

Jami and how it empowers users

LibrePlanet 2021

Amin Bandali



Jami and how it empowers users

Jami and how it empowers users

LibrePlanet 2021

Amin Bandali



- hello and welcome! (thanks for introduction?)
- thank you for tuning in to my talk
- i'm Amin Bandali, though usually go only by my last name (bandali) on the interwebs
- i'm a free software activist and computing scientist
- GNU maintainer and volunteer, and interned with the FSF tech team in 2020
- today i'm here to talk to you about Jami and how it empowers users

What is Jami?

Jami and how it empowers users

└ Introduction

Jami is free software for universal communication
that respects the freedom and privacy of its users



Jami is free software for universal communication
that respects the freedom and privacy of its users

GNU package for universal communication

Jami and how it empowers users

└ Introduction

- one-on-one conversations
- file sharing
- audio/video calls & conferences
- screen sharing in video calls & conferences
- recording & sending audio/video messages
- SIP phone software functionality
- cross-platform communication framework

- one-on-one conversations
- file sharing
- audio/video calls & conferences
- screen sharing in video calls & conferences
- recording & sending audio/video messages
- SIP phone software functionality
- cross-platform communication framework

some of the high-level features of Jami include ...

Architecture overview

the communication is end-to-end encrypted, even when media relay (TURN protocol) is involved – mchibani

Jami and how it empowers users

└ Architecture overview

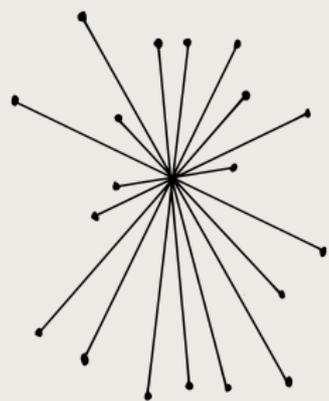
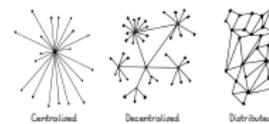
Jami is
an end-to-end encrypted secure
and distributed voice, video,
and chat communication platform
that requires no central server
and leaves the power of privacy
and freedom in the hands of users

Jami is

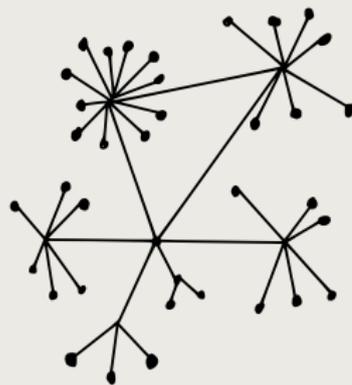
an **end-to-end encrypted** secure
and **distributed** voice, video,
and chat **communication platform**
that requires **no central server**
and leaves the power of **privacy**
and **freedom** in the hands of *users*

Jami and how it empowers users

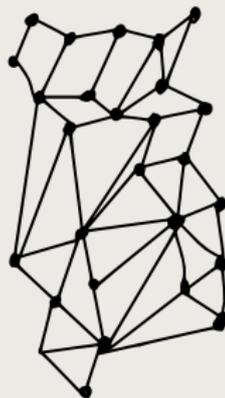
└ Architecture overview



Centralized



Decentralized



Distributed

typology of networks, dating back to the early 1960s.
from a research memorandum by paul baran, one of the
two independent inventors of packet switching

OpenDHT

- lightweight and scalable, designed for large networks and small devices
- high resilience to network disruption
- IPv4 and IPv6 support
- clean and powerful C++14 *map* API
- C, Rust, and Python 3 bindings
- public key crypto layer providing optional data signing and encryption (using GnuTLS)
- REST API with optional HTTP client+server and push notification support

Jami and how it empowers users

└ Architecture overview

OpenDHT 

- lightweight and scalable, designed for large networks and small devices
- high resilience to network disruption
- IPv4 and IPv6 support
- clean and powerful C++14 *map* API
- C, Rust, and Python 3 bindings
- public key crypto layer providing optional data signing and encryption (using GnuTLS)
- REST API with optional HTTP client+server and push notification support

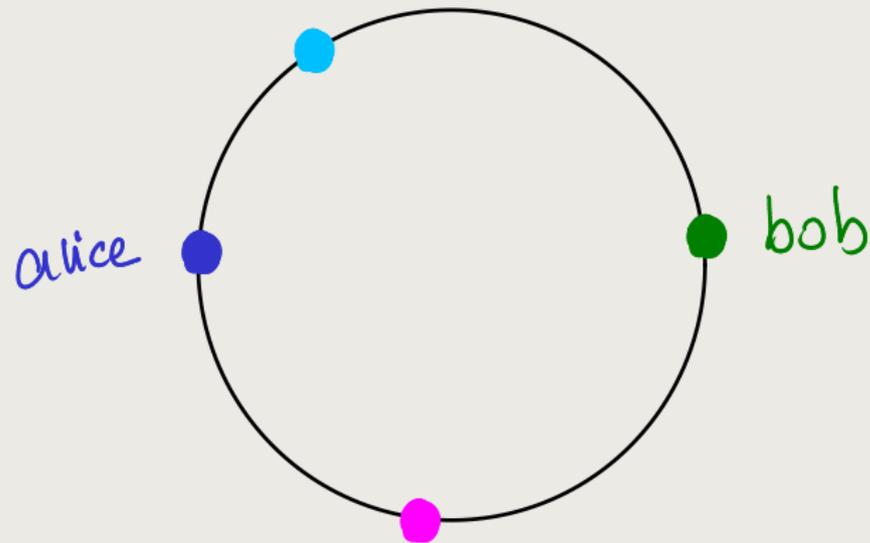
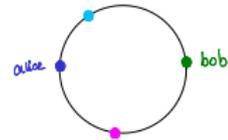
C++14 distributed hash table implementation

API similar to mainline BitTorrent DHT

provides easy-to-use distributed in-memory data store. every node in the network can read and write values to the store. values are distributed over the network, with redundancy.

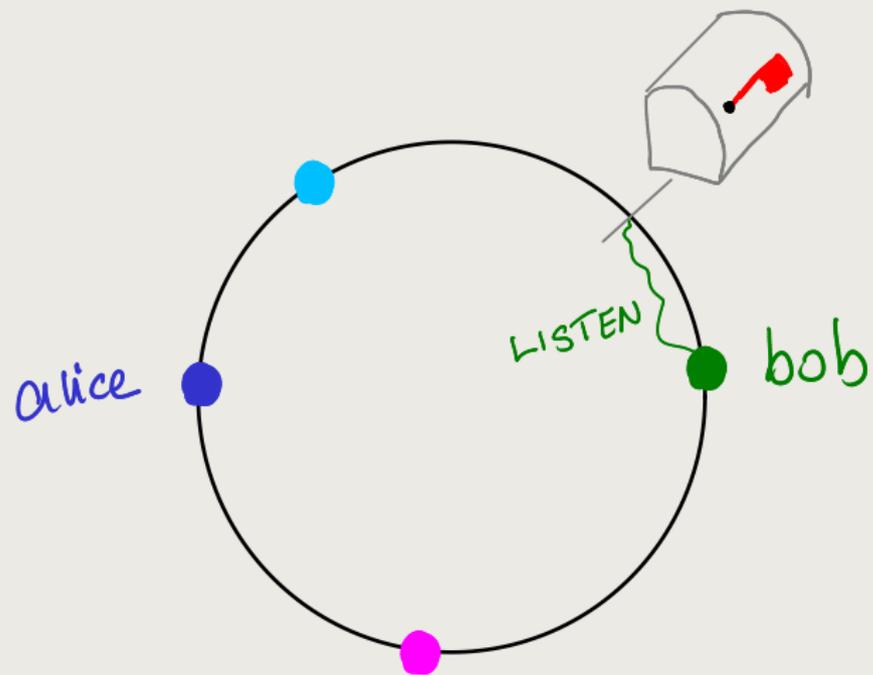
Jami and how it empowers users

└ Architecture overview



say we have a network of users, including alice and bob who would like to establish a connection

the circle is our network and the points are nodes



Jami and how it empowers users

└ Architecture overview

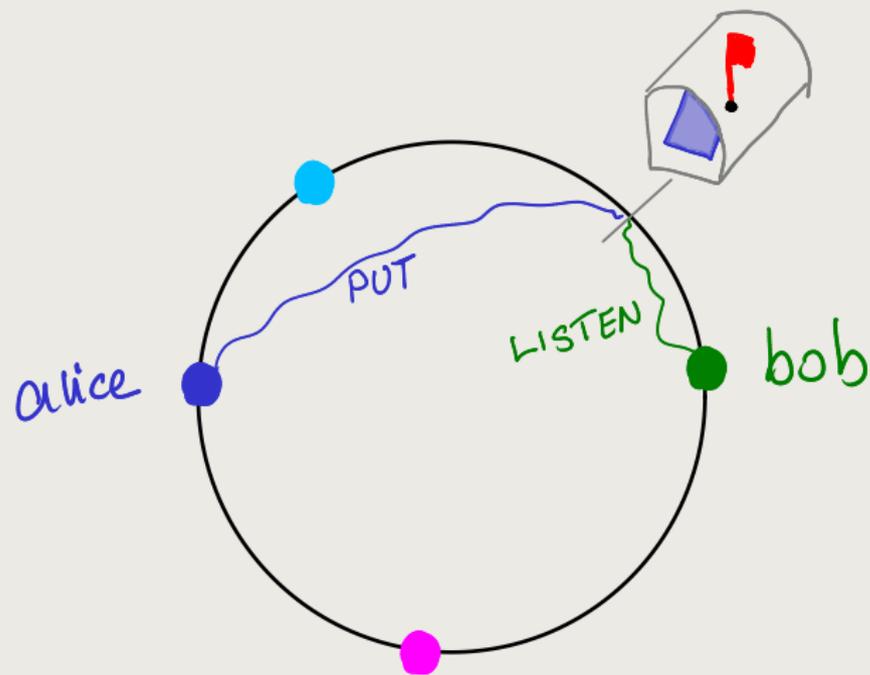
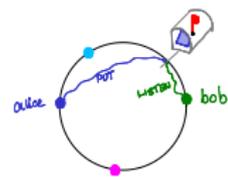


bob performs a listen operation on the network (typically served by closest node on the network), with the 160-bit key being the hash of his public key

the mailbox represents the 'key' in the dictionary

Jami and how it empowers users

└ Architecture overview



alice then performs a put operation at the same key, which bob will be immediately notified of and receive the value that was put on the dht

the value put on the dht (the blue envelope in the mailbox in our diagram) is an encrypted list of ICE candidates (IP addresses used to try and establish p2p communication)

Jami and how it empowers users

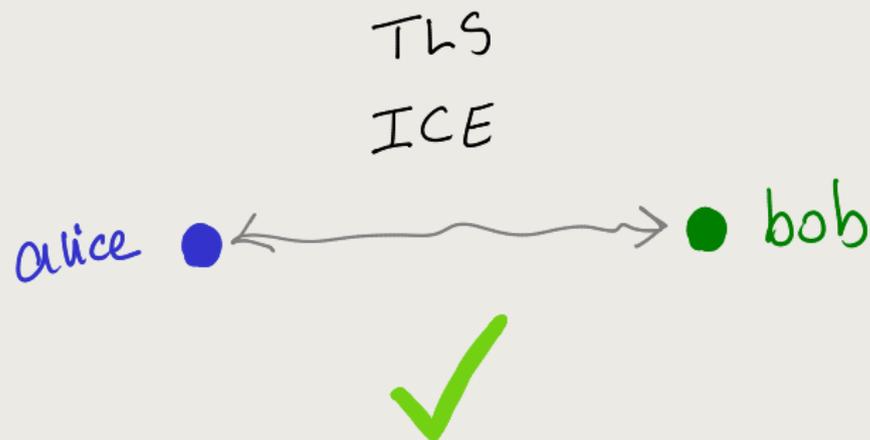
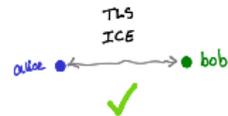
└ Architecture overview



this is used to establish p2p communication using ICE (interactive connectivity establishment)

Jami and how it empowers users

└ Architecture overview



over the ICE connection we establish a TLS connection

the connection is authenticated both ways:

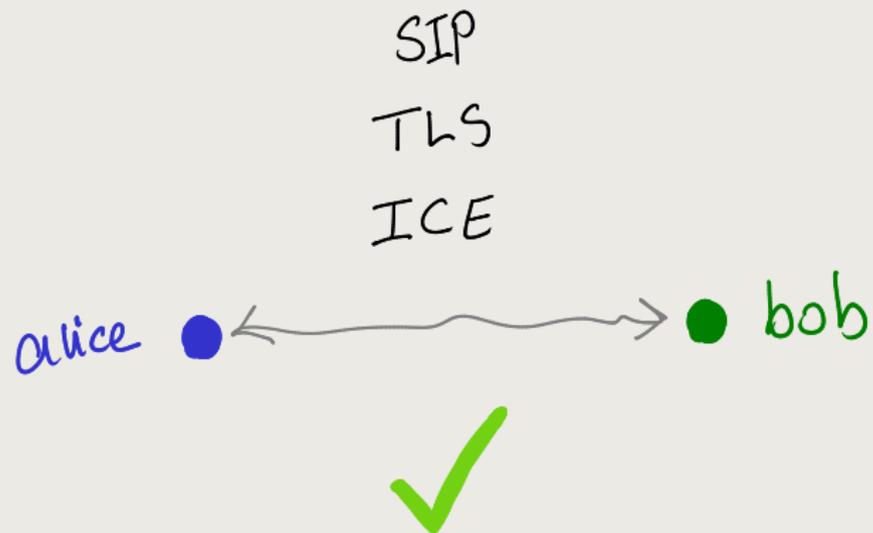
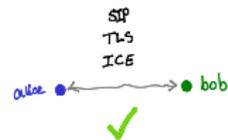
in contrast to web browsers where only clients authenticate the web servers and the servers typically don't authenticate clients using certs (but usually use other web technologies like SSO, cookie-based auth, etc), in Jami both parties exchange cert chains and check each other's certs and keys

we have a p2p authenticated e2e-encrypted connection

...

Jami and how it empowers users

└ Architecture overview

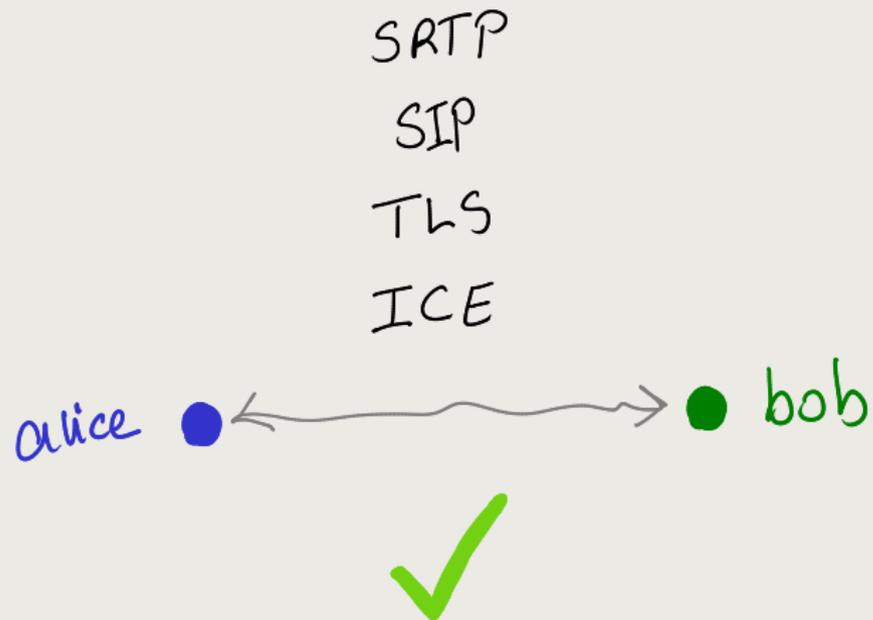
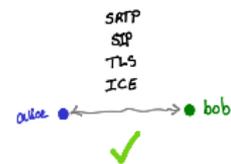


over which we do SIP (using pjsip) (we also use pjnath for ICE)

we use SIP to negotiate the call and its parameters (like which audio and/or video codecs to use, etc)

Jami and how it empowers users

└ Architecture overview



which we use to perform SRTP communication (Secure Real-time Transport Protocol) which carries the media streams

notice the key aspect of Jami establishing this p2p ICE communication without use of a central server and instead over the opendht distributed network

Development news

Jami and how it empowers users

└─Development news

Development news

important recent or upcoming changes and features

Jami and how it empowers users

└ Development news

- many connectivity improvements
- automatic video bitrate adjustment
- detached host rendezvous points
- notification improvements
- bidi text support in the chat view
- video renderer improvements
- conference call moderation
- improved error handling
- object copy reductions
- plugin API overhaul
- ... and more!

- many connectivity improvements
- automatic video bitrate adjustment
- detached host rendezvous points
- notification improvements
- bidi text support in the chat view
- video renderer improvements
- conference call moderation
- improved error handling
- object copy reductions
- plugin API overhaul
- ... and more!

many fixes & improvements throughout Jami's codebases

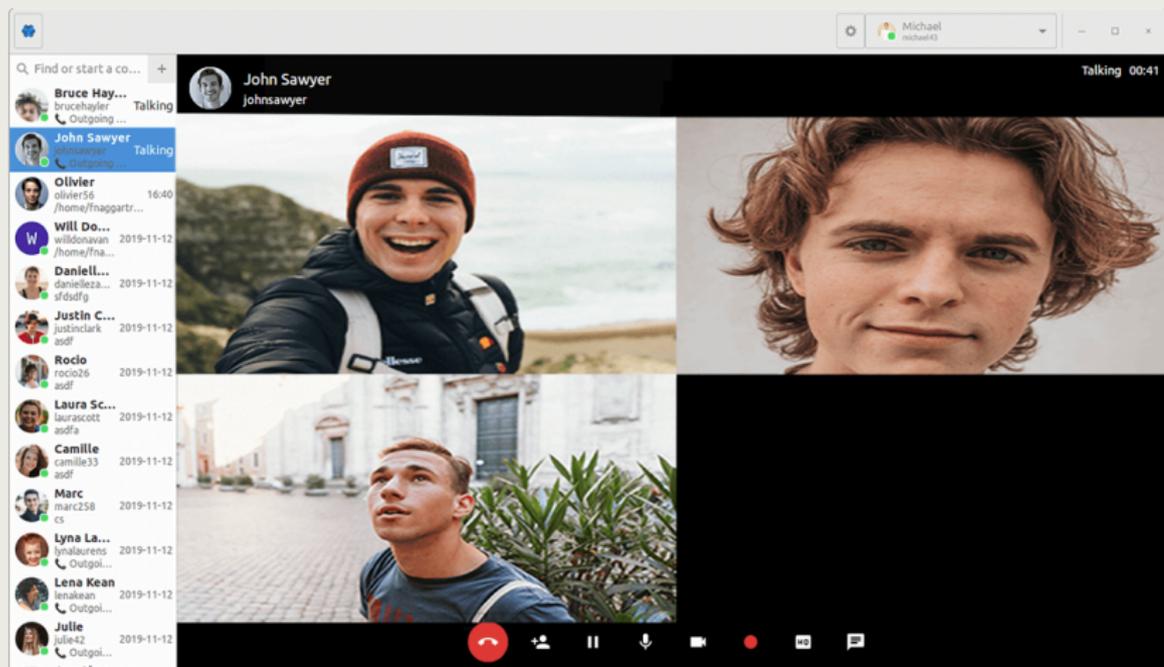
major UPnP refactoring adding handler for automatic port mapping provisioning to keep a pool of mappings ready for use for incoming or outgoing calls

Jami and how it empowers users

└─Development news

Rendezvous points

Rendezvous points



Jami and how it empowers users

└ Development news



jami has long supported group calls with multiple participants. rendezvous point accounts introduced last year take that to the next level, essentially allowing you to turn your machine running Jami into a conference server

rendezvous points automatically answer incoming calls, and by default are in a 'detached' or 'headless' state and don't transmit the host's audio/video

you can create new rendezvous point accounts or easily turn any existing account into a rendezvous point from the account settings page

Plugins

Jami and how it empowers users

└─Development news

Plugins

are a new addition to the Jami universe

plugins written in C++ using ChatHandler and MediaHandler APIs of Jami daemon, Python SDK for easily creating new plugins based on skeleton projects

AudioFilter: audio-related filters for audio/video calls. for instance, a reverb effect

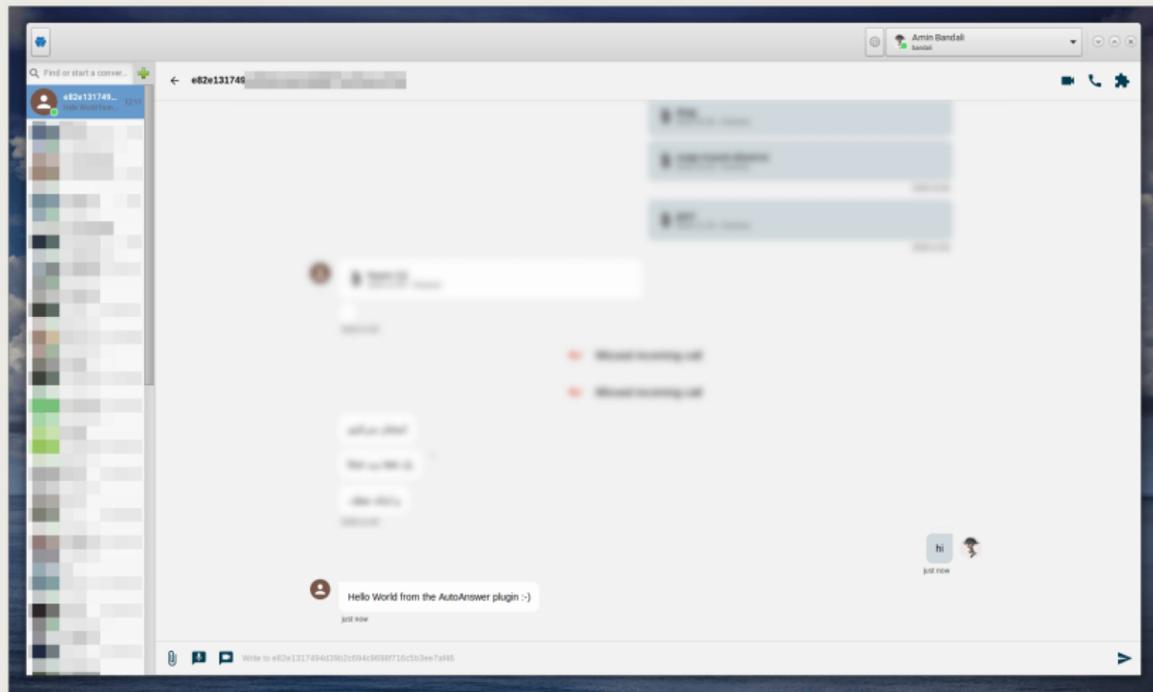
if you're interested in getting started hacking plugins and creating your own, we have a tutorial that walks you through setting things up and writing a simple plugin that draws a circle at the center of the frame in video calls

Jami and how it empowers users

└ Development news

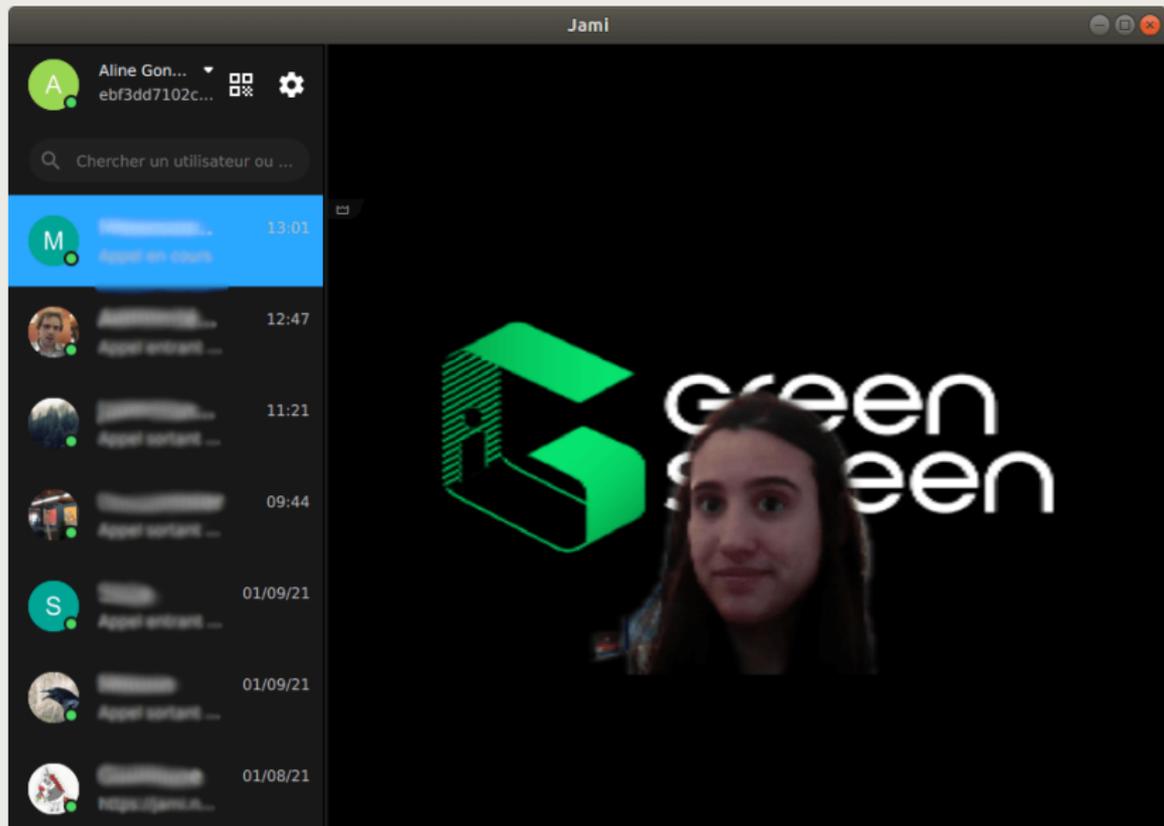


AutoAnswer



AutoAnswer

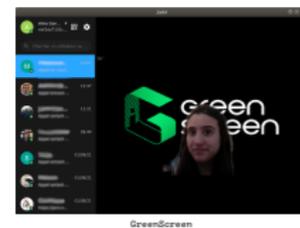
AutoAnswer: bot-like plugin for automated replies



GreenScreen

Jami and how it empowers users

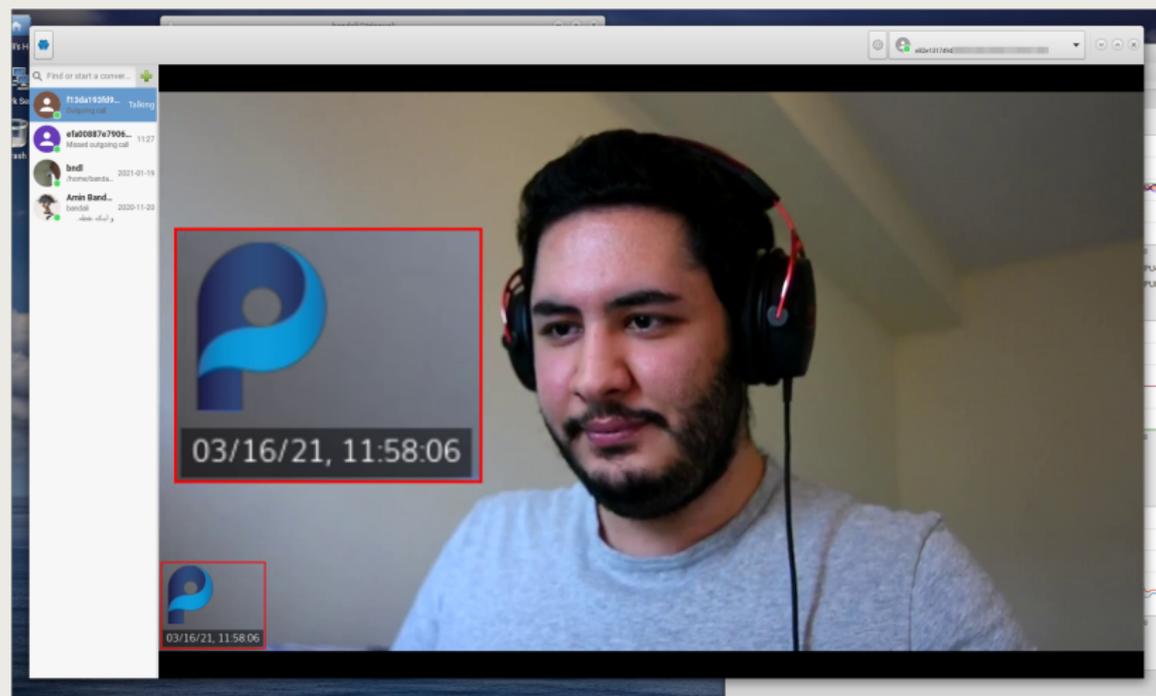
└─Development news



GreenScreen: uses neural networks to do green screen effect of putting you in the foreground of an image

Jami and how it empowers users

- Development news



WaterMark



WaterMark

WaterMark: enables you to add a watermark in video calls. can be an image but can also contain location, date, and time as well

JAMS

Jami and how it empowers users

└─Development news

JAMS

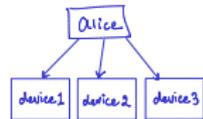
Jami Account Management Server enables organizations to manage their own community of Jami users while taking advantage of Jami's distributed network architecture

JAMS can either run standalone and use its own local database, or integrate with an existing LDAP or AD installation, and allows managing contact lists and pushing specific configurations to groups of users

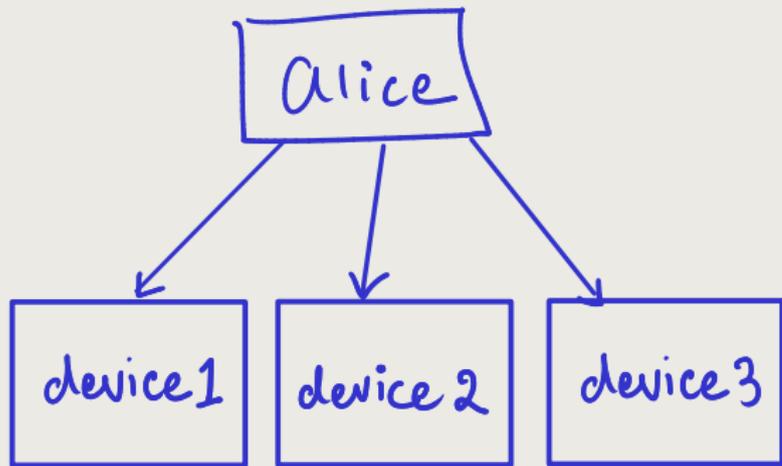
SFL offers paid commercial support via the Jami Store

Jami and how it empowers users

└ Development news



Jami account & device management



Jami account & device management

how does Jami authenticate users and manage accounts in a non-centralized way and without any central authority? using X.509 certs & cert chains

it's a well-known and widely used standard (e.g. by web browsers when visiting web sites over TLS, and various large organizations use it internally for user authentication and account management)

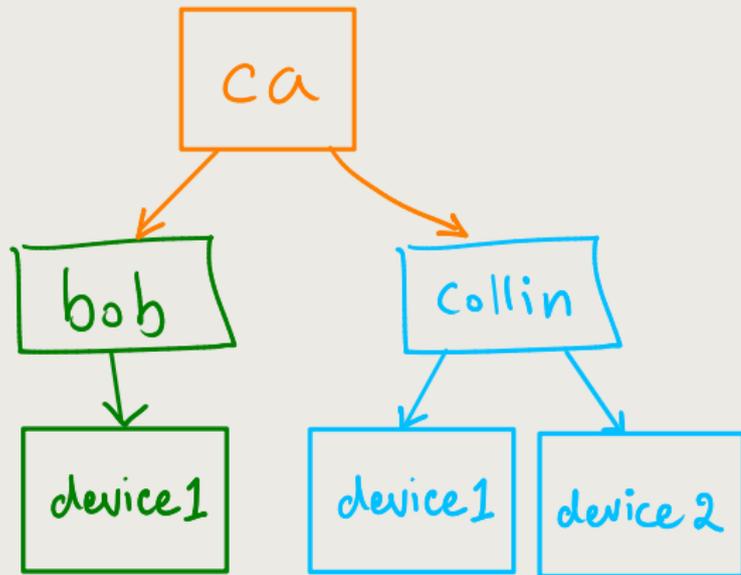
Jami extends the use of cert chains to device management, covering the multiple-devices-per-account use-case, enabling easy addition or revocation of devices. contacts are managed similar to openssh

Jami and how it empowers users

└ Development news



Jami account & device management (with JAMS)



JAMS brings in a CA into the picture, enabling organizations to manage and revoke users and so on. the JAMS server will fulfill CSRs for users via the org CA (when using Jami outside this kind of setting, account certs are self-signed)

using X.509 certs in this way enables mixed distributed & centralized authentication: in an org setting, allows authenticating users and members of the same org, or even another org you're working with, if configured

Jami account & device management (with JAMS)

Jami and how it empowers users

└─Development news

jami-qt client

jami-qt client

Jami and how it empowers users

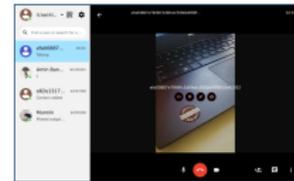
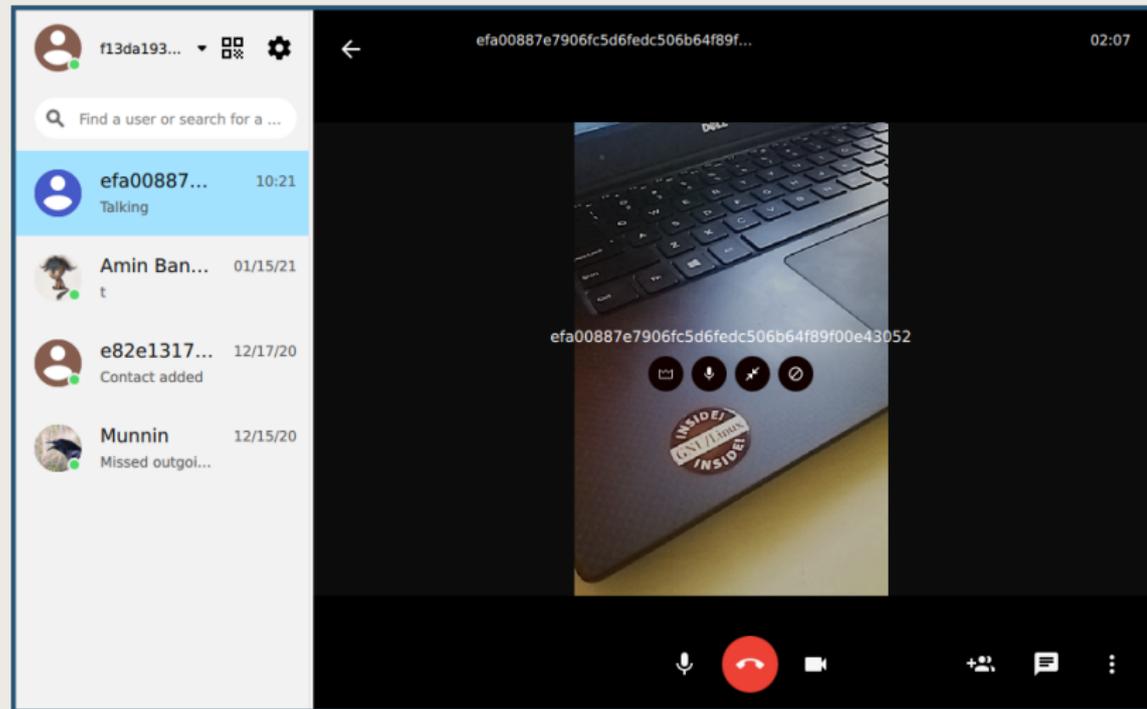
└─Development news

Moderation

Moderation

Jami and how it empowers users

└ Development news



Swarm chat

Jami and how it empowers users

└─Development news

Swarm chat

currently Jami supports linking multiple devices to a single account, however, as any Jami user would happily remind you, unfortunately the message histories are not synchronized across devices.

this has been an important missing feature and probably the most-commonly asked about or requested one so far, along with group chats.

and there's a good reason for their absence: implementing these features in a fully distributed setting like Jami is a real challenge, as we would like to achieve this without any central server or authority.

Community

Jami and how it empowers users

└─Development news

Community

very happy to say that i think we have a healthy and growing community around Jami, and we'd love to have you with us!

folks ask "how can i get involved in the community?"
here are some ways

Jami and how it empowers users

└─Development news

- forum.jami.net
- jami@gnu.org
- [#jami on freenode](#)
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

- `forum.jami.net`
- `jami@gnu.org`
- `#jami` on freenode
- `git.jami.net`
- `review.jami.net`
- `docs.jami.net`
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- *use Jami and help spread the word <3*

1. forum for discussing Jami and helping others
2. can also use the ML for that
3. for quick questions or chatting with users/devs
4. report bugs on `git.jami.net`
5. send patches on `review.jami.net`; i'd love to receive patches to `jami-gnome` and help from the community to maintain it
6. help write and improve jami docs

Jami and how it empowers users

└─Development news

- forum.jami.net
- jami@gnu.org
- [#jami on freenode](#)
- git.jami.net
- [review.jami.net](#)
- [docs.jami.net](#)
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

- forum.jami.net
- jami@gnu.org
- [#jami on freenode](#)
- git.jami.net
- [review.jami.net](#)
- [docs.jami.net](#)
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- *use Jami and help spread the word <3*

1. forum for discussing Jami and helping others
2. can also use the ML for that
3. for quick questions or chatting with users/devs
4. report bugs on git.jami.net
5. send patches on review.jami.net; i'd love to receive patches to `jami-gnome` and help from the community to maintain it
6. help write and improve jami docs

Jami and how it empowers users

└─Development news

- forum.jami.net
- jami@gnu.org
- [#jami on freenode](#)
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

- `forum.jami.net`
- `jami@gnu.org`
- `#jami` on freenode
- `git.jami.net`
- `review.jami.net`
- `docs.jami.net`
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- *use Jami and help spread the word <3*

1. forum for discussing Jami and helping others
2. can also use the ML for that
3. for quick questions or chatting with users/devs
4. report bugs on `git.jami.net`
5. send patches on `review.jami.net`; i'd love to receive patches to `jami-gnome` and help from the community to maintain it
6. help write and improve jami docs

Jami and how it empowers users

└─Development news

- forum.jami.net
- jami@gnu.org
- [#jami on freenode](#)
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

- forum.jami.net
- jami@gnu.org
- [#jami on freenode](#)
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

1. forum for discussing Jami and helping others
2. can also use the ML for that
3. for quick questions or chatting with users/devs
4. report bugs on git.jami.net
5. send patches on review.jami.net; i'd love to receive patches to `jami-gnome` and help from the community to maintain it
6. help write and improve jami docs

Jami and how it empowers users

└─Development news

- forum.jami.net
- jami@gnu.org
- [#jami on freenode](#)
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

- forum.jami.net
- jami@gnu.org
- [#jami on freenode](#)
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

1. forum for discussing Jami and helping others
2. can also use the ML for that
3. for quick questions or chatting with users/devs
4. report bugs on git.jami.net
5. send patches on review.jami.net; i'd love to receive patches to `jami-gnome` and help from the community to maintain it
6. help write and improve jami docs

Jami and how it empowers users

└─Development news

- forum.jami.net
- jami@gnu.org
- #jami on freenode
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

- forum.jami.net
- jami@gnu.org
- #jami on freenode
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- *use Jami and help spread the word <3*

1. forum for discussing Jami and helping others
2. can also use the ML for that
3. for quick questions or chatting with users/devs
4. report bugs on git.jami.net
5. send patches on review.jami.net; i'd love to receive patches to jami-gnome and help from the community to maintain it
6. help write and improve jami docs

Jami and how it empowers users

└─Development news

- forum.jami.net
- jami@gnu.org
- #jami on freenode
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

- forum.jami.net
- jami@gnu.org
- #jami on freenode
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- *use Jami and help spread the word <3*

1. forum for discussing Jami and helping others
2. can also use the ML for that
3. for quick questions or chatting with users/devs
4. report bugs on git.jami.net
5. send patches on review.jami.net; i'd love to receive patches to jami-gnome and help from the community to maintain it
6. help write and improve jami docs

Jami and how it empowers users

└─Development news

- forum.jami.net
- jami@gnu.org
- #jami on freenode
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- use Jami and help spread the word <3

- forum.jami.net
- jami@gnu.org
- #jami on freenode
- git.jami.net
- review.jami.net
- docs.jami.net
- write and share your own plugins
- help translate Jami to your language(s)
- package Jami in your GNU/Linux distribution
- *use Jami and help spread the word <3*

1. forum for discussing Jami and helping others
2. can also use the ML for that
3. for quick questions or chatting with users/devs
4. report bugs on git.jami.net
5. send patches on review.jami.net; i'd love to receive patches to jami-gnome and help from the community to maintain it
6. help write and improve jami docs

Thanks!

bandali@gnu.org
bndl.org/lp2021
(GPLv3+)

Amin Bandali

Jami and how it empowers users

└─Development news

Thanks!

bandali@gnu.org
bndl.org/lp2021
(GPLv3+)

Amin Bandali