

Hop3: Empowering Digital Sovereignty

An Open-Source Solution for Application Deployment

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Stefane Fermigier (PhD), CEO, Abilian

The Challenge: Self-Hosting F/OSS

- **The Sovereignty Imperative:** Growing need to break free from vendor lock-in and regain true data control.

But:

- **Complexity Overload:** Infrastructure, configuration, ongoing maintenance.
- **Significant Time Sink:** Diverts focus from core missions & innovation.
- **Security Burdens:** Self-managed systems are constant targets.

The “Linux Distribution” model invented in the 90s works well for infrastructure services and desktop applications, but has not been extended successfully to Web applications



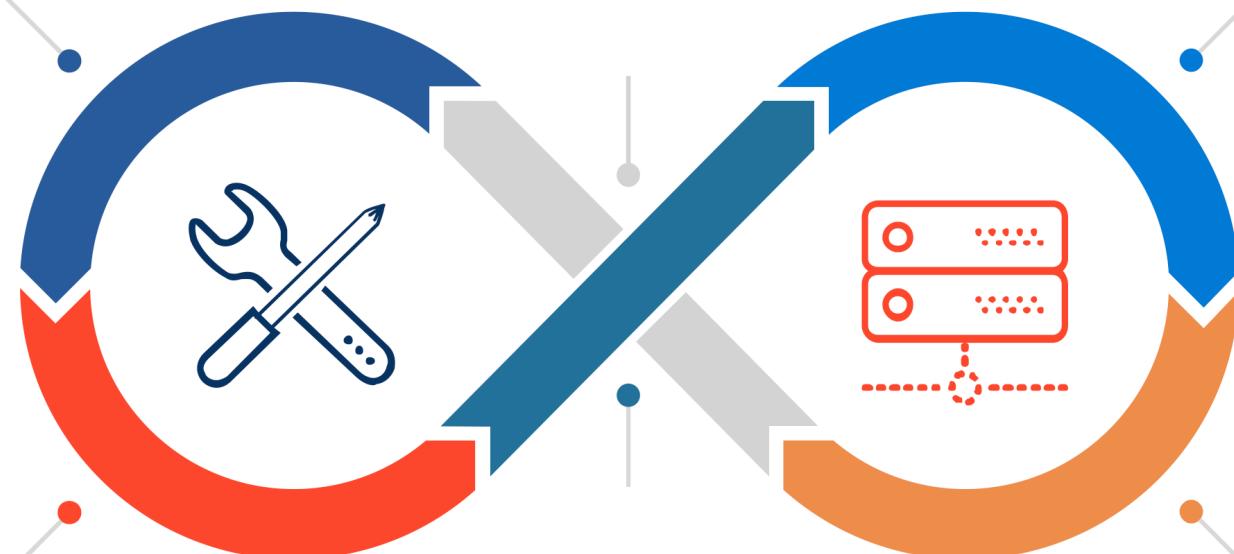
Introducing Hop3: Your Open-Source PaaS

- **The Hop3 Solution:** An Open-Source PaaS engineered to conquer self-hosting hurdles.
- **Holistic Lifecycle Management:** From build & deploy to maintain, secure, & backup.
- **Empowering You:** Uncompromising control over your infrastructure & data.
- **Strategic Objectives:**
 - Boost internal operational efficiency & resilience.
 - Enable robust, sovereign client-facing SaaS offerings.
- **Our Mission:** To make F/OSS deployment **effortless, secure, and universally accessible.**



Develop & Package

A methodology and technical specifications to define running application from a source code base



Run

A server platform ("orchestrator") ensures that applications run according to the stated intent

Build & Test

Developers tools to help app vendors and package makers easily build robust application images

Deploy

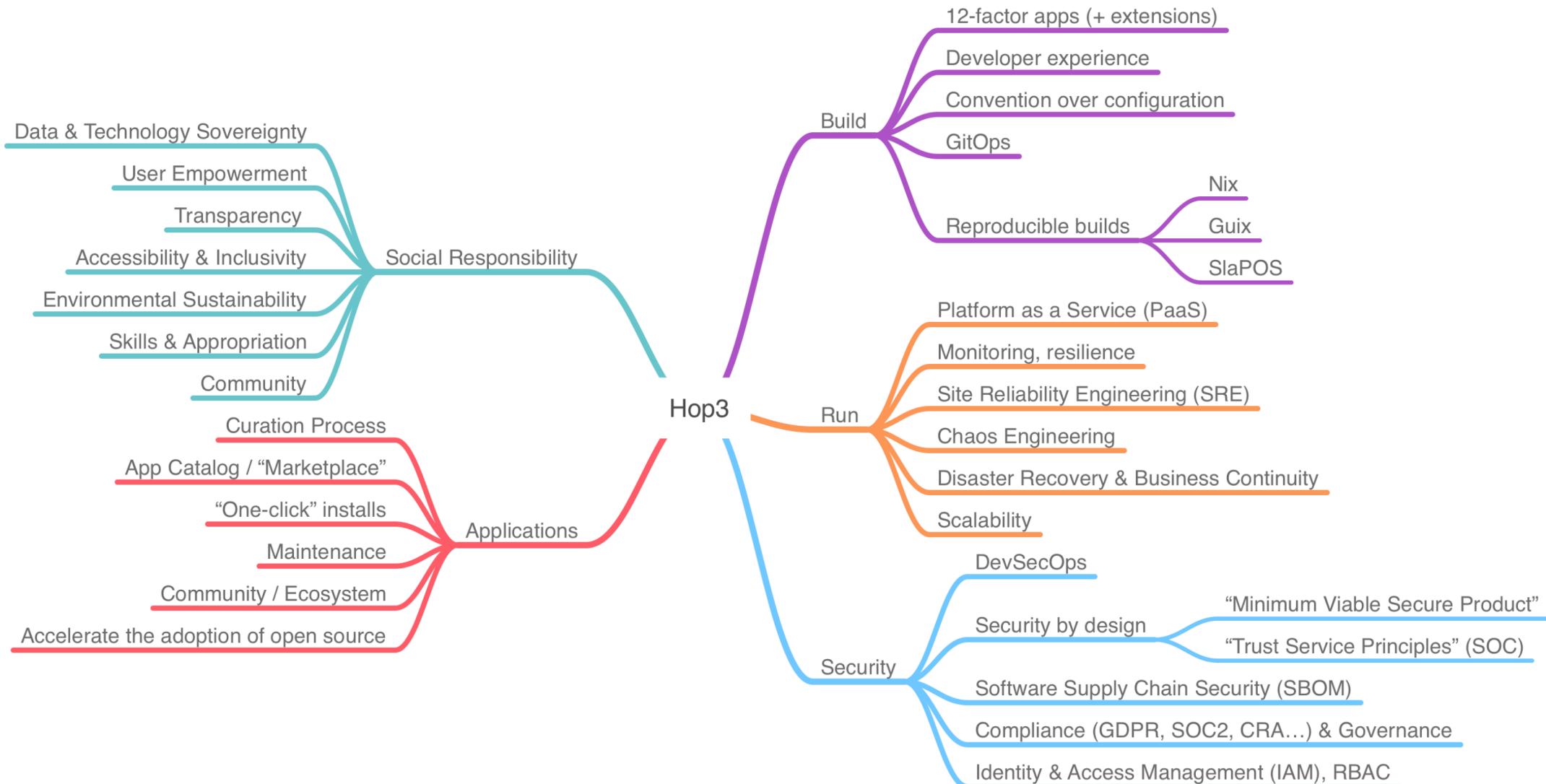
"One click" or one-line CLI deployment of applications, according to use cases relevant to each target use group

Secure

Backups & Disaster Recovery, Firewall, WAF, IDS, extra authentication, RBAC...

What is Hop3: Today & Tomorrow

- **Today (Q2 2025):**
 - Single-server PaaS for F/OSS web apps.
 - `git push` deployment, `hop3.toml` declarative configuration.
 - OCI image builds (Docker concepts, flexible runtime) and "virtual environment" builds (more lightweight)
 - Growing catalog of easily deployable F/OSS applications.
- **Short-Term Roadmap (Q3-Q4 2025):**
 - Comprehensive multi-server, distributed application orchestration.
 - Advanced security, user management (SSO/RBAC), rich Web UI.
 - A vibrant application marketplace & active global community.
 - (Optional) Nix Integration: For Hop3 itself, app builders, reproducible environments, isolation.



Core Principles & Architecture

Guiding Principles: The Hop3 DNA

- **12-Factor App Adherence:** Foundation for scalability, maintainability, resilience.
- **Beyond the 12 Factors:** Security-by-Design, Ethical Considerations, Sustainability.
- **Key Values Driving Development:**
 - Sovereignty, Security, Sustainability
 - Simplicity, Efficiency, Inclusivity
- **Lean & Agile:** Minimal dependencies for a robust, efficient platform.
- **Designed for Efficiency:** Runs on low-cost hardware, entry-level VPS; lightweight & energy-conscious.

Architectural Overview: Tech Stack

- **Primary Language:** Python 3.10+ (Robust, extensive ecosystem)
- **Runtime Agent:** Python also
- **Standard Tooling:** Leveraging OCI/Docker *concepts* for image building, Git, SSH. (Runtime is flexible, moving towards Nix)
- **Declarative Configuration:** `hop3.toml` (primary), Procfile compatibility.
- **Web UI (Hypermedia-Driven Approach):**
 - Backend: Flask, SQLAlchemy
 - Frontend: Tailwind CSS, Datastar (Modern, efficient)



Lineage & Synergy: Piku & Nua

- **Inspiration:** FreedomBlox, YunoHost, Dokku, and especially Piku & Nua.
- **Building on Experience:** Reuses code and learnings from Piku & Nua (Abilian's 2021 PaaS).
- **Nua:** Was container-based, provided full lifecycle management.
- **Hop3's Distinct Approach:** Initially non-containerized for leanness, will integrate concepts and code from Nua to support containers; also, Nix tooling, as an alternative.
- **Synergistic Future:** Exploring future integrations, potentially merging strengths for a unified platform.



FreedomBox





Extensible Plugin Architecture

- **Core Design Philosophy:** Modular and plugin-based for ultimate flexibility.
- **Seamless Integration:** Easily adapt to new technologies, languages, and backing services.
- **Future-Proofing Hop3:** Ensures long-term adaptability and relevance, as well as community contributions.
- **Crucial for Ecosystems:** Key for supporting various build tools, runtimes, distributed external systems.

Use Cases

Hop3 in Action: Dogfooding & Vision

- **Internal Use (Dogfooding):**
 - ~12 websites, SaaS, customer apps at Abilian.
- **Future Vision:** Effortless deployment for complex apps:
 - **SDOs** (Software Developing Organisations): Streamline deployment workflows with GitOps and CI/CD, enabling efficient application lifecycle management and simplified infrastructure control.
 - **SMEs**: Reduce IT costs and maintain sovereignty by hosting essential applications (Digital Workspaces, CRMs, ERPs or e-commerce...), on a user-friendly, self-managed cloud platform.
 - **R&D Collaboration**: Hop3 provides an open, extensible platform with a modular architecture and plug-in system, making it ideal for collaborative experimentation with and advancing new approaches in cloud computing (orchestration, resource optimization, edge integration....).

Key Features: Power & Simplicity

- **Simplified Configuration** (compared to, e.g., Kubernetes)
- **User Management & Access** (SSO, RBAC)
- **Automated Backups & Restore**
- **Monitoring & Logs**
- **Admin Processes**
- **Web Management Interface**
- **Multi-Technology Support:** Python, PHP, Node.js, Ruby, Go, Java, Rust...
- **Reproducible Builds** (Nix integration key)

(NB: some of these features are planned for the end of 2025).

```
> hop
...
COMMANDS
apps      List apps (running or stopped).
backup    Run a backup for an app.
config    Manage app config. Type 'hop config' for help.
deploy    Deploy app.
destroy   Destroy app, remove all files.
help      Display help information for the Hop3 CLI.
logs      Tail running logs, e.g: hop-agent logs <app> [<process>].
pg        Manage a PostgreSQL database.
plugins   List installed plugins.
ps        Show process count for app.
redis    Manage Redis commands.
restart   Restart an app.
run      Run command in the context of app, e.g.: hop run ls -- -al.
sbom     Generate a SBOM for an app.
setup    Initialize environment.
start    Stop an app.
stop     Stop an app.
```

```
> cd projects/hop3/flask-gunicorn-pip/  
  
> ls  
Procfile          app.py          requirements.txt  
  
> cat Procfile  
web: gunicorn -b 0.0.0.0:$PORT app:app  
  
> git remote add hop3 hop3@ssh.hop.mydomain.com:flask  
> git push hop3 main  
  
...  
  
> hop config:set NGINX_SERVER_NAME=flask.hop.mydomain.com  
  
...  
  
> open https://flask.hop-dev-big.abilian.com/
```

```
> hop apps
* flask-demo
> hop stop
> Stopping app 'flask-demo'...
> hop start
-----> Picked free port: 59407
-----> nginx will look for app 'flask-demo' on 127.0.0.1:59407
-----> nginx will map app 'flask-demo' to hostname(s) 'flask.hop.mydomain.com'
-----> spawning 'flask-demo:web.1'
> hop sbom
{
  "components": [
    {
      "bom-ref": "requirements-L3",
      "description": "requirements line 3: Flask==3.1.0",
    ...
  ]
```

Future Roadmap & Community



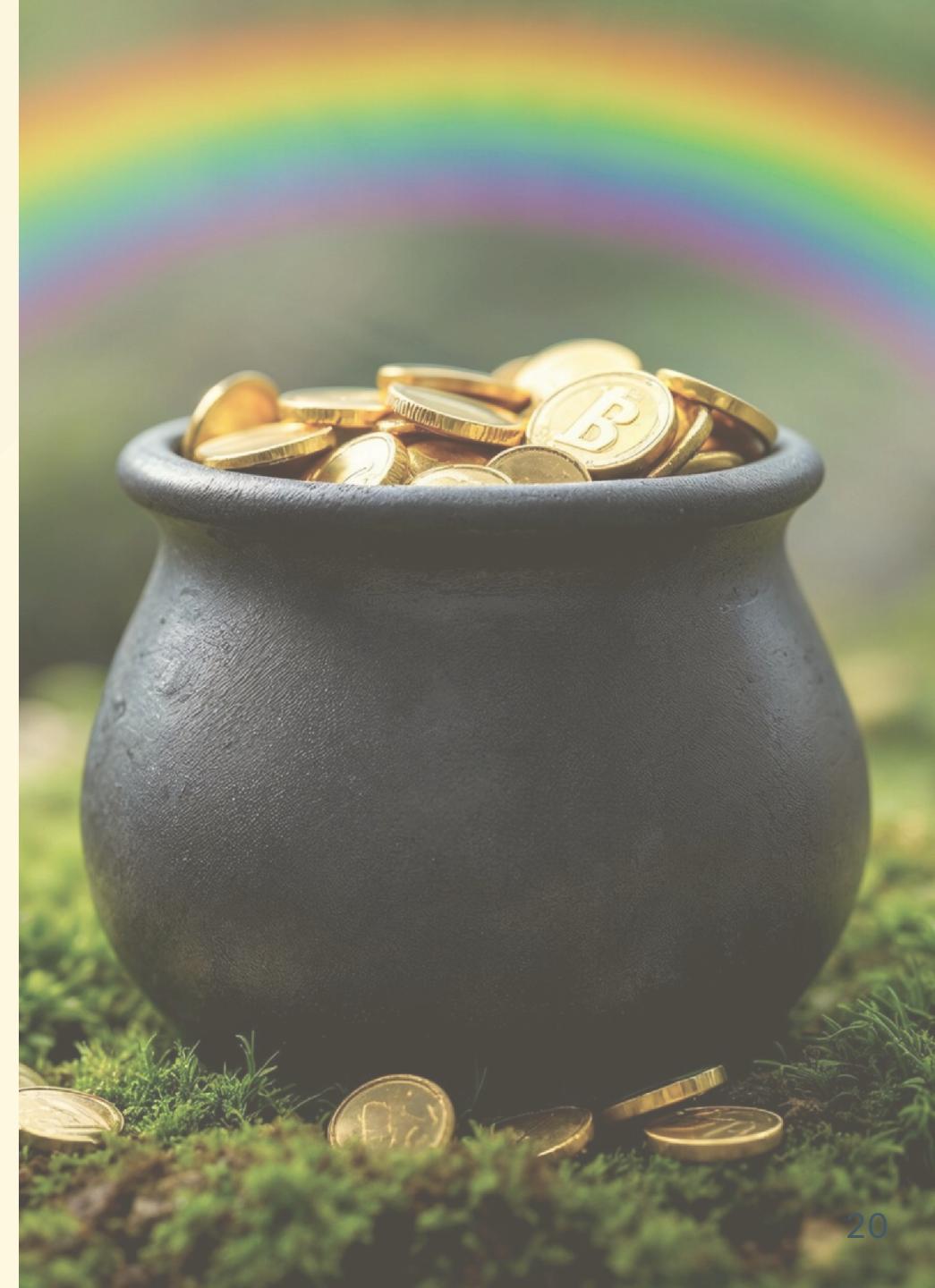


Future Vision: Expanding Hop3

- **M3 / V1 MVP:** Full core platform services.
- **Runtime Integration:** Nix, SlapOS, Docker Swarm, Kubernetes, Nomad...
- **Scaling & Placement:** Vertical scaling, workload placement, multi-server.
- **Enhanced Security:** Firewall, WAF, better isolation (incl. VMs)
- **Broader Support:** Containers/VMs, Unified Login (LDAP/IAM), More base OSes.

Project Backing & Status

- **Abilian:** Industrial R&D lab, F/OSS vendor (since 2012)
- **Funded By:**
 - Initial internal Abilian funding
 - [NGI Zero Commons Fund](#)
 - [NEPHELE Project](#)
 - France2030 (via [HyperOpen X](#))



NGI - Nix & Reproducible Builds

- **Deterministic Deployments:** Nix integration is KEY.
- **Goal:** Package apps in Nix as services.
 - Ambitious but high practical utility.
- **NGI0 Deliverable:** Fully functional Nix package for Hop3.
- **Simplifying NixOS:** Make it accessible for the "average office."

NGI - Supply Chain Security

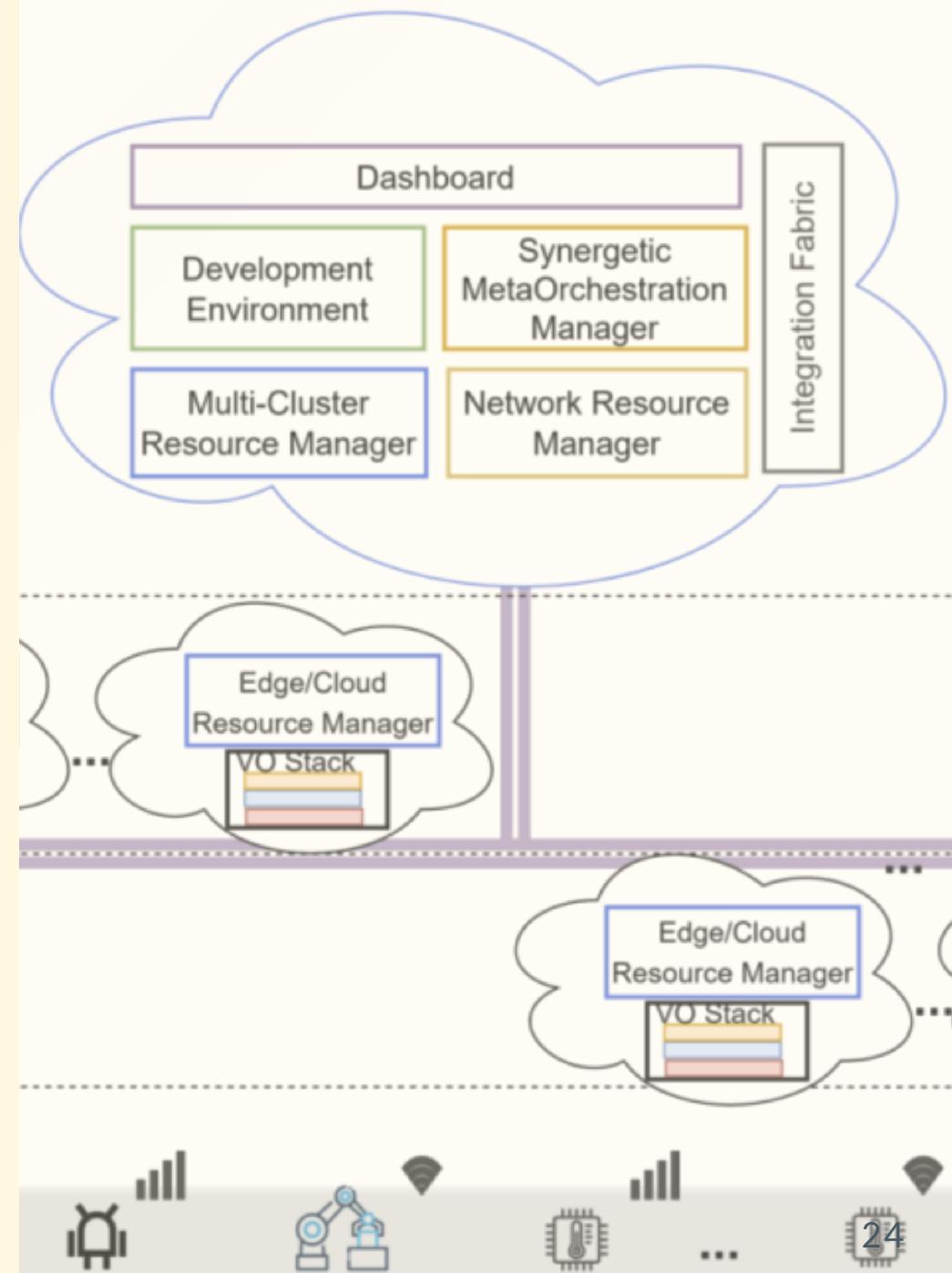
- **Software Supply Chain Security:** Top priority.
- **Automated SBOM Generation:**
 - CycloneDX format
 - Tools like Genealogos
- **Transparency & Verifiability:** For dependencies, compliance, audits.
- **REUSE Compliance:** For licensing clarity.

NGI - Security By Design

- **Foundation: Secure Software Development Lifecycle (SSDLC):**
 - Threat modeling integrated into design phases.
- **Platform Hardening & Isolation:**
 - **Lean Runtimes:** Minimizing attack surface (-> Nix-based isolation goal).
 - **Principle of Least Privilege:** For all components and user access.
 - **Secrets Management:** Secure handling of sensitive credentials.
- **Network & Application Security:**
 - **Firewall & WAF:** Network-level firewall and Web Application Firewall (WAF) for ingress/egress control and threat prevention.
 - **Data Encryption at Rest:** For sensitive application data and backups.
- **Operational Security & Resilience:**
 - **Continuous Monitoring & Alerting:** For security events and anomalies.

NEPHELE Integration (H3NI)

- **H3NI Project Focus:**
 - Leverage SMO for elasticity, workload consolidation.
 - Placement & Scaling provided by NEPHELE SMO.
- **SMO:** Synergetic Meta-Orchestrator (placement, scaling, monitoring, "glue" layer).
- **Integration:** SMO as a driver for Kubernertest deployments.
- **Contribution:** Testing/validation + Open-source mechanisms for SMO (orchestration, decision-making).



Join Us! Open Source & Community

- **Fundamentally Open Source!**
- **Contributions Welcome:** Code, feedback, ideas.
- **Engage:**
 - Documentation, presentations (FOSDEM, PyCon, OSXP, OW2Con, etc.)
 - Website/blog, social media
 - Workshops, user groups
- **Hosted:** SourceHut & GitHub
- **Values:** REUSE compliance, PSF Code of Conduct.



Find Hop3 Online

- **GitHub:**
github.com/abilian/hop3
- **SourceHut:**
git.sr.ht/~sfermigier/hop3
- **Eclipse Research Labs:**
gitlab.eclipse.org/eclipse-research-labs/nephele-project/opencall-2/h3ni
- **Abilian:**
www.abilian.com
- **Hop3:**
hop.cloud (coming soon!)
- **NGI0 Commons project:**
nlnet.nl/project/Hop3-Nixified/

Key Takeaways & Impact

Why Hop3 Matters

- **Viable Self-Hosting:** Open Source PaaS makes it accessible.
- **Digital Sovereignty:** Empowering users and organisations with infrastructure control.
- **F/OSS Ecosystem:** Simplifies deployment, fosters collaboration.
- **Champions:** Sustainability & Open Standards.
 - Cf. NGI's vision for an "Internet of Human Values - Resilient. Trustworthy. Sustainable."



Key Takeaways

Developers/DevOps:

- ⚡ Quick dev deployments
- 🛡 Manage production (backup, upgrades)
- 🚶 Easy `git push` / CLI workflows

IT Managers:

- 🏙 Deploy & manage F/OSS portfolio
- 🔑 Full control: infrastructure & data

App Developers:

- 🛠 Port apps to Hop3
- 🛡 Leverage reproducible builds, simple config
- 📦 Packaging effort (Nix) valuable

F/OSS Contributors:

- 🌎 Discover roadmap
- 🤝 Contribute to NGI0/NEPHELE funded project

Questions?

Thank You!

Stefane Fermigier

sfermigier@abilian.com

abilian.com | github.com/abilian/hop3

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