



Apache GuacamoleTM



EGroupware

SMART ONLINE OFFICE

Apache Guacamole™



- Apache Projekt
- Version 0.8.3 from 08.2013
- 12.2016 Incubator
- 01.2018 Top-Level Projekt
- <https://guacamole.apache.org/>



Apache Guacamole™

What is Guacamole



Apache Guacamole™ (hereafter just Guacamole) is a

clientless remote desktop gateway

This gateway accesses desktops / consoles on one side via **VNC**, **RDP** or **SSH** (**Telnet**) (and **K8s**) and makes them available in **a browser** on the other side.

Clientless in this case means that **no software needs to be installed** on the PC/tablet or a browser add-on. You only need a browser!

What is Guacamole



- Guacamole is written in **Java** and is published as **Free** and **Open Source Software** under the Apache Licence V. 2.0.
- Commercial product support and other services related to Guacamole are offered by companies.
- These provide products based on Apache Guacamole™, develop them further and return the development to the Apache project.

Business-Support



You can also get commercial/professional support for guacamole:

ETES

German service provider with expertise in guacamole.



GLYPTODON

US main company/developer. There the product is then called Glyptodon.



Alternative to ...



If the corresponding prerequisites and requirements are met, **Guacamole can replace or supplement the installation and operation of MS Terminal Server + Paralles RAS/Citrix Virtual Apps/....** This avoids high licence costs and complex installation/configuration.

Pure operation **in the browser** ensures a **high level of security**, as the client does not directly access the target systems (and vice versa).
With SSL encryption (HTTPS) and secure authentication (2FA), access can/should/must be secured.

- Avoid VPN (infrastructure)
- Avoid commercial web remote software
- Avoid direct access to RDP, ...

Possible uses



- Remote maintenance Server/PCs
- Home office/Branches
- Provision of special PC/software
- ...

Technical structure



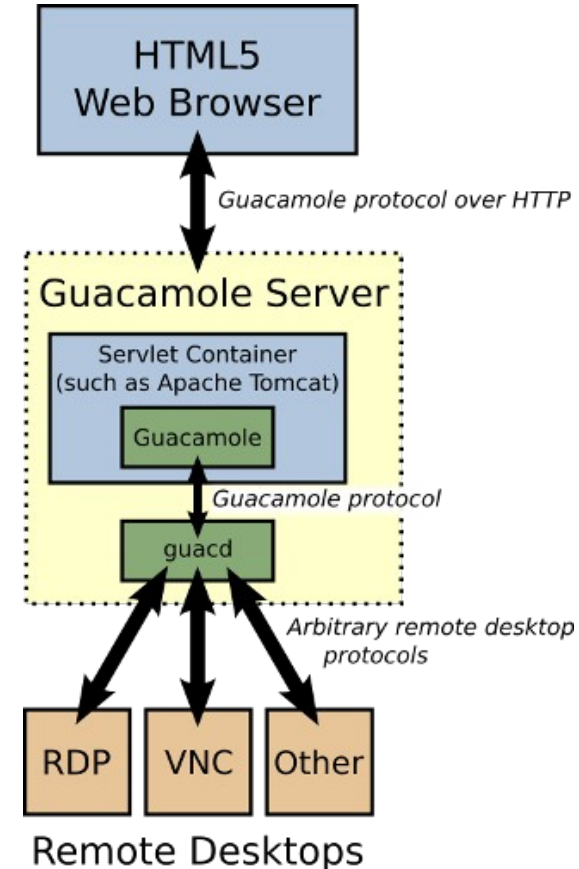
Basically consists of two components:

1. Guacamole

Web frontend, JavaScript

2. guacd

Guacamole Proxy, translates RDP/VNC/SSH => Guacamole Protocol



Implementation and architecture

Installation options



Can basically be installed in two ways:

1. Native

guacamole must be built, There are also various installation scripts on the net (be careful!)

Installing Guacamole natively

2. Docker

The two necessary containers are available on [Docker Hub](#).

Installing Guacamole with Docker

Installation options



Or alternatively:

- On a **Univention Corporate Server**

Guacamole is available in the Univention App Centre.
Currently in an older version...



- On a **EGroupware-Server**

As an installation package (almost) always current
version, simple (re-)Installation



Client: Chromium vs. Firefox

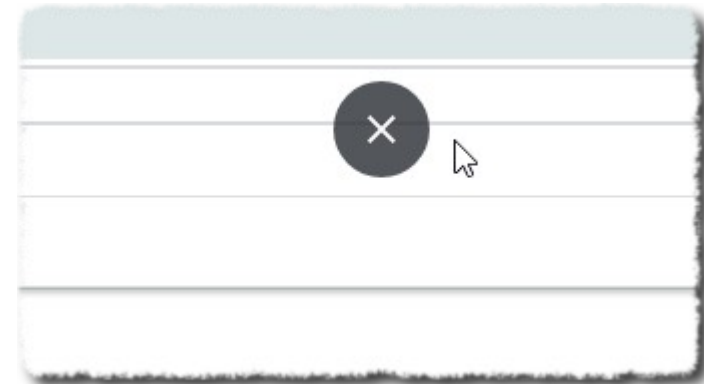


Basically, all current browsers work.

But:

Full screen (F11) is unfavourable for Firefox. When moving the mouse to the upper edge, FF shows the bars and reduces the area for guacamole at that moment. Consequence: The target system rescales.

Chromium only fades in a x and leaves the area of the target system



Client: Chromium vs. Firefox



Firefox unfortunately does not provide all possible functions.

Limitations found are:

- No DnD of files (client $\rightleftharpoons$ remote desktop).
- Some key combinations do not work (Ctrl-W, ...)
- Screen size is not (always) transferred correctly => scaled, blurred image
- Full screen mode: rescaling when touching the upper edge of the screen
- Direct text exchange via the clipboard not possible

These limitations are partly due to the lack of implemented functions in Firefox.

Authentication



Guacamole can handle the following authentication methods:

- Database
- LDAP
- OpenID Connect
- Radius, SAML, CAS, ...
- HTTP header, JSON

- 2FA (Duo, TOTP)

This and that...



Internet connection

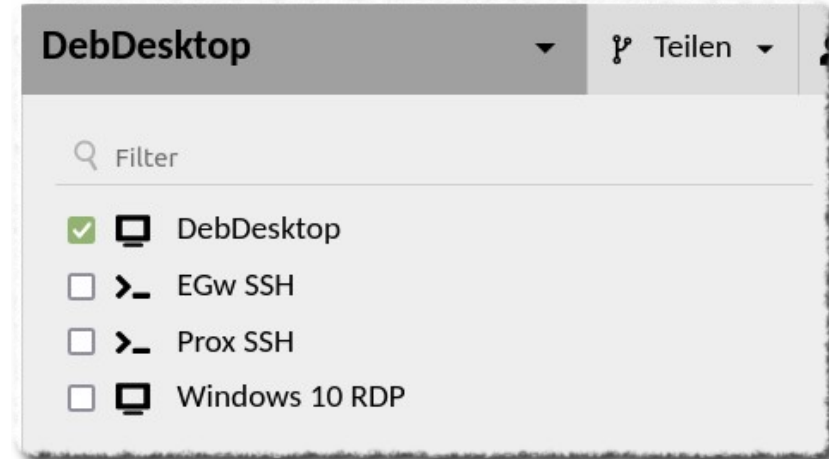
- Guacamole is a **real-time application!**
- Short ping times (practical experience: 30ms works, less is better).
- No packet loss
- WLAN in the home office can become a problem.
- Use cables if possible!
- "Security software" on the client can interfere

This and that...



Multiple connections at the same time

- Several connections can be opened simultaneously from one client.
- Open connections can be selected / changed at the bottom right.



This and that...



Clipboard

- **Text** can be exchanged between the PC and the remote desktop via the clipboard. Other types of data, such as pictures, are not currently provided for.
- The file size is limited. In the test, however, it was sufficient for a text with ~ 7000 characters.
- The exchange can be deactivated by the admin in the connection settings.

This and that...



Clipboard

- The Guacamole sidebar provides an alternative exchange field:

FAQ Copying/pasting text



This and that...



Screen scaling

- No (operating system) screen scaling should be set on the client system.
- A screen scaling of e.g. 125% prevents a 1:1 resolution, as the scaling cannot be communicated to Guacamole.
- The web browser tells Guacamole the available (browser) area (px).
- Relevant for RDP
- Browser should also not scale

This and that...



Guacamole as a WebApp

- If you want to run Guacamole as a window, you can (of course) set it up as a web app (browser).
- On Linux Mint also directly...
- Full screen mode still works then.
- Depending on the mode, the behaviour changes, especially with key combinations!

This and that...



Wake-on-LAN

- Guacamole is capable of Wake-on-Lan to wake up clients when they connect.
- Not with Docker and Docker Net
- The "Magic Packet" must be able to reach the client network unhindered.

Wake-on-LAN

This and that...



Printing

- With RDP, a virtual printer can be created on the remote Windows (when logging on).
- If printing is done on this printer, the client offers the printout as a PDF (for download, ...). This document can then be processed further...
- Cannot print directly to client printers (no VPN, installed remote client (as with Citrix, for example). Is more secure and should only be printed in exceptional cases (environment).

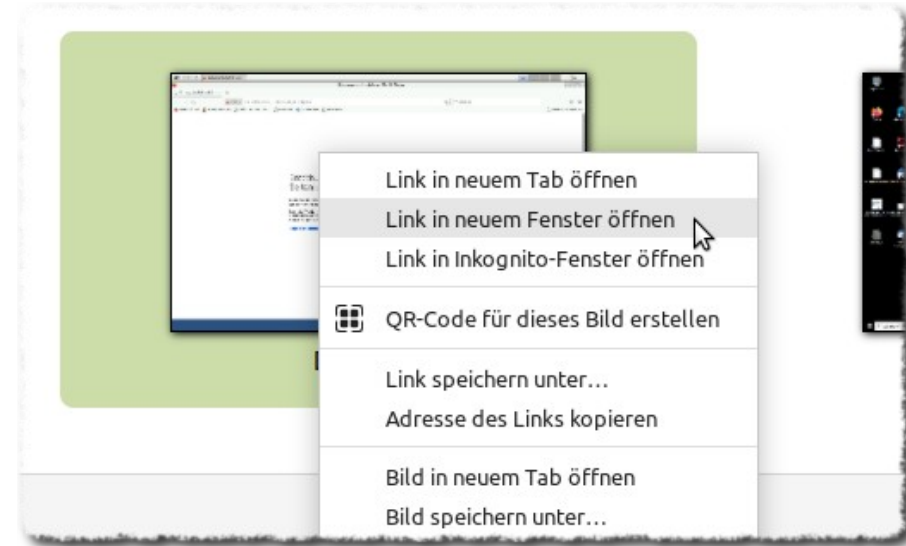
FAQ Device redirection

This and that...



Only one connection

- If a user has configured only one connection, this connection is opened directly after authentication.
- This can be OK if it is desired or (always) opened in an iframe.
- If right-click in a new window:
Create/assign a dummy connection for a selection.



This and that...



Admin access to session

- The admin can access running sessions.
In other words, they can connect and see/operate the user's desktop (and thus provide support).
- Note for the user comes with version 1.5.0

	Benutzername ▾	Sitzung aktiv seit	Entfernter Host	Verbindungsname
☐	[REDACTED]	19-03-2022 19:30:06	172.22.0.1	DebDesktop

This and that...



Mobile devices

- Guacamole can be used on mobile devices (in the browser).
- Display keyboard, mouse emulation
- Does it have to be?

This and that...



VPN tunnel

- Basically, Guacamole and the remote systems can be in separate networks. The networks must then be connected via VPN.
- Likewise, the guacd can be on the network with the clients and guacamole can be on a vServer, for example. Connected via VPN.

This and that...



NLA authentication

- With RPD, NLA authentication can be switched on. Then the (Windows) user data is requested in the Guacamole web browser.
- (Windows) RDP access data configured in the connection are saved in plain text! Not recommended...
- In environments with appropriate authentication/connection, the login data can be replaced by variables (see below questions...)

Parameter tokens

This and that...



Share/launch application/window

- It is possible to share (only) application windows (Windows RemoteApps).
-
- It is possible to automatically start an application when a connection is established

RemoteApp

This and that...



Record session

- A session can be recorded as a video.
- Some improvements come with version 1.5.0

Graphical session recording

This and that...



Ad-hoc Connections

- Extension which provides a field in the UI to establish a connection directly via IP/DNS.

Ad-hoc Connections

- Not included in the Docker container.
- Currently no directory passed through under EGroupware installation. Would have to be copied/downloaded manually into the container.

This and that...



Extensions

Guacamole can be extended with extensions. There are a few existing ones, and you can add your own.

OpenID Connect is an extension, already included in the Docker container.

Guacamole extension

Client customising (logo, login, ...)

Extensions can be used to customise the user interface.

This and that...



Release session

Shares can be configured for connections:

And be distributed in the session as a link:

The screenshot shows the EGroupware 'SMART ONLINE OFFICE' interface. In the top right, there are two buttons: 'Neue Verbindung' and 'Neue Verbindungsgruppe'. Below them is a list of connections. Two connections are circled in red: 'FreigabeDeb' under the 'Neues Verteil-Profil' group, and 'FreigabeW10' under another 'Neues Verteil-Profil' group. The 'FreigabeW10' connection is selected, and a 'Teilen' (Share) button is circled in red. Below this, a message states: 'Diese Verbindung wird nun geteilt. Die aktuelle Verbindung wird gegenwärtig geteilt und kann von jeder Person über den folgenden Link erreicht werden:'. A link is provided: [https://egw. \[redacted\] /guacamole/#/?key=NM8HtY0vTEaVLEdMrIHgHbllmyisZq_FKB4_zhE0y1hX](https://egw. [redacted] /guacamole/#/?key=NM8HtY0vTEaVLEdMrIHgHbllmyisZq_FKB4_zhE0y1hX). Below the link is a section titled 'Zwischenablage' (Clipboard) with text: 'Kopierter oder ausgeschnittener Text aus Guacamole wird hier angezeigt. Änderungen am Text werden direkt auf die entfernte Zwischenablage angewandt.'

Settings/Connections



- There are few global settings in the WebUI.
- Depending on the connection type, the configuration for connections offers different parameters.

Live...

Problems?



- Printing (improvement with 1.5.0 for larger print jobs)
- Keyboard input sporadically not possible
- Docker: Logging access IP address (coming with 1.5.0, hopefully!)
- Docker: WOL (depending on configuration)

These are personal experiences from daily operation in two technically identical environments. This may be different in other environments!

Outlook 1.5.0



Version 1.5.0 is (already) targeted for March 2022.

<https://lists.apache.org/thread/q4cmkttjwl97lj2oc26sohsnxd46dj6j>

But it will come when it is ready... :-)

Link collection



[Guacamole website](#)

[Documentation/Manual](#)

[Mailinglist / Archiv/Graphic](#)

[Guacamole/EGroupware flyer](#)

[EGroupware-Guacamole website](#)

[Guacamole in EGroupware forum](#)



EGroupware

SMART ONLINE OFFICE

Smart Online Office

- **Smart** : Intelligent linking of information
- **Online** : Web application usable on all platforms
- **Office** : (almost) **complete office in the web browser**

Modules in EGroupware



Email



InfoLog
**(Tasks/
Notes/...)**



Calendar

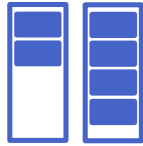


Contacts

Modules in EGroupware



**Filemanager /
Filesharing**



Kanban



smallPART



Project Manager



Helpdesk



Bookmarks



Timesheet



Ressources

**Knowledge
management**

Modules in EGroupware



Videoconference
(Jitsi)



Remote Desktop
(Guacamole)



Videoconference
(BBB)



Chat
(Rocket.Chat)



Discourse ?



Online Office
(Collabora Online)



**Your
application?**

Installation



On an **existing** and **configured EGroupware installation**:

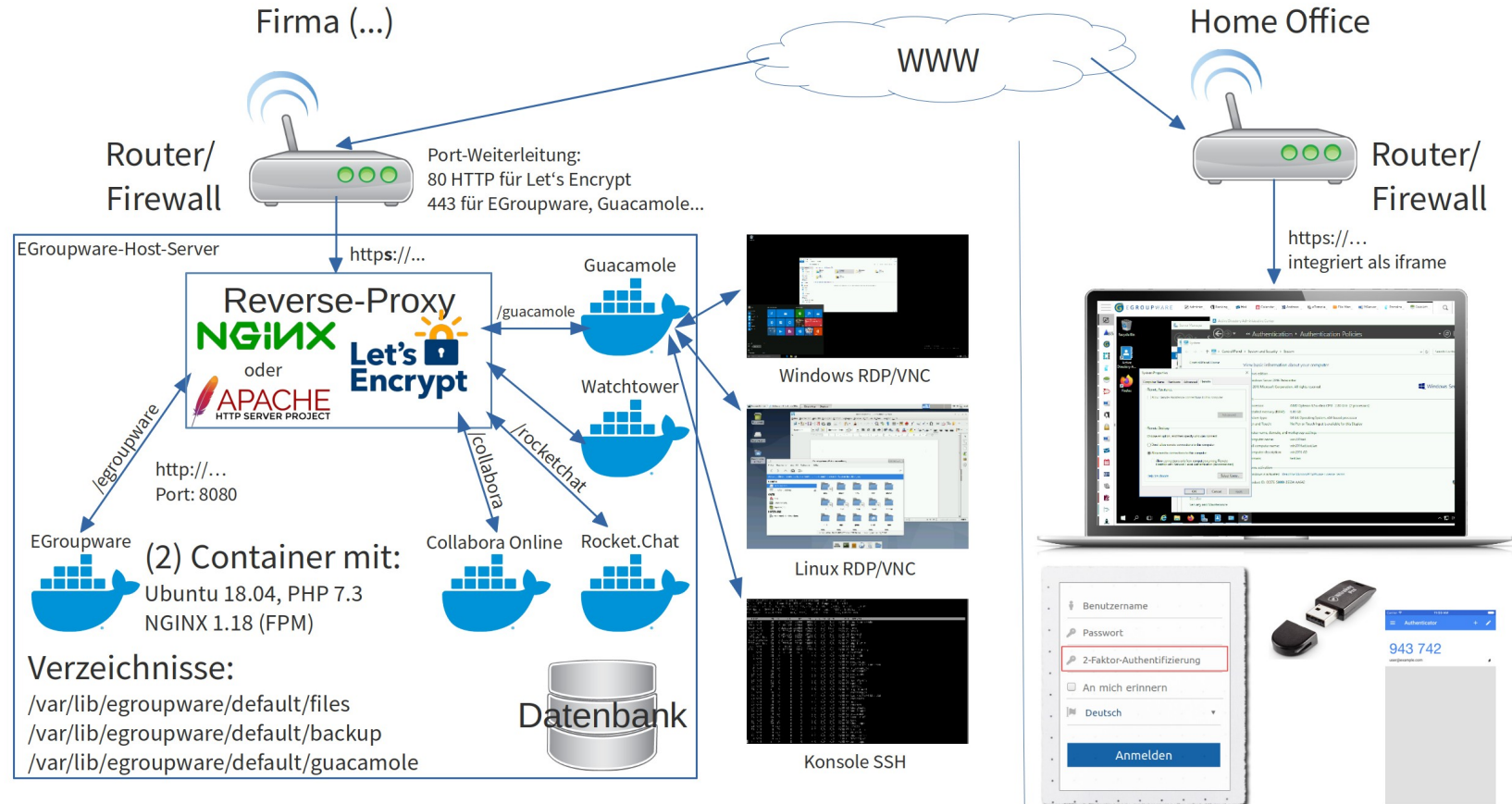
```
apt install egroupware-guacamole
```

- Loads the containers, sets up Guacamole in Docker.
- Configures Guacamole as an app (app. permissions, auth, ...).
- Creates the database tables/views

Lecture from the [Kielux 2020](#) (German):
[Jitsi und Apache Guacamole in EGroupware](#)

The [installation of EGroupware](#) is not more complex :-)

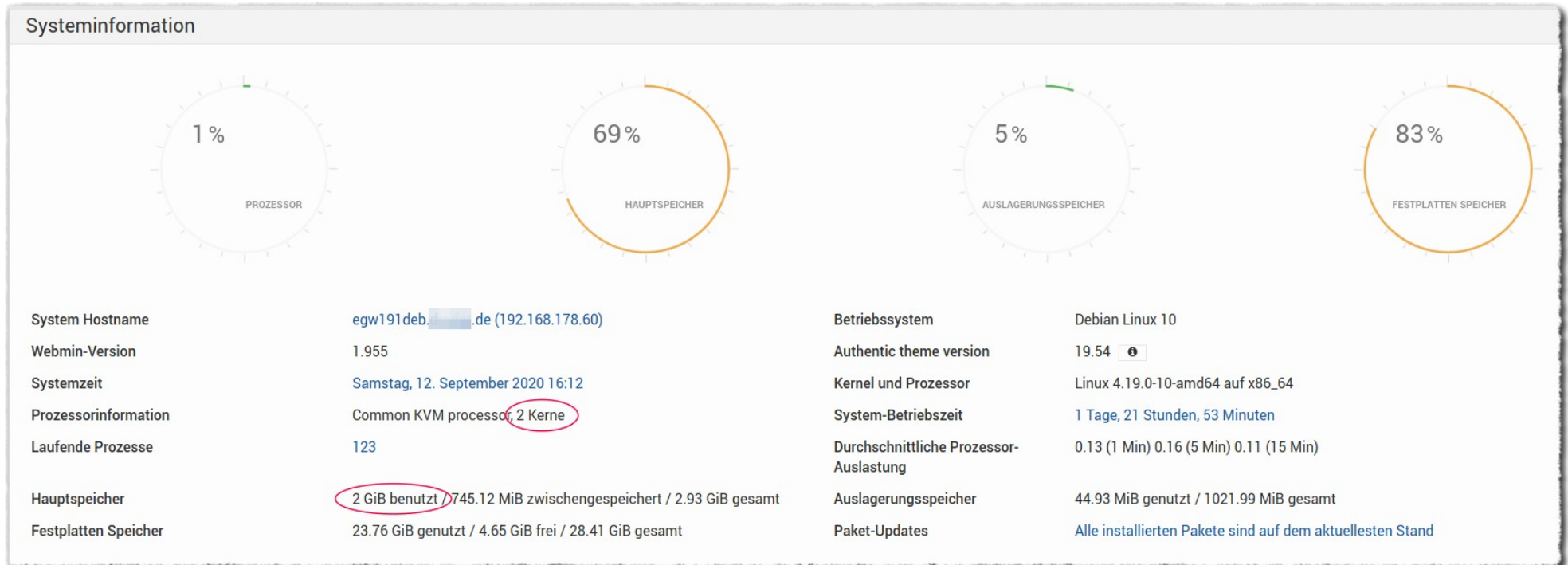
Scheme



Ressources



Resource requirements of a full installation of EGroupware with Collabora Online, Rocket.Chat, Guacamole and Data



Ressources



Resource requirements 9 sessions home office

EGroupware with

- Rocket.Chat
- Collabora Online
- Guacamole

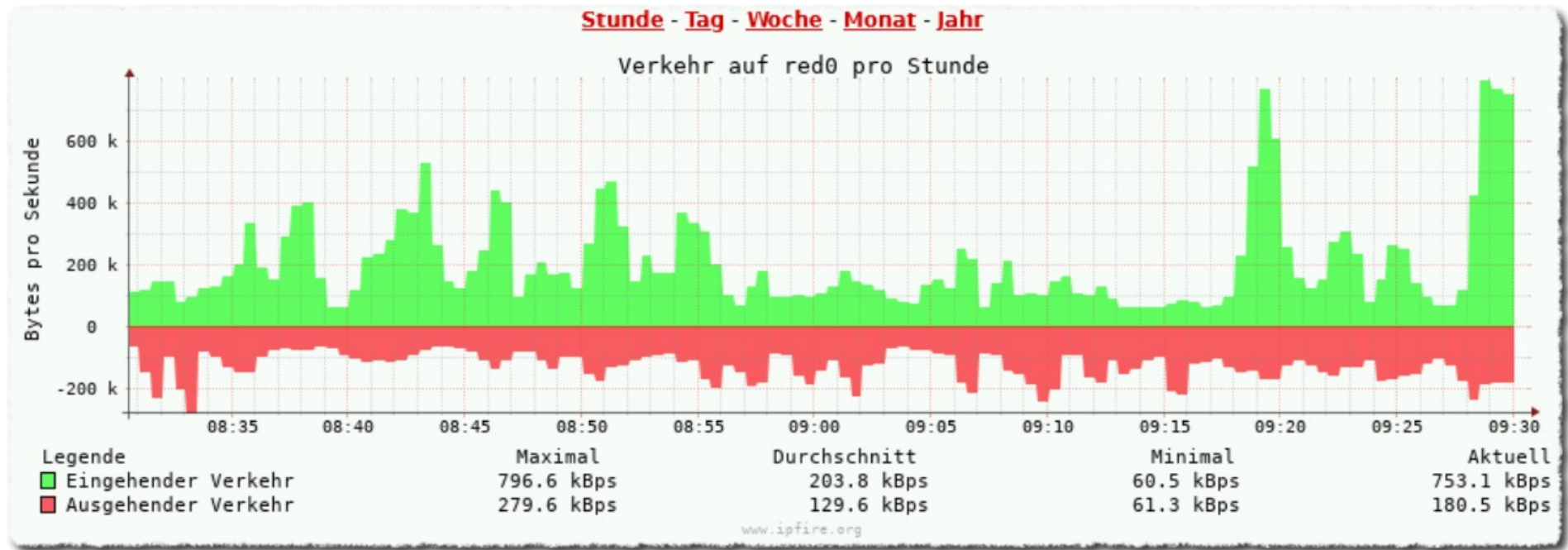
In the example:
90 sessions EGw
6 GB RAM
4 CPU
29 GB HD (incl. data)



Ressources



Necessary bandwidth for 9 sessions home office



Authentication/Security



EGroupware can authenticate (even multiple) against:

- Database
- LDAP
- AD
- Mail, CAS, SAML 2.0 / Shibboleth / SimpleSAMLphp

and can use 2FA:

- Authenticator Android/iOS
- U2F Tokens

And protects by

- Brute Force Protection, Application Firewall

Direct call



Guacamole can also be accessed directly via URL:

`https://sub.domain.tld/guacamole/#`

Thus, an EGroupware/Guacamole installation can be used to run Guacamole without actively using the EGroupware part.

(Container-)Updates are installed automatically (watchtower).
Update info in the forum as [announcement](#).

Requirements



To install Guacamole directly on an EGroupware server a few requirements have to be met:

- Users and groups in EGroupware Database
- Debian or Ubuntu host
- MariaDB/MySQL Database ([PostgreSQL](#))
- HTTPS
- ~ 1 GB additional disk space
- ~ 200 MB additional RAM

More in the [Wiki](#).

Integration



The installation integrates and configures Guacamole:

- Installation database tables/views for connections
- Users and groups as read-only view (EGw-DB!)
- Installation as App with Auth against EGroupware-OpenID
- Administration of connections in EGroupware

- Rights management in EGroupware (execution rights app)
- Connection rights exclusively in EGroupware (user/group)!
- Automatic updates

Live...

Article in EGroupware forum



[Information/Help about Guacamole](#)

[Apache Guacamole - The integration into EGroupware](#)

[Guacamole - Connections and use](#)

[Guacamole - Advanced Administration and Tips 1](#)

EGroupware in the home office



- Groupware im Webbrowser
- Remote-Desktop im Browser
- Chat
- Fileserver
- Online Office
- Audio/video conference
- CTI/Telephony

Goal: Complete office in the web browser

Home office = distributed locations (branch office, etc.)

EGroupware in the home office



Thus:

- No VPN
- No direct MS terminal server access (MS, Citrix, Parallels, ...)
- No terminal server with TS licenses (with PCs/vPCs)
- No need to open ports for mail
-
- Low complexity, easy configuration
- All in one solution (for the user)
- DSGVO compliant operation
-
- Secured by SSL, 2FA, (EGw-Firewall), Brut-Force-Protection, ...



Infos

Try EGroupware



- [Live demo](#) (but without guacamole...)
- **30 days test system in EGroupware-RZ** (including Rocket.Chat, Collabora Online, smallPART, Guacamole and E-Mail)
- More time on request, if interested possible transfer of data into productive system
- [UCS installation](#) (from App-Center or as appliance)
- **Self-installation** ([GitHub Wiki](#))
- NAS (QNAP/Synology with Docker or as VM (better))

EGroupware informationen



- **Forum**
- **Website**
- **GitHub (Wiki)**
- **Twitter, Facebook, LinkedIn, XING, Mastodon, YouTube**
- **Flyer EGroupware, Collabora Online, Rocket.Chat, Guacamole, Jitsi**
- **Testimonials (German) Linux-Magazin, IT-Administrator**

- **info@egroupware.org**: (customized) offers, licensing issues, Collabora online licenses, ...

EGroupware Lectures (German)



Lectures from the **Tux-Tage** 2020

EGroupware (from the user's point of view)
EGroupware (From the user's point of view)

Lectures from the **Kieler Linux Tage** 2020

Jitsi und Apache Guacamole in EGroupware

EGroupware Lectures



- EGroupware im Homeoffice und in Bildungseinrichtungen [Tux-Tage 2021](#)
- LibreOffice Online in EGroupware [FrOSCon 2019](#), [CLT 2019](#)
- More videos on [Youtube/EGroupware](#)
- Listing of all [presentations and slide](#), with with some translated slides and some presentations in English



Thank you for your interest !

Contact: su@egroupware.org

Forum: help.egroupware.org

Questions



I have answered the questions received during the presentation on the pad in detail in the forum:

You are welcome to deepen the topics in the forum!

Many thanks to the moderator Norbert, who also runs Guacamole and could already answer questions during the lecture. I leave his answers in the text and supplement them where it makes sense.

Questions



Question

Does RemoteFX (RDP extension for 3D) work over Guacamole?

Norbert No

Stefan

There are commits for it, but it is **not planned** for version 1.5.0
[GUACAMOLE-377: Add support for RemoteFX.](#)

Questions



Question

VNC has security vulnerabilities, alternatives? E.g. VPN tunnel recommended

Norbert

RDP works. Where is the problem with VNC in a closed network?

The session from the browser is encrypted via SSL to the guacamole (Doesn't matter which protocol). :+1:

Stefan

VNC is first of all a protocol. Different client/server can of course have security related issues. Like any other software (RDP!).

Here VNC is used for the access of the guacd to the target desktop. From there to the user is transferred via guacamole protocol. Over a secured SSL connection.

Guacamole is just there to not have to use a VPN. Especially to protect the network from external access. Which also takes place via VPN.

Questions



Question

Basically a CAL (Client Access License) would have to be purchased when accessing a MS-RDP system with Guacamole or is the mode with temporary licenses "abused" here?

Norbert

A: One must already have the regular licenses.

A2: On the web you can find a registry hack for resetting the "GracePeriod" entry in the registry. I don't want to mention it directly here ;-)

A3: Every Win 10 Pro client comes with a "RDP license". The user doesn't even have to have admin rights.

Stefan

Access to a TS does not change by using Guacamole. Why also...

Questions



Question

Why no gaming (60 fps)? HTML5 can do this in the web browser ...

Stefan

Guacamole would have to process the fps via RDP, bandwidth on all line segments would have to transport the amount of data.

Guacamole is simply not designed or made for this.

Questions



Question

Which VNC server is recommended for Linux? (Problem: resolution is not automatically adjusted like with RDP.) noVNC?

Norbert

noVNC? --> is a VNC client, I mean servers like RealVNC, UltraVNC, TightVNC, ... → this is a matter of the backend individually?

--> so far I have not found a VNC server where the automatic adjustment of the resolution works. (My users are not enthusiastic to have to set the resolution by hand) :+1:

Stefan

I don't know of any VNC server/client that can do this.

But it is not really useful most of the time. E.g. in support the resolution remains as the user sees it on the screen.

Questions



Question

Does xrdp automatically adjust the resolution?

Stefan

On (initial) login, the session adjusts to the px from the browser window and provides a clean/sharp image.

When the browser window is changed, the resolution is also reset. However, it must be set to "Reconnect".

On Windows this makes a new login necessary, on Linux (on me a Debian with xrdp) this takes only a small moment and works without (user) re-login.

Bildschirm

Breite:	
Höhe:	
Auflösung (DPI):	
Farbtiefe:	Hohe Farbtiefe (16-bit) ▾
Force lossless compression:	☐
Größenänderungs-Methode:	Erneut verbinden ▾
Nur-Lesen:	

Zwischenablage

"Display Update" virtual channel (RDP 8.1+)
Erneut verbinden

Questions



Question

What about support for Spice in the future? :+1: :+1:

Stefan

Inquired, thought about, discussed, not implemented.
Waiting for funding. Say: Someone to commission it.

spice protocol support
Support for SPICE protocol

Questions



Question

What is the situation with X2Go?

Norbert

Currently not implemented.

Stefan

[FAQ](#)

Questions



Question

Scenario special software on a single user system (RDP): Can another user detect if someone is already active on the target system?

Norbert

Yes, Windows shows that someone is logged in and asks if the session should be taken over. Not with the same username, the session is simply taken over, therefore the questions whether one sees this in Guacamole --> no, there nothing is indicated. Have seen this behavior so far as an advantage. --> Don't the users have individual user IDs? in this case, no. --> I wouldn't recommend it and I think it would also cause trouble.

Stefan

See answer Norbert +1

Questions



Question

Can file sharing/clipboard be disabled?

Norbert Yes

Stefan

Clipboard is active by default and can be disabled.
Data exchange via drive has to be enabled separately.

Basically you can set up a connection so that no data exchange except KVM (console/video/mouse) is possible.

Zwischenablage

Line endings:

Disable copying from remote desktop:

☐

Disable pasting from client:

☐

Geräteumleitung

Audiounterstützung Konsole:

☐

Audio deaktivieren:

☒

Audioeingänge (Mikrofon) aktivieren:

☐

Druckunterstützung aktivieren:

☒

Name des weitergeleiteten Druckers:

Guacamole PDF Remotedrucker

Austauschlaufwerk aktivieren:

☐

Laufwerksname:

Austauschlaufwerk

Disable file download:

☐

Disable file upload:

☐

Laufwerkspfad:

Austauschlaufwerk automatisch erstellen:

☐

Statische Kanäle:

Questions



Question

Kann man Sitzungen aufzeichnen?

Norbert

Ja (<https://guacamole.apache.org/doc/gug/configuring-guacamole.html#graphical-recording>)

Questions



Question

Was sind die Systemanforderungen für bis zu 5 Sitzungen?

Norbert

CPU: 2 Kerne RAM: 4GB

Stefan

Wir kalkulieren zu einer EGroupware-Installation

- ~ 1 GB zusätzlicher Festplattenplatz
- ~ 200 MB zusätzlicher RAM

Hinzu. => + EGroupware 2CPU/4GB RAM; Vollinstalation 4CPU/6GB RAM; s.o.

Für nur Guacamole auf OS gilt Norberts Angabe.

Questions



Tipps from Norbert

Deactivate the desktop background and animations in RDP, then it also runs super smoothly over WLAN. (We have about 60 RDP connections running in parallel without any complaints from the users).

It is possible to pass the login data e.g. to a RDP session, then no login data is cached in the database. (Enter `${GUAC_USERNAME}` and `${GUAC_PASSWORD}` in the RDP settings)

Security: Guacamole in DMZ and an additional guacd into the internal net. So not every RDP server has to be enabled in the firewall for access from DMZ. :+1:

Chromium is generally better with Remote Desktop or HTML5.

If only one RDP session per user is set up, it will start automatically after the guacamole login.