ZABBIX

Monitoring the Stars with the Ventspils International Radio Astronomy Center
A case study

VIRAC

Client

INDUSTRY
AEROSPACE

ESTABLISHED
1974

LOCATION
IRBENE, LATVIA

TELESCOPES
RT-32, RT-16, AND LOFAR ANTENNA FIELD

The Ventspils International Radio Astronomy Centre (VIRAC / VSRC) is a radio astronomy installation belonging to the Latvian Academy of Sciences. It observes a wide variety of near-Earth and deep-space objects in the radio-wave spectrum, using RT-32 and RT-16 telescopes, which are parabolic antennas with diameters of 32m and 16m as well as a LOFAR phased antenna array.

Challenge

VIRAC needed a monitoring tool that could:

- Obtain values from the equipment used in radio-astronomical observations, such as the antenna control system, receivers, a stable frequency source (active hydrogen maser), digitizers, and data recorders

- Track the availability of all servers and computers located in Irbene and monitor their parameters

- Notify engineers if any values deviate from the defined norm, or if a device reports an error state

Previously, there was no single monitoring tool that did everything in one place – there were only methods for retrieving the required values or tools intended to monitor a specific server. This meant that extending or expanding the tooling was needlessly complex.

Solution

VIRAC chose Zabbix because it was already used in the VSRC High-Performance Computing (HPC) department, and Zabbix itself had been recommended to that department by the ITML department of the Ventspils University of Applied Sciences.

Most collected items in the custom Zabbix solution come from standard Linux/Windows server templates. Custom items very often use system.run(), which executes custom scripts for data collection. In addition, .json files are read and then split into multiple items.

The created triggers for problem detection, meanwhile, are quite basic, since the obtained data is already closely tied to the actual equipment. Therefore, for most triggers associated with the created items, the team at VIRAC checks to see whether the value is equal to a specific value or whether a numeric value falls within a defined range.

When it comes to visualization, the graph and problems widgets are used from the built-in widgets. Shortly before the release of Zabbix 7.0, custom Zabbix widgets were developed, one of which is used to navigate Zabbix dashboards. This widget consists of two buttons with links to other dashboards.

The main widget displays the radio telescopes, with additional buttons placed at specific locations that indicate whether there are any problems with equipment in that particular area. This widget functions as a custom map, and when one of the buttons is clicked, another widget displays the values associated with the selected location.

The described widgets can be seen here, where *Telescope Information* is the above-mentioned "map," and the *Information Display* widget shows the related items/values when one of the available buttons is pressed. In the top-right corner, all key values are displayed for cases where there is no desire to click on specific buttons.
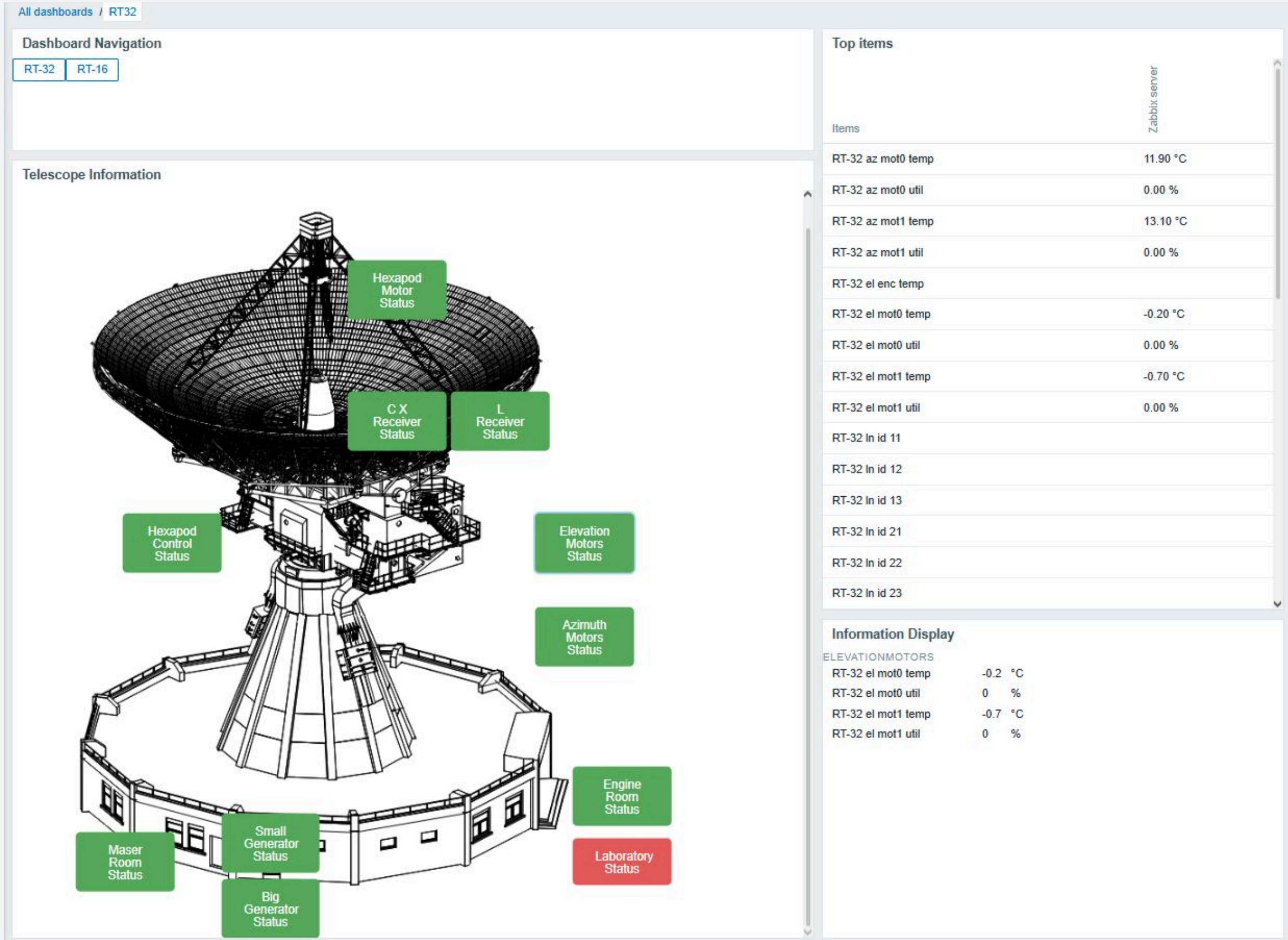
Results

Zabbix allows the team at VIRAC to detect hardware issues such as complete device outages or parameters that fall outside the desired range, such as elevated receiver temperature, server/PC downtime, hard disks nearing full capacity, or faulty HDDs not recognized by the system. This has helped to ensure that scientific observations are not affected by these issues.

High availability has not been implemented yet, but VIRAC has services where it will be necessary, such as the maser–GPS PPS signal delay reader, which determines the delay between two signals with microsecond precision and is crucial for defining an accurate time reference for observations.

Conclusion

"

So far, we have not encountered any problems and are very satisfied with Zabbix. In fact, Zabbix has saved several important scientific observations.

"

Arturs Orbidans, Head of Engineering and Technical Operation Group, Ventspils International Radio Astronomy Center.

Find out more about Zabbix solutions for the
aerospace industry

Visit our website