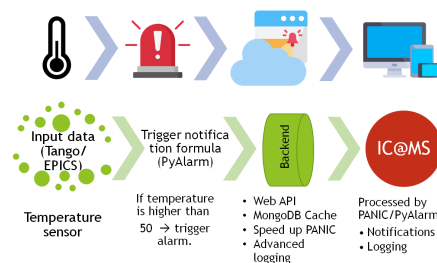- Documented REST API (Swagger).

Figure 1: IC@MS Overview.

Alarm Dashboard

The alarm dashboard (Figure 2) is the view that users see most often. That dashboard presents active and not active alarms. When the alarm is triggered, its color changes following the severity. The most important and recent alarms are shown on top. There are buttons to perform operations like acknowledge, reset, or disable the alarms.
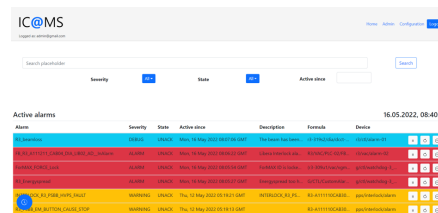

Figure 2: Alarm dashboard in IC@MS.

Users can modify existing alarms (Figure 3) and create new ones using the configuration page. To create a new alarm user should provide:

1. Alarm name,

2. Receivers (email / phone number),

3. Formula (defines when the alarm will be triggered),
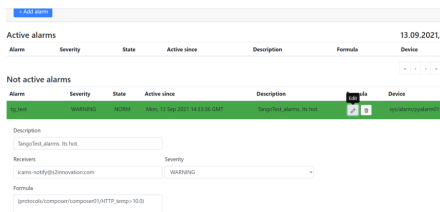
4. Severity.

All fields can be edited.

Figure 3: Creating alarm in IC@MS.

Users And Roles Management

Software to manage alarms must be safe and secure. Therefore, only registered users can login to the IC@MS and manage the alarms. Moreover, for a better overview of the configured alarms, it has roles, so the user can see easier alarms that they are interested in. Additionally, with Active Directory (AD) users can use the same credentials.

Data Sources And Composers

The configuration page has the option to define new data sources and composers devices (Figure 4).

Example of data sources:

- HTTP,
- MQTT,
- Modbus.

Composers:

- Propagate signal from low-level device.
- Compatible with HTTP, MQTT, Modbus.
- Extract data from different data formats: JSON, XML, HTML, raw strings, Modbus.
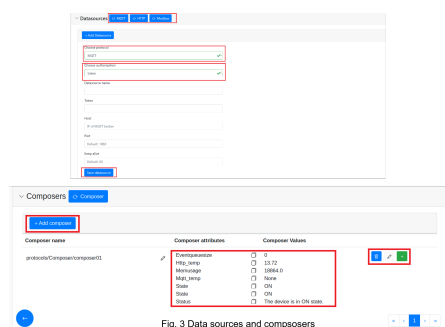

Figure 4: New data sources and composers.

ALARM HISTORY

One of the most helpful functionality is alarm history, which allows users to view the history of alarms including dates, states, and values of formulas connected to the selected alarm (Figure 5). Moreover, users can browse alarms by date, severity, and other criteria (Figure 6).
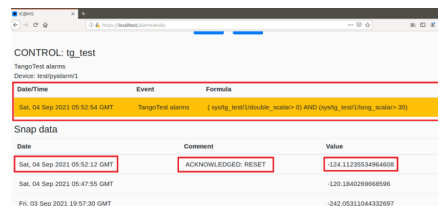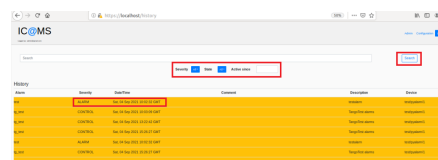

Figure 5: Single Alarm history.

Figure 6: All alarms history.

CONCLUSION AND FUTURE WORK

The IC@MS (Integrated, Cloud-ready @larm Management Software) fulfills the requirements of modern and robust alarm software. During the tests at particle accelerator facilities, it proves that can process thousands of alarms. It is a modular and containerized web-based alarm management software, that is continuously improved with feedback from the users.

REFERENCES

[1] PyAlarm documentation, https://tango-controls.readthedocs.io/projects/panic/en/latest/recipes/HowPyAlarmWorks.html

[2] AlarmHandler source code, https://gitlab.elettra.eu/cs/ds/alarm-handler

[3] PANIC documentation, https://tango-controls.readthedocs.io/projects/panic/en/latest/

[4] TANGO Controls System website, https://www.tango-controls.org/

[5] EPICS Documentation, https://docs.epics-controls.org/en/latest/