



Element's distribution for Matrix deployments.

Agenda.

- Where we have come from: ESS Classic
- The new Element Server Suite stack
 - ESS Community
 - ESS PRO
 - ESS TI-Messenger
- Capabilities of ESS Pro
- Roadmap & outlook

Where we have come from: ESS Classic



SECTIONS

 Host Domains Certificates Media Cluster Authentication Synapse Element Web Homesever Admin Integrator Integrations

Host

Deployment

Install

 Standalone Kubernetes Application Run the operator & the updater with debug logs. This will include the contents of all manifests the operator and updater put into the cluster Use Legacy Auth

Use Synapse Legacy authentication. You will need this if your setup requires GroupSync or SAML, as these are not yet compatible with next gen authentication. If you are able to use OIDC we recommend you do so.

Cert Manager

Cert manager settings

 Setup Cert Manager Skip Cert Manager

The Admin email configured on the issuer

Deployment Status

Available

Components and workloads are all available

ESS has come a long way.

- **ESS Classic** is the **legacy** Matrix backend distribution from Element for **professional use**
- Comes as a **binary** with an **installer** and an **installer GUI**
- Provides a **standalone** installation mode that would deploy the underlying K8s node on a single machine for customers (with limited scalability)
- Supports inexperienced admins with step-by-step guidance through the installation for single deployments
- Does not provide a free edition or trial (for paying customers only)
- **Challenges** with ESS Classic:
 - Uses **K8s operators** which require admin permissions on an existing K8s cluster
 - The deployment process (initial and after changes) usually takes a lot of time (**~30 mins**)
 - A lot of scope creep ("featuritis") due to shipping a lot of single-customer features
 - **Blackbox** vibes due to complexity and compiled components

... with lots of learnings

- Not a best practice deployment method
 - Some customers like the binary- and UI-based installer
 - But most customers don't expect an installer binary and GUI-based wizard
 - Hard to automate deployments
 - Hard to manage multiple deployments
 - Not suitable for GitOps-style deployments
- The Classic stack goes beyond our core competencies
 - Full monitoring stack bundled
 - Full Jitsi stack bundled
 - Air-gapped mode has many external dependencies which cause a lot of pain
 - Standalone mode uses Ubuntu/RedHat images and integrates with them

The new ESS stack.

High-level benefits and guiding principles.

- Deployment method according to **industry standards**
 - Deployment **automation** possible
 - Config can be versioned
 - Supports **GitOps**-style deployments
- Can be **set up and modified quickly**
- Can be deployed and used by **less experienced admins**
- **Curated selection** of components **developed by Element** for specific use cases
- Lightweight stack with **small surface for issues** and bugs
- High **quality** and **stability** bar
- **True Community edition**, free and open source, for community use and starters
- **Community edition** can easily be upgraded to Pro

Overview.

The legacy ESS stack: **ESS Classic**

The new, unified and helm-based ESS stack



Community

Non-professional deployments
and evaluations



PRO

Professional use, enterprise-grade
performance and features



TI-Messenger

Optimised specifically
for German healthcare



element Server Suite

Community

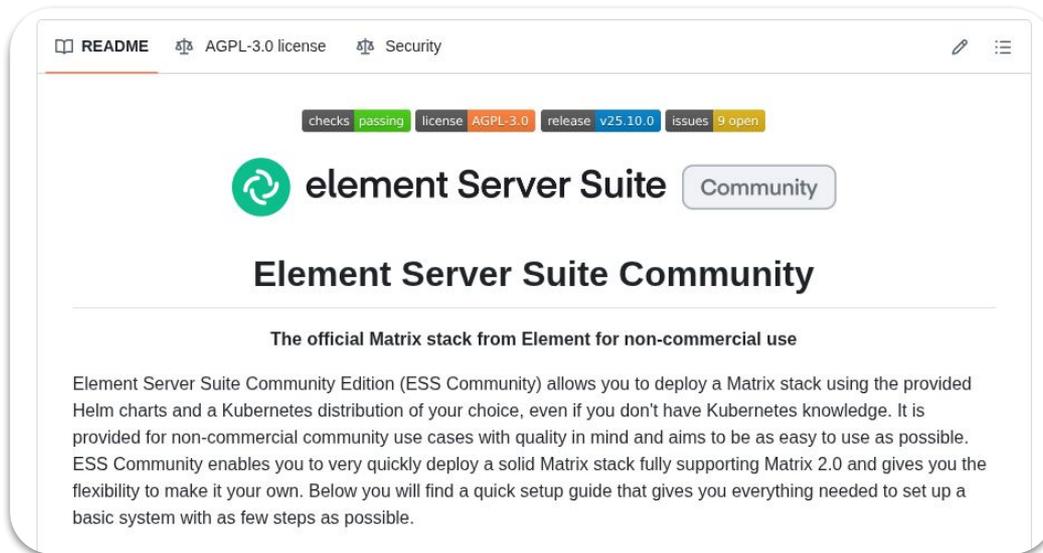
- **ESS Community** is the Matrix distribution from Element **for non-commercial use**
- Helm chart based Matrix stack with a focus on quality and ease of use
- Basic stack, suited for casual small-scale community use and eval (up to 100 users)

Components

- Synapse
- MAS
- Element Web
- Element Call
- Element Admin

Core properties

- **Free to use** for everybody
- Fully **Open Source** (AGPLv3)
- Ready for **Matrix 2.0** and **Element X**
- Works with **any Kubernetes distribution**
- **Easy and quick** to deploy, even with limited Kubernetes knowledge
- Extensive **step-by-step** deployment guide
- Great **out-of-the-box experience** with sensible defaults
- Ships **bleeding edge** releases, no LTS
- **Community-supported**



- Check it out at <https://github.com/element-hq/ess-helm> (it's awesome!)
- ESS Community room for feedback and questions [#ess-community:element.io](https://matrix.to/#/#ess-community:element.io)
- *Getting started with ESS Community* workshop with Gaël Goinvic tomorrow at 13:35



element Server Suite

PRO

- **ESS Pro** is the Matrix backend distribution from Element **for professional use**
- Helm chart based stack built according to industry standards
- Professional stack, suited for any deployment size

Components

- All of Community
- Synapse Pro
- Element Pro clients
- Advanced IAM
- SBG
- Sygnal
(Push Gateway)
- Auditing
- Moderation

Core properties

- Based on ESS Community
- Adds capabilities for **scaling** and **professional/enterprise use**
- **Automation** and **central control**
(users, rooms & permissions, access control, etc.)
 - Power with the end-user = Community
 - Power with the org = Pro
- **Full autonomy/sovereignty** and **air-gapped** support
- Professional, true **L3 support & Long-Term Support (LTS)**
- Advance **Security Advisories**
- **Certifications** (ISO, CRA, CE+, etc.) and **SBOMs**



element Server Suite

TI-Messenger

- **ESS TI-M** is a **special version of ESS Pro** focused on the requirements of **TI-Messenger Pro** and ePA as specified by the German National Digital Health Agency **Gematik**

Components

- Synapse Pro
(with TI-M modules)
- SBG
(with TI-M modules)
- Federation List Service (FLS)
- Signal
(Push Gateway)

Core properties

- Comes with the **same commitments and services as ESS Pro** but ships different components and features, compliant with the TI-M Pro and ePA specifications
- Can be deployed in **Pro or ePA mode**
- Provides a modern, scalable and lightweight **Messenger Proxy**
- Part of an **accredited TI-M product with T-Systems** for BARMER health insurance and others

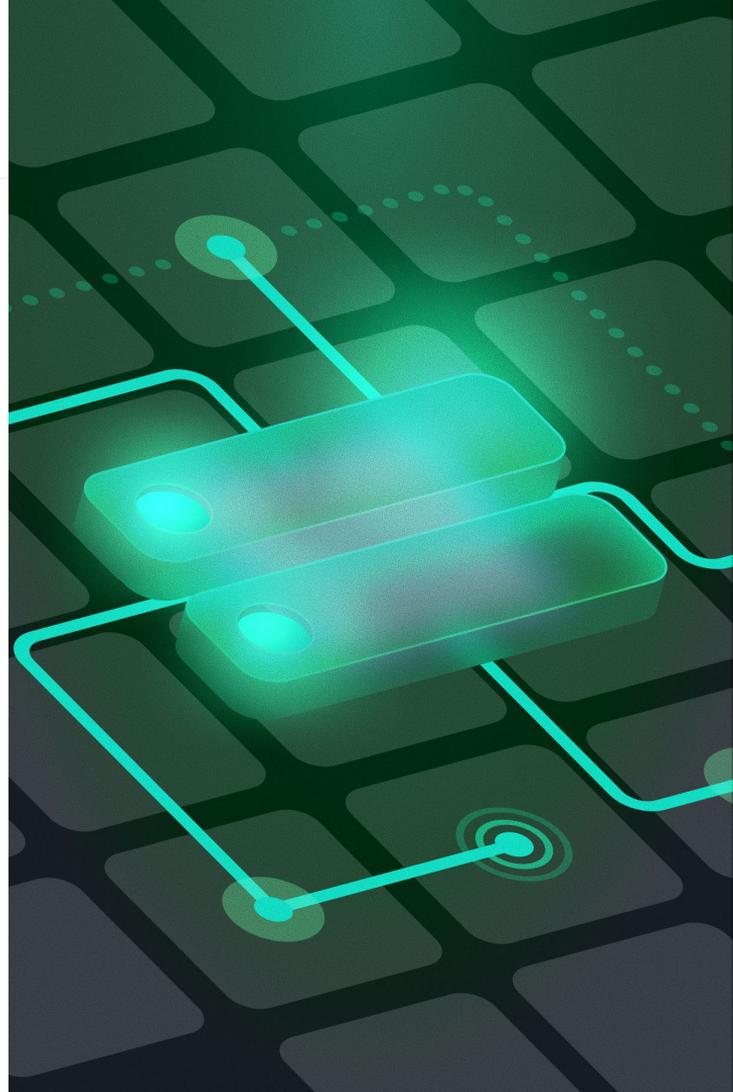
Capabilities of ESS **PRO**

- Synapse is targeted at **community use cases** (small-/mid-scale)
- Synapse supports **workers for scaleouts** but
 - Config requires a lot of (manual) trial-and-error to find appropriate values
 - The number of workers needs to be set manually and adjustments require a restart of the entire system
 - Some workers cannot be scaled horizontally (exclusive database access)
- Synapse has a **relatively high resource footprint** at scale
 - Running large hosts is inefficient
 - Running many small hosts is inefficient
- Synapse can't be re-deployed **without downtime**
 - Some workers use static sharding for scaling (e.g., for persisting new messages in a room)
 - The number of workers needs to be configured statically
 - Config updates require downtime

- **Synapse Pro** is Element's commercial implementation of Synapse targeted at **professional use**
- Synapse Pro ships as part of **ESS Pro**
- Its mission is to **address the limitations of Synapse FOSS** so that it can:
 - **Scale** to massive size effortlessly and automatically
 - Save **resources** and reduce operational **cost**
 - Ease operations and improve operational **stability**
- Synapse Pro is available in **two flavours**:
 - Synapse Pro for **Large Hosts** (> 100 users up into the millions)
 - Synapse Pro for **Small Hosts** (< 100 users)

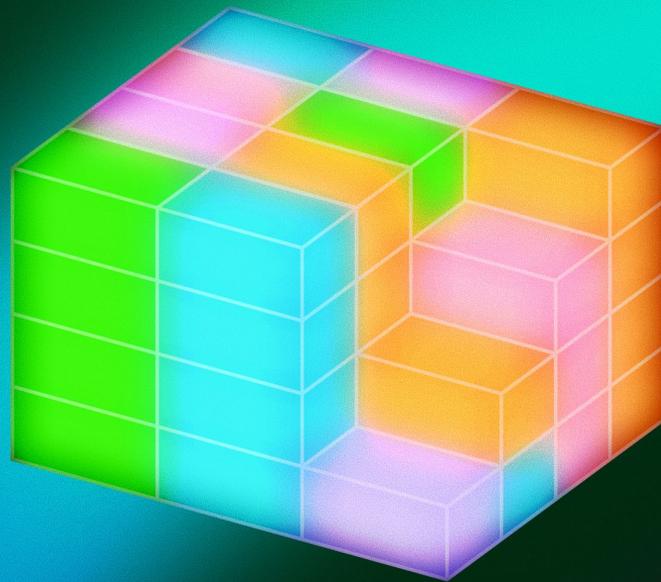
Synapse PRO for large hosts

- Synapse Pro enhances Synapse with **new services**
 - Replacements for existing **expensive components**
 - Shared components and caches
 - Improved general performance and caching strategies
- Services are **Rust**-based
 - Lower **resource footprint**
 - Better **performance**
 - Better **security**
- Services are built according to **cloud-native principles**
 - Static areas become more **dynamic**, singletons are reduced
 - In conjunction with ESS it is **perfectly suited for Kubernetes** environments



Synapse PRO for small hosts

- Synapse Pro introduces **multi-tenancy** for better small host efficiency
- Main goal is to **reduce memory consumption** per tenant and **personnel cost for operations**
- Basic idea
 - Run multiple distinct tenants within one Python process ("shard")
 - Fully-featured Matrix servers
 - Segregate tenant data on db schema level
 - Tenant management API
 - Kubernetes controller to integrate with CD-tooling and GitOps processes



- **Synapse Pro for Large Hosts** (>100 users)
 - Rust components replace Synapse subsystems, making them more efficient and scalable
 - **Auto-scaling, high availability & rolling updates** leveraging Kubernetes tooling
 - Default operation mode for ESS Pro
 - **50-80% infrastructure cost savings while ensuring great UX at all times**
- **Synapse Pro for Small Hosts** (Multi-tenancy)
 - Kubernetes controller deploys Synapse shards (each can host up to 50 tenants)
 - Kubernetes controller dynamically manages shards and tenant allocations
 - **90% infrastructure cost savings, operational cost savings**
- **Fleet management with ESS**
 - ESS Pro can easily be plugged into CD tooling (like **ArgoCD**) to manage whole fleets of Matrix servers
 - Large hosts and small hosts can be **combined**
 - **Switch** from Small Host to Large Host (and vice versa) easily

Users & authentication

- Matrix Authentication Service (MAS) by default
- Next-gen user management & authentication based on MSC3861
- Benefits
 - Support for Element X clients
 - Better security with industry-standard authentication (OpenID Connect)
 - QR code login feature to seamlessly sign in new devices



Welcome

Manage your matrix.org account

Username or email

Sign in

New to matrix.org? [Create account](#)

[Info](#) • [Privacy](#) • [Terms & Conditions](#)

Users & authentication

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**Local user
management**



LDAP/AD



SSO

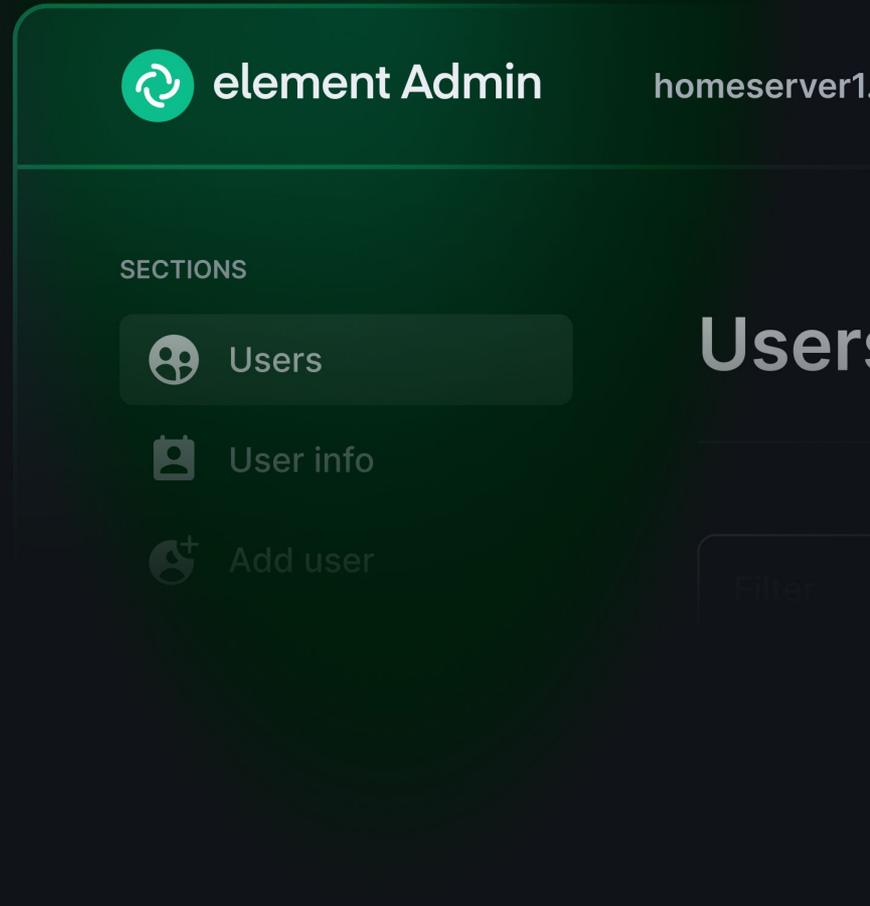
Advanced IAM (formerly 'Group Sync')

- Integration and automation between external Identity and Access Management (IAM) systems and the Matrix backend
- Supports **LDAP** and **SCIM**
- Features
 - Synchronize user attributes (e.g., display name, email address, etc.) with external IDM systems
 - User lifecycle management (automated user deprovisioning)
 - Group access control (ability to control room memberships based on LDAP/IdP attributes)
 - Mirror organizational structures to Matrix rooms and Spaces
 - Automated room memberships based on user attributes in external IDM systems (e.g., group memberships)
 - Automated room permission management based on user attributes in external IDM systems

The screenshot shows a dark-themed interface for 'Civic Administration'. At the top, there is a header with a dropdown arrow and a profile icon. Below the header is a vertical list of organizational units, each with an icon and a label: 'All Hands' (hand icon), 'Office' (building icon), 'Federal Coordination' (document icon), 'State' (classical building icon), 'Municipal' (crown icon), 'HR' (people icon), and 'Finance' (calculator icon). Below this list is a button labeled 'Add new space' with a plus icon. At the bottom, there is a 'Role' dropdown menu with a list of roles: 'Member', 'Admin', 'Admin', 'Moderator', and 'Member'. The first 'Admin' role is selected, indicated by a checkmark. There are 'x' icons to the right of the dropdown menu.

element Admin

- Admin console to manage ESS deployments
- Fully Open Source / AGPLv3
- Available in Community & Pro
- Initial features
 - Dashboard with update notification
 - Local user management
 - Room management
 - Registration token management
- Will get addons exclusive to ESS Pro




element PRO
example.corp

 A

- [Dashboard](#)
- [Users](#)
- [Rooms](#)
- [Registration tokens](#)
- [Documentation](#)

Users

77 users [Filter](#)

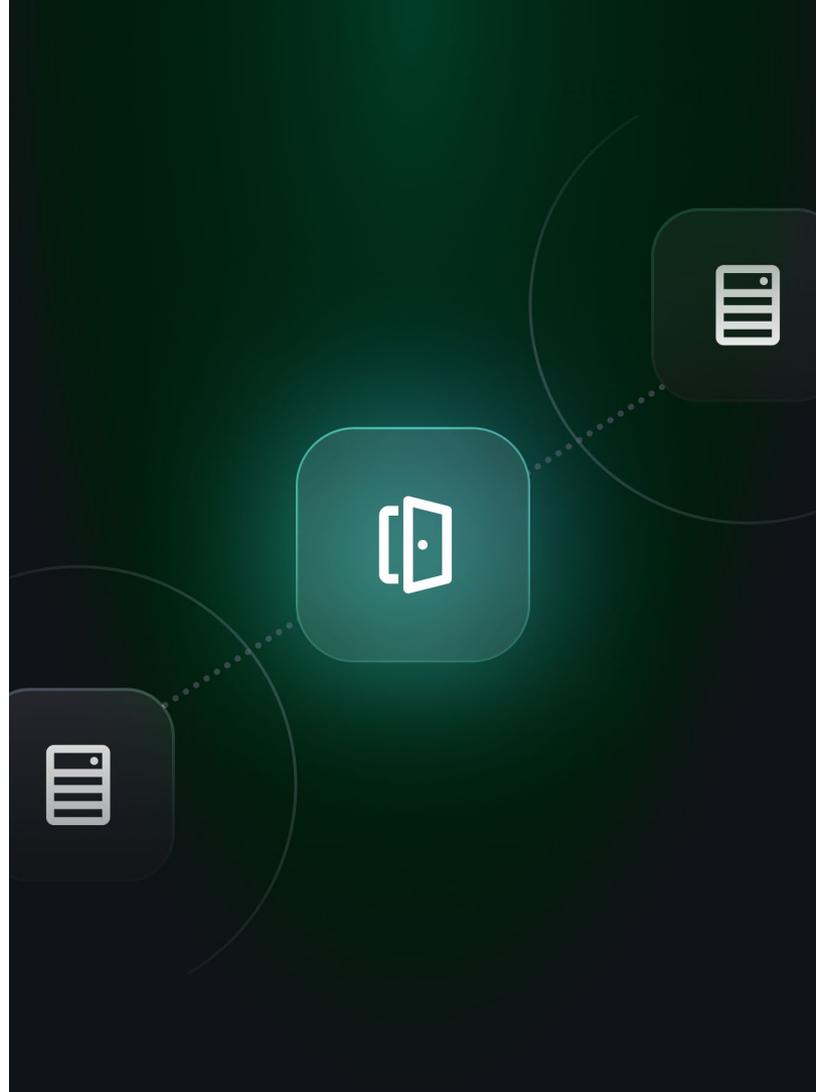
Add

MATRIX ID	CREATED AT	ACCOUNT STATUS
L localadmin <small>@localadmin:example.corp</small>	24/09/2025, 16:26:11 BST	Admin ✔
A Admin <small>@admin:example.corp</small>	24/09/2025, 16:46:04 BST	Admin ✔
T @testuser1234:example.corp	26/09/2025, 12:26:57 BST	Deactivated ✘
 Susan Brown <small>@susan.brown:example.corp</small>	26/09/2025, 12:29:16 BST	Active ✔
D @deborah.lewis2:example.corp	26/09/2025, 12:29:20 BST	Deactivated ✘
 Sandra Rodriguez <small>@sandra.rodriguez3:example.corp</small>	26/09/2025, 12:29:24 BST	Locked ✘
 Daniel Martin <small>@daniel.martin4:example.corp</small>	26/09/2025, 12:29:26 BST	Active ✔
 Nancy Wilson <small>@nancy.wilson:example.corp</small>	26/09/2025, 12:29:28 BST	Active ✔
 Carol Phillips <small>@carol.phillips2:example.corp</small>	26/09/2025, 12:29:32 BST	Active ✔
 Helen Harris <small>@helen.harris3:example.corp</small>	26/09/2025, 12:29:36 BST	Active ✔
 Ruth Rivera <small>@ruth.rivera4:example.corp</small>	26/09/2025, 12:29:39 BST	Active ✔
 Sarah Thomas <small>@sarah.thomas5:example.corp</small>	26/09/2025, 12:29:42 BST	Locked ✘

Secure Border Gateway (SBG)

- **Application-level firewall** for Matrix servers
- Inspects **all requests** to and from the server
- Can use all request **metadata** to enforce rules
- **Pipeline**-based approach to connect APIs and rule sets
- Pluggable **rules engine** that can be applied to the pipelines
- Main use cases
 - Federation controls
 - Client restrictions

See the talk "*Federated, not out of control*"
from Matrix Conference 2024



Auditing

- Room auditing via AuditBot
- Ability to define which rooms to record
- Can store decrypted room events to file storage or S3
- Machine-readable data stream (JSON)
- Can easily be ingested by log analyzer tooling for further filtering and analysis

Export messages

HTML Plain Text JSON

(1) Room selected

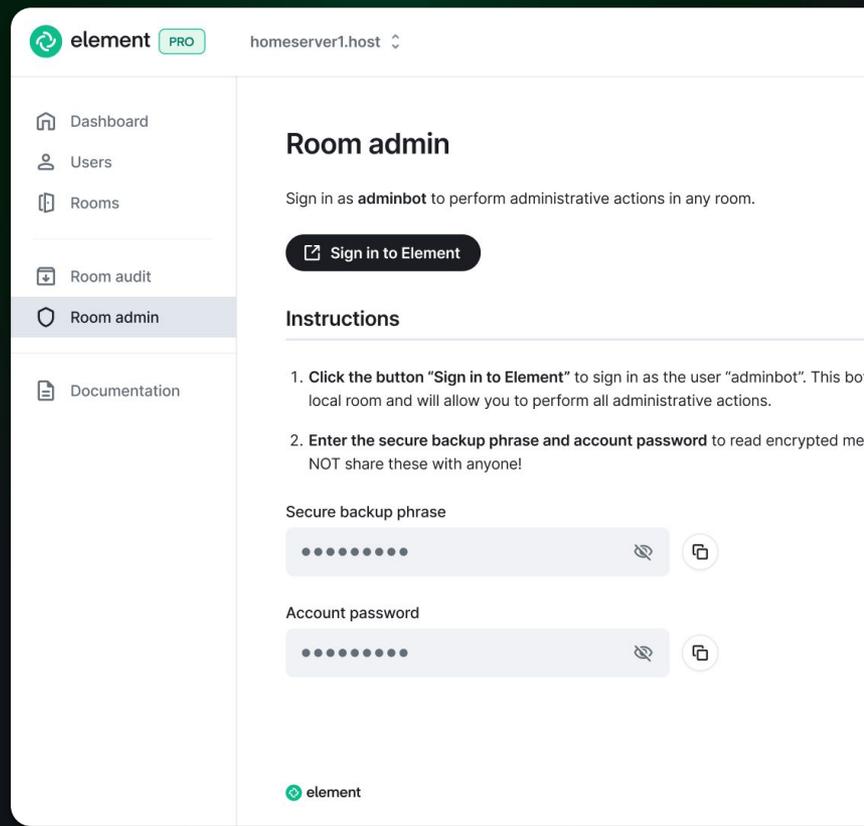
Cybersecurity



5

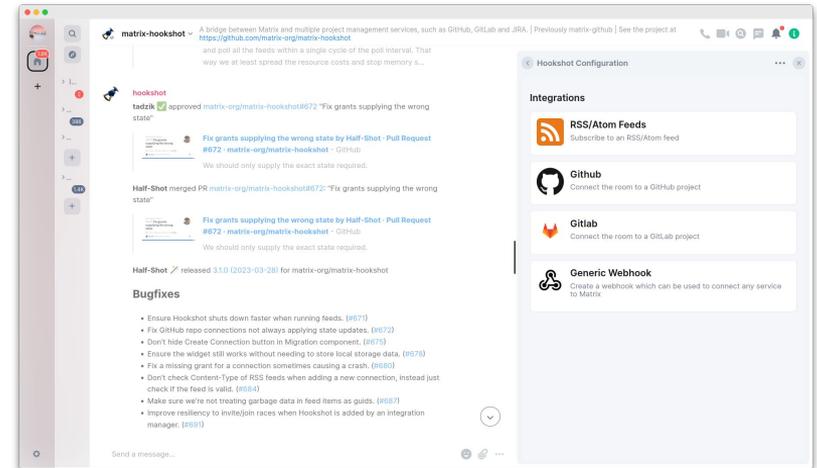
Moderation

- Room moderation via AdminBot
- Ability to define which rooms to apply to
- AdminBot can be impersonated by administrators via Element Web



Webhook integrations with Hookshot

- A Matrix bot to **integrate external services** via Webhooks
- **Supported services**
 - GitHub
 - Jira
 - GitLab
 - OpenProject
 - Figma
 - RSS/Atom feeds
 - ... and more!
- Ability to write rich templates using JS
- Powerful widgets to configure Hookshot





Roadmap

ESS Roadmap

- **Q2/2025:** General availability (new deployments can use the stack)
- **Q3-Q4/2025**
 - ESS Classic migrations to MAS
 - More components for ESS Pro
 - Moderation (AdminBot)
 - Hookshot
 - Content Scanner
 - Preparation of customer migrations from Classic to Pro
 - Element Admin functional enhancements
- **10/2025:** (likely) Last LTS release for ESS Classic (25.10)
- **Q1/2026:** First customer migrations to ESS Pro



In a nutshell

ESS in a nutshell

- **A high quality Matrix backend tailored to your use case**
 - Community
 - Pro
 - TI-M
- **All the benefits of Synapse Pro**
 - Reduced resource footprint (50-80%) and better stability / user experience for **large hosts**
 - Reduced resource footprint (90%) and operational cost reductions for **small hosts**
- No need to worry about Synapse internals, load balancing, etc.
- True L3 Support (from the code owners)
- Long-term support (LTS)
- Commercial license for Synapse without copyleft (to prevent **AGPL risks**)
- ISO 27001, ISO 5230 and Cyber Resilience Act compliance
- Security notices in advance

Questions?