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## Microsoft Exchange replacement

# Top Dog in Sight

Grommunio is setting itself up as an open source drop-in replacement for Microsoft Exchange. By Markus Feilner

For decades, Microsoft Exchange has dominated the enterprise groupware market. Whether as a desktop, mobile, or plain vanilla web application, no competitor has been able to assert itself permanently against Microsoft Exchange. Possible alternatives have proved too clumsy and often lacked comparable features and scalability. Yet the market

leader's product has many weaknesses, which opens a huge market opportunity.

A new player appeared on the market in 2021 with the launch of grommunio [1], which advertises itself as a largely complete replacement for Microsoft Exchange. Moreover, the startup promises features such as support for the Messaging Application

Programming Interface (MAPI)-over-HTTP protocol, file synchronization (ownCloud), chat (Mattermost), and video conferencing with its own Jitsi fork (Figure 1).

## Exchange Exasperation

Administrators with mixed feelings about Exchange are reticent to use it, and Microsoft is feeling growing resentment among some users. Reasons include vendor lock-in, a general lack of data protection

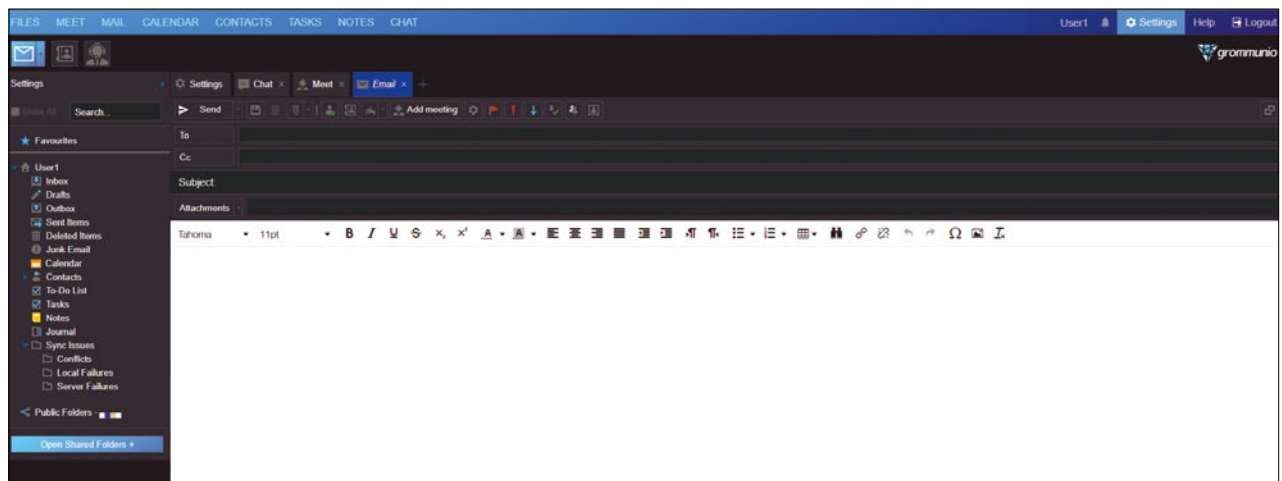
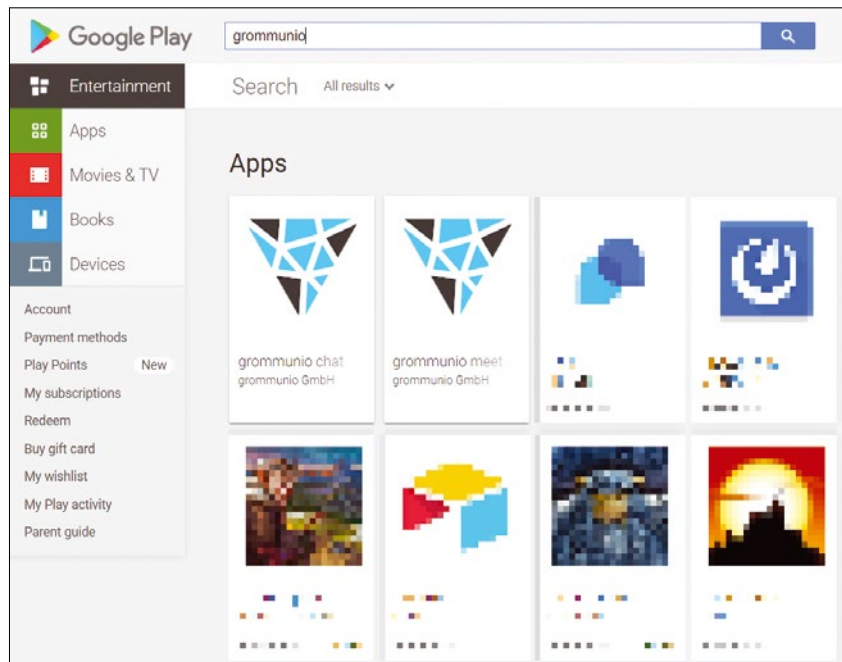


Figure 1: Video, chat, notes, tasks: Grommunio's original name derives from the claim "groupware and much, much more." © grommunio.com

Photo by Gabriel Crismariu on Unsplash

compliance, and the vulnerability of Microsoft's products to malware. Recently, Microsoft had to fix another vulnerability in Exchange that exposed client user data [2]. Many admins feel left out by Microsoft: Policies, strategies, and responses to customer complaints are typically geared for very large installations. For fans of open source, Exchange adds another problem: It is not based on open standards, and it uses proprietary protocols and APIs like MAPI [3] for internal communication. Clients for Exchange are pre-installed on all Windows, Android, and Apple devices, but Exchange still has a poor reputation when it comes to communicating with external services or third-party clients. Microsoft promises to emulate free standards like the Simple Mail Transfer Protocol (SMTP) or Internet Message Access Protocol (IMAP) but lacks the functions necessary for compatibility.

In light of the advance of cloud-based solutions, many companies are under pressure to hand over their data to corporations like Google, Apple, or Microsoft. Microsoft's flagship products are also heading in the direction of cloud-only offerings.

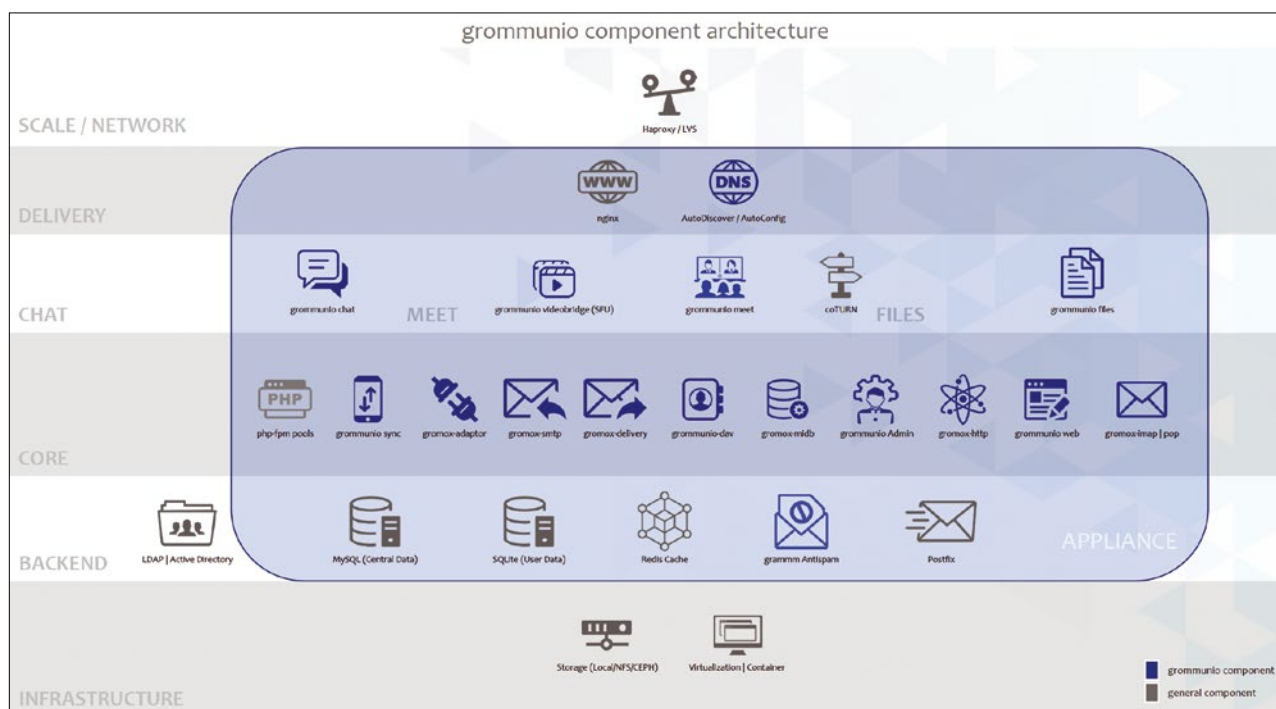


**Figure 2: Grommunio is constantly and rapidly evolving: The August 2021 version introduced many new features, including a migration wizard and two apps in the Google Play store for meetings and chats.**

Exchange and other products such as MS Office are increasingly being drawn into this vortex. Although Exchange is still available on-premises, Microsoft is increasingly focusing on cloud products [4].

European companies cannot transfer their data to a third-party cloud,

even more so if it is hosted in another jurisdiction or by a company based there. The General Data Protection Regulation (GDPR) and liability and data protection considerations prohibit doing so. When it comes to public administration data or particularly sensitive health data,



**Figure 3: Grommunio's service architecture is based on sharding.**

for example, the restrictions are even tighter, leading to a growing market that needs an alternative to Microsoft Exchange, wherein mail is hosted locally and transparently on the company's own servers and is demonstrably under the control of the operator.

## Transparent for Clients

According to the developers, grommunio supports both the aged Remote Procedure Call (RPC)-over-HTTP

protocol by Microsoft from 2017 and the newer MAPI over HTTP [5] and offers ActiveSync for mobile devices. In contrast to Exchange, the open source groupware additionally entices users with standard protocols for other clients. The choice extends from CalDAV (calendar) and CardDAV (address book) to a variety of Microsoft Exchange protocol extensions. According to the manufacturer, a grommunio instance can be integrated easily into an existing Windows Active Directory (AD) domain.

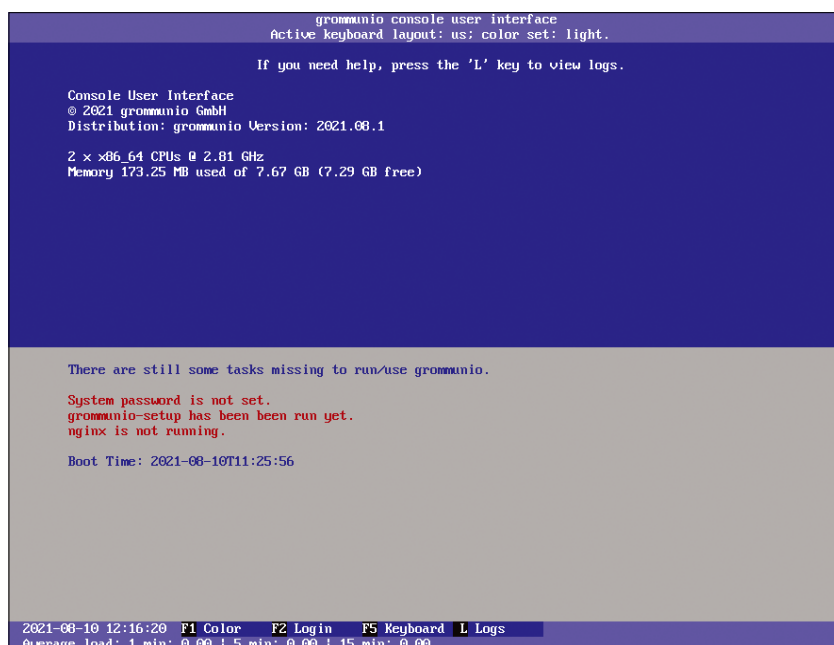
Linux provides the operating system (openSUSE, Ubuntu, Red Hat, Raspberry Pi OS), which makes the solution significantly more robust against malware and hackers. Like its competitors, grommunio comes with a number of typical add-on services that allow you to manage individual notes and tasks; to communicate by chat, video, and audio telephony; and to exchange files with a sync tool. For example, the modular component architecture lets you integrate chat with a simple command like:

```
zypper in grommunio-chat
```

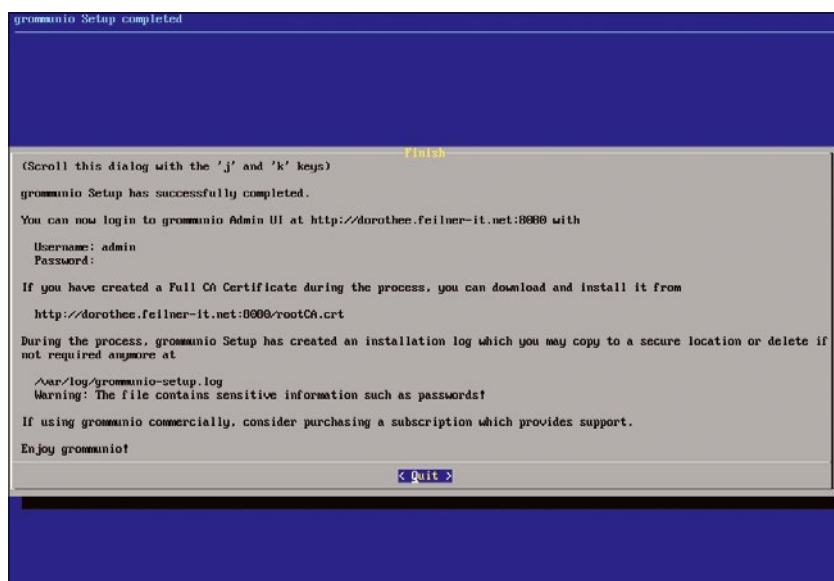
Version 2021.08.1 introduced a menu for the setup routine, from which admins can select or deselect modules. Grommunio claims that the choice of clients for the basic feature set is almost unrestricted – thanks to open standards. However, for the time being, features beyond those offered by Exchange are only available with the web interface. Apps for mobile devices are on the roadmap, and apps already exist for Chat and Meet (Jitsi) in the Google Play store (Figure 2). As a client, grommunio accepts any (mobile) Exchange client that connects by ActiveSync or other protocols. Users do not notice whether they are adding the new account on a real Exchange or on grommunio. After entering a username and password, the client goes about providing service in the usual way. Grommunio plans to provide features not supported by the Microsoft API or vendor protocols – file synchronization, calls, chat, video conferencing – with separate apps.

## Scaling by Sharding

Like Exchange, grommunio uses sharding to scale seamlessly (Figure 3). Essentially, this involves distributing horizontally partitioned databases across multiple hosts. Transparent to the user, grommunio can use multiple shards located on different servers by simply adding another server or cloud account to



**Figure 4:** Before the installation, you need to log in by pressing F2 and possibly selecting the keyboard language with F5.



**Figure 5:** Before the end of the setup, grommunio informs you of your choice of settings.

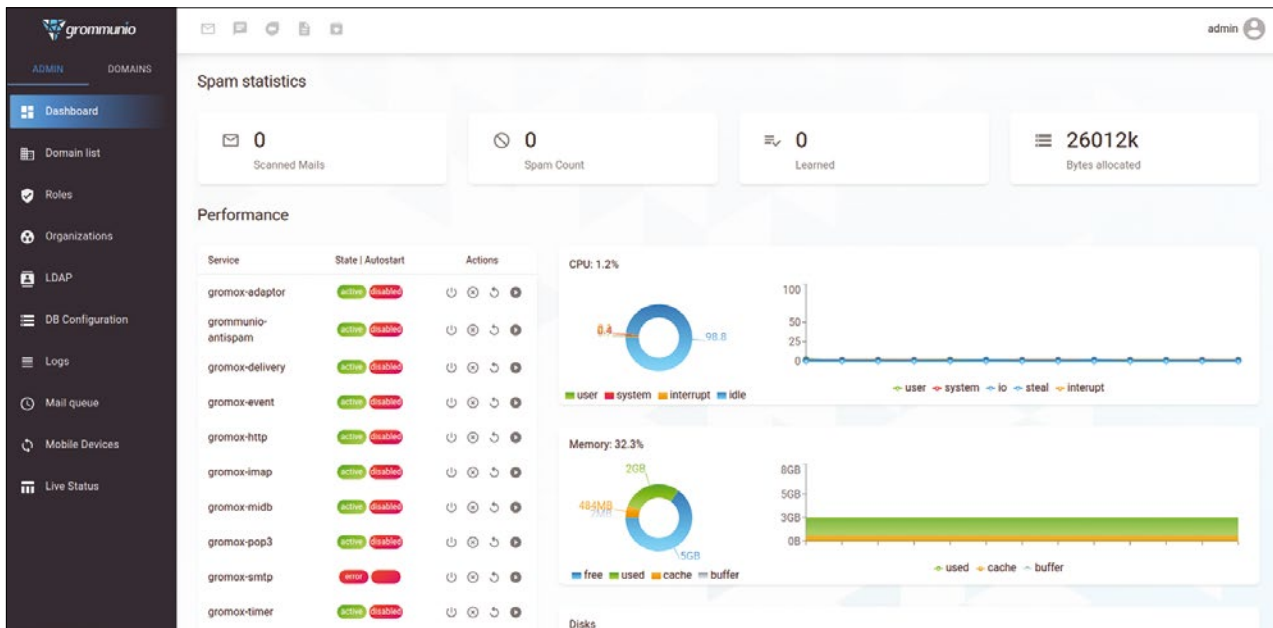


Figure 6: The grommunio server web interface offers extensive monitoring functions.

the storage back end when space becomes scarce.

Unlike its competitors, grommunio uses a MySQL database for the meta-data only and stores content data (e.g., mail and groupware objects) in a SQLite database for each user. The platform allows multidomain and multitenant setups and runs with any POSIX-compliant storage back end, according to the vendor.

## Getting Started

The software is available on GitHub [6] or as a packaged distribution from grommunio's customer repository service [7] or a community repository service [8]. Internally, grommunio uses the Open Build Service [9].

Initially, grommunio provides an ISO file that boots directly into the installation routine. After a reboot, the setup wizard waits for the initial configuration of the new grommunio instance. To begin, you import an existing SSL certificate or create a Let's Encrypt certificate with a supplied script.

Installation, configuration, and debugging take place on the grommunio console interface (Figure 4). The installation wizard asks whether it can delete the data on the first disk it

finds. Afterward, grommunio shows you the admin login prompt and the decisions you made (Figure 5).

In the next step, you define further installation parameters like the correct mail domain(s). Regardless of the platform on which grommunio is installed, you can work at the grommunio command-line interface, in the admin graphical user interface (GUI), or from the web interface. Many options are available both in

the browser (Figure 6) and in the shell (Figure 7), and users can enable individual modules for themselves in the web interface (Figure 8). For example, to add users to the mail domain, go to the *Domain list* section in the web interface.

Because the ISO image is built on openSUSE, it uses the distribution's standard tools, including YaST for network configuration and Zypper for package management. The

```
mfeilner@al-khwarizmi.feilner-it-home:~ — Konsole <2>

dorothee:/home/mfeilner # grommunio-
grommunio-admin grommunio-dbconf grommunio-setup grommunio-sync-top
grommunio-chat grommunio-lmapsync grommunio-support
dorothee:/home/mfeilner # grommunio-admin
usage: grommunio-admin [-h]
                        {dbconf,passwd,domain,fetchmail,fs,ldap,mconf,run,version,config,taginfo,shell,
                        shrek,mlist,connect,user}
...

grommunio admin cli

positional arguments:
  {dbconf,passwd,domain,fetchmail,fs,ldap,mconf,run,version,config,taginfo,shell,shrek,mlist,connect,u
  ser}
  dbconf                Database-stored configuration management
  passwd                User password management
  domain                Domain management
  fetchmail              Fetchmail management
  fs                     Filesystem operations
  ldap                  LDAP configuration, diagnostics and synchronization
  mconf                  Managed configurations manipulation
  run                    Run the REST API
  version                Show version information
  config                 Show or check configuration
  taginfo                Print information about proptags
  shell                 Start interactive shell
  mlist                  Mailing/distribution list management
  connect                Connect to a remote shell
  user                   User management

optional arguments:
  -h, --help            show this help message and exit
dorothee:/home/mfeilner #
```

Figure 7: You can configure numerous settings and install modules at the Linux command line.

```
zypper ref
zypper up
gromox-dbop -U
```

commands update the RPM packages and the database schema. A reboot is recommended afterward.

## Performance

The closer the user to the software, the more important the performance for the acceptance of the chosen tool. Numerous failed open source groupware systems have already been forced to learn that a positive user experience with services such as email and calendars is massively dependent on responsiveness and speed. If it takes too long to receive mail, dissatisfaction spreads quickly. Components that cause a delay are discarded because of architectural decisions that imply massive hardware requirements for large setups. Well-coded software is always cheaper than new hardware. Grommunio is aware of this phenomenon: The Vienna-based company refers to up to 50,000 active mailboxes on a high-end server, according to load tests and customer experience. Functional tests currently deliver promising results, which according to the developers is also due to the elegance of MAPI over HTTP: Microsoft has done a

good job here, and grommunio also benefits. MAPI over HTTP is load-balanced and proxy-enabled and has proven to be very practical in terms of scalability – a task at which many open source groupware projects have already failed.

## Closing the Gaps

Mail and groupware servers in the Microsoft cosmos are often a cyber battlefield. In the past, the largest malware attacks have always been routed through this infrastructure, and complete protection seems impossible. Although Outlook and Office 365 remain attack vectors with grommunio, two of the main entry points for hackers can be secured in a far better way: the groupware server itself and its operating system. No more Windows, no more waiting for patches and, on top of that, an open source community to help fix bugs and vulnerabilities – that sounds promising.

By default, grommunio runs on many Linux distributions on platforms ranging from the Z-series mainframe to the Raspberry Pi. Given a connection, an Active Directory or Lightweight Directory Access Protocol (LDAP) directories can act as an automatic source for usernames during authentication. Because the server integrates the

Pluggable Authentication Modules (PAMs) built into Linux, tokens and all other known PAM solutions also work, provided the client supports challenge-response. The same applies to clients such as Outlook, Thunderbird, Apple Mail, Gmail, or Evolution: Whatever the operating systems allow, authentication works with the grommunio server in the same way as Microsoft Exchange.

## Mobile Use

Grommunio's Mobile Device Management (MDM) is based on the features included in Microsoft Exchange. Together with grommunio Sync, it takes care of sharing and synchronizing mailboxes and enables access to shared folders depending on the user's authorization. Additionally, remote wipe is supported, with device policies per the manufacturer. Remote wipe and some other functions can be configured in the administrator panel in the web GUI without user interaction.

MDM does not have a separate app because, just like Exchange, grommunio uses the functions of Microsoft Exchange clients, which are disguised as "accounts" through provisioning in mobile devices. After setting up an account, the administrator can remotely wipe the phone. Users can also delete and reconnect,

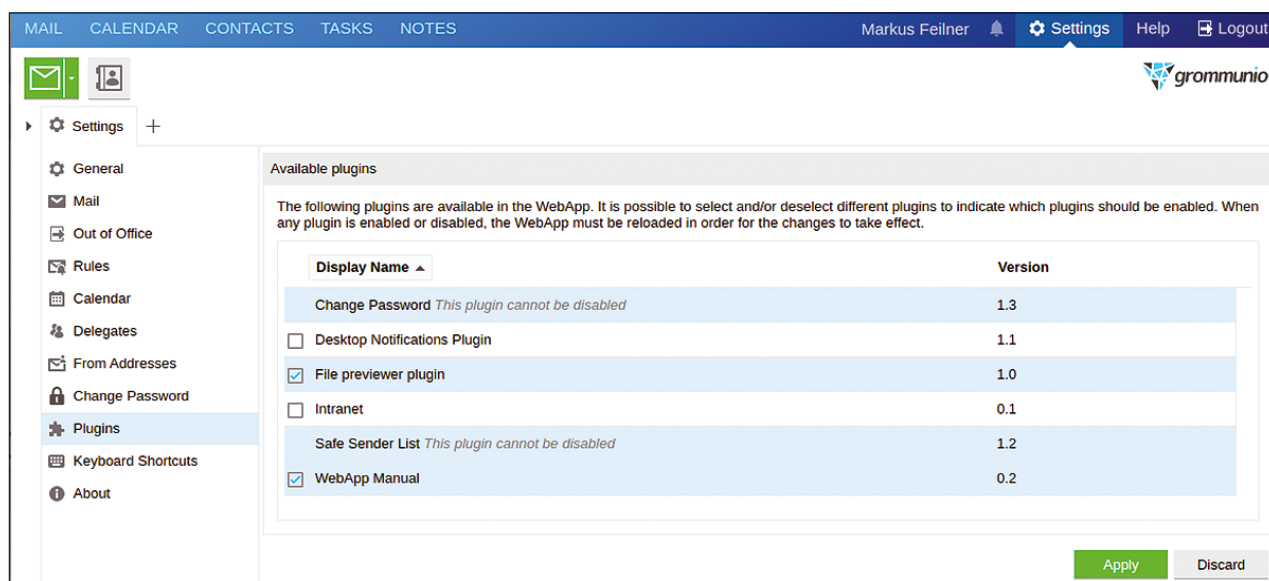


Figure 8: Whether desktop notifications or file previews, users can configure their modules in the web interface.

just as when using an Exchange server. The ownCloud-based grommunio Files function stores data on users' devices, enabling sharing, syncing, offline use, and many other features, including a search engine, versioning, and automatic image upload.

## Data Migration

A simple definition of digital sovereignty is: "exit strategy first." Before signing a contract, IT management must answer the question of how to migrate data away from a new server product. Grommunio seems promising here with its open standards. For example, email can be read with any standards-compatible mail client. Because the groupware product is open source, server states can be tracked, data model changes can be analyzed, and actions can be initiated.

Things don't always work that seamlessly with Microsoft Exchange. Exchange admins know that, in the past, even migrating from one version to the next could be tedious and hazardous, sometimes even failing completely. Although Microsoft upgrades have certainly improved in quality and stability, migrations to third-party groupware solutions at the latest almost always rely on the physical presence of the admin in front of the client.

Scripts offered a remedy to this problem (e.g., for Microsoft PowerShell, which the grommunio developers also use as a basis). The `grommox-pffimport` tool has been added to their product and offers scripts for importing Exchange data by user and account. Since 2022, users benefit from the powerful PowerShell `exchange2grommunio.ps1` script [10] that connects to the server and handles the migration. The script automatically creates mailboxes on the destination server and uses the `plink.exe` executable for secure connections, Common Internet File System (CIFS) for access, and `.pst` files for data migration. Administrators will have to fill in some variables

in the script and then run the script from the Exchange admin shell. The script has about 500 lines, assumes a correct LDAP/AD setup (also with grommunio attached!), and requires at least Windows Server 2012 R2 and PowerShell 2.0. Listing 1 shows the first lines of the migration loop.

## Migration Tools

So far, an alternative way to migrate data has been lacking. Like the majority of groupware products on the market, Microsoft Exchange uses its own formats to store user data such as mailboxes, calendar entries, and

Listing 1: Migration by Script

```
01 foreach ($Mailbox in (Get-Mailbox)) {
02     $MigMBox = $Mailbox.PrimarySmtpAddress.ToString()
03     if ($IgnoreMBoxes.Contains($MigMBox)) {
04         $MailboxesSkipped++
05         $MailboxesTotal++
06         Write-Host "Ignoring mailbox: $MigMBox" -fore yellow
07         continue
08     }
09     Write-Host ""
10
11     [...]
12
13     Write-Host "Removing all MailboxExportRequests." -fore green
14     Get-MailboxExportRequest | Remove-MailboxExportRequest -Confirm:$false
15
16     # Remove old / orphaned .pst file
17     if (Test-Path -Path $WinSharedFolder\$MigMBox.pst) {
18         Remove-Item -ErrorAction SilentlyContinue -Path $WinSharedFolder\$MigMBox.pst
19         Write-Host "Removing outdated $MigMBox.pst file." -fore yellow
20     }
21     Write-Host ""
22
23     # Create a .pst file for every mailbox found on system.
24     #
25     Write-Host "Exporting mailbox $MigMBox to file $MigMBox.pst..." -fore green
26
27     [...]
28
29     New-MailboxExportRequest -Mailbox $Mailbox -FilePath $WinSharedFolder\$MigMBox.pst | ft
30     -HideTableHeaders
31     Write-Host -NoNewline "[Wait] " -fore yellow
32     $MailboxesTotal++
33
34     [...]
35
36     $nTimeout = 0
37     while ((Get-MailboxExportRequest -Mailbox $Mailbox).Status -ne "Completed") {
38         Start-Sleep -s 2
39         $nTimeout += 2
40         if ($nTimeout % 60 -eq 0) {
41             Write-Host -NoNewline "|" -fore yellow
42         } else {
43             if ($nTimeout % 10 -eq 0) {
44                 Write-Host -NoNewline "." -fore yellow
45             }
46         }
47     }
48     [...]
```

contacts. To exchange information between different instances in a better way, it does let you export files to compatible formats. Grommunio uses a similar approach to import user data exported from Exchange into its user database Gromox.

The grommunio developers are aware of the importance of a migration tool, especially given their ambitious claim of being able to act as a drop-in replacement for Exchange. Grommunio supports the Microsoft PST (Outlook data file), OST (offline Outlook data file), and PAB (personal address book) formats and integrates

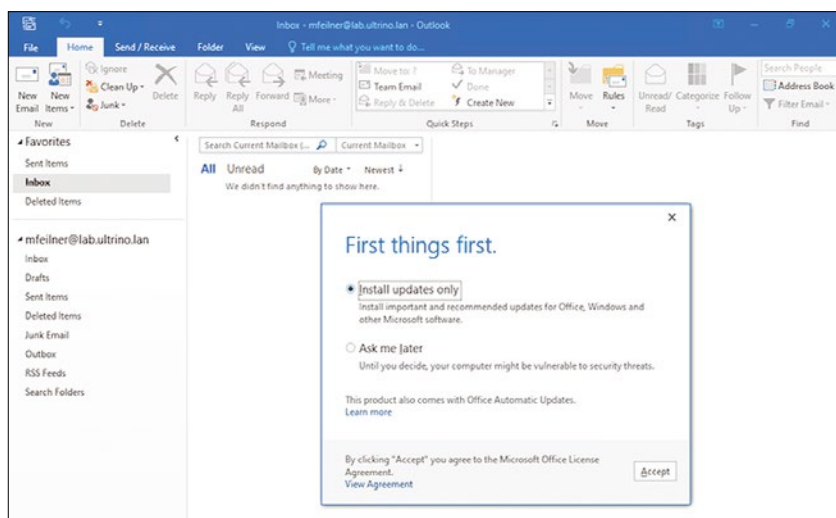
the open source imapsync IMAP transfer tool and fetchmail. Both are used to import data from other servers. A server-side migration tool is already under development.

## What the Future Holds

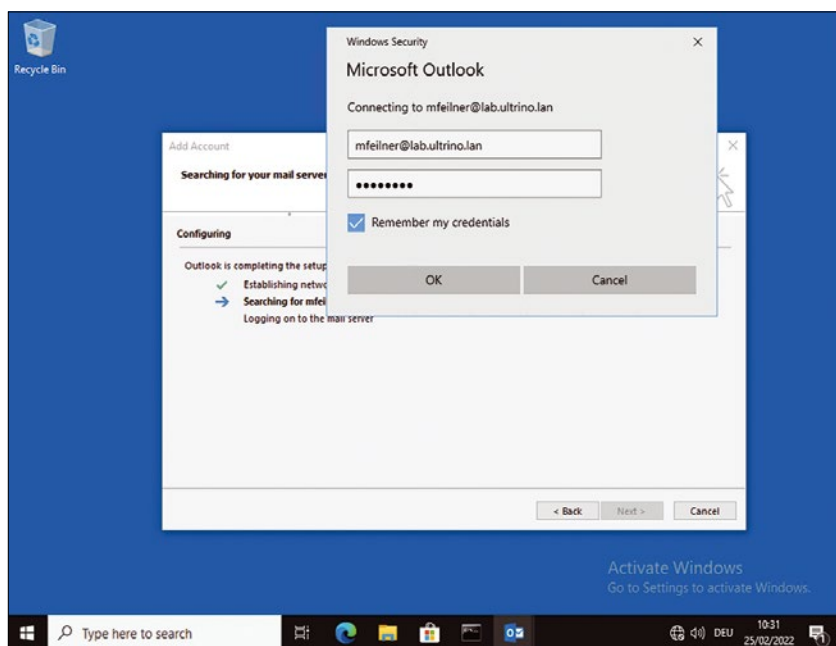
Only a few months old, grommunio is already quite far down the road to becoming a true drop-in replacement for Exchange. Unlike its predecessors, it bundles open source and open standards services and promises to lead the way out of the vendor lock-in jungle. So far, however, admins

are likely to be missing more detailed documentation [11] and a full-fledged, automated migration wizard. Grommunio is aware of these shortcomings and is already working intensively on both topics, as the latest updates on the website confirm. Moreover, the migration tools are currently updated frequently.

The Outlook connection (Figure 9) works without problems (Figure 10) but will still have to prove its capabilities in the coming months. The comparatively low prices (see the “Editions” box and Table 1) and the open source character of what is still fairly new software are likely to lower the inhibition threshold for users wanting to try out the groupware product. Extensive independent tests are still outstanding and would be important to back up the vendor’s claims relating to speed, stability, scalability, and migration options. If grommunio stands up to the test and the developers deliver the missing features, then grommunio could become a real game changer on the groupware market. The approach definitely looks promising. ■



**Figure 9:** After creating users and domains, connecting Outlook users is a smooth process. Microsoft’s email client thinks it is talking to an Exchange server.



**Figure 10:** Outlook users are connected natively in grommunio without a client-side plugin.

## Info

- [1] grommunio: [<http://grommunio.com/>]
- [2] Autodiscover flaw in Microsoft Exchange leaking credentials: [<https://www.techtarget.com/searchsecurity/news/252507119/Autodiscover-flaw-in-Microsoft-Exchange-leaking-credentials>]
- [3] MAPI: [<https://en.wikipedia.org/wiki/MAPI>]
- [4] End of REST API on-premises mailboxes preview: [<https://techcommunity.microsoft.com/t5/exchange-team-blog/the-end-of-the-rest-api-for-on-premises-mailboxes-preview/ba-p/3221219>]
- [5] MAPI over HTTP: [<https://docs.microsoft.com/en-us/Exchange/clients/mapi-over-http/mapi-over-http?view=exchserver-2019>]
- [6] GitHub: [<https://github.com/grommunio>]
- [7] Repository: [<https://grommunio.com/download/>]
- [8] Community repositories: [<https://download.grommunio.com/community/packages/>]
- [9] grommunio openSUSE Build Server: [<https://build.grommunio.com>]

[10] PowerShell migration script: [<https://github.com/grommunio/gromox/blob/master/tools/exchange2grommunio.ps1>]

[11] Documentation: [<https://docs.grommunio.com>]

#### Author

Markus Feilner, technology and network policy editor at Mailbox.org, has been working with Linux since 1994. He was deputy editor-in-chief of the German publications Linux-Magazin and iX and doc team leader at SUSE. He has run his company Feilner IT, specializing in documentation, digital sovereignty, and OSI layers 8, 9, and 10, for 22 years.



#### Editions

Grommunio's free Community subscription provides accounts for five users with basic features such as groupware and mobile device management. The Basic version includes email or web support. Professional users who need telephony support need to purchase the Plus edition. For enterprise customers, the Business subscription has all features, including high availability. Customers who need round-the-clock support have to request this, and it is the only difference between the business and enterprise licenses, apart from the targeted company size. For science, education, public service, government, and NGOs, grommunio grants discounts of up to 25 percent. Hosters can also receive a licensing program specifically tailored to their needs.

**Table 1: Features at a Glance**

Manufacturer	grommunio GmbH
License	AGPLv3
Price (per user/month)	Community (5 users or fewer) free, Basic (6-49) EUR1.99, Plus (6-49) EUR2.99, Business (50-999) EUR4.49, Enterprise (1000 or more) ask
Operating models	On-premises, cloud
Server OS	Linux
Groupware protocols	SMTP, IMAP, POP3, MAPI, RPC over HTTP, CalDAV, CardDAV, WebDAV, LDAP, Active Directory, Exchange ActiveSync (EAS), Exchange Cached Mode
<b>Exchange Features</b>	
Email	Offline mode, public folders, categories and flags, webmail, global address lists
Contacts	Support for all contact fields, multiple contact folders, contact groups, export
Calendar	Free/busy times, appointment invitations, recurring appointments and exceptions, shared calendars and delegations
<b>Groupware Features</b>	
Features	Notes, tasks (with time tracking), file synchronization and sharing (ownCloud), chat (Mattermost), video conferencing (Jitsi), office features (OnlyOffice), archive
Clients	Outlook (without plugin), all Exchange clients, web GUI, app (chat, video, files), email clients, calendar clients, global search
<b>Other</b>	
Architectures	High availability, sharding, multidomain, multitenancy, all POSIX-enabled storage back ends, AD forest installations
Security	S/MIME, remote wipe, OpenPGP, single sign-on (in development), two-factor authentication (2FA; in development), anti-spam, antivirus (third party)
<b>Administration Features</b>	
Installers	Installer ISO, OVA, image
MDM	Yes
Data migration	Export from Exchange/Kopano/ICAL/IMAP/POP3 to grommunio
White label/branding	Yes
App stores	No



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