



**Rootstock**

**Bitcoin**

**Developer**

**Workshop**

April 2024



**Who**

**am I?**



**RAUL LAPRIDA**

**DIRECTOR OF ARCHITECTURE ROOTSTOCKLABS**



# What We'll cover



Rootstock Tech Overview



Porting Web3 DApps to Rootstock



Useful dev resources



# Rootstock

# Tech Overview

(A Tech Crash Course)



[rsk.co/slack](https://rsk.co/slack)

# Rootstock: Bitcoin's first & longest standing sidechain

1.0 Secured by **Bitcoin** proof of work (**PoW**) through merge-mining.

2.0 **EVM** compatible, allowing **direct** deployment of Ethereum smart **contracts**.

3.0 Enabling **DeFi** on Bitcoin, by hosting a **variety** of dApps, protocols and other services.



# RSKj:

# The Blockchain Node

## Reference implementation

Open source: [github.com/rksmart/rskj](https://github.com/rksmart/rskj)

Licence: LGPLv3

See [RSK White Paper](#)

## Rootstock Improvement Proposals

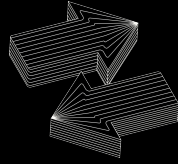
Open source: [github.com/rksmart/RSKIPs](https://github.com/rksmart/RSKIPs)

Licence: CCO

See [Rootstock Research Forum](#),  
<https://ips.rsk.co/>



# Rootstock



# Bitcoin

## Merge mining with Bitcoin

Bitcoin mining pools include Rootstock tags in Bitcoin blocks

See: [Rootstock Overview](#), [Merged Mining Architecture](#), [Armadillo](#)

## Bitcoin as A network

## Powpeg with Bitcoin

Bidirectional conversions BTC ↔ RBTC

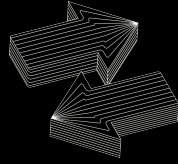
See: [Rootstock Overview](#), [PowPeg Architecture](#), [RBTC](#)

## Bitcoin as a cryptocurrency





# Rootstock



# Ethereum

## RVM & EVM

VM OPCODEs compatible  
Enables smart-contract ports to RSK  
Solc and all the Solidity toolchain/ libs/  
frameworks work!  
See: [RVM Architecture](#)

**Web3  
Developer  
compatibility**

## JSON-RPC

Enables wallets, DApp clients, etc. to be ported  
Only requires config changes  
See: [JSON-RPC Reference](#)

**Web3  
User  
compatibility**





**Rootstock**

**Infrastructure**

**Framework**

**.RIF**

**Suite of App & Services**

Name service, DID, Scheduler, Multisig,  
Relay, Storage, and more.

Open source!

See: [Rootstock Infrastructure Framework](#)

**Suite of App & Services**

See: [RIF token](#)



# Everyday

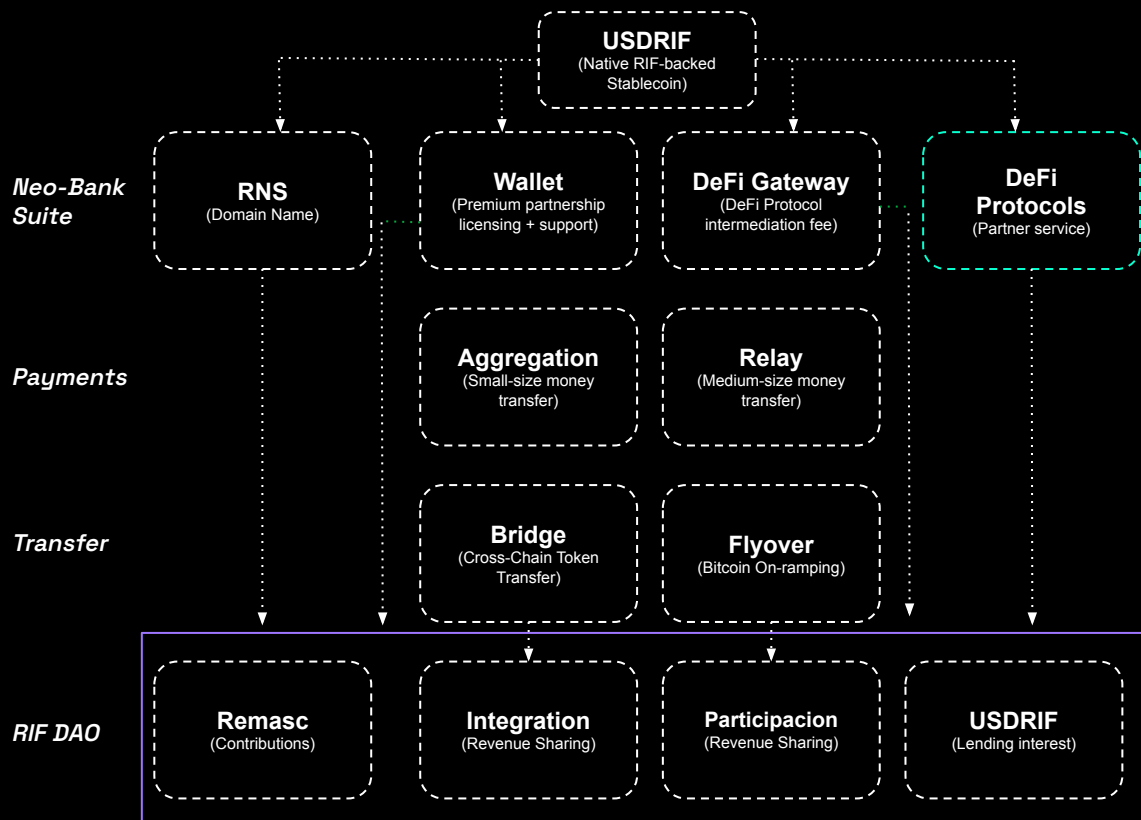
# DeFi Vision

**SAVE** with safe, low-risk stablecoins.

**BORROW** with uncollateralized community-supported loans.

**SEND** remittances anywhere with local currency cash on/off ramps.

**PAY** utility bills and receive salary with crypto.



# Numbers

**Hash rate: 50%  
of Bitcoin**

(±10%) most secure smart  
contract platform

**Latency:  
~30s/block**

comparison: Bitcoin 600s,  
Ethereum 12s

**Throughput  
: ~10tx/s**

comparison: Bitcoin 4.5,  
Ethereum 10-12

**Gas: 2% - 2.9%  
of Ethereum's**

note: During Ethereum network  
congestion, can drop to under 0.9%



**Rootstock:**

**An ecosystem**

**Building on**

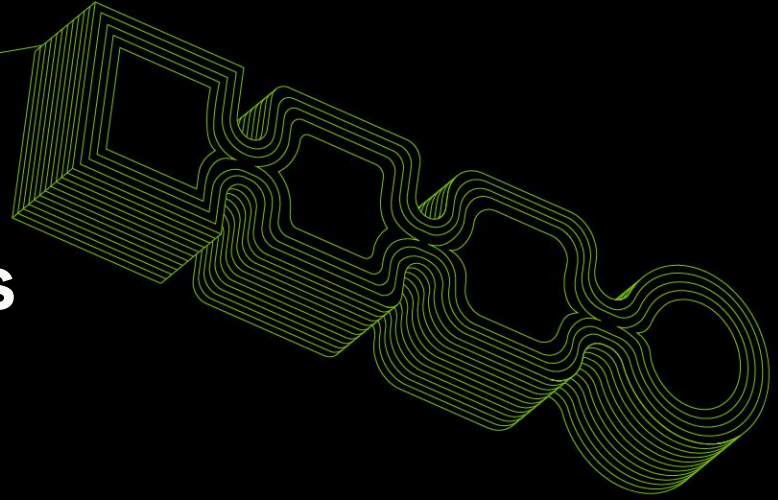
**Bitcoin**



- Close to 270M (USD) Native tokens Total Value Locked (TVL).
- 2,289 days mainnet live (3 January 2018 and counting).
- 100% network uptime (all time).
- 60% Bitcoin merged-mining hashrate (avg.).
- 211,708 wallet addresses.
- 13,972 Smart Contracts
- 235,638 transactions (/month).
- 12,964,026 transactions (all time).
- 28 second block time (avg.).
- 2747 (BTC) / \$185M (USD) Bitcoin Locked in Two-Way Peg.



# Porting Web3 DApps to Rootstock

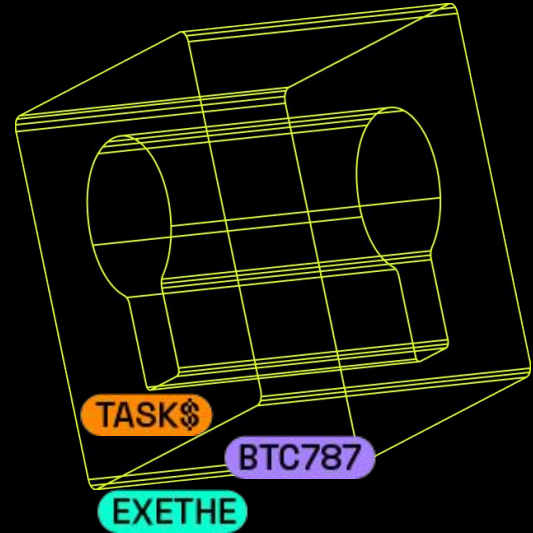


# Solidity

# toolchain

# +web3

- Due to VM OPCODE-level compatibility, and JSON-RPC compatibility
- Smart contract dev tools:
  - solc, ganache, truffle, hardhat, oz-cli, remix, etc.
- Client-side libraries & wallets
  - web3.js, ethers.js, metamask, etc.





**EIPs**

**related to**

**smart-contract**

**standards**

- 🌐 Common fungible token standards
  - ERC20, ERC677, ERC777, etc.
- 🌐 Common non-fungible token standards
  - ERC721, ERC1155, etc.
- 🌐 Existing reference implementation contracts work out-of-the-box
  - e.g. OpenZeppelin contracts

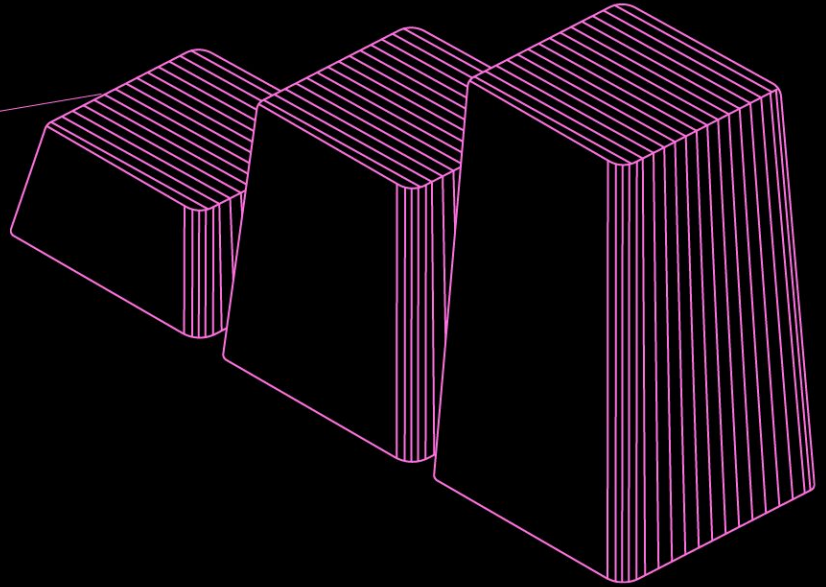


# Configuration differences

- 🌐 Derivation path (BIP-44)
- 🌐 Checksums (EIP-155, EIP-1191)
- 🌐 Experienced Web3 developers
  - Usually productive on Rootstock in < 1 day
- 🌐 Reference: [Account Based addresses on Rootstock](#)



# Examples



**Web3.js**

**And**



```
const Web3 = require('web3');

const wsProvider = new
Web3.providers.WebsocketProvider("wss://public-node.testnet.rsk.co/websocket");
const web3 = new Web3(wsProvider);

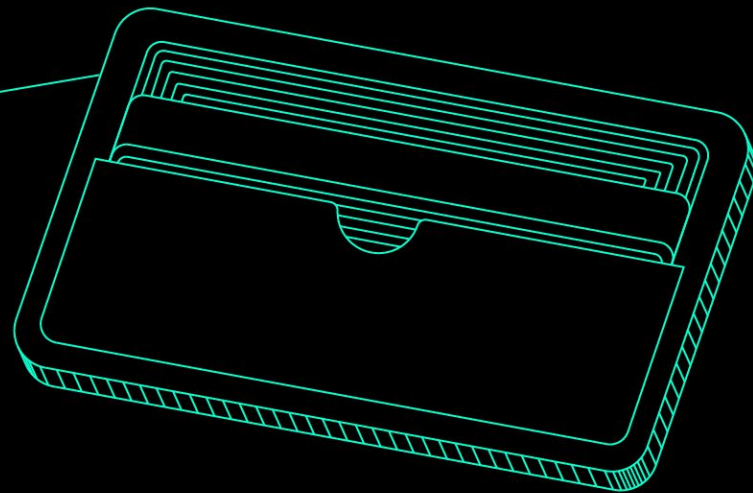
console.log("Subscribing to newBlockHeaders");
web3.eth.subscribe('newBlockHeaders', function(error, blockHeader){
  if (!error) {
    console.log(blockHeader.number)
  } else {
    console.error(error);
  }
});
```





# Rlogin

(for wallet connection)



<https://codesandbox.io/s/rlogin-3b4g9?from-embed>





src > App.js > ...

```
1 import { useState } from "react";
2 import { providers } from "ethers";
3 import { rLogin } from "./rlogin";
4
5 const App = () => {
6   const [isLoggedIn, setIsLoggedIn] = useState(false);
7   const [disconnect, setDisconnect] = useState(null);
8   const [address, setAddress] = useState("");
9
10  const login = () =>
11    rLogin
12      .connect()
13      .then(({ provider, disconnect }) => {
14        const web3Provider = new providers.Web3Provider(provider);
15        const signer = web3Provider.getSigner(0);
16        setDisconnect(disconnect);
17        signer.getAddress().then(setAddress);
18        setIsLoggedIn(true);
19      })
20      .catch(console.error);
21
22  const logout = async () => {
23    await disconnect;
24    setDisconnect(null);
25    setAddress("");
26    setIsLoggedIn(false);
27  };
28
29  return (
30    <div className="App">
```

https://3b4g9.csb.app/

login

logout

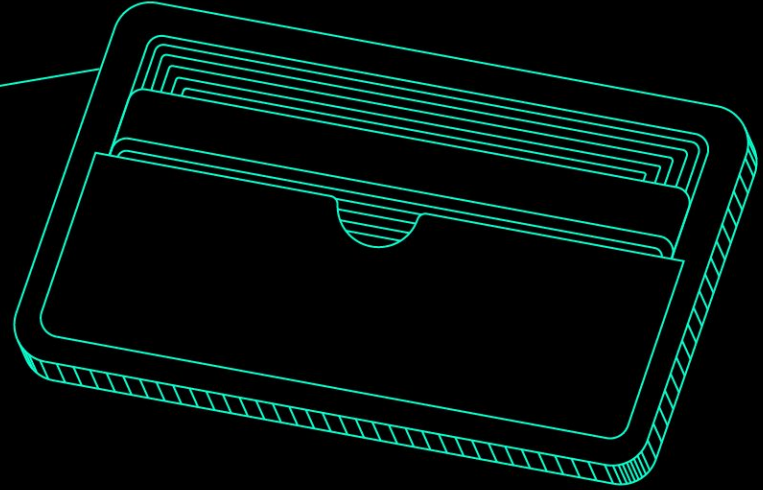






**RNS**

(Naming service)



```
import Web3 from 'web3'  
import RNS from '@rsksmart/rns'  
import { ChainId } from '@rsksmart/rns/types'  
  
const web3 = new Web3('https://public-node.rsk.co')  
const rns = new RNS(web3)
```



Get an address:

```
rns.addr('testing.rsk').then(console.log)
```

Get Bitcoin address:

```
rns.addr('testing.rsk', ChainId.BITCOIN).then(console.log)
```

Check if `example.testing.rsk` subdomain is available:

```
rns.subdomains.available('testing.rsk', 'example').then(console.log)
```

Reverse lookup: Get the name of a given address:

```
rns.reverse('0x0000000000000000000000000000000000000000000000000000000000000000123456789').then(console.log)
```

Create a subdomain under my parent domain:

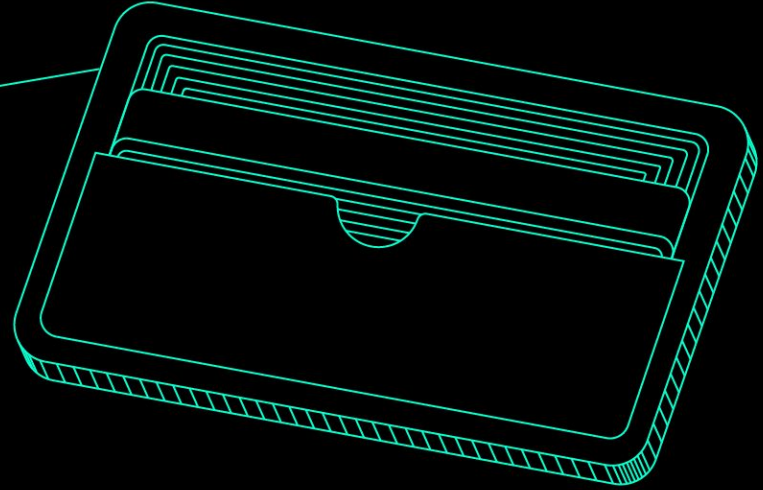
```
const newOwnerAddress = '0x0000000000000000000000000000000000000000000000000000000000000001';  
rns.subdomains.setOwner('mydomain.rsk', 'example', newOwnerAddress);
```





# RIF Wallet

(Non custodial Smart Wallet)





# Resources

- General info: [rootstock.io](https://rootstock.io)
- Technical info: [dev.rootstock.io](https://dev.rootstock.io)
- RSKIPs: [ips.rsk.co](https://ips.rsk.co) & [research.rsk.dev](https://research.rsk.dev)
- RSK Mainnet stats: [stats.rsk.co](https://stats.rsk.co)
- [RSK White Paper](#)
- [RIF White Paper](#)



## More

- [RBTC faucet](#)
- [RIF faucet](#)
- [Mainnet](#) and [Testnet](#) explorers
- [Mainnet](#) and [Testnet](#) (Blockscout)
- [Public nodes](#)
- [Blockscout API](#)
- [Covalent](#)
- [Solutions \(GetBlock\)](#)
  
- [Bitcoin sidechains](#)
- [Comparing RSK and Ethereum](#)
- [Secure, permissions, and uncensorable Bitcoin Peg](#)
- [Flyover protocol](#)
- [RIF Rollup](#)
- [Porting zkRollups from Ethereum to RSK](#)



**Grants** \$2.5M **to build**  
**better** **on Bitcoin**

Let's meet the  
Rootstock Strategic Grants Program



# Rootstock Grants Program

- 100 grants in 2023/24
- 100 grants in 2025
- \$2.5M USD in prizes
- Technical, Product & Marketing support



Apply for grants





# Dev Portal



**Discord**



**Help Desk**



**Blockchain User Course**  
**Blockchain Developer Course**

**[rsk.thinkific.com/collections](https://rsk.thinkific.com/collections)**



**Welcome to**

**Rootstock**

**the home of**

**DeFi on Bitcoin**



[rootstock.io](https://rootstock.io)

# Thank

# you

ROOTSTOCK



rootstock.io





# Good to know

- Respect the distance between logo and text. Clear space around the logo ensures that it has maximum visibility and impact on every communication.
- Avoid crowding graphics, images, diagrams or other elements.
- Is better to have more slides than cram all the information into one.
- Maintain font size.
- Any doubt please check the Rootstock guidelines:  
<https://www.figma.com/file/XOo374e5FG6SNziVW41s1j/Rootstock-%E2%80%A2-Brand-Guidelines-and-Assets?node-id=60%3A4117&t=KB3ioc1qFyHHXLDY-0>
- Don't remove slides 11-15, they are editable. Just duplicate the slide and/or if you don't need it please just skip the slide.
- For titles we use: Space Grotesk and for the body DM Sans.
- Please Skip this slide DO NOT remove it.