

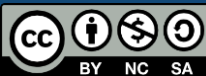
Mauro Giacchini

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RAPIDS:

A Ready-to-Use EPICS Stack for Facilities Without a Controls Team

Rapid Automated Production Infrastructure Deployment System



Starting with EPICS is easy. Being operational is not.

Use Case One

A working facility needs:

- ▶ EPICS base + modules → weeks to build and configure all the stuff
- ▶ Data archiving → Archiver Appliance + MariaDB + Tomcat
- ▶ Electronic logbook → Olog + ElasticSearch + MongoDB
- ▶ Operator client → Phoebus, pre-configured for your site
- ▶ Time synchronisation → Chrony, site-specific NTP server
- ▶ Firewall management → ports, zones, service rules

Large facilities: assembled over years by dedicated teams.

Small experiment / new beamline / R&D group: that team does not exist.

RAPIDS as a Service Platform for In-Kind Partners and Collaborations

Use Case Two

A controls group uses RAPIDS as its standard toolkit to deploy EPICS for projects with no controls staff:

In-kind partner fills in local.yml

→ declares project name, NTP, FQDN — done

Runs one command

→ deploys a complete, branded EPICS environment

Partner receives

→ fully operational system, day one

Group retains full support capability

→ same stack, zero ramp-up time

Future integration

→ stack alignment eliminates impedance mismatch

Live proof: INFN-LNL → ANTHEM collaboration / University of Caserta

The screenshot shows a logbook entry for a "RAPIDS Automated Stepper Motor Stress Test". The entry includes a "Test Identification" section with fields for Institution, Laboratory, Architecture, Script, Host, and Start Time. Below this is a "Hardware Configuration" section with fields for Motor Model, IOC Name, Controller, Axis / Channel, and EPICS Driver. Finally, there is a "Motor Resolution Parameters" section with fields for Step Angle, Full Steps per Revolution, Microsteps per Full Step, Total Microsteps per Revolution, and Angular Resolution.

Field	Value
Institution	INFN Laboratori Nazionali di Legnaro
Laboratory	MG LAB
Architecture	RAPIDS (Rapid Automated Process Integration and Deployment System)
Script	degree_stepper_stress_test_w_olog_insertions.py
Host	localhost.localdomain
Start Time	2026-02-19 11:52:49

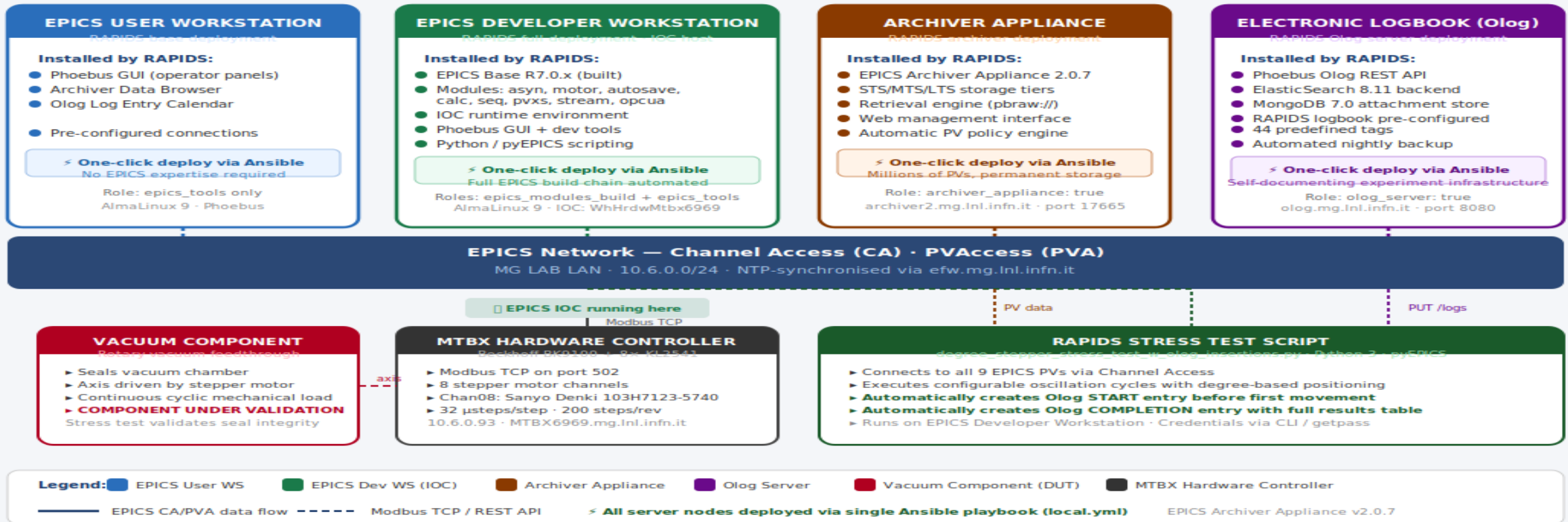
Parameter	Value
Motor Model	Sanyo Denki Stepsyn 103H7123-5740
IOC Name	WhHrdwMtbx6969
Controller	MTBX (Beckhoff BK9100 + KL2541)
Axis / Channel	8 (Chan08)
EPICS Driver	BeckMotor

Parameter	Value
Step Angle	1.8000° / full step
Full Steps per Revolution	200 steps/rev
Microsteps per Full Step	32 justeps/step
Total Microsteps per Revolution	6,400 justeps/rev
Angular Resolution	56.2500 m°/justep (0.056250°/justep)
Motor Resolution	17.7378 utsteps/turn

*Olog logbook in Phoebus — automated entries
with structured metadata, written by the RAPIDS stack*

RAPIDS — Minimal Installation Architecture

Rapid Automated Process Integration and Deployment System · INFN-LNL MG LAB



Infrastructure powered by ✂ RAPIDS

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Built on the EPICS Training VM (Ralph Lange et al.) — extended into a production deployment platform

Local.yml file

```
# Who you are
rapids_project_name: "MY-EXPERIMENT"
rapids_author_name: "Jane Smith"
rapids_institution: "Univ. of Somewhere"

# What you want – enable/disable like a menu
system_time:      true    # Chrony NTP
epics_modules_build: true  # EPICS build
epics_tools:      true    # Phoebus
archiver_appliance: true  # Archiver
olog_server:      true    # Logbook

# Olog logbooks – seeded automatically
olog_initial_logbooks:
  - { name: "MY-EXPERIMENT" }
  - { name: "OPERATIONS" }
olog_initial_tags:
  - { name: "maintenance" }
  - { name: "fault" }
  - { name: "beam-trip[" }

# NTP servers
ntp_servers:
  - 192.168.1.1    # your site NTP server

# Archiver – network-visible FQDN
archappl_host: "archiver.mysite.org"
Archappl_fqdn: "archiver.mysite.org"
```

Project branding

rapids_project_name appears in the Archiver UI and Phoebus — site-tailored

Menu-style toggles

true / false enables or disables entire service stacks — no role code to touch

Logbooks from config

Olog logbooks + 44 pre-defined operational tags seeded automatically on first run

NTP parameterised

Site NTP server declared here — no hardcoded addresses in any Ansible role

FQDN from day one

Archiver network-visible — not localhost-only like the original Training VM

`./vm-setup/update.sh`

EPICS Base 7.0.9

`asyn, autosave, busy, calc, opcua, pvxs, seq, sscan, stream`

Archiver Appliance 2.0.7

MariaDB · Tomcat · STS/MTS/LTS tiers

Retention: configurable in `local.yml`

* Network-visible via FQDN – not localhost-only

Olog 5.1.2

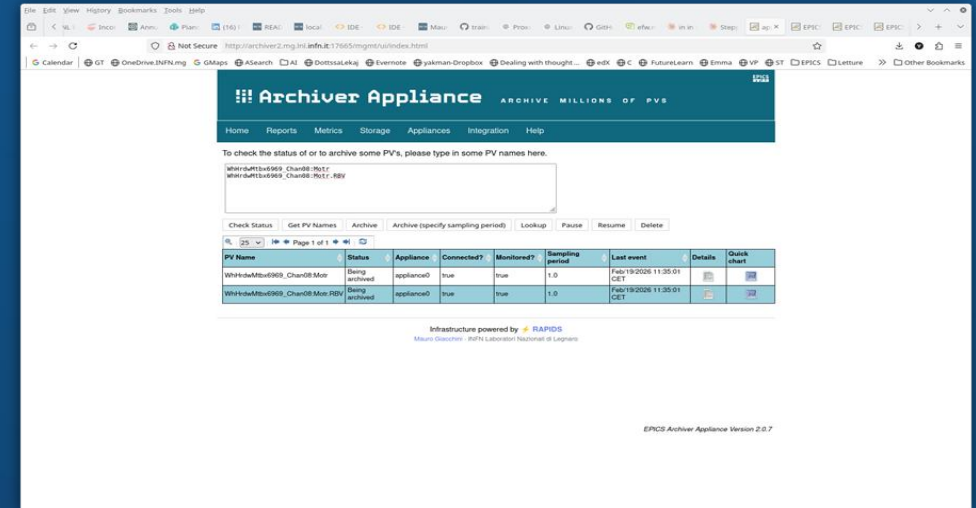
ElasticSearch 8.11 · MongoDB 7.0

Logbooks + tags seeded from `local.yml`

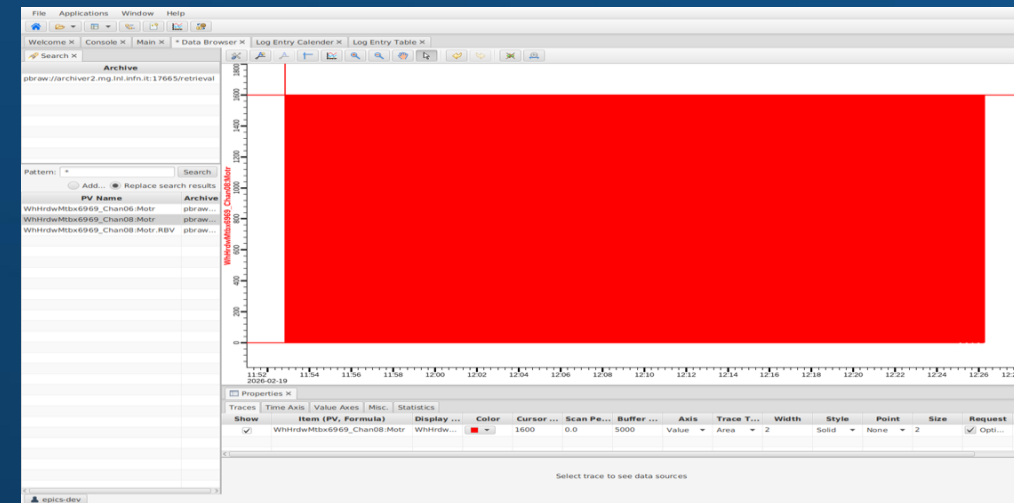
Phoebus (pre-configured)

`Ctrl+D` → archiver · `Ctrl+L` → logbook

Chrony NTP · firewall · Firefox bookmarks



Archiver UI — network-visible, RAPIDS-branded



Phoebus Data Browser — `pbraw://` pre-configured

Vanilla AlmaLinux 9 → fully operational < 1 hour

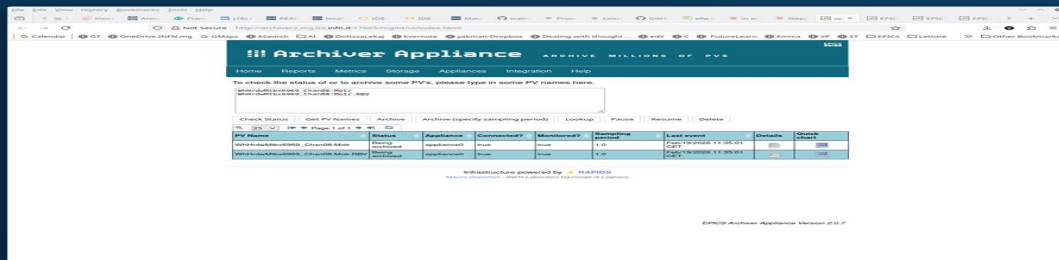
In Production at INFN-LNL — and a Community Finding

ANTHEM Collaboration

- ▶ INFN-LNL + University of Caserta
- ▶ Complete standalone EPICS system
- ▶ Deployed and maintained by INFN-LNL controls group

SPES Exotic-Beam Facility

- ▶ Live Archiver Appliance migration in progress
- ▶ Parity: ~97% — cutover deadline August 2026



⚠ Community Finding

Archiver Appliance 2.0.7 + MariaDB strict mode

- ▶ STRICT_TRANS_TABLES silently rejects all INSERTs into PVTypeInfo
- ▶ Engine runs correctly from heap memory — no error, no warning
- ▶ You will not notice anything is wrong until restart
- ▶ On restart: all PV configuration is gone
- ▶ 11,355 PVs in memory · zero rows in database

Fix: ALTER TABLE + Tomcat JDBC pool flush after every schema change

Now embedded in the RAPIDS MariaDB role — prevented automatically on fresh installs

(fix details shared on request at this meeting)

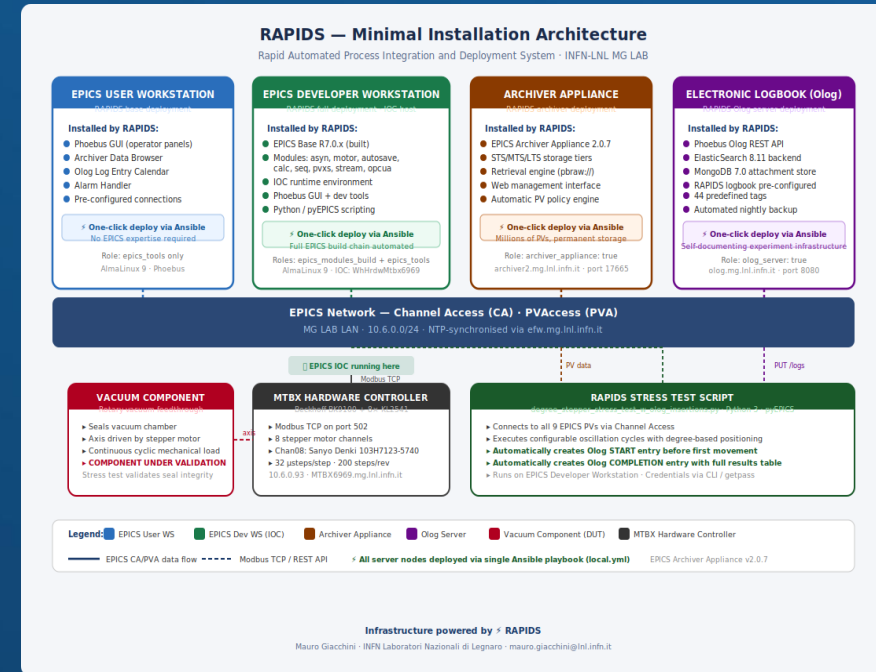
Why RAPIDS? A real story.

The ANTHEM project at INFN-LNL needed a complete EPICS control system — **but had no controls engineers of their own.**

INFN-LNL used RAPIDS to deploy a full tailored environment for them: archiving, logbook, Phoebus, IOC development stack — all branded ANTHEM, **in one command, from a single local.yml.**

When the ANTHEM sub-systems/in-kind partners eventually needs to integrate with the ANTHEM central control system — **the stack is already compatible. Zero impedance mismatch.**

This is the model RAPIDS was built for.



Documentation and requirements open for community input: github.com/Jack-at-LNL/rapids-epics

2-minute community survey: forms.gle/H7V2h13qeLrrgXBs6

Just a fellow EPICS developer sharing something that worked — feedback, ideas and contributions very welcome.