Das Cashu Protokoll

Going Nuts

(soft) requirements

- part 1: grundlegendes verständnis von Bitcoin / Lightning
- part 2: JavaScript basics

über mich

- class of 21
- cashu contributor
- npub.cash
- cashu-ts co-lead / maintainer

get in touch

purple bird (nostr): egge@npub.cash

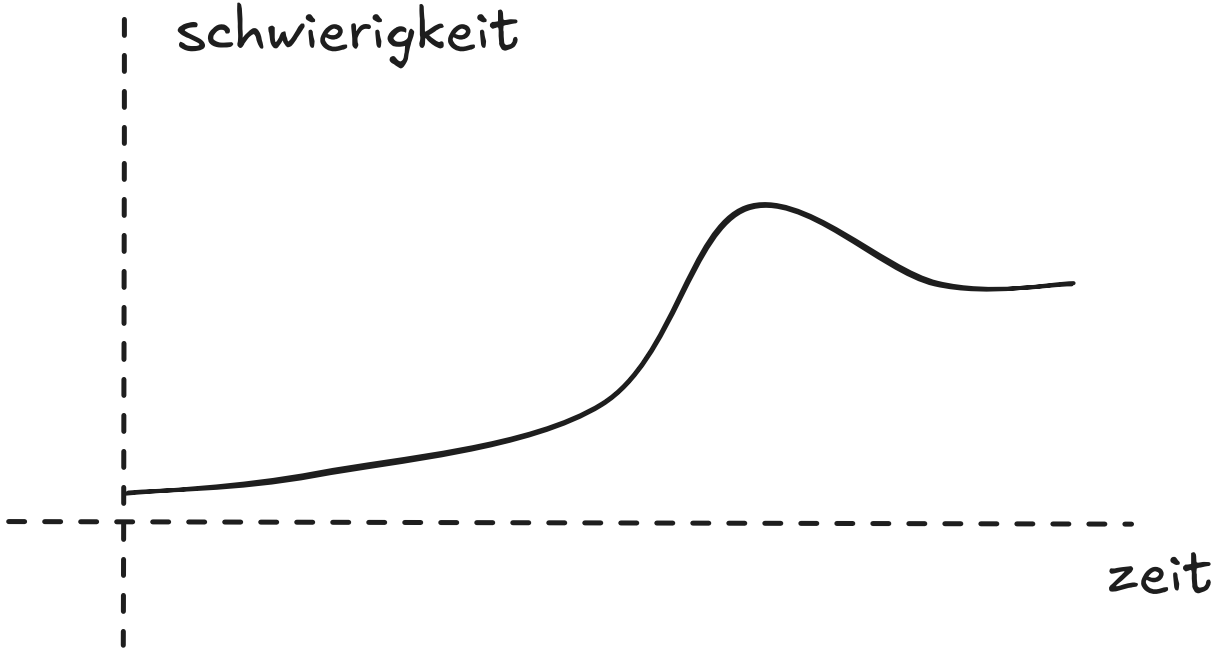
blue bird (twitter): Egge21M

über diesen workshop

ziele:

- lernen was ecash ist und wofür es nützlich ist
- verstehen wie das cashu protokoll funktioniert
- optional: gemeinsam implementierungen beginnen

über diesen workshop



agenda

1. intro
2. chaumian ecash
3. cashu und seine anwendungsfälle
4. blinde signaturen
5. die cashu API
4. Q&A 1
5. optional: live coding mit cashu-ts

chaumian ecash

David Chaum

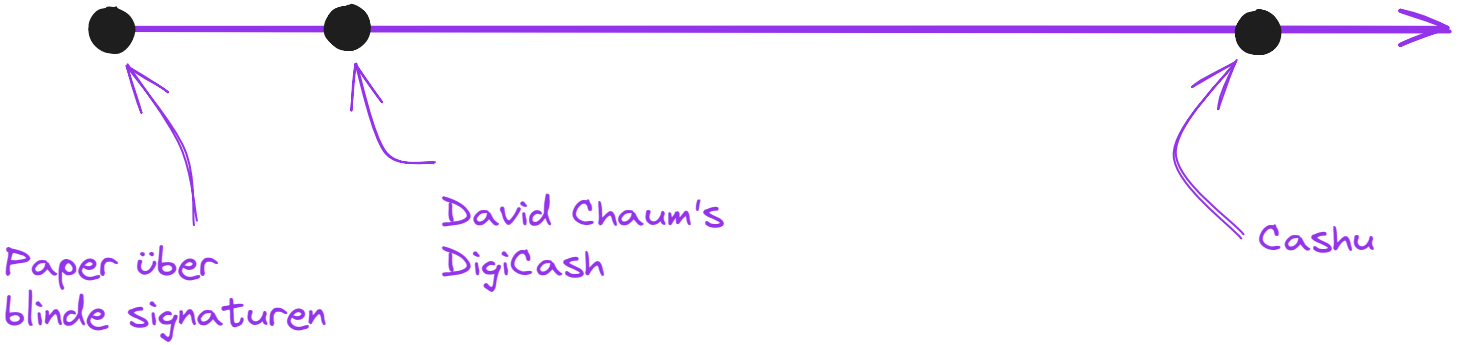
cypherpunk und
crypto-urgestein

chaumian ecash

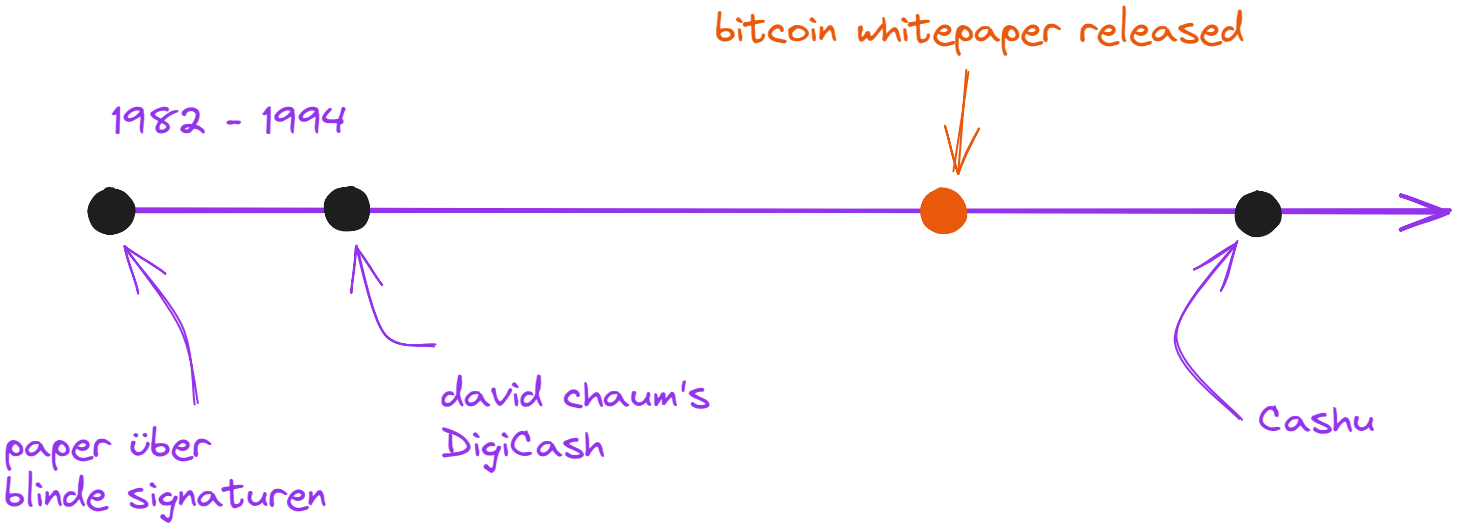
an anonymous cryptographic electronic money or electronic cash system

- digitales bargeld
- durch digitale signaturen gesichert
- offline verwahrbar
- erlaubt anonyme zahlungen im Internet ohne accounts

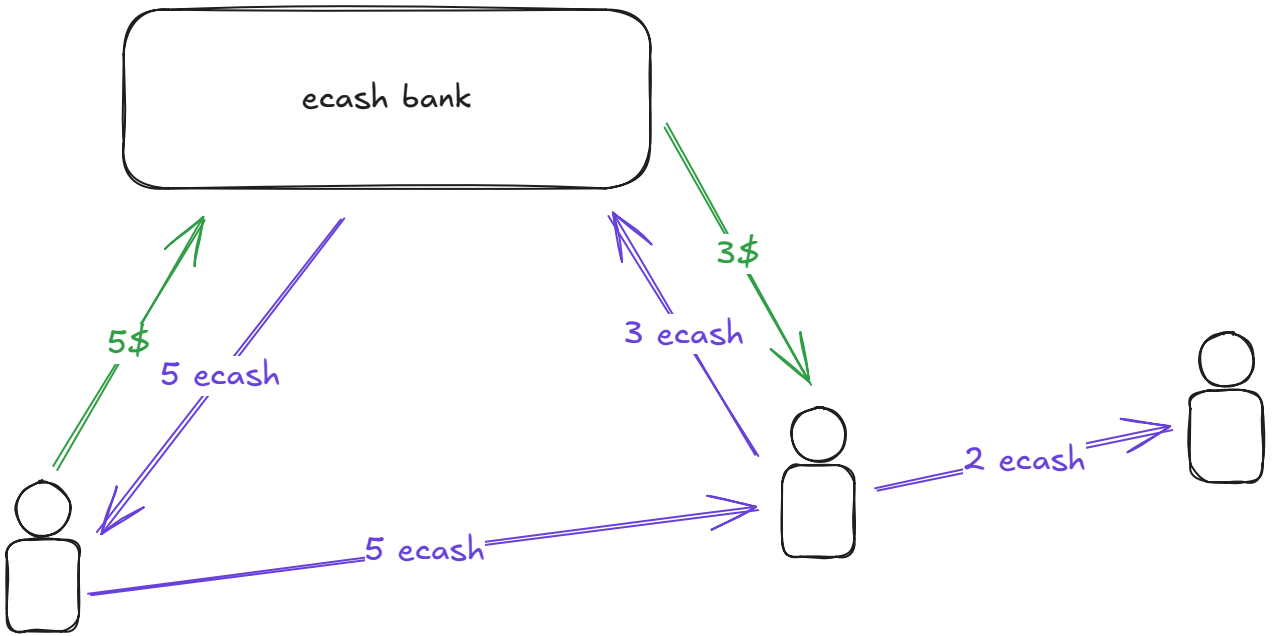
ecash zeitstrahl



ecash zeitstrahl



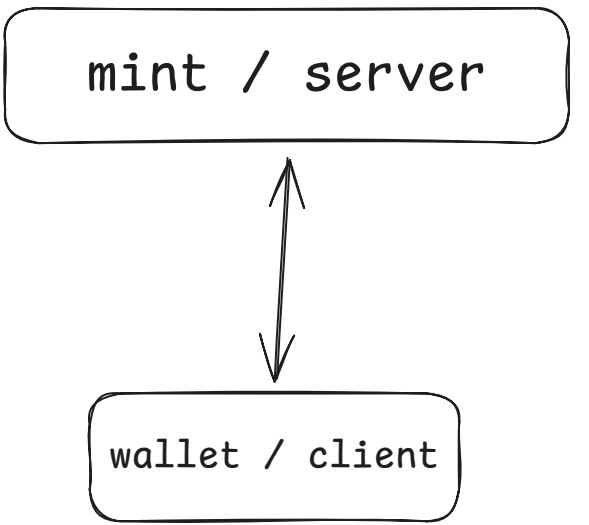
chaumian ecash



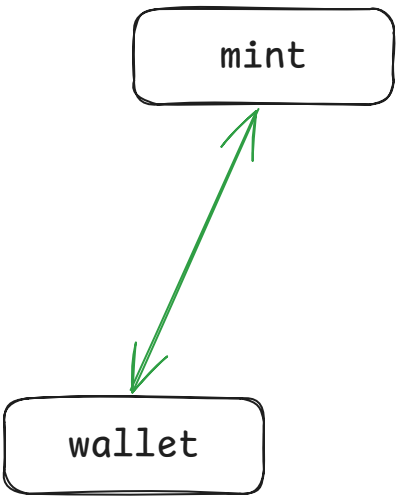
cashu in a nutshell

cashu in a nutshell

ist ein crypto und kommunikations
protokoll zwischen servern und clients



cashu in a nutshell

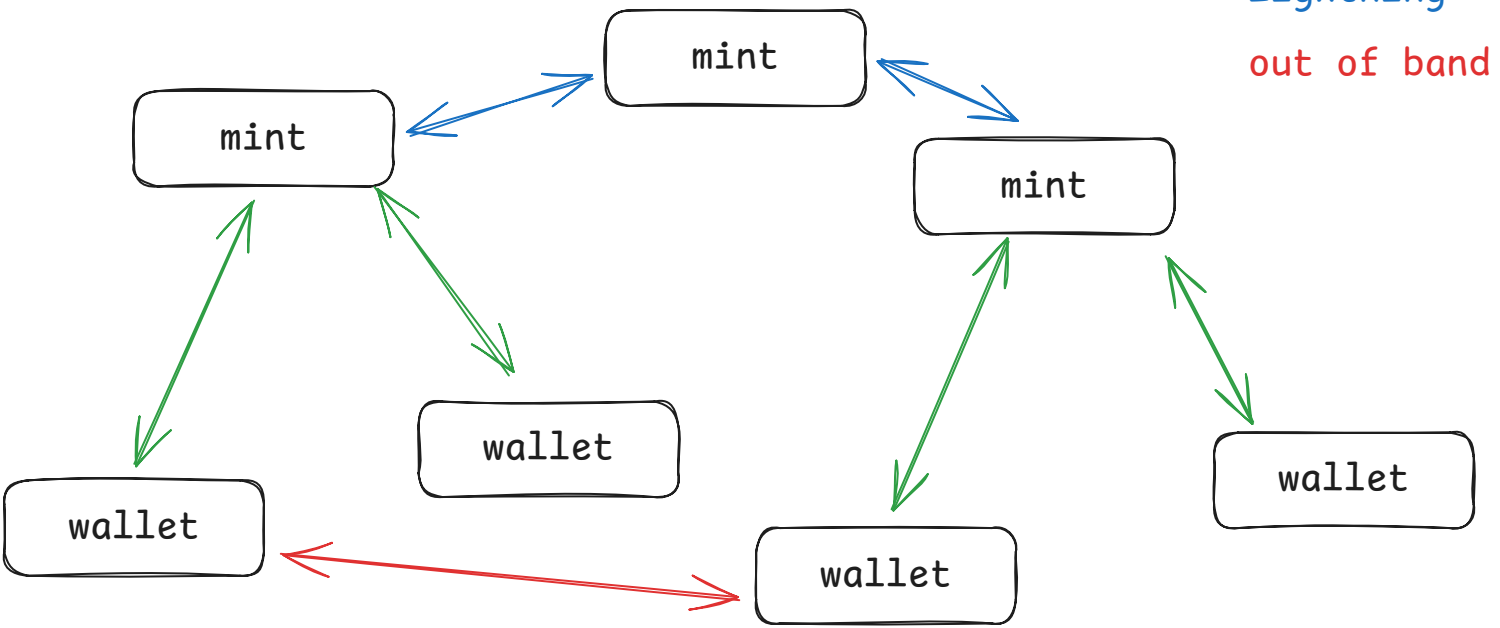


cashu in a nutshell

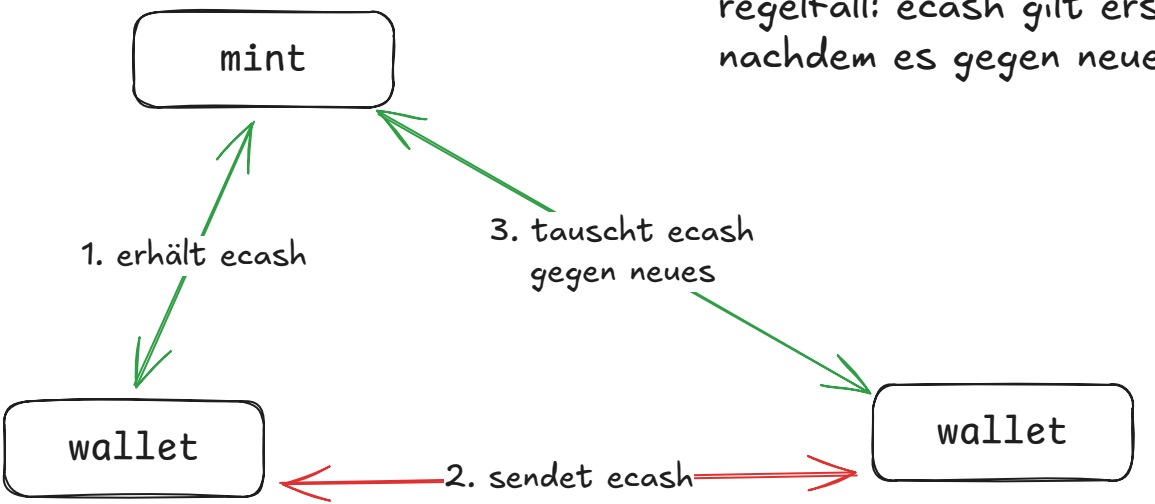
Cashu

Lightning

out of band



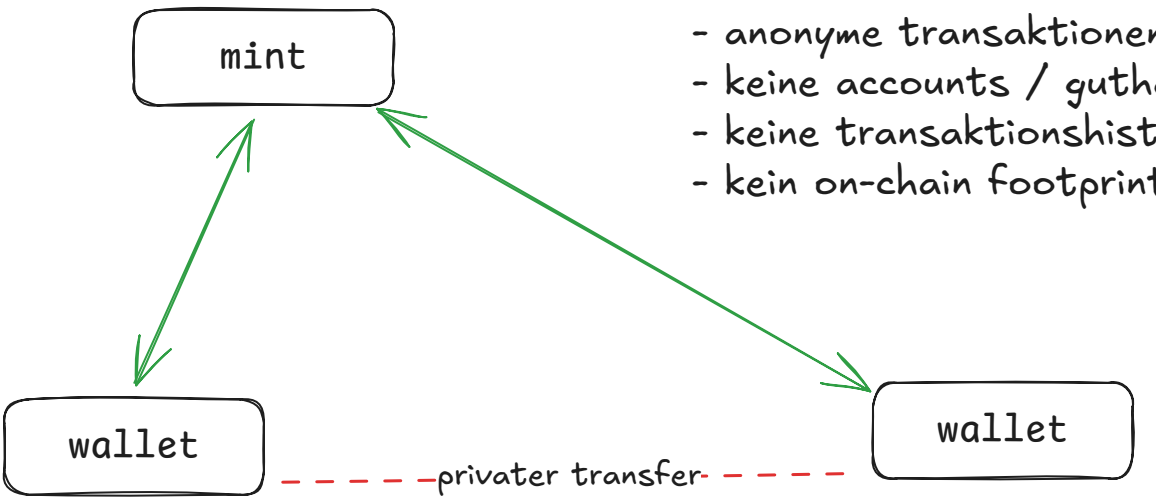
cashu in a nutshell: doublespending



regelfall: ecash gilt erst als "erhalten"
nachdem es gegen neues getauscht wurde

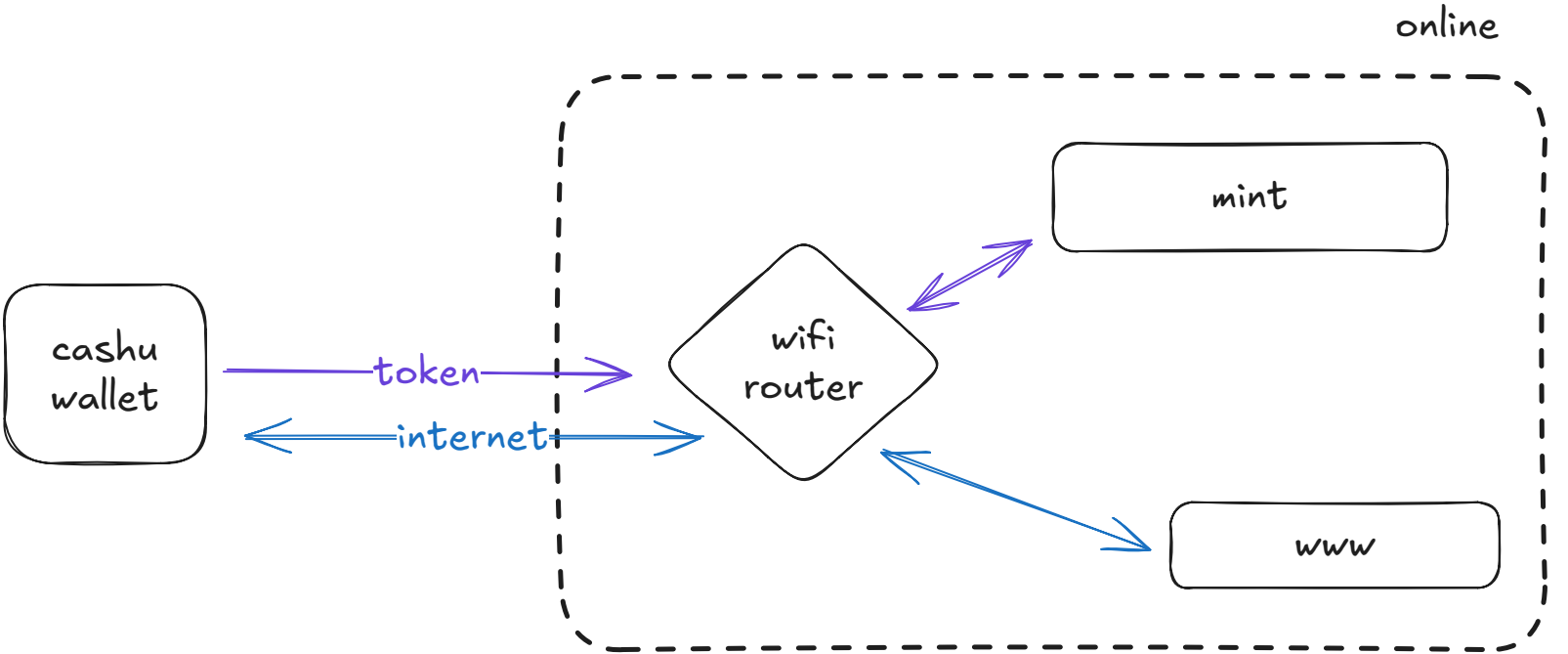
warum cashu?

warum cashu? anonymität!

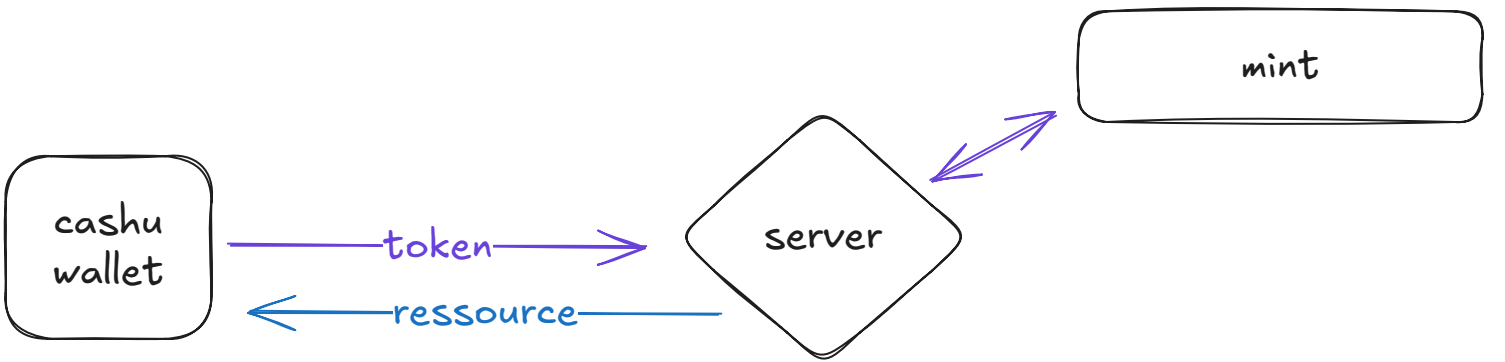


- anonyme transaktionen zwischen nutzern
- keine accounts / guthaben
- keine transaktionshistorie
- kein on-chain footprint

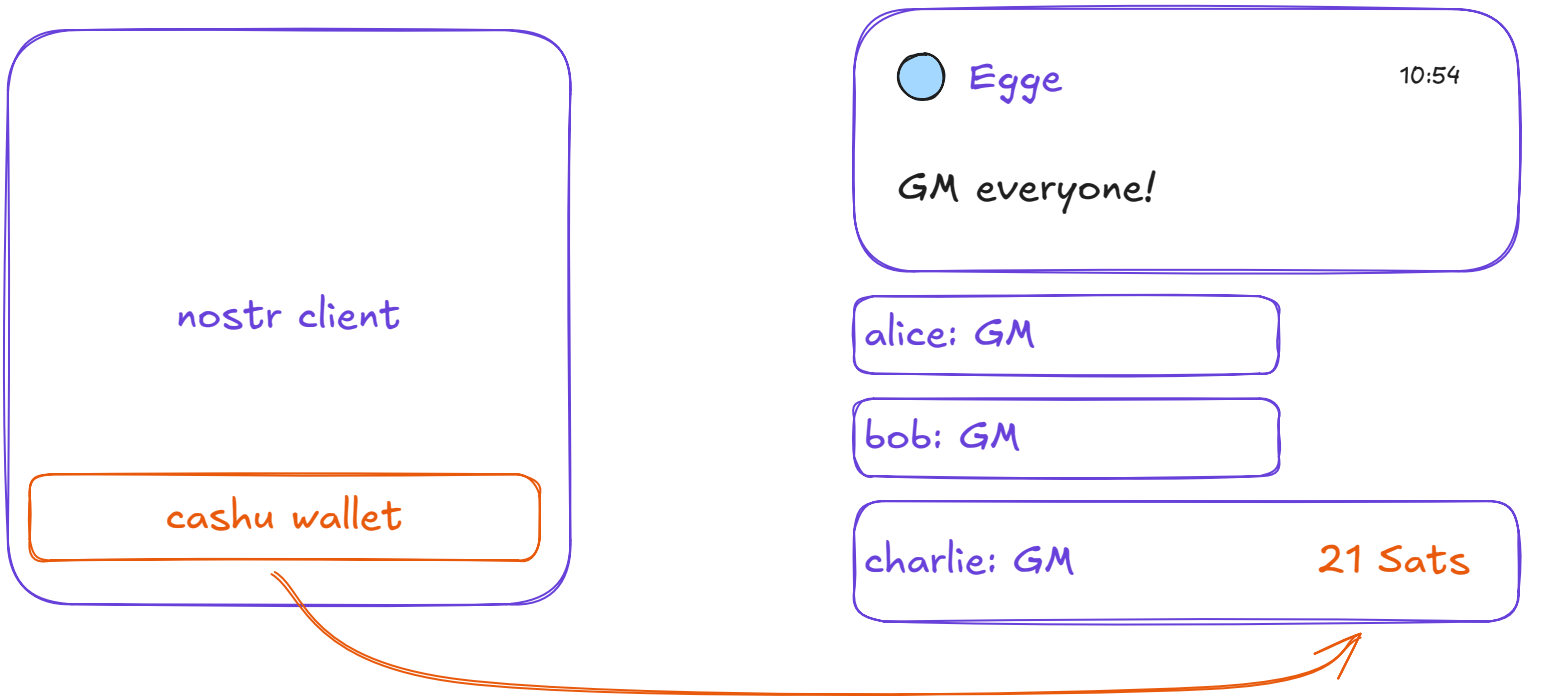
warum cashu? neue usecases! tollgate



warum cashu? neue usecases! Cashu 402



warum cashu? neue usecases! nutzaps



blinde signaturen

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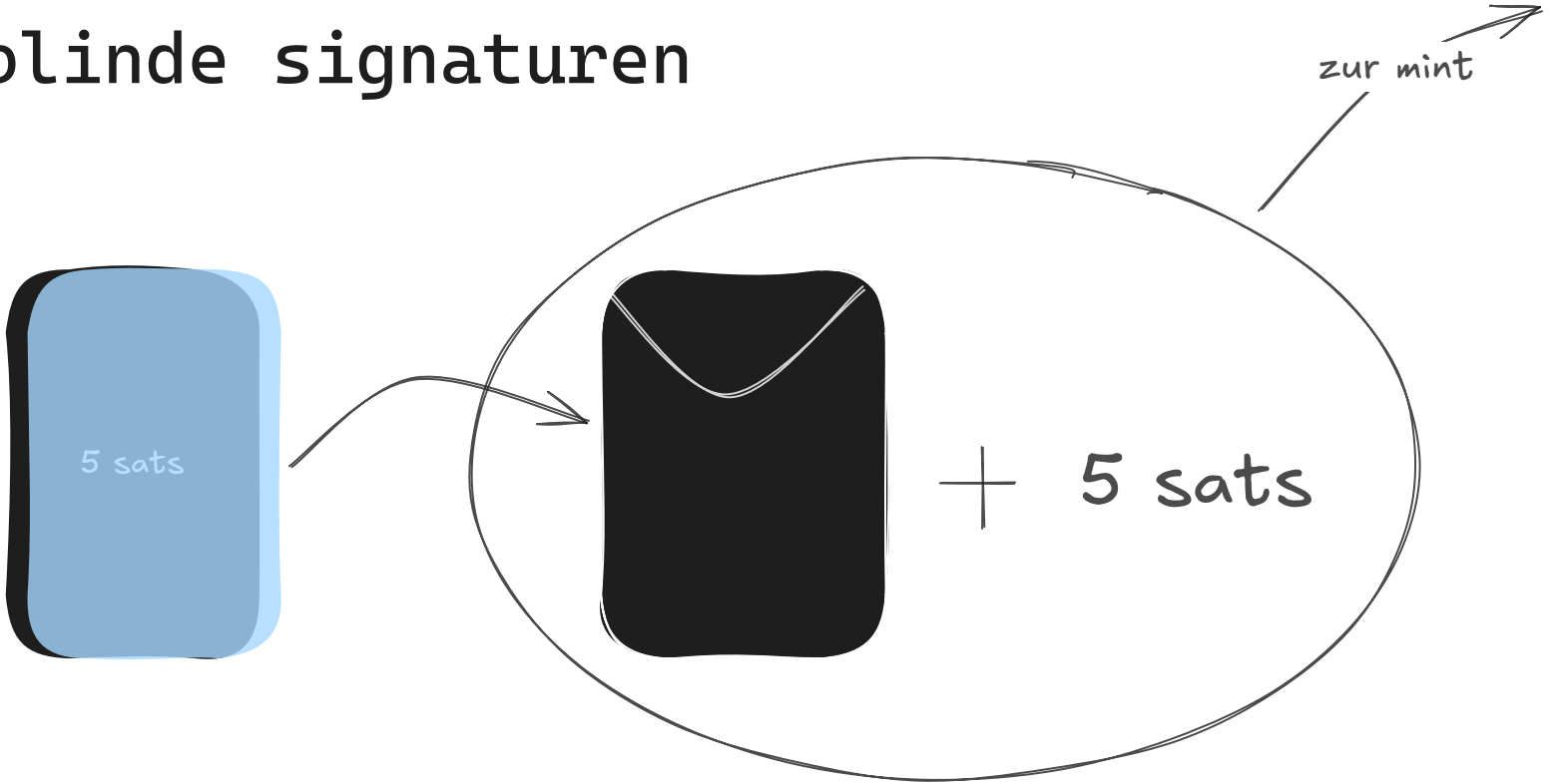
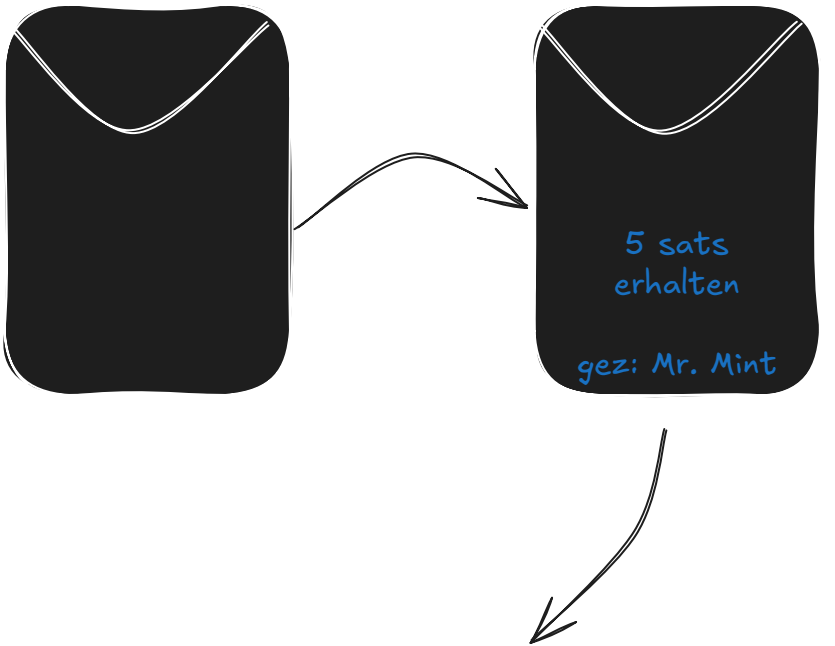
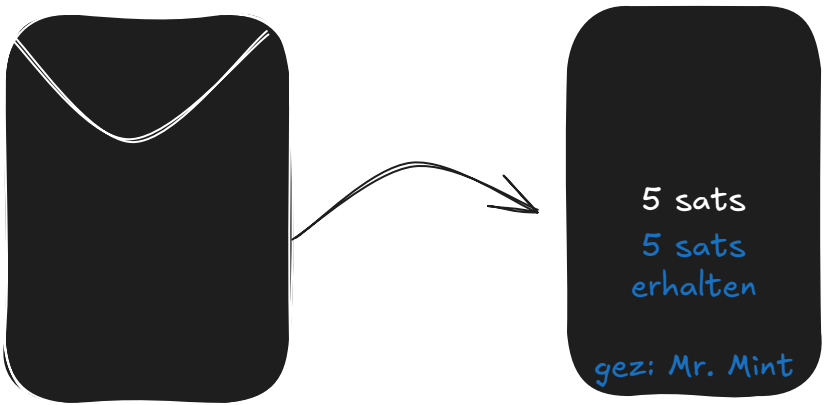


blinde signaturen



blinde signaturen



blinde signaturen

bob wählt schlüssel k und veröffentlicht kG = K

alice wählt geheimnis x und berechnet Y = hash_to_curve(x)

alice wählt Blinding Factor r, berechnet B_ = Y + rG (blind message) ⟶ bob

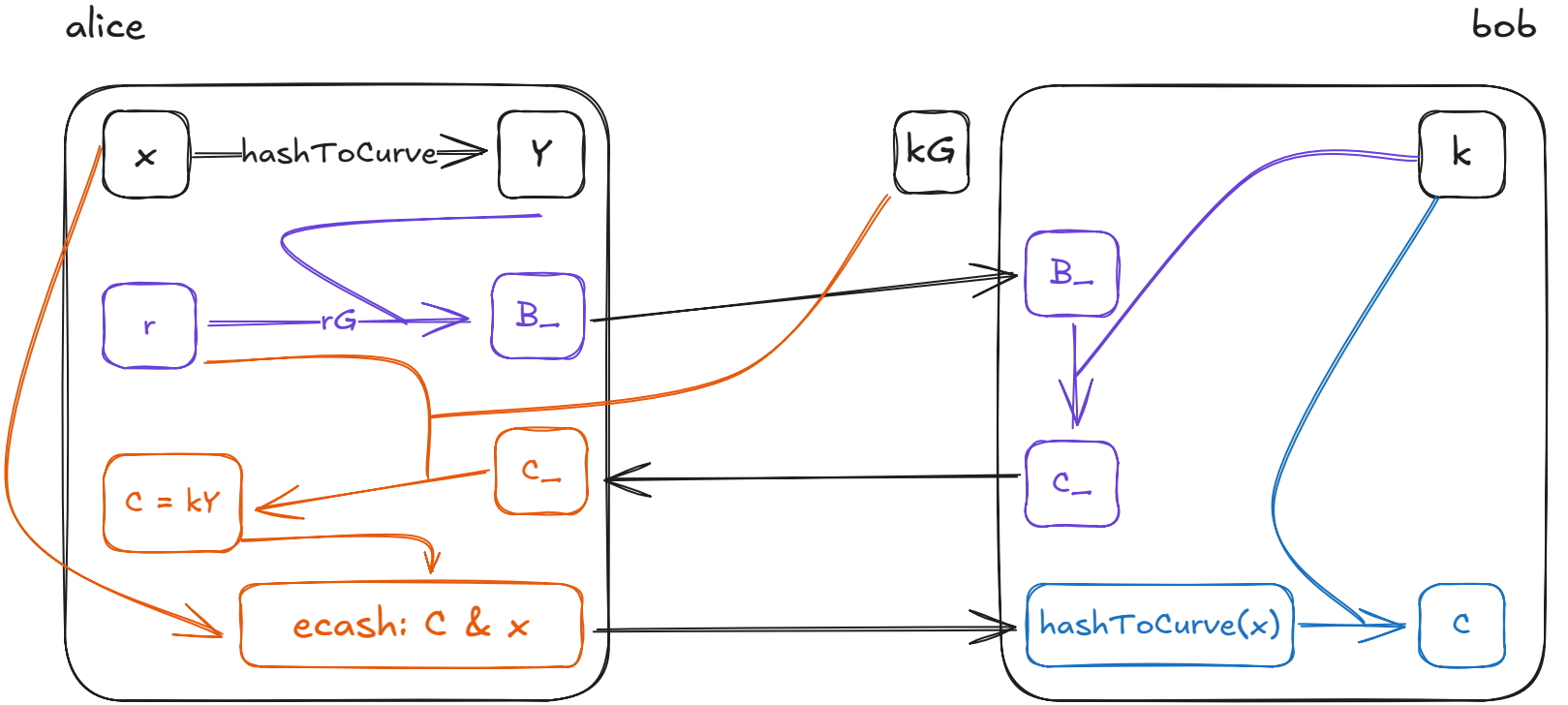
bob erstellt blind signatur C_ = kB_ = kY + krG ⟶ alice

alice berechnet die unblided signature C = C_ - rK = kY + krG - krG = kY

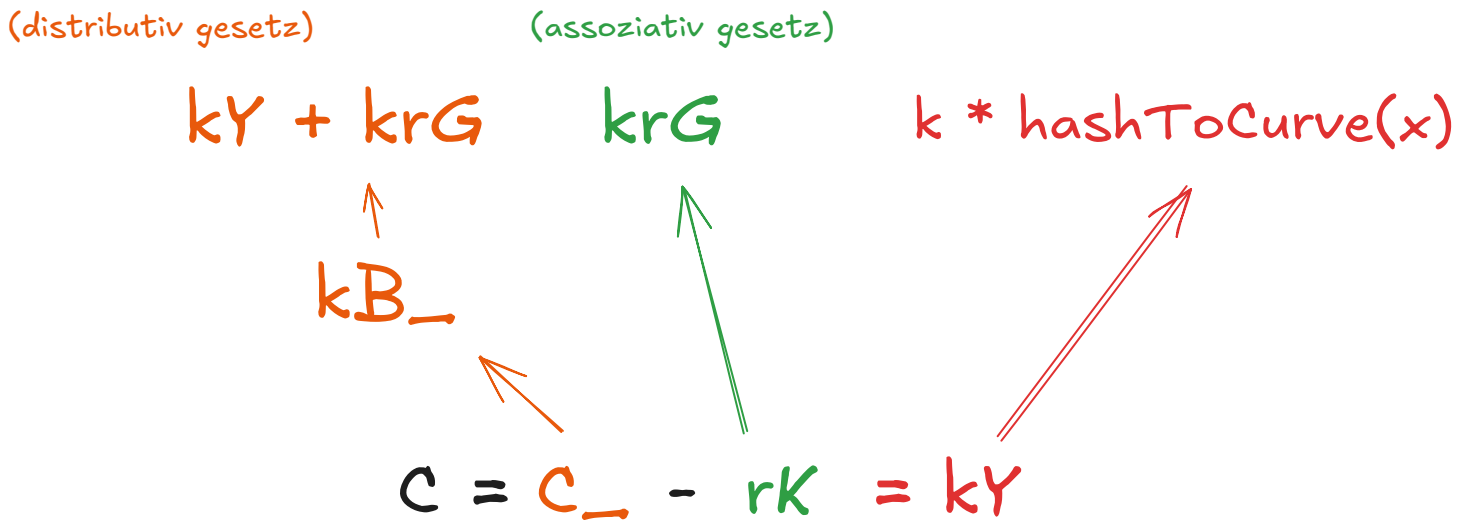
⟶ ecash = C & x

bob kann ecash verifizieren: k*hash_to_curve(x) == C

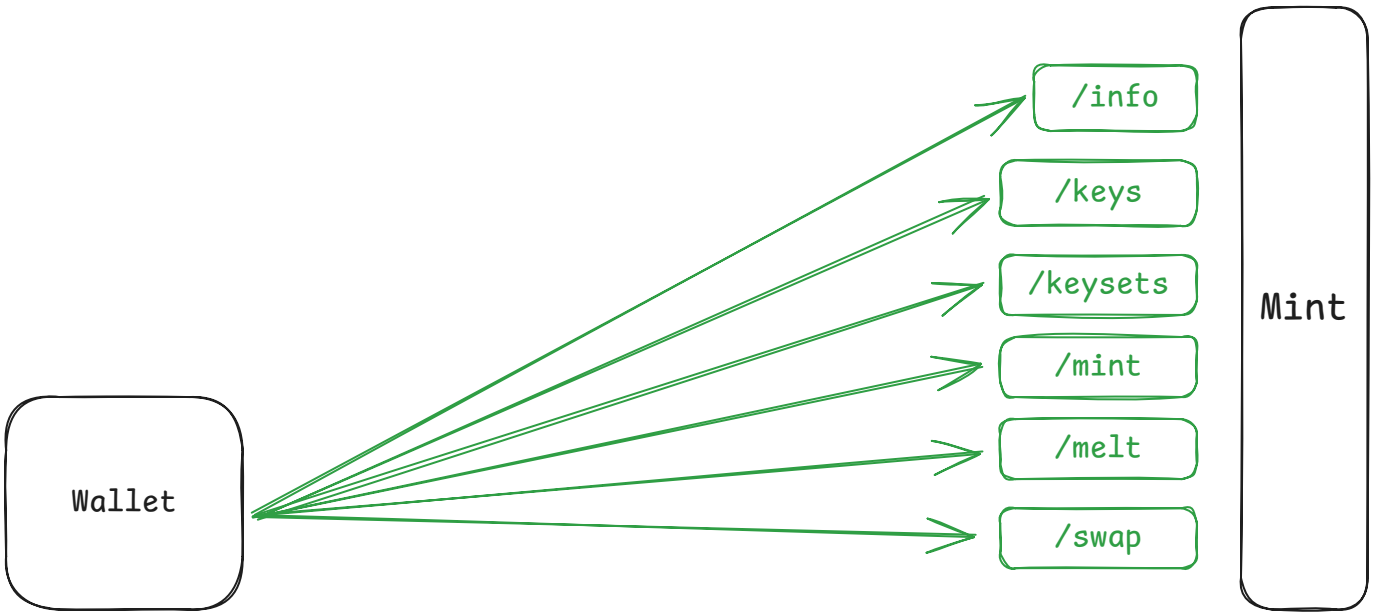
blinde signaturen



blinde signaturen



cashu in a nutshell



cashu in a nutshell: /info


```
{
"name": "Bob's Cashu mint",
"pubkey":
"0283bf290884eed3a7ca2663fc0260de2e20
64d6b355ea13f98dec004b7a7ead99",
"version": "Nutshell/0.15.0",
"description": "The short mint description",
"contact": [...],
"icon_url": "https://mint.host/icon.jpg",
"time": 1725304480,
"nuts":...
}
```

```
"nuts": {
"4": {
"methods": [
{
"method": "bolt11",
...
}
],
"disabled": false
},
"5": {
"methods": [...],
"disabled": true
},
"7": {
"supported": true
}
}
```

cashu in a nutshell: /keys


```
{
"keysets": [
{
"id": "009a1f293253e41e",
"unit": "sat",
"keys": {
"1": "02194603ffa36356f4a56b7df9371fc31924723514 53ec7398b8da8117e7c3e104",
"2": "03b0f36d6d47ce14df8a7be9137712c42bcdd960b19dd02f1d4a9703b1f31d7513",
"4": "0366be6e026e42852498efb82014ca91e89da2e7a5bd3761bdad699fa2aec9fe09",
"8": "0253de5237f189606f29d8a690ea719f74d65f617bb1cb6fbea34f2bc4f930016d",
...
}
}
]
}
```

cashu in a nutshell: /keysets


```
{
"keysets": [
{
"id": "009a1f293253e41e",
"unit": "sat",
"active": True,
"input_fee_ppk": 100
},
{
"id": "0042ade98b2a370a",
"unit": "sat",
"active": False,
"input_fee_ppk": 100
}
]
}
```

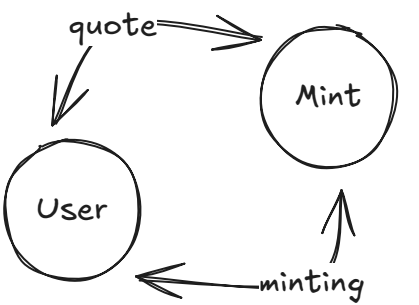
cashu in a nutshell: /mint

endpunkt zum erstellen von ecash

1. mint quote mit POST /mint/<method> erstellen
-> mint gibt MintQuoteResponse zurück

2. mint quote bezahlen und passendes ecash erstellen

3. ecash mit POST /mint/<method> signieren lassen
-> mint gibt MintResponse zurück



cashu in a nutshell: /melt

endpunkt zum einlösen von ecash

1. melt quote mit POST /melt/quote/<method> erstellen
-> wallet sendet zu zahlende invoice
-> mint gibt PostMeltQuoteBolt11Response zurück (enthält gebühr)

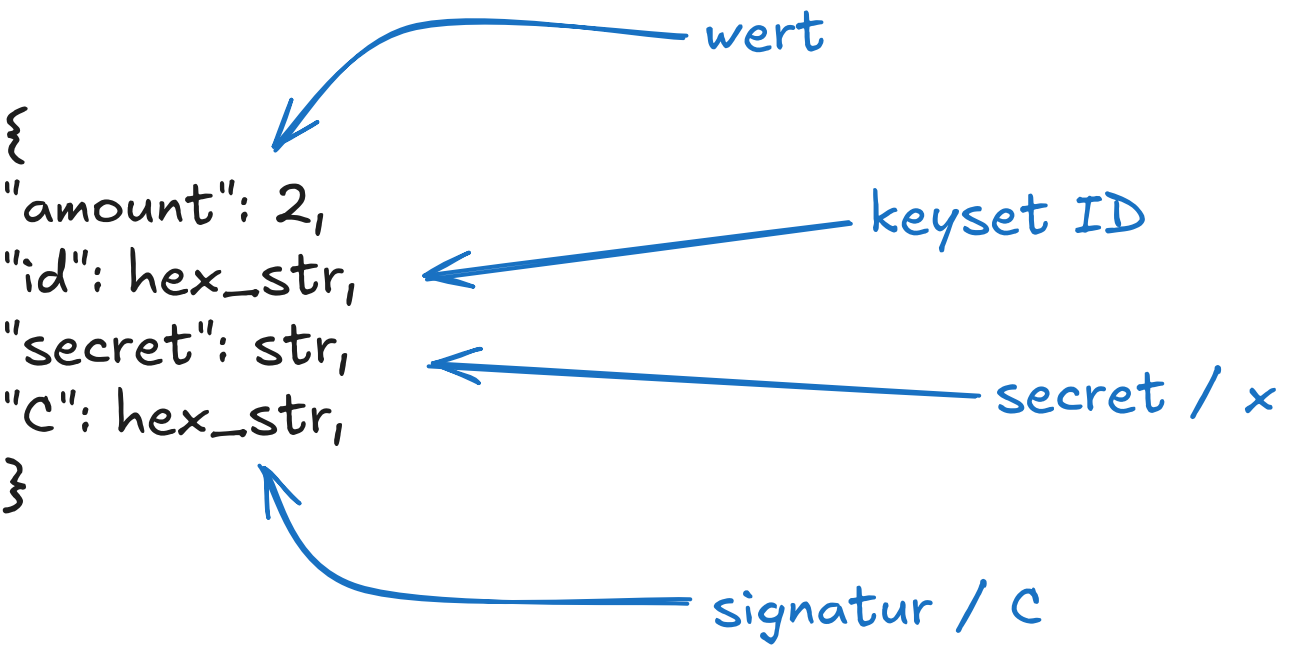
3. ecash in entsprechender höhe mit POST /melt/<method> an mint senden
-> mint gibt PostMeltQuoteBolt11Response zurück

cashu in a nutshell: /swap

endpunkt zum tauschen von ecash

1. zu tauschende proofs wählen und mit neuen blind messages an /v1/swap senden
-> mint gibt PostSwapResponse zurück, welche neue signaturen enthält.
-> das "alte" ecash ist jetzt verbraucht / ungültig.

cashu in a nutshell: proof



cashu in a nutshell: token