

Jami and how it empowers users

LibrePlanet 2021

Amin Bandali



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

Jami and how it empowers users

└ Introduction

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

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

Architecture overview

Jami and how it empowers users

└ Architecture overview

Architecture overview

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

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*

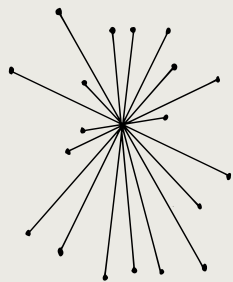
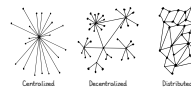
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└ Architecture overview

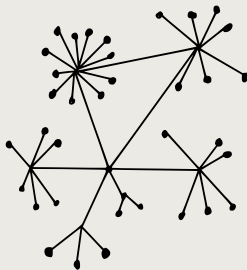
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└ Architecture overview



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

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└ Architecture overview

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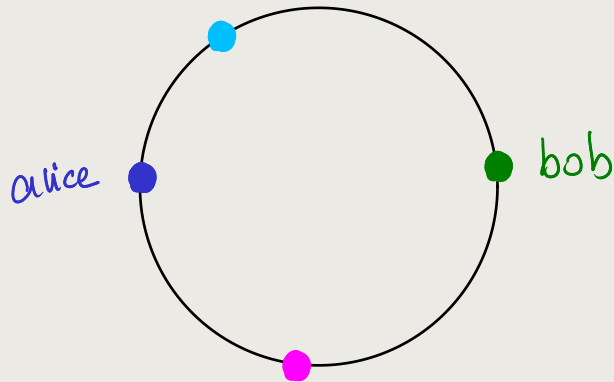
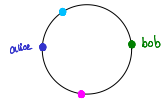
C++14 distributed hash table implementation

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.

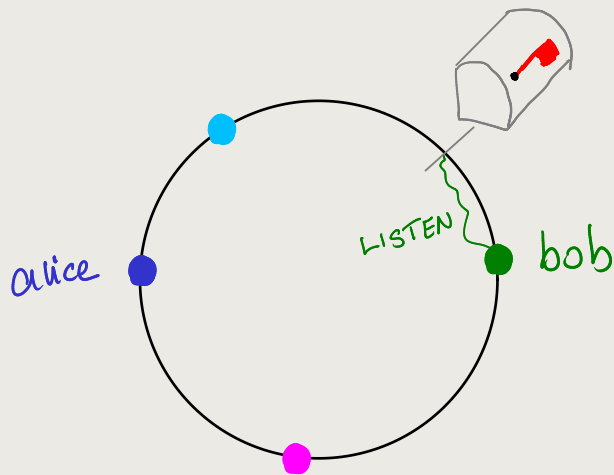
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└ Architecture overview



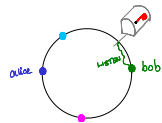
say we have a network of users, including alice and bob who would like to establish a connection

the circle is our network and the points are nodes



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└ Architecture overview

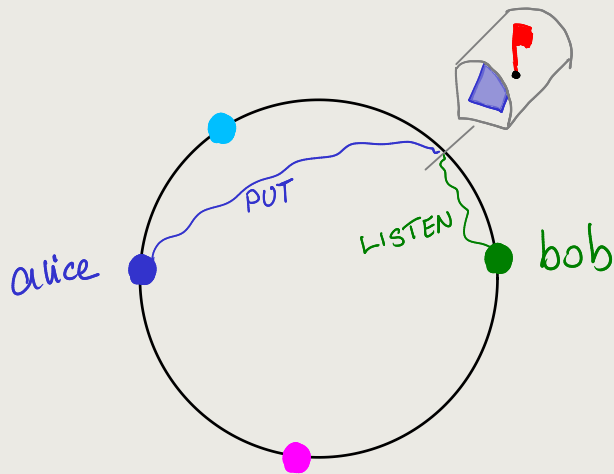
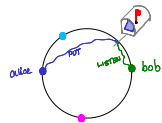


bob performs a listen operation on the network (typically served by closest node on the network), with the 160-bit key being the hash of his public key

the mailbox represents the 'key' in the dictionary

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└ 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)

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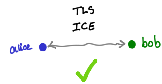
└ Architecture overview



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

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└ Architecture overview



over the ICE connection we establish a TLS connection

the connection is authenticated both ways:

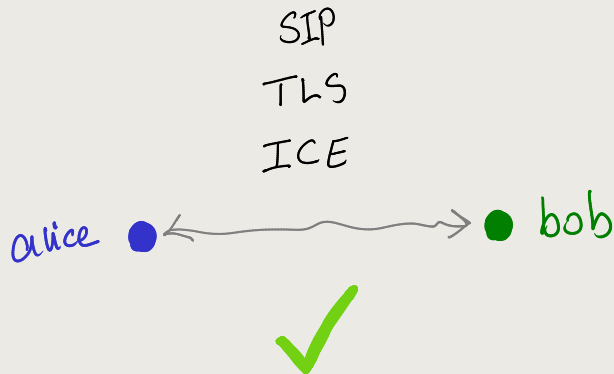
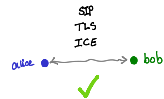
in contrast to web browsers where only clients authenticate the web servers and the servers typically don't authenticate clients using certs (but usually use other web technologies like SSO, cookie-based auth, etc), in Jami both parties exchange cert chains and check each other's certs and keys

we have a p2p authenticated e2e-encrypted connection

...

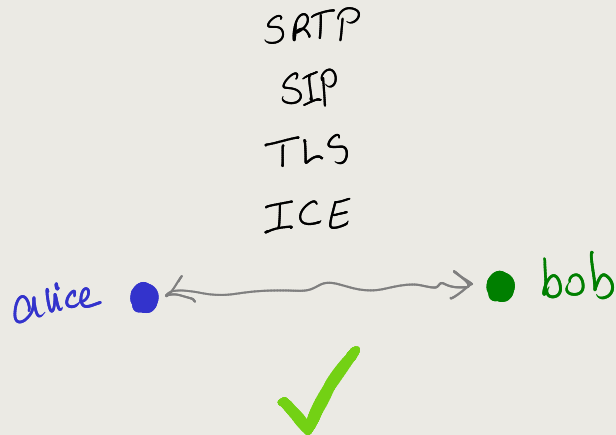
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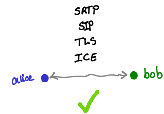
over which we do SIP (using pjsip) (we also use pjnath for ICE)

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



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└ 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

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└─Development news

Development news

important recent or upcoming changes and features

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!

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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

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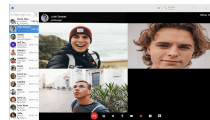
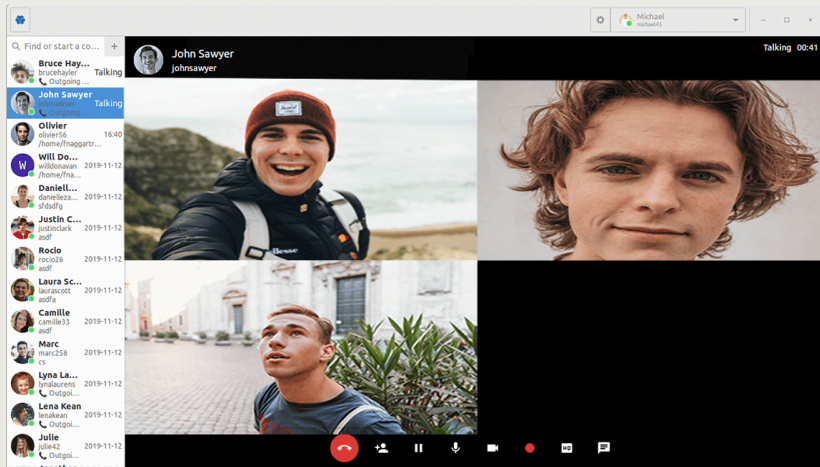
└─Development news

Rendezvous points

Rendezvous points

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└ 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

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└─Development news

Plugins

are a new addition to the Jami universe

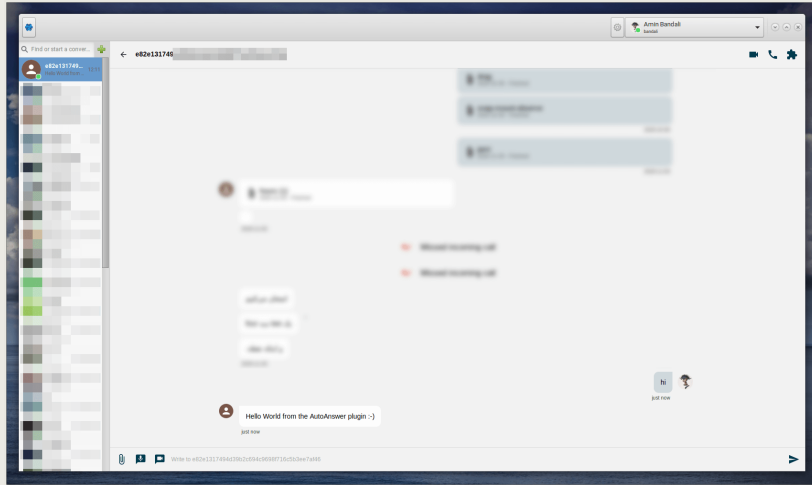
plugins written in C++ using ChatHandler and Media-Handler APIs of Jami daemon, Python SDK for easily creating new plugins based on skeleton projects

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

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└─Development news

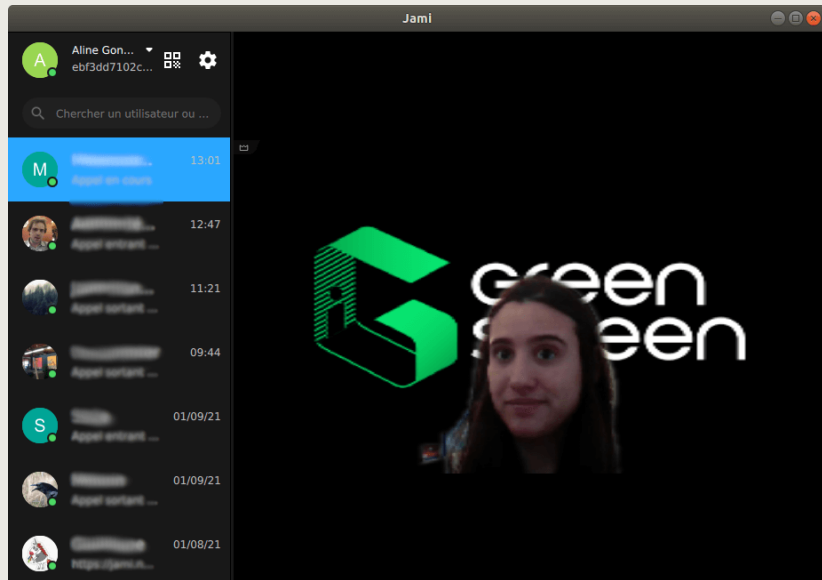


AutoAnswer



AutoAnswer

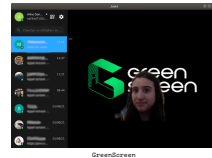
AutoAnswer: bot-like plugin for automated replies



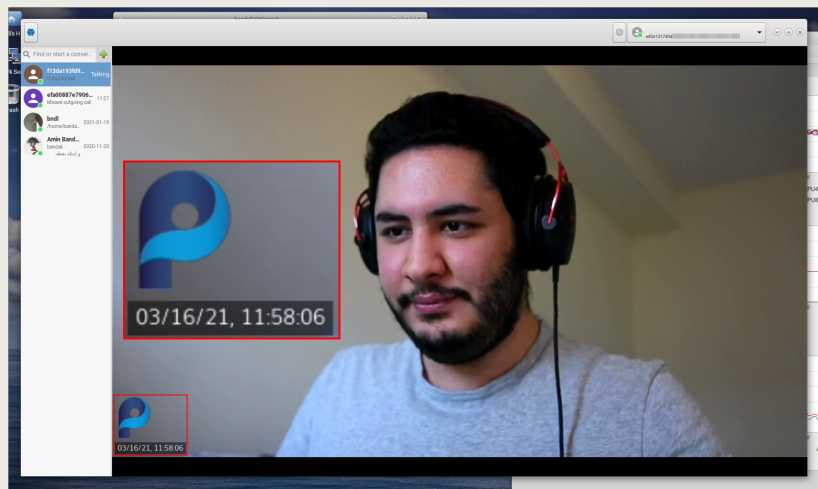
GreenScreen

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└ Development news



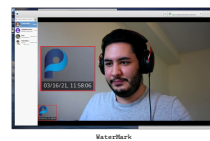
GreenScreen: uses neural networks to do green screen effect of putting you in the foreground of an image



WaterMark

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└ Development news



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

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└─Development news

JAMS

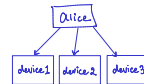
Jami Account Management Server enables organizations to manage their own community of Jami users while taking advantage of Jami's distributed network architecture

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

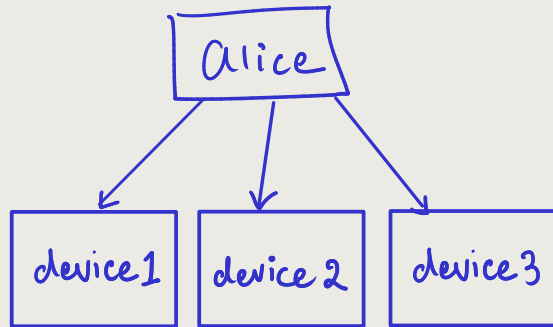
SFL offers paid commercial support via the Jami Store

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Jami account & device management



Jami account & device management

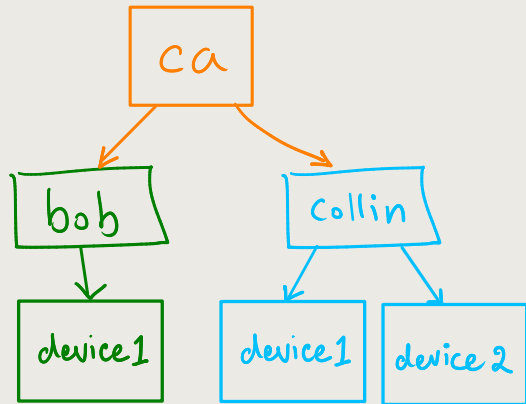
how does Jami authenticate users and manage accounts in a non-centralized way and without any central authority? using X.509 certs & cert chains

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)

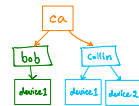
Jami extends the use of cert chains to device management, covering the multiple-devices-per-account use-case, enabling easy addition or revocation of devices. contacts are managed similar to openssh

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└ Development news



Jami account & device management (with JAMS)



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-qt **client**

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jami-qt **client**

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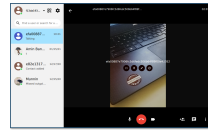
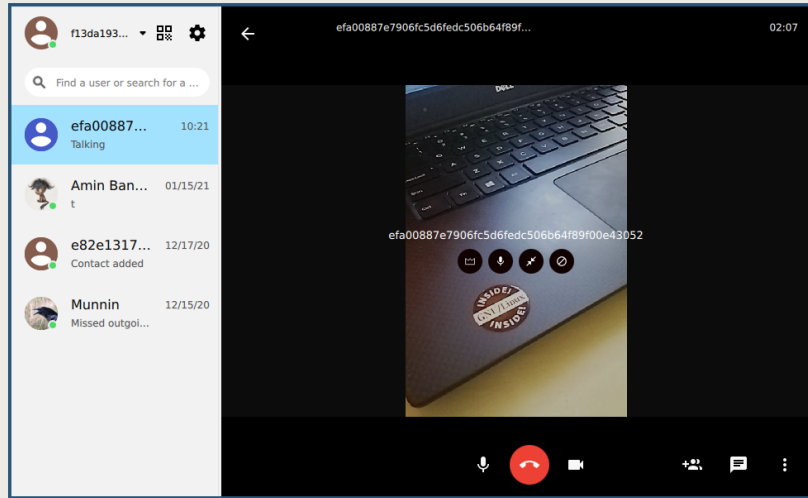
└─Development news

Moderation

Moderation

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- Development news



Swarm chat

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└─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

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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

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

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Thanks!

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

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Thanks!

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bndl.org/lp2021
(GPLv3+)

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