SYLVA HACKATHON 2026

LIGHTNING TALK
BERN · SWITZERLAND

BARE METAL · GITOPS · KUBERNETES

A Swiss Cloud-Native Farm

Cows, biogas and electric fences, run like a telco cloud.



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SWISSCOM · BERN

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The Farm



Main Site

65 cows, dairy facilities, milk vending machine



Biogas Plant Site

Energy production

Why Cloud-Native?

What’s there

- Old proprietary protocols
- Windows-only GUIs, VNC
- Data locked in silos

What I wanted

- Real-time data & alerting
- Mobile-friendly dashboards



"Swiss Farm" (1883) by Eugène Burnand

Oil on canvas, farm in Ecublens near Seppey, Vaud

Let's Turn the Farm Cloud Native



The Infrastructure



- **4 Linux PCs** sitting on a desk
- **Kubernetes** on **Talos Linux**[1]
- Managed with **TOPF**[2] (which I co-created)

> That's basically it.

1. https://www.talos.dev
2. https://github.com/postfinance/topf

Use Cases

Milking Data

Real-time collection & analysis

Biogas Plant

Performance metrics & alerts

Electric Fences

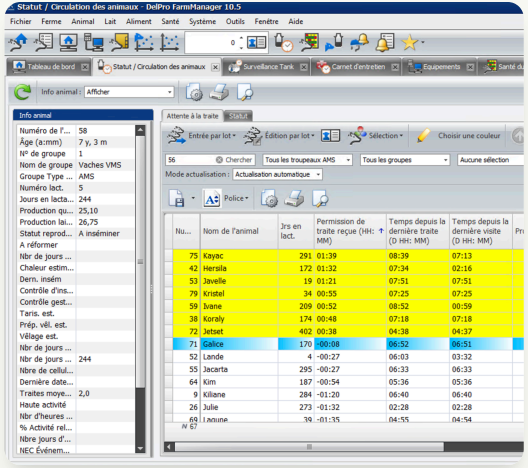
Remote control & monitoring

Milk Vending Machine

LiDAR sensor integration

Milking at the Farm

- Holstein cows
- 65 cows, ~2.3 milkings/day
- DeLaval VMS voluntary milking system
- Cows choose when to be milked
- Managed in DelPro (Windows only)





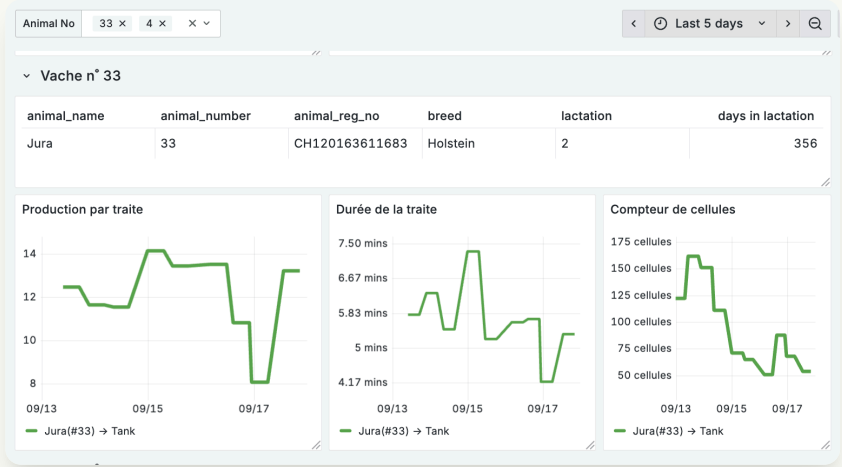
DeLaval VMS milking robot

From DelPro to Grafana

DelPro: Windows app on MS SQL, no API

Custom Go exporter[1]: SQL → Prometheus metrics

- `/metrics` for live data
- `/historical-metrics` to backfill VictoriaMetrics



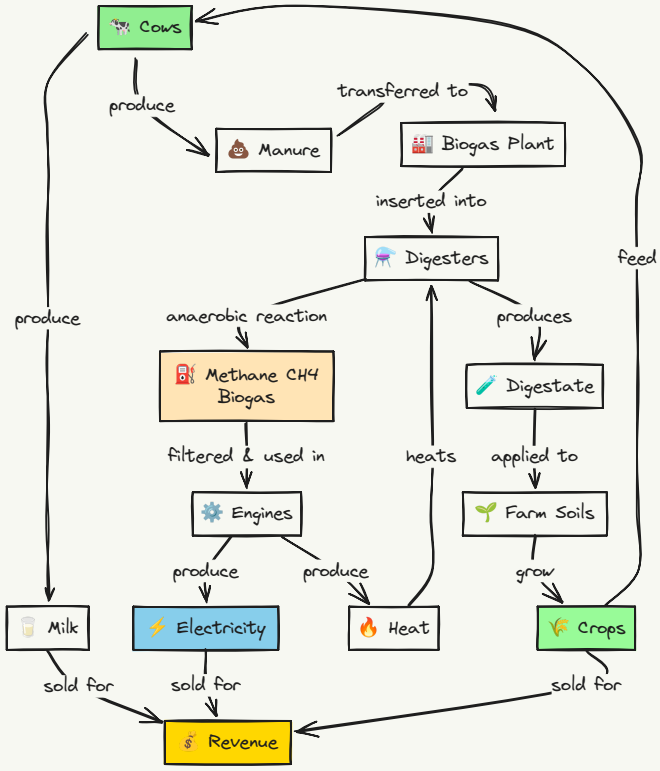
Individual cow stats - Jura (#33)

1. https://github.com/clementnuss/delpro-exporter

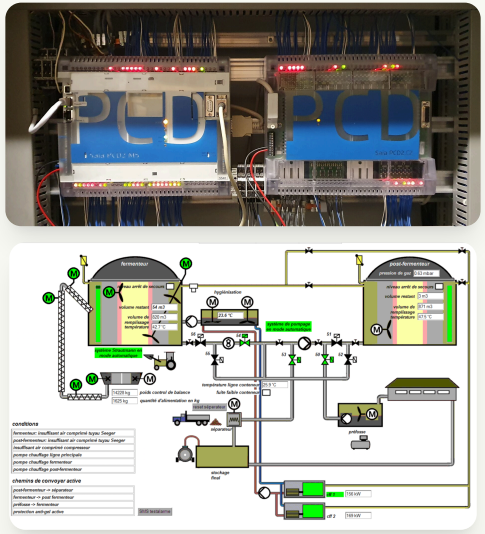
The Biogas Cycle

A complete circular economy on the farm:

- Cows eat crops → produce manure
- Manure produces methane (CH_4)
- Methane fuels engines → electricity + heat
- Residual heat heats the digesters
- … and dries crops
- Digestate fertilizes crops



Talking to the Biogas Plant



SAIA PCD controller and its Windows GUI (VNC only)

SAIA PCD: proprietary EtherSBus over UDP

↓

digimat-saia: existing Python library

↓

gRPC service (Python, ConnectRPC)[1]

↓

Go exporter → VictoriaMetrics[2]

> **I didn't want to write a Prometheus exporter in Python again.**

1. https://github.com/clementnuss/saia-grpc-service
2. https://github.com/clementnuss/saia-pcd-exporter

Biogas Plant Dashboard



Real-time biogas plant monitoring and analytics

Electric Fence Control

Remote Fence Management

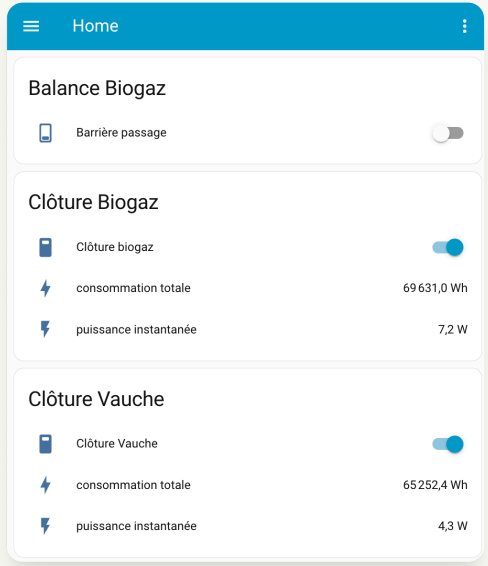
- Shelly relays for power control
- Kubernetes-hosted MQTT server
- Home Assistant integration

Use Cases

- Repairs / emergency fence shutdown



Shelly 1PM Gen3 MQTT relay



Home Assistant fence control

Shelly → MQTT ← Home Assistant

Milk Vending Machine

Measuring Milk Levels

- No level sensor in the tank
- LiDAR measures the milk surface
- Alerts when the machine is empty

Tank Geometry: 1cm height = 1 liter

$$1L = 10^{-3}m^3 = \pi \cdot r^2 \cdot 10^{-2}m$$

$$r = \sqrt{\frac{10^{-1}}{\pi}} = 0.178m = 17.8cm$$



Milk vending machine monitoring dashboard

Thank You!

Questions?

Cloud-native principles work everywhere, even on Swiss farms!



The farm that started it all

clement.n8r.ch

From Kubernetes to Cows -
Happy to discuss both!