Introduction to Sigstore: Cryptographic signatures made easier

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About me

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Supply chain security: why are signatures important?

- **Software Supply Chain**: the end-to-end journey software takes from development to distribution, involving the tools and people responsible for its delivery
- Developers, version control, build systems, registries, deployment platforms...
- Attackers play on developer expectations of **systematic reproducibility** to find vulnerable links in a Software Supply Chain
- Cryptographic signatures guarantee:
  - Software **integrity**
  - Software **authenticity**

Signing software before Sigstore

Challenges of using OpenPGP/GPG for software signing

- **Public key distribution:** ensure recipients have access to the correct public keys to verify the authenticity of software
- **Private key storage and rotation:**
  - Safeguarding private keys is costly and leaks happen anyway
  - Need to regularly rotate signing keys to protect from key compromise
- **Intricate command line options**
- **Occasional need for cryptography knowledge**

See: *PGP signatures on PyPI: worse than useless* on blog.yossarian.net

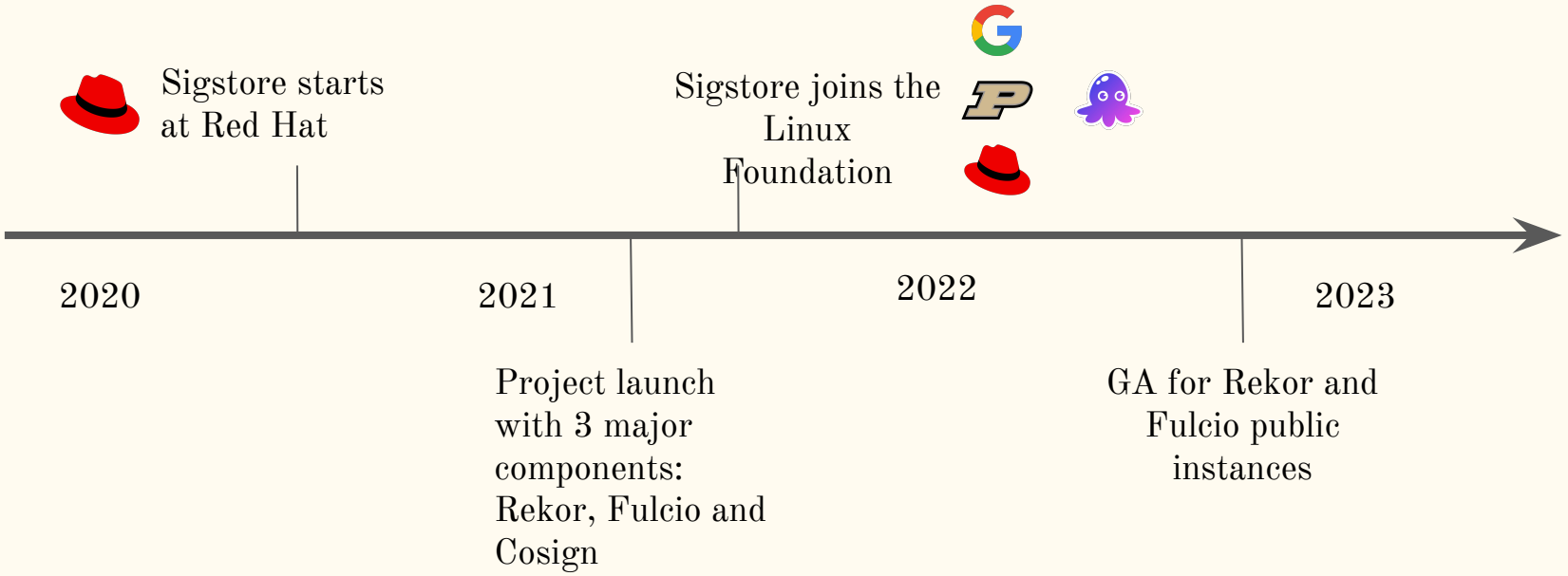
A key signing party in front of FOSDEM 2008, Wikipedia

"Become to digital signatures what Let’s Encrypt is to HTTPS"

- A free and automated Certificate Authority
- Allows any domain owner to obtain a trusted certificate at zero cost
- Over 256M active certificates delivered since 2016 (~3M a day)

- A free service for signing digital artifacts
- Signatures are logged publicly for verification
- Over 25M entries stored since 2021

Project Timeline



What is Sigstore?

Sigstore solves common issues with current signature schemes that prevent developer adoption:

- No knowledge of cryptography or PKI protocols required.
- A simple interface to make signing accessible to everyone
- No more private keys management and rotation
- Easier auditing and revocation in case of compromise
- Signatures are bound to a public **identity** instead of a public key

What is Sigstore?

sigstore rekor

Signature transparency log

sigstore fulcio

Free Certificate Authority

sigstore cosign

CLI to sign and verify artifacts

+ ecosystem-specific clients (Python, JavaScript, Rust...)

Architecture/Spec

OpenSSF Project

Projects

sigstore cosign

sigstore fulcio

sigstore gitsign

sigstore rekor

Deployments

sigstore public service

l.openssf.org

OpenSSF Landscape

OpenSSF

Sigstore is a new standard for signing, verifying, and protecting software. It is an OpenSSF project and this landscape is intended as a map to explore the Sigstore ecosystem.

Integrations

Artifact HUB

flux

HARBOR

HELM

in-toto

JReleaser

KUBEWARDEN

Kyverno

TEKTON CHAINS

TUF

aqua trivy

Language Clients

GO

Maven

JS

python

Ruby

Signed With

cilium

python

flux

Istio

JENKINS X

Karpenter

KEDA

Knative

kubernetes

KUBEWARDEN

Kyverno

Ockam

TEKTON

urllib3

Case Studies

AUTODESK

EDGELESS SYSTEMS

RANCHER

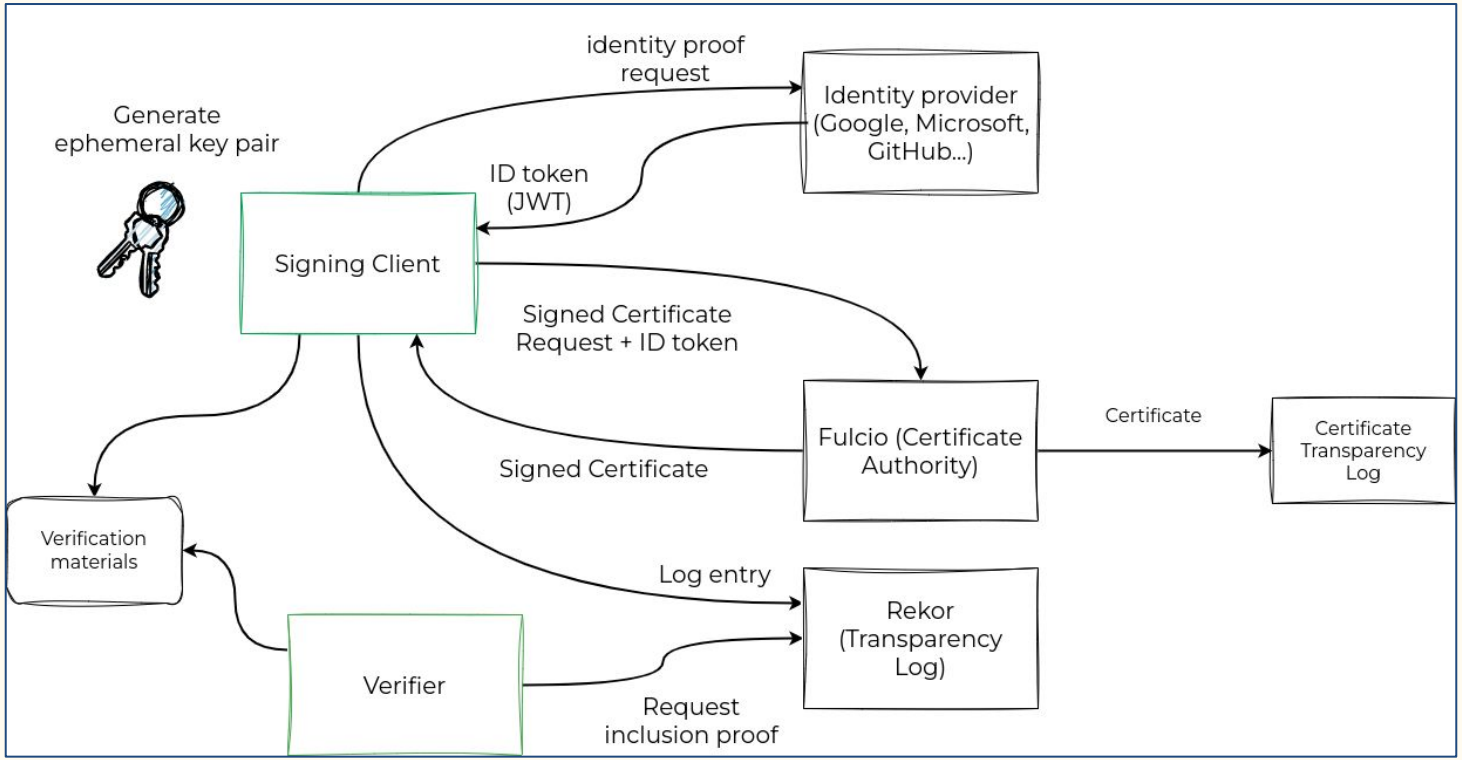
verizon

Demo:
Signing and verifying a file with the Cosign CLI

How does it work?

Sigstore's "keyless" signing workflow

Signing an artifact



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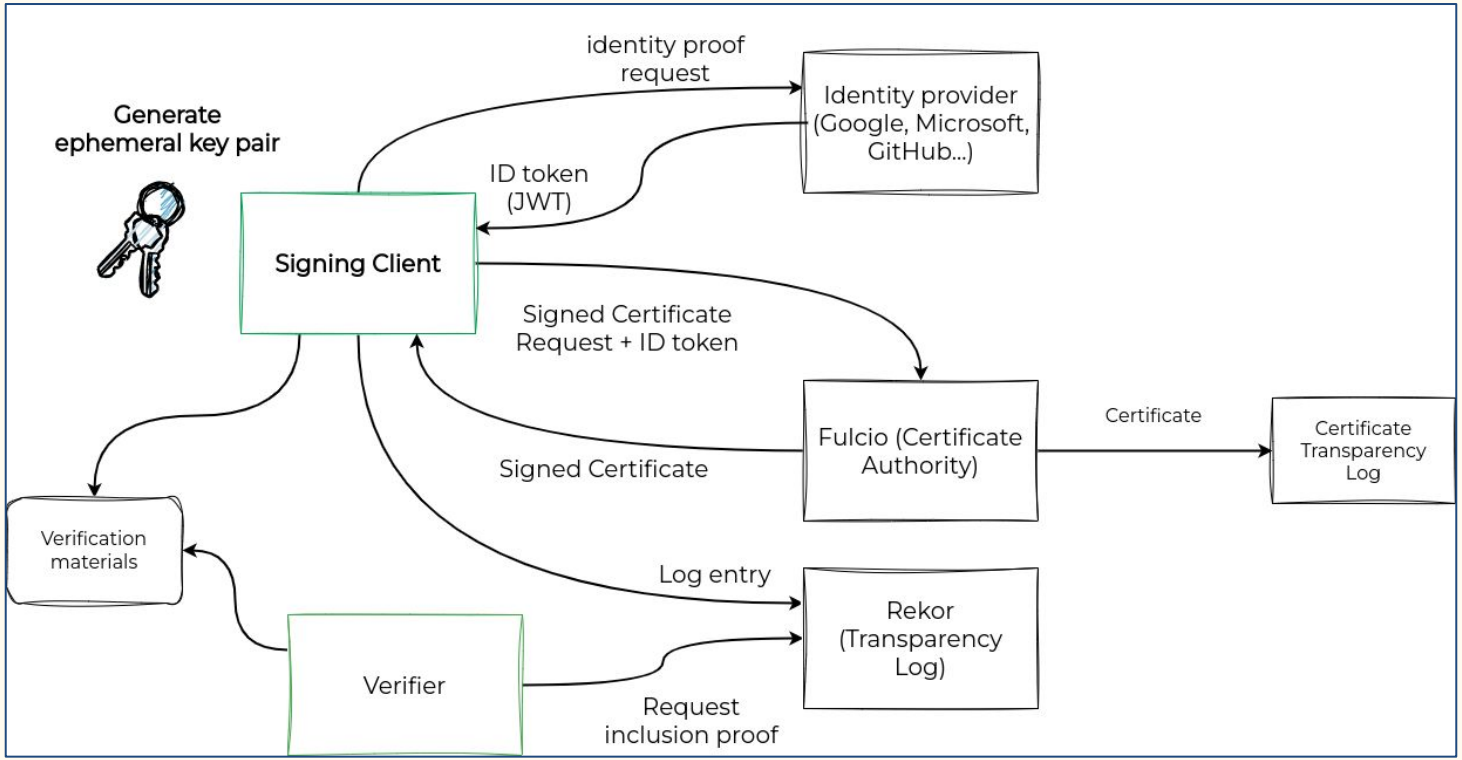

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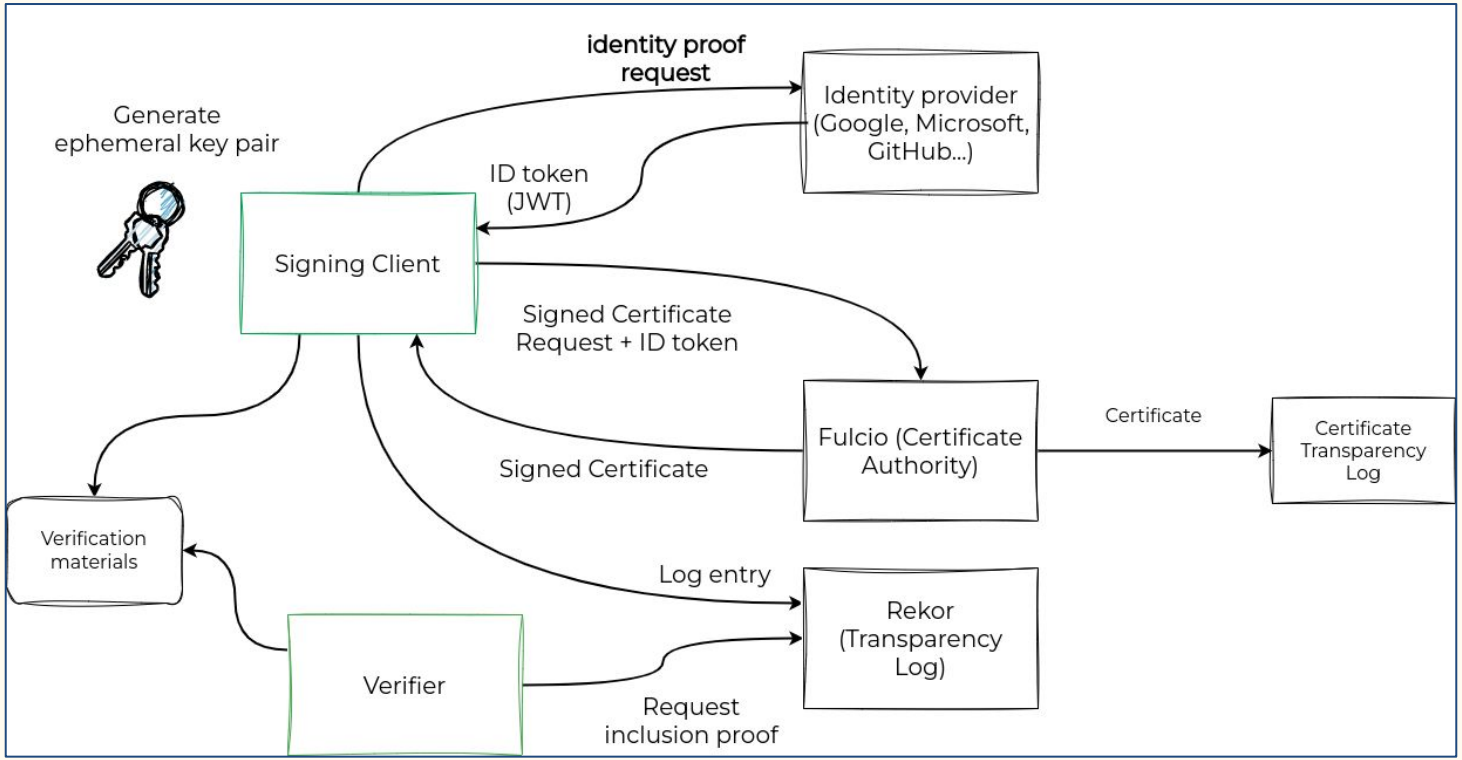

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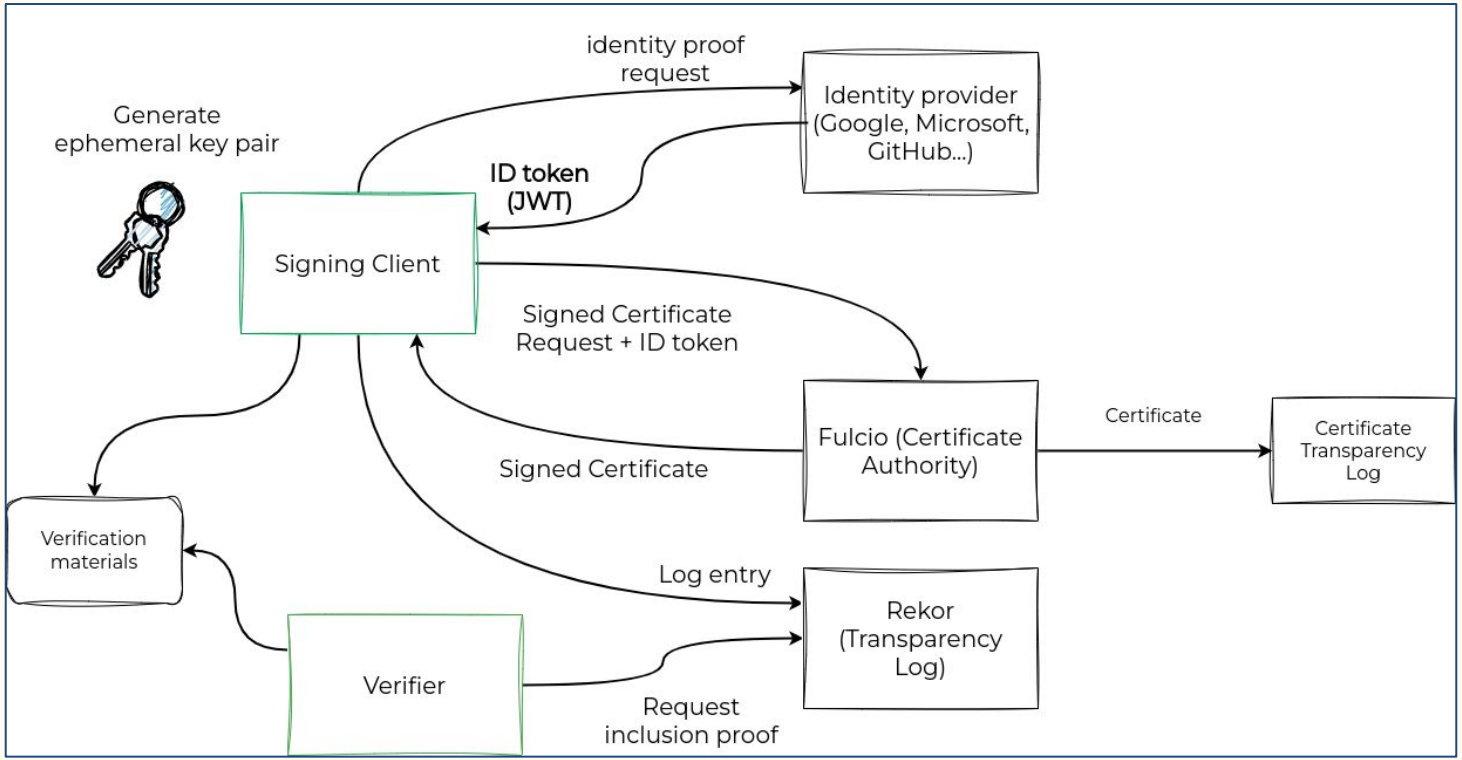

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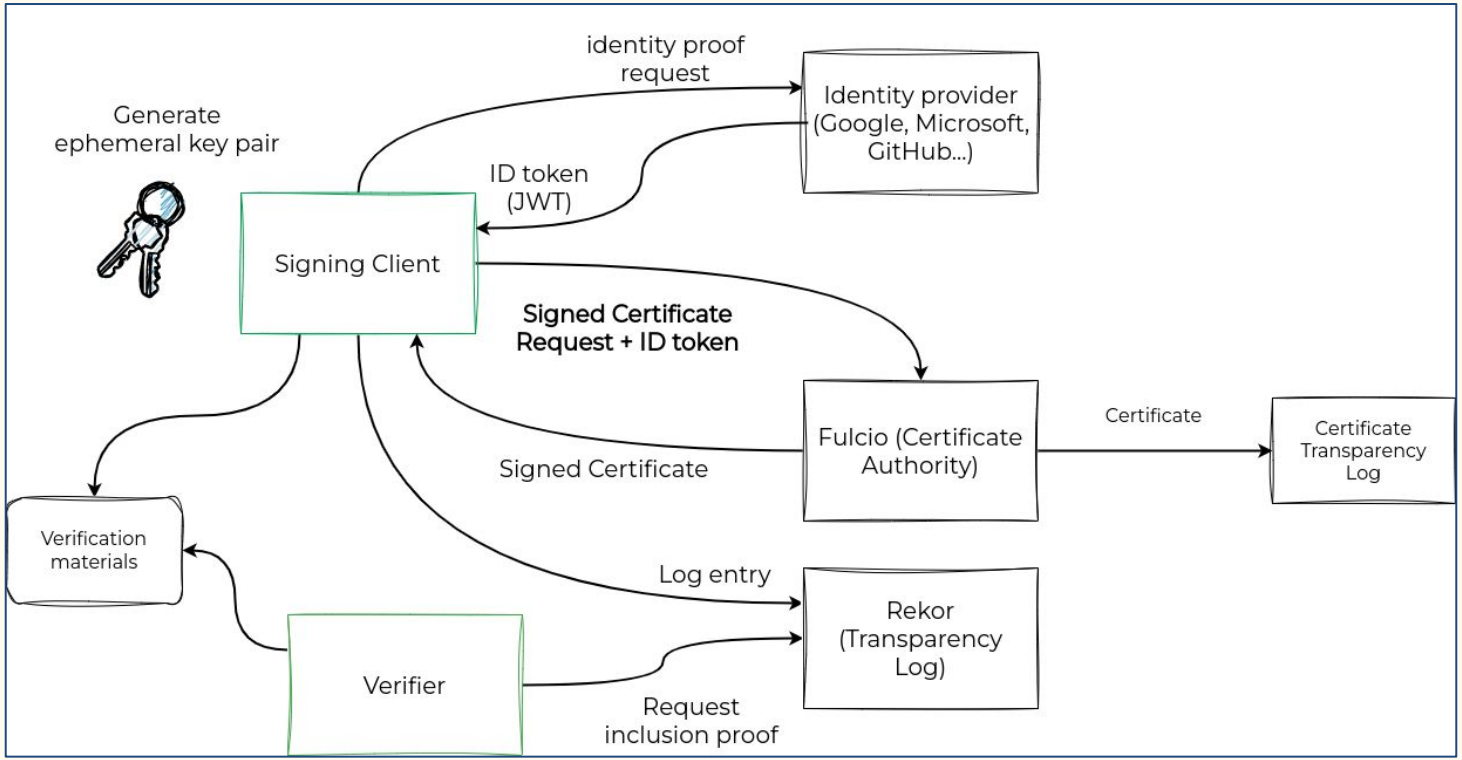

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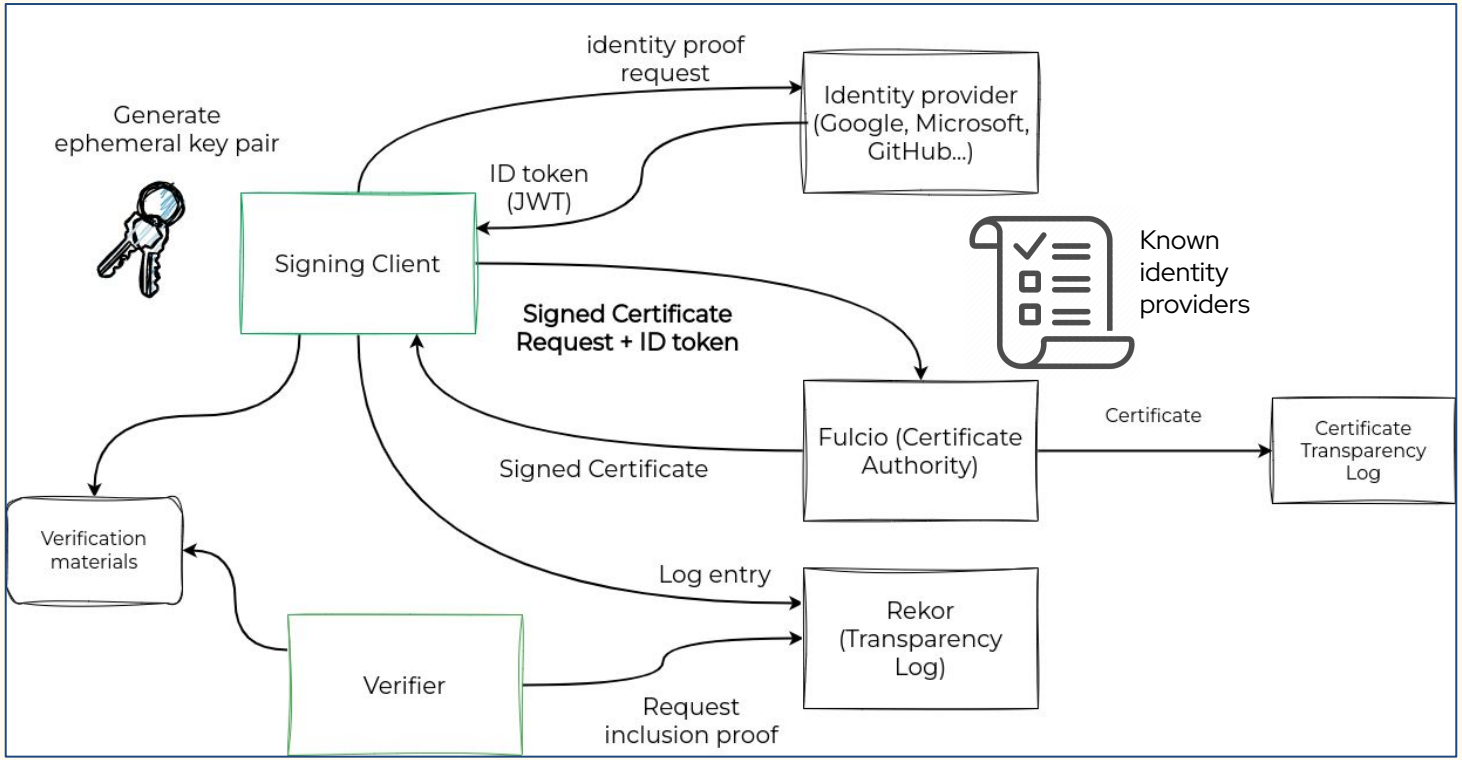

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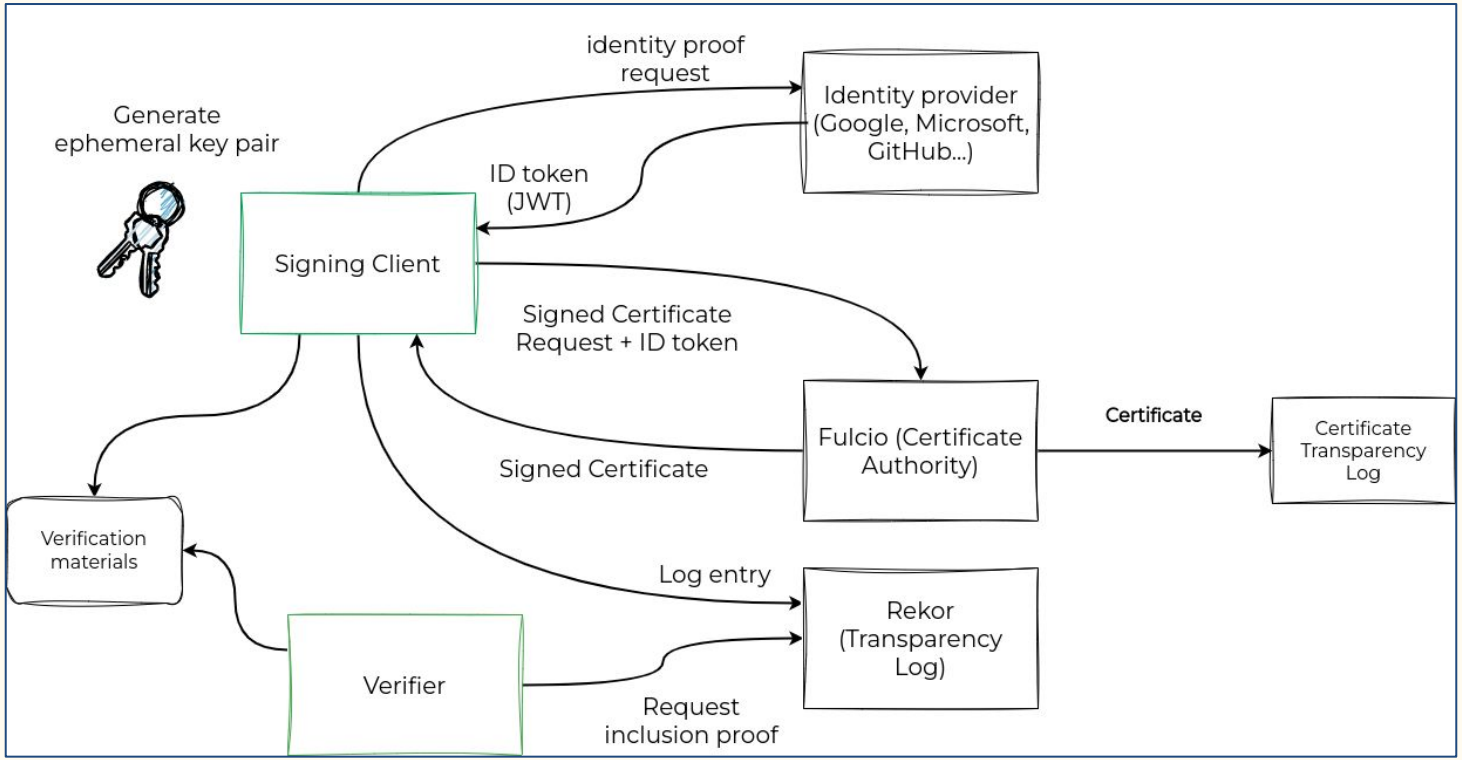

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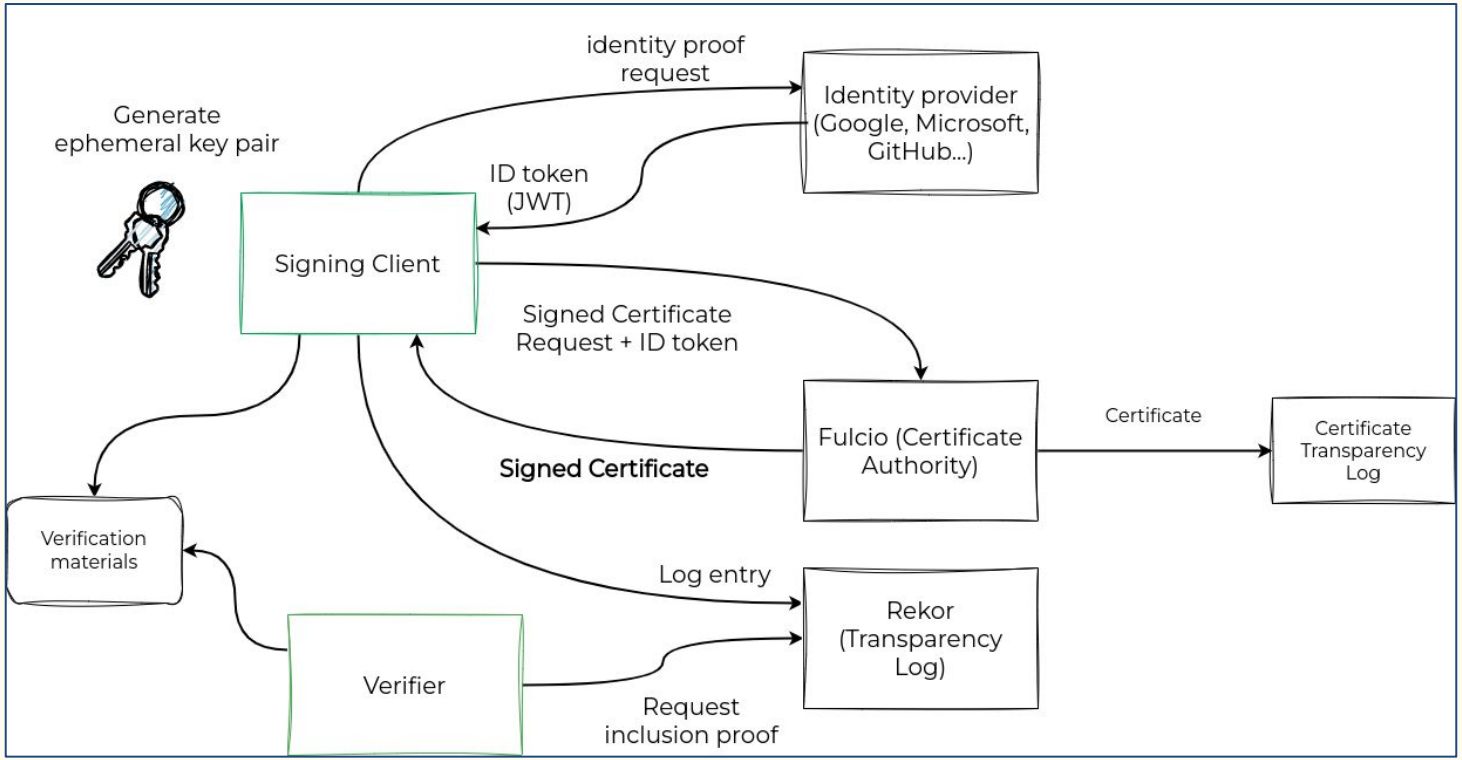

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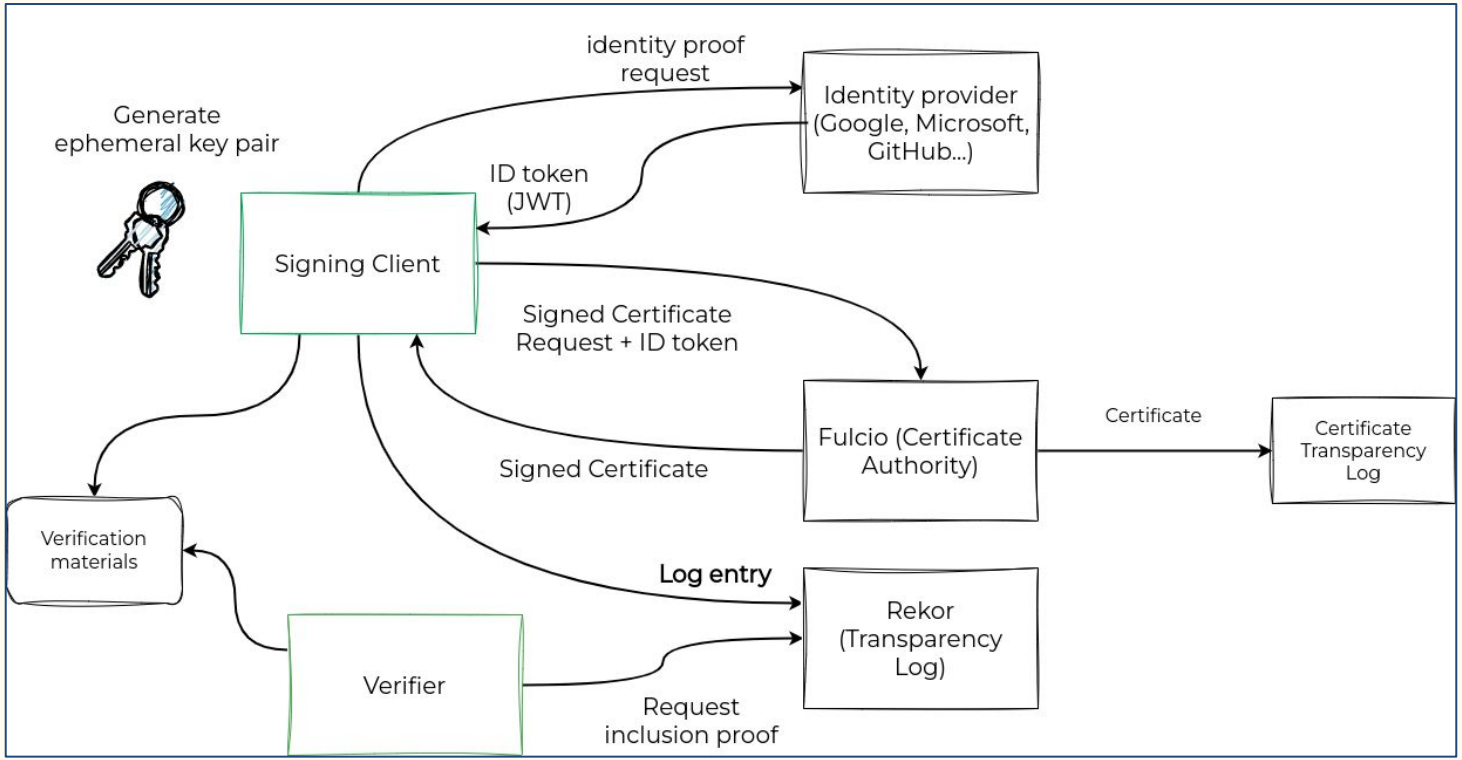

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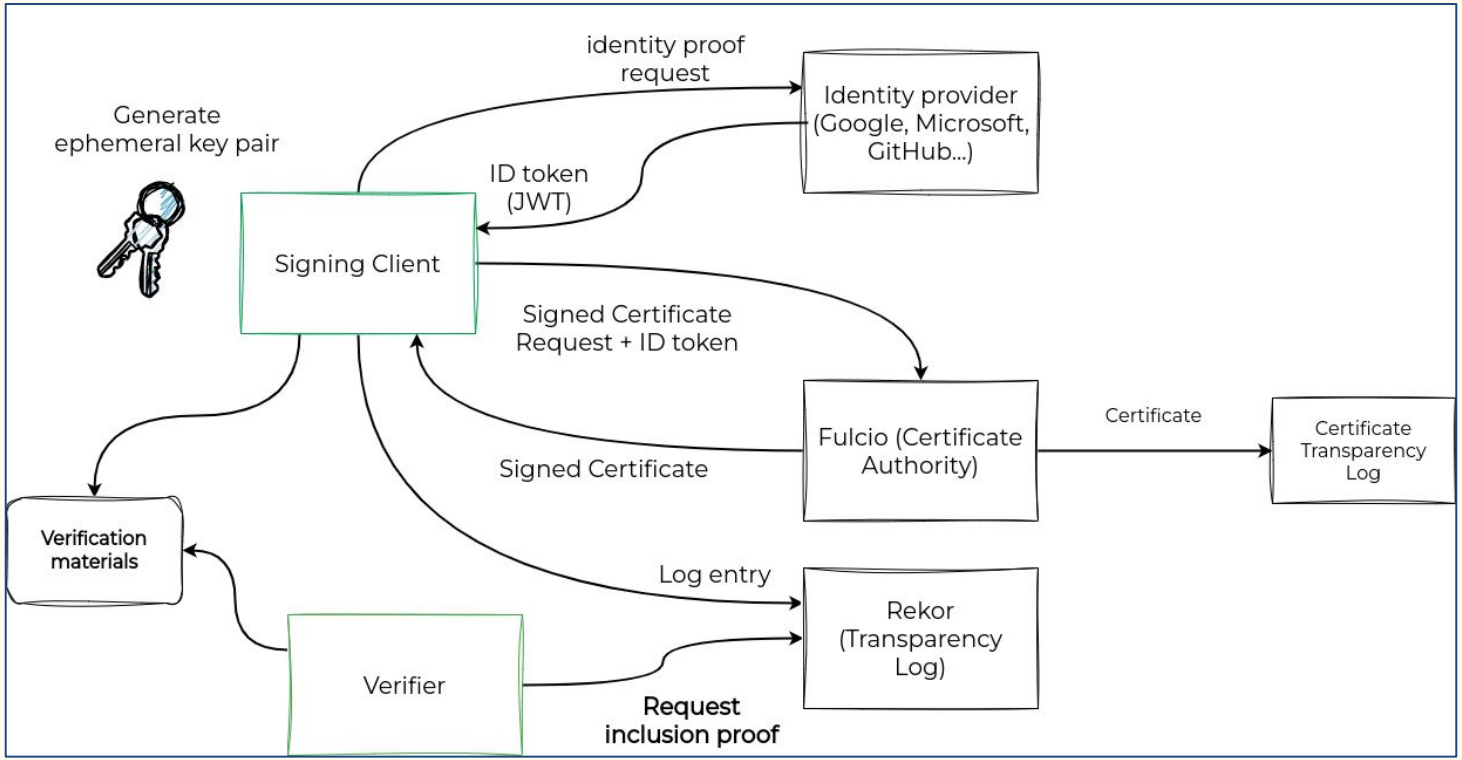
Verifying a Sigstore signature

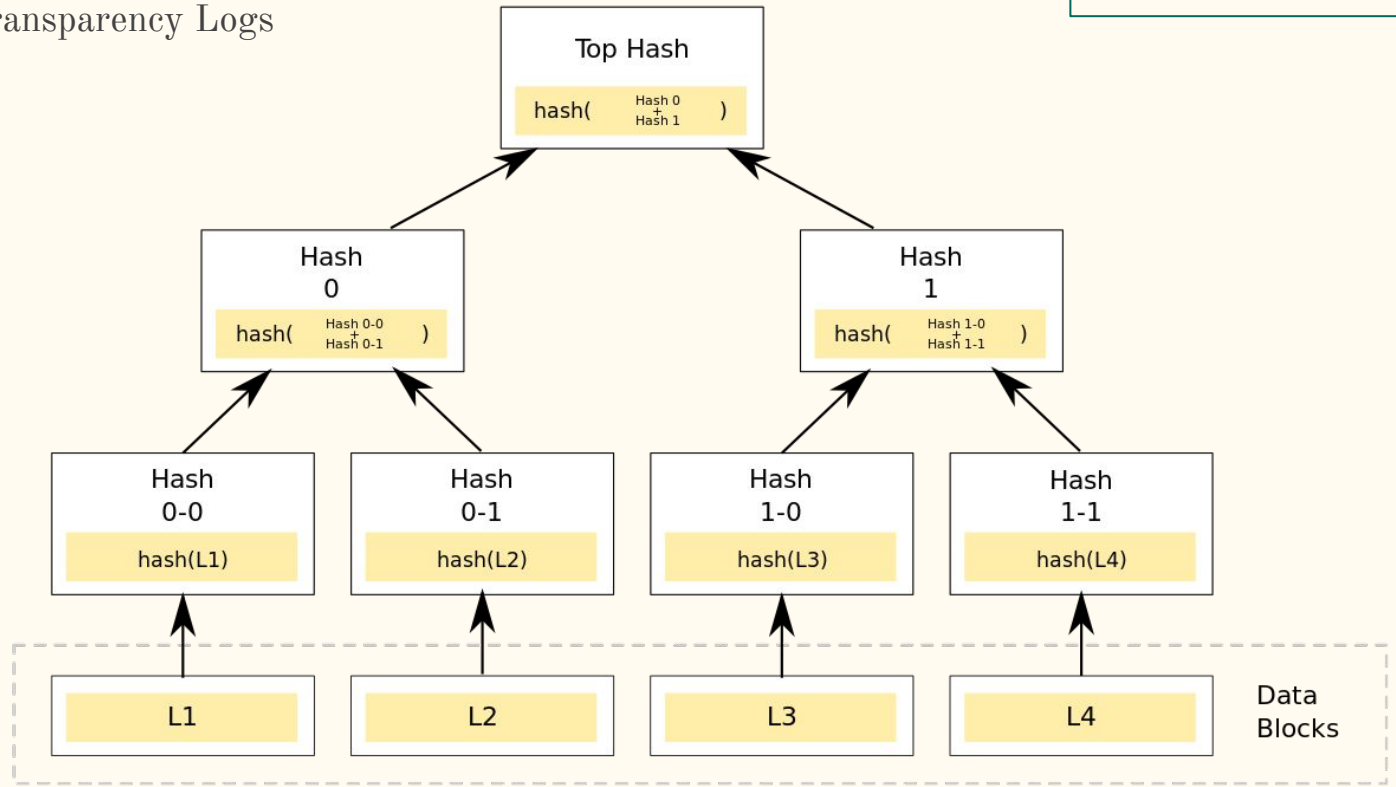


How does it work?

Behind Sigstore's Transparency Logs

- Immutable
- Read-only

Merkle Tree



Join the community and get involved

sigstore.dev/community

https://links.sigstore.dev/slack-invite

https://www.youtube.com/@projectsigstore

https://blog.sigstore.dev/

Thank you!

Q&A