

blockchain JOURNAL

The Impact of Blockchain and Distributed Ledger Technology on the DevOps Experience

I come not to praise DLT,
but to describe it....

... and explain why it might be
interesting to you.

Purpose...

The purpose of this presentation is to provide an overview of blockchain and distributed ledger technology to devops professionals so that they may have a better understanding of what blockchain/DLT is about and how it is, and can be used in modern Information Technology

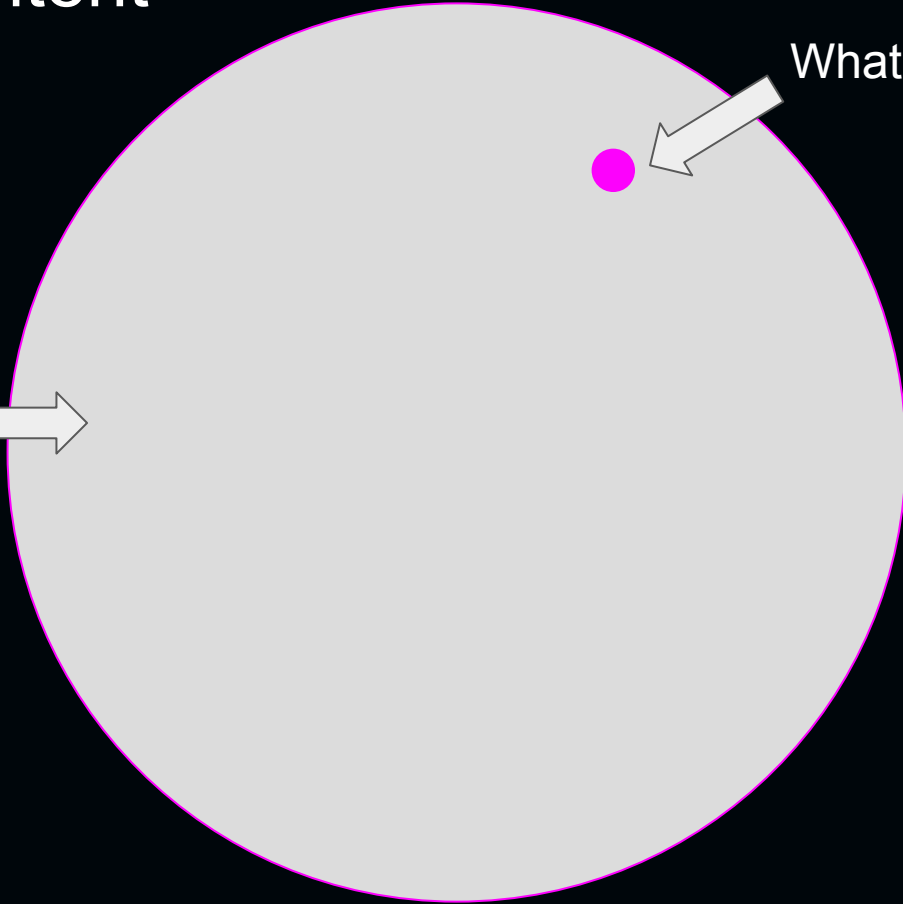
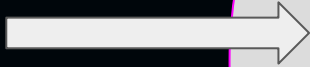
Agenda

- Whoami?
- The elephant in the living room
- My bottom line
- Blockchain/DLT 101
- Working with wallets
- Smart contracts
- The NFT stuff
- Creating a blockchain
- Programming stuff
- DevOps stuff
- Issues
- Bonus demo

Scope of Content



All there is to
know about
Blockchain and
DLT

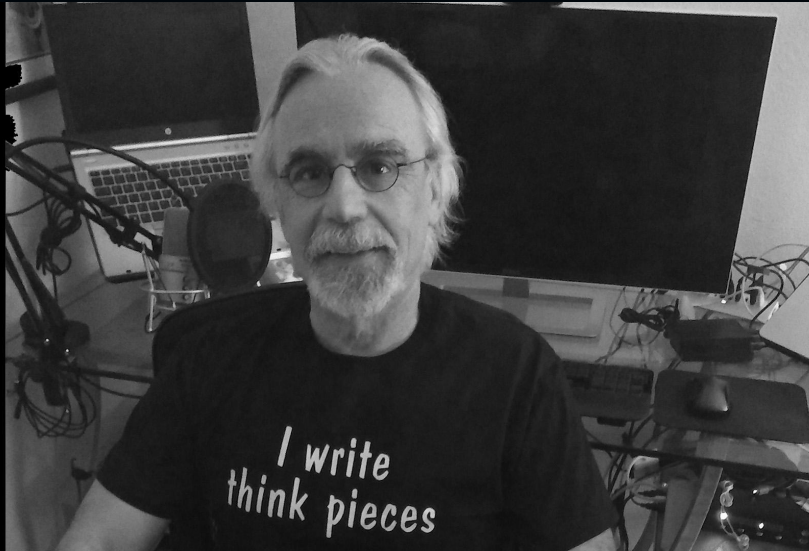


What I'll cover today



Who am I?

- Sr. Tech Analyst: Blockchain Journal
- Other technical analyst gigs:
 - Red Hat Developer and Enable Architect
 - Linux Foundations
 - Tech Crunch +
 - DevOps.com
 - TechTarget
 - ... and more
- Once upon a time I did production level architecture and coding
- Today I like to do show and tell



bcj Article / Primer / Guide to Bitcoin's Transaction Fees (Hint: Size Matters!)

Guide to Bitcoin's Transaction Fees (Hint: Size Matters!)

Gaining an understanding of how blockchain fees impact the total cost of ownership of your distributed ledger strategy requires a study of how fees differ from one chain to the next. Let's start with the grandmother of them all: Bitcoin.

Total Cost of Ownership | DLT Strategy

By Bob Reselman · Published January 9, 2018

In this Article

- When it comes to how they charge fees for their usage, no two distributed ledgers are the same but most often charge fees in denominations of their tokens.
- Developing an appreciation for the nuanced differences in fee structures from one chain to the next will help business executives and IT managers to make informed decisions related to the total cost of blockchain ownership.
- The fees connected to a Bitcoin transaction are very much tied to the transaction's payload size which in turn is connected to the transaction number and outputs.
- Another factor that impacts transaction cost can be the Bitcoin miner's tip; a premium that's paid to prioritize a transaction, especially during times of congestion.

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Understanding the Essentials of Using an Ephemeral Key Under TLS 1.3

October 15, 2021

By Bob Reselman

For as long as there's been an internet, there have been security threats. Fortunately the good guys have been able to come up with ways to meet the growing number of hazards. But, this has come with a performance price. Until the introduction of Transport Layer Security (TLS) 1.3, doing something as simple as a "Hello World" between browser and website required a number of requests and response round trips to establish a secure connection.

Security protocols have evolved a great deal since Netscape released Secure Sockets Layer (SSL) in 1995. Unfortunately SSL had some significant security vulnerabilities that in 2014 led the US Government to restrict its use on websites exchanging HIPAA data and sensitive government information. Instead, the [government mandated](#) the use of the next generation security protocol, Transport Layer Security (TLS).

TLS addressed the security vulnerabilities in SSL, but TLS versions before 1.3 still had the performance problem incurred by the extended handshake. Under TLS 1.2, the connection handshake required at least a 2 request-response exchange to authenticate a client to the server.

Today, TLS 1.3 has reduced the key creation handshake to a single request and response round trip. That single round trip makes it possible for both the client and server to share the same encryption key. But, that encryption

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- After Protect App Secrets
- Cisco Extends Scope and Reach of Observability Platform
- Scrimmage

DevOps Chats

DevOps Chat: The Impact of Automation on DevOps and Society, with Bob Reselman

DevOps Chat: The Impact of Automation on DevOps and Society, with Bob Reselman

BY: ALAN SHIMEL ON AUGUST 20, 2018 — 0 COMMENTS

Those of you who have been reading DevOps.com for a few years are familiar with the RoelBob cartoons, which have a prominent spot on the home page. RoelBob's creator, Bob Reselman, is also a technologist and creator of other forms of media. Lately, he's been writing a series of articles about the impact of automation on society as a whole—not just DevOps.

All views expressed in this
presentation are my own

Who are you?

- Do terms such as:
 - user address
 - *Proof of Stake*
 - *Ethereum*
 - *Solana*
 - *gas fee*
 - *USDT*
 - *Smart contract*
 - ... have meaning for you?
- Do you have a cryptographic wallet such as MetaMask?
- Do you own cryptocurrency?
- Do you own an NFT?
- Have you programmed for a blockchain?
- Have you done any sort of application deployment activity that targets a blockchain?

Let's talk about the Elephant in the Living Room

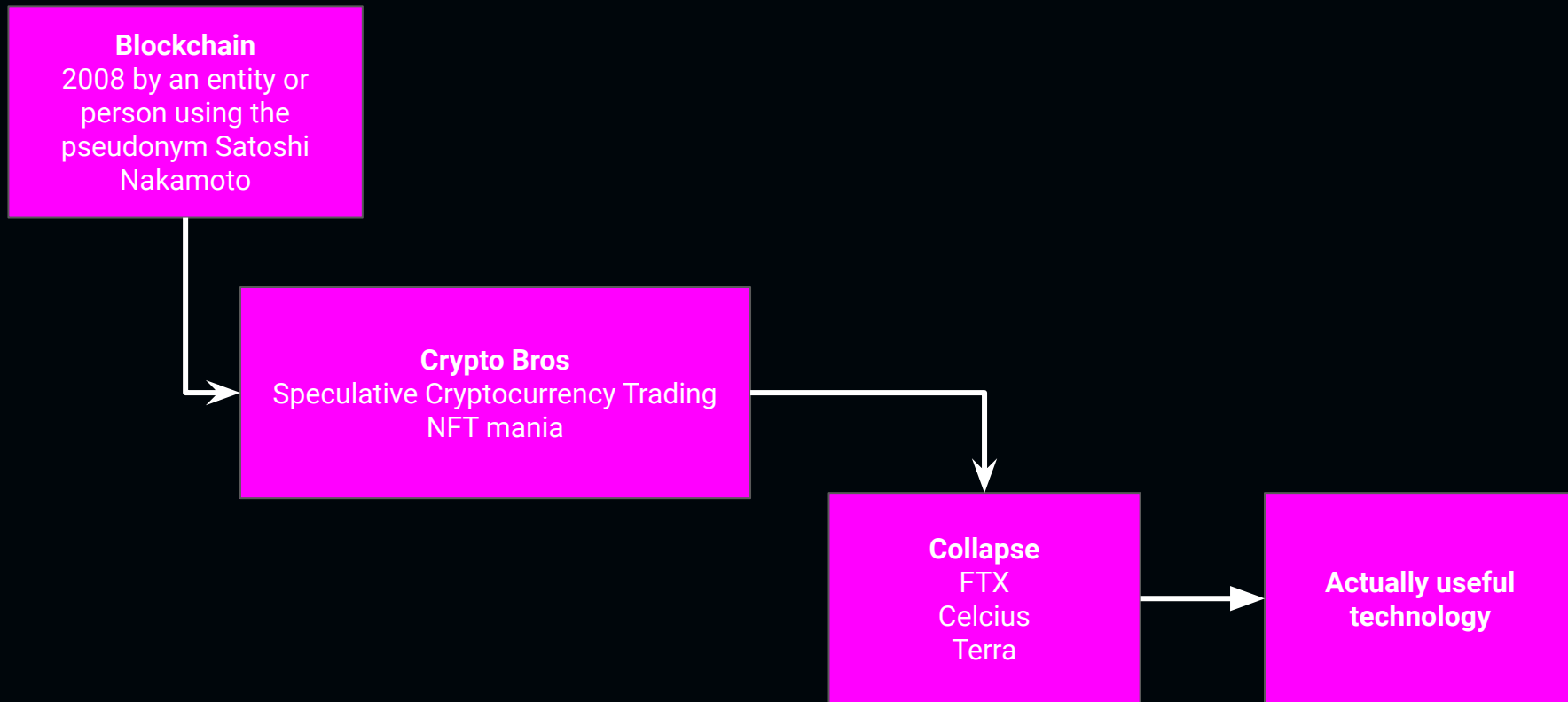


People using their mobile phones to play the cryptocurrency game *Axie Infinity* in an alley in suburban Manila. Players had to buy teams of cartoon blobs and earned tokens by using them in battles. The game became a get-rich-quick craze in the Philippines. By October 2021, about two million people were playing the game every day. (Left: Zeke Faux; right: Jam Sta. Rosa/AFP via Getty Images)

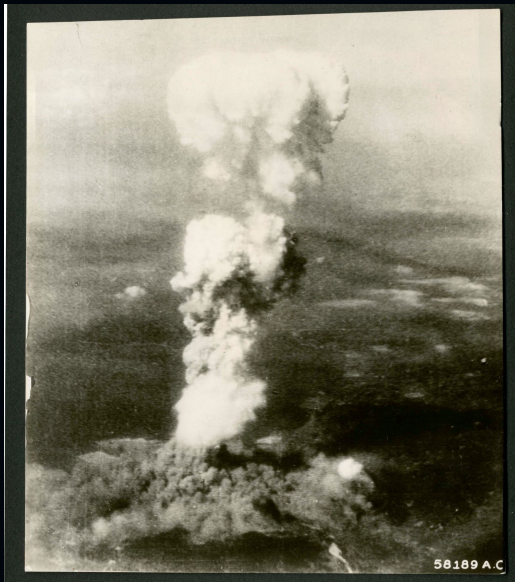


In "Chinatown," a vast compound of derelict office towers in Sihanoukville, on Cambodia's western coast, thousands of migrants worked as online cryptocurrency scammers. Workers who have escaped say they were held against their will and forced to send spam text messages day and night. Some say they were beaten, tortured, and worse. This drone photograph shows the section known as Kaibo and the KB Hotel. (Danielle Keeton-Olsen)

Let's talk about the Elephant in the Living Room



Let's talk about the Elephant in the Living Room



The atomic bomb named "Little Boy" was dropped on the Japanese city of Hiroshima on August 6, 1945



Calder Hall nuclear power station in the United Kingdom started operating on October 17, 1956

The Big Players respond...



The screenshot shows the Google Cloud product page for the Blockchain Node Engine API. At the top, the Google Cloud logo and a user profile 'teaching-tasks' are visible. The page title is 'Product details'. Below the title is the product icon, a blue square with a white 'G' and 'C' intertwined. The product name is 'Blockchain Node Engine API' with a 'Google' link below it. A description reads 'Fully managed node hosting for building on the blockchain.' At the bottom, there are two buttons: 'ENABLE' and 'TRY THIS API' with an external link icon.

The screenshot shows an Azure blog article. The top navigation bar includes 'Azure', 'Explore', 'Products', 'Solutions', 'Pricing', 'Partners', and 'Resources'. The page is titled 'Blog / Databases' with a 'Subscribe' button. A search bar is present. The article title is 'Introducing the Azure Blockchain Development Kit' by 'Microsoft Azure'. The article content is partially visible, starting with 'Announcements, Azure confidential ledger, Databases'.

The screenshot shows the AWS documentation page for Amazon Managed Blockchain (AMB) Hyperledger Fabric. The top navigation bar includes 'aws', a search bar, and 'Contact Us'. The breadcrumb trail is 'AWS > Documentation > Amazon Managed Blockchain > Hyperledger Fabric Developer Guide'. The main heading is 'Amazon Managed Blockchain (AMB) Hyperledger Fabric Developer Guide'. Below the heading is a sub-heading 'What Is Amazon Managed Blockchain (AMB) Hyperledger Fabric?'. The page content is partially visible, showing the start of an article.

The screenshot shows the IBM Blockchain website header. The IBM logo is on the left. The navigation bar includes 'Products', 'Solutions', 'Consulting', 'Support', and 'Think'. Below the navigation bar is a large image of a modern building's interior with a complex, organic structure. The text 'IBM Blockchain' is overlaid on the left side of the image.

The screenshot shows the Hyperledger Foundation website header. The top navigation bar includes 'Introducing new project Hyperledger Web3', a search icon, and a 'Find out more' link. The main navigation bar includes 'Hyperledger FOUNDATION', 'ABOUT', 'PROJECTS', 'PARTICIPATE', 'USE', 'LEARN', 'BLOG & NEWS', and 'JOIN'. Below the navigation bar is a large image of a modern building's interior with a complex, organic structure. The text 'Building better together' is overlaid on the right side of the image. Below this is the text 'The open source global ecosystem for enterprise-grade blockchain technologies' and a 'JOIN US' button.

What is blockchain?

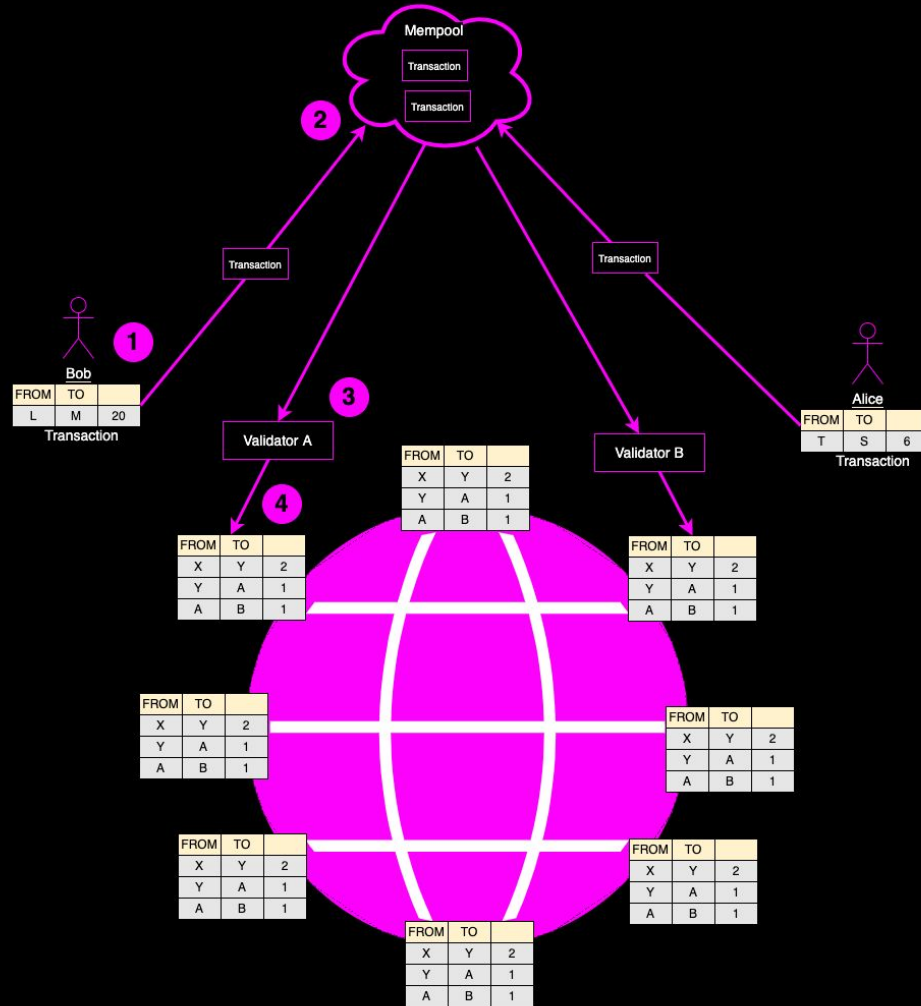
Blockchain is a peer-to-peer, consensus driven technology in which data is stored immutably, in an identical manner among a large number of computers. Once a piece of data is stored on the blockchain, it can never be changed. And, no one computer is the sole source of truth for the data on the blockchain. If one computer on a blockchain network goes down, there are a number of other computers, storing the same data that will provide service. These networks can be public or they can be private. It all depends on the specific blockchain network.

Another term for blockchain is *distributed ledger technology* (DLT)

Blockchain 101

Consensus techniques

- Proof of Work (Bitcoin)
- Proof of Stake (Ethereum)
- Gossip about Gossip (Hedera)
- Proof of History (Solana)



Blockchain 101

You can think of blockchain as one very, very big spreadsheet

Ledger

| From | To | Count |
|----------------------|-------|-------|
| Genesis Block (Mint) | | 50 |
| Mint | Bob | 20 |
| Bob | Alice | 8 |
| Bob | Mike | 6 |
| Alice | Jane | 4 |
| Mike | Jane | 2 |

Account Balances

| Account | Count |
|----------------------|-------|
| Genesis Block (Mint) | 30 |
| Bob | 6 |
| Alice | 4 |
| Mike | 4 |
| Jane | 6 |

There are many blockchain networks out there



Bitcoin



Ethereum



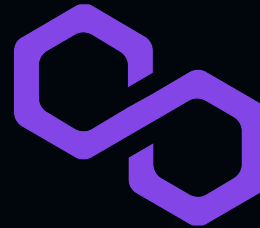
Hedera



Solana



Avalanche



Polygon

There are more...

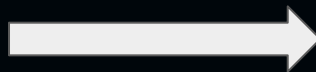
What can you do with DLT?

- Blockchain is more than a way to mint cryptocurrency any more than a printing press is a technology to only print money.
- Use cases
 - The company **Cario** is working with state level motor vehicle departments in the US to put all motor vehicle titles on the blockchain in order to make title auditing and title transfer easier.
 - Camera manufacturer **Canon**, in collaboration with the news organization Reuters and an academic research project named Starling Lab have developed a methodology by which digital images shot with certain Canon cameras have verification data that is embedded and stored on the blockchain immutably reducing the risk of visual misinformation.
 - Golden State Foods uses **IBM Food Trust** technology to monitor food freshness.

Creating a new blockchain

- Anybody can create a blockchain
- It's all about adoption and use
- Once it's deployed, that's it
- The rules for adding data to the chain are baked in by the given blockchain

My blockchain: reselcoin



The screenshot shows the GitHub interface for the 'reselcoin' repository. At the top, it indicates the repository is public and shows options to pin, unwatch, fork, and star. Below this, there are navigation tabs for 'main', '1 Branch', and '0 Tags'. A search bar and 'Add file' button are visible. The main content area displays a list of commits, with the most recent one by 'reselbob' titled 'updated readme' from 2 years ago. The commit list includes files like 'src', 'test', '.gitignore', 'LICENSE', 'README.md', 'package-lock.json', 'package.json', and 'tsconfig.json'. On the right side, there is an 'About' section with a description of the project as a distributed ledger for a fictitious currency, and sections for 'Releases', 'Packages', and 'Languages'.

Real world demo: reselcoin



```
{
  message: 'Constructing Block',
  level: 'info',
  timestamp: '2024-02-10T00:17:52.086Z'
}
{
  message: 'Executing ICO for 2000',
  level: 'info',
  timestamp: '2024-02-10T00:17:52.094Z'
}
{
  message: 'Constructing Transaction',
  level: 'info',
  timestamp: '2024-02-10T00:17:52.094Z'
}
```

```
/**
 * This method run an Initial Coin Offering against the blockchain adding coins to the
 * blockchain's Treasury
 * @numberOfCoinsToIssue amount, the number of coins issued during the ICO
 */
executeIco(numberOfCoinsToIssue: number){
  const tx = new Transaction( fromAddress: null, this.treasury.address , numberOfCoinsToIssue)
  this.addTransaction(tx);
  logger.info( message: `Mining transaction ${JSON.stringify(tx)}`)
  this.minePendingTransactions(this.miner.address);
  logger.info( message: `Mined transaction to ${tx.toAddress}`)
  const treasuryAddress = Treasury.getTreasury().address
  logger.info( message: `The treasury at address ${treasuryAddress} now has ${this.getBalanceOfAddress(treasuryAddress)} coins`)
}
```

<https://github.com/reselbob/reselcoin>

Wanna run an Ethereum node?

- Get a machine with a minimum specs include 4-8 GB RAM, 2 TB SSD, and an Intel NUC 7th gen or higher x86 processor
- Make sure you have a wired internet connection because it's essential for stable performance
- Install a client such as Geth, Nethermind, Erigon, or Besu to run your node
- Enjoy

Coins and Tokens

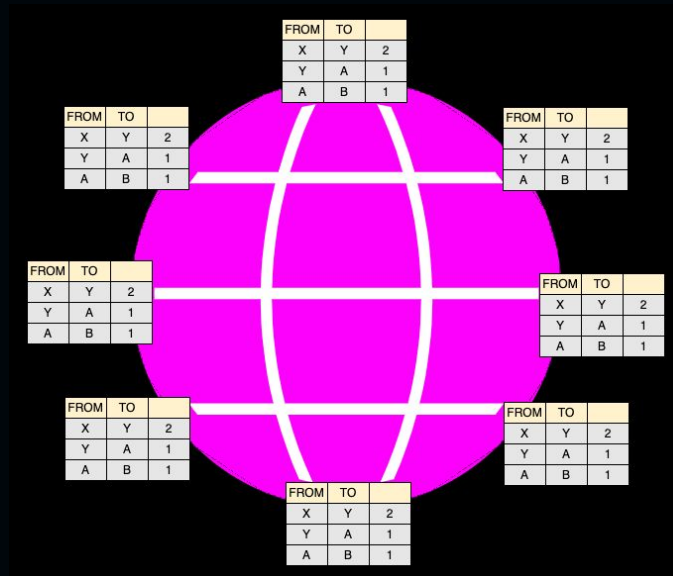
US Federal Reserve Bank



Mint



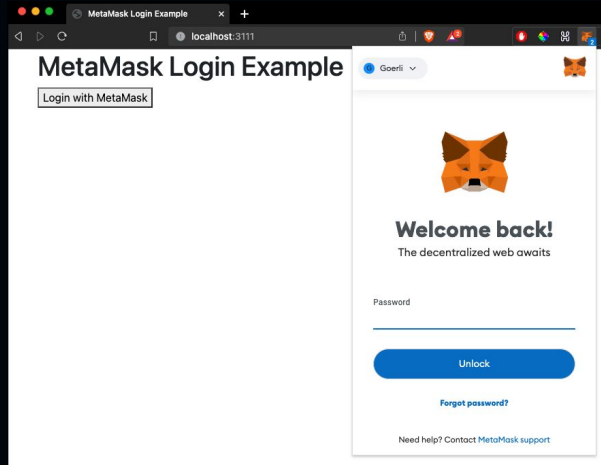
ReselChain



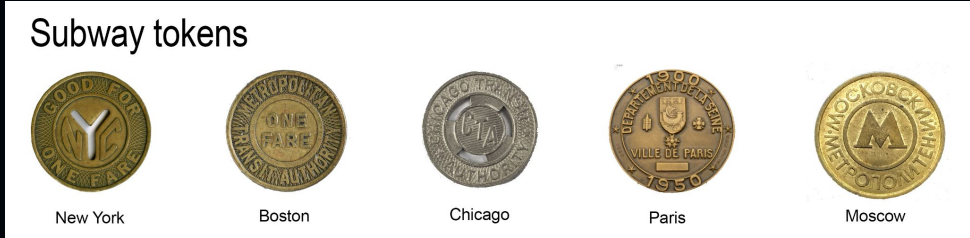
Mint



Real world demo: Wallet based login



The NFT stuff: Fungible tokens



Basic blockchain example

| From | To | Count |
|---------------------------|------------------------|-------|
| Subway token manufacturer | City Transit Authority | 50 |
| City Transit Authority | Mike | 10 |
| Mike | Alice | 1 |

Mike buys 10 subway tokens from the city

Mike gives one of his tokens to Alice

The NFT stuff: Non-Fungible Token

Each car is unique
and uniquely
identifiable



| From | To | VIN (fictitious) |
|---------------------------|---------------------------|-------------------|
| Auto manufacturer | Bob the Automobile Dealer | 1FAHP25NX8W111111 |
| Auto manufacturer | Bob the Automobile Dealer | 1FAHP25NX8W222222 |
| Auto manufacturer | Bob the Automobile Dealer | 1FAHP25NX8W333333 |
| Bob the Automobile Dealer | Mike | 1FAHP25NX8W111111 |
| Mike | Alice | 1FAHP25NX8W111111 |

Mike buys a car from
Bob the Automobile
Dealer

Mike sells the car
to Alice



The NFT stuff: Interplanetary File System

It's a place to put assets

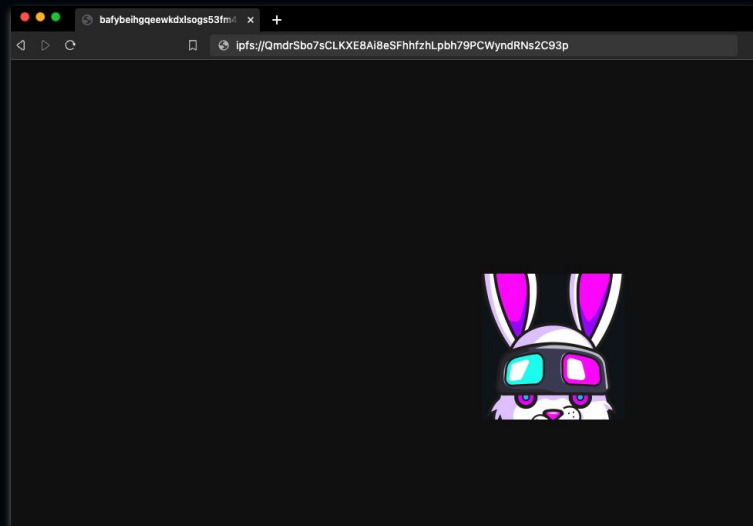
URLs describe content NOT the location of content

`ipfs://QmdrSbo7sCLKXE8Ai8eSFhhfzhLpbh79PCWyndRNs2C93p`

VS

`https://blockchainjournal.com/images/logo.svg`

Those things we call NFTs, the actual graphic files live on the IPFS



Game Changer: Smart contracts

A smart contract is an application that runs on the blockchain at a particular address. The most popular programming languages for creating smart contracts are Solidity, Rust and Python, but there's probably more... (things are moving pretty fast!).

Smart contracts are typically associated with blockchain platforms, such as Ethereum, Binance Smart Chain, or others that support the execution of decentralized applications (DApps). These contracts can be used for a wide range of applications, including financial transactions, supply chain management, voting systems, and more.

Real world demo: Solidity

```
// SPDX-License-Identifier: MIT
```

```
pragma solidity ^0.8.0;
```

```
contract AddOperation {
```

```
    event LogAnswer(uint256 answer);
```

```
    function add(uint256 a, uint256 b) public returns (uint256) {
```

```
        uint256 result = a + b;
```

```
        emit LogAnswer(result);
```

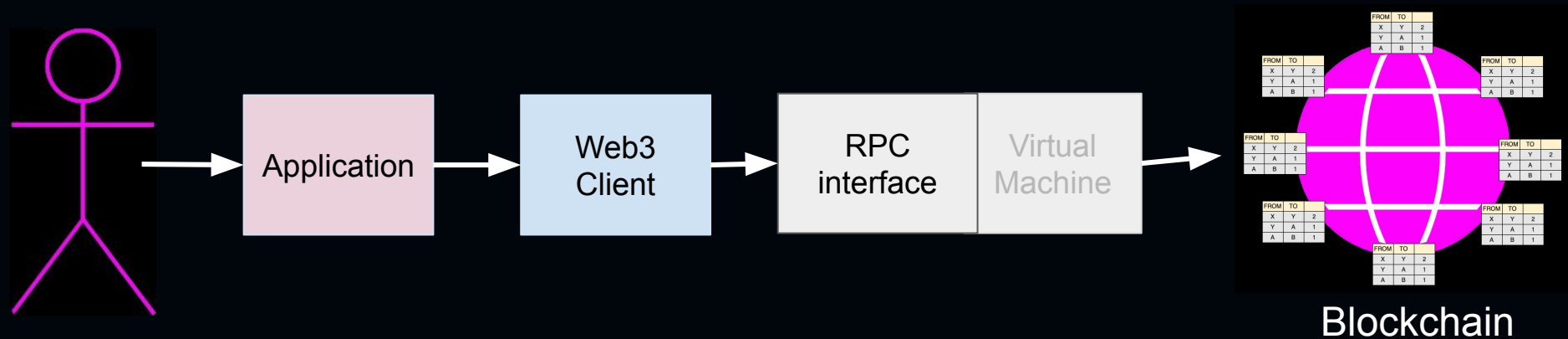
```
        return result;
```

```
    }
```

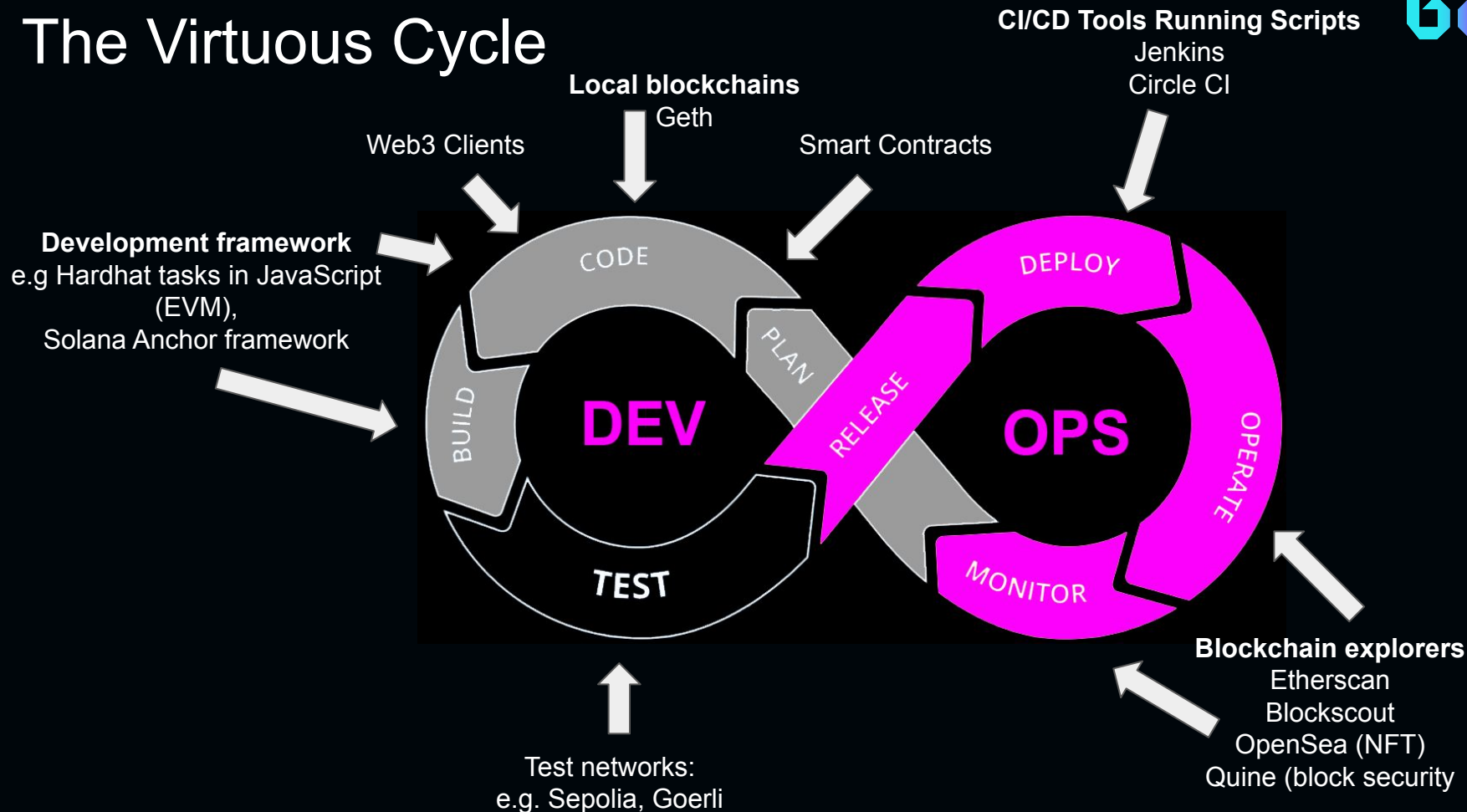
```
}
```

The screenshot displays the Remix IDE interface. On the left, the 'ENVIRONMENT' panel shows 'Remix VM (Shanghai)' with 'wei' as the network, account '0x583...edd4', and a gas limit of 3000000. The 'CONTRACT' panel shows 'AddOperation - Add.sol' with a 'Deploy' button. The main editor shows the Solidity code for the 'AddOperation' contract. The 'TRANSACTIONS' panel at the bottom shows a successful transaction for 'ADDOPERATION AT 0x583...edd4' with a balance of 0 ETH. The 'DEBUG' panel shows the execution flow, including the constructor call and the 'add' function call.

Working with a blockchain application 101



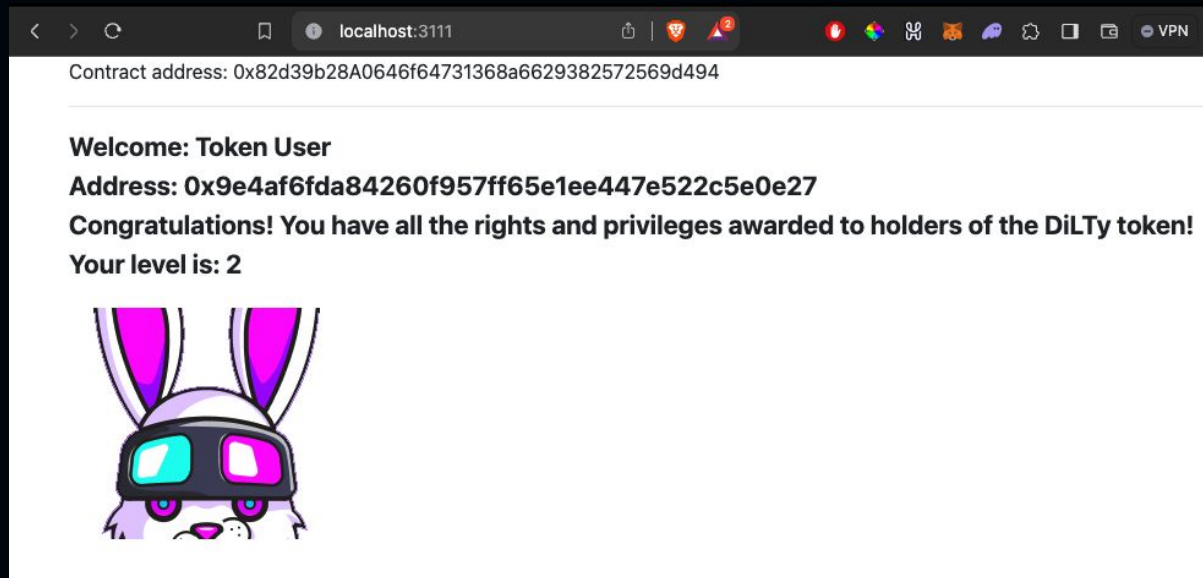
The Virtuous Cycle



The issues


- In general
 - Transaction speed
 - Gas fees
 - Immutability
 - Security
 - Ever evolving complexity
- For DevOps:
 - CI/CD is hard
 - Local nets vs public Testnets

Real world demo: Token Gating

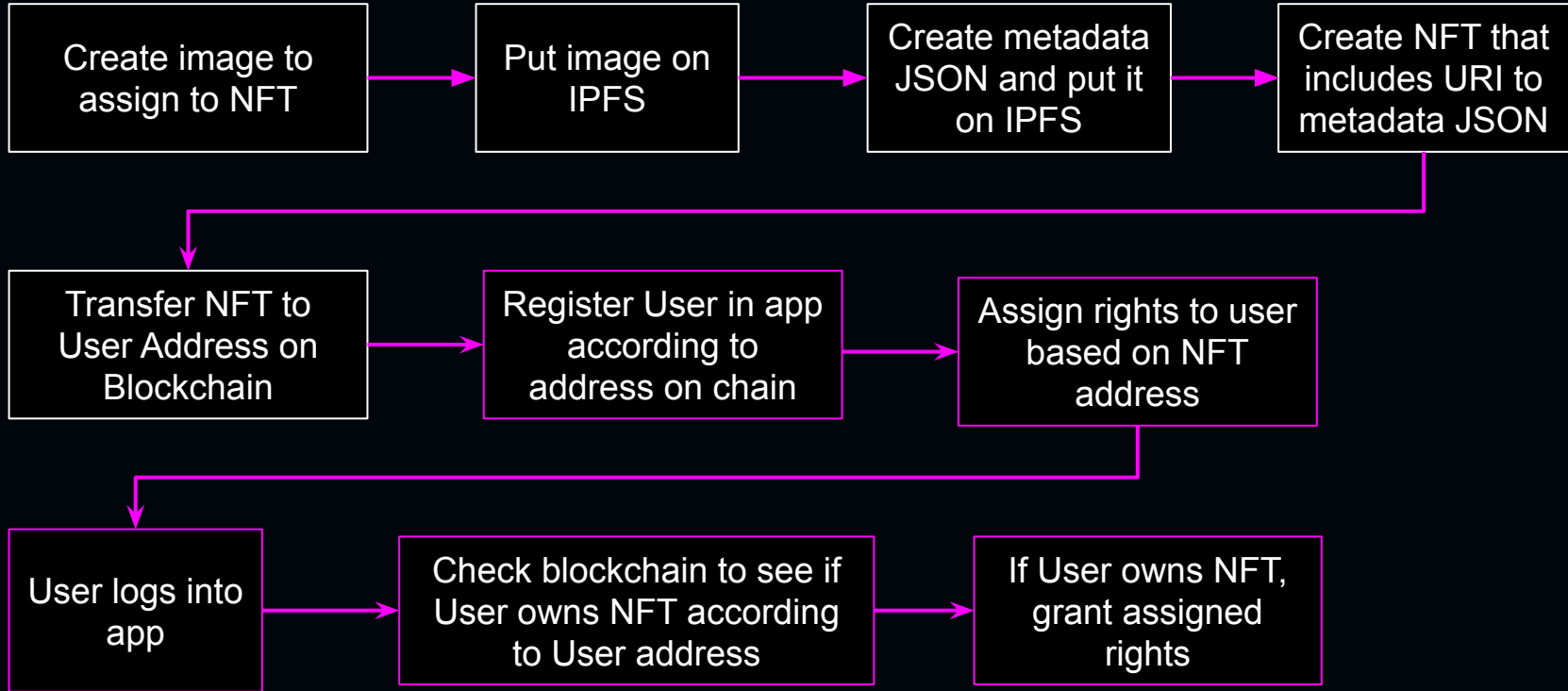


How it works

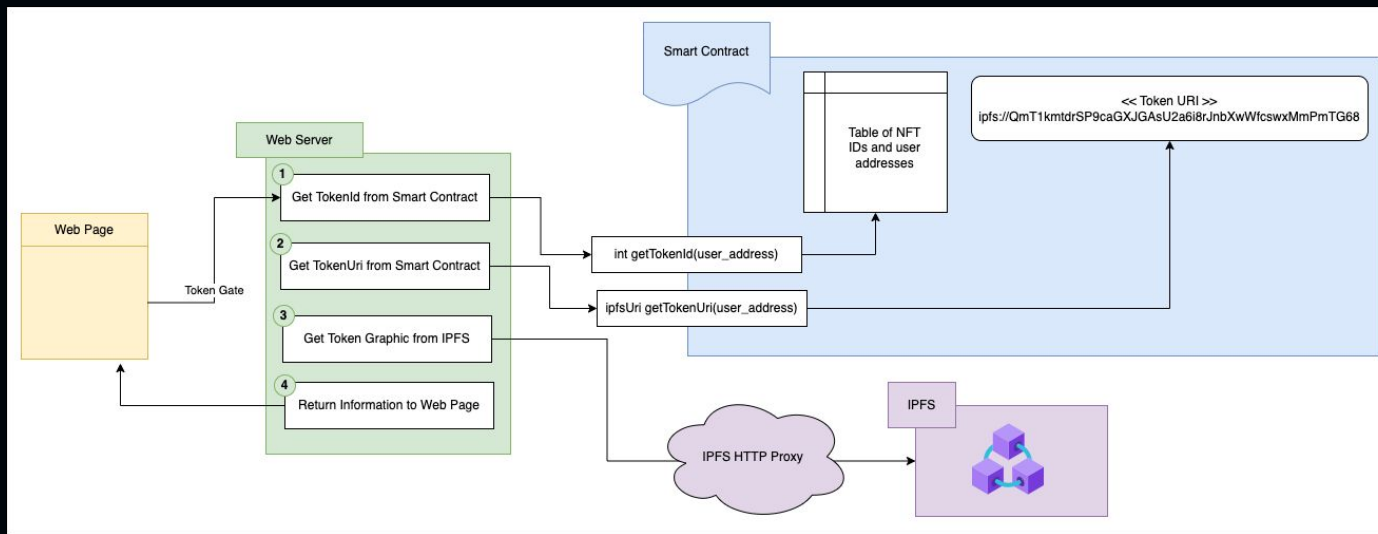
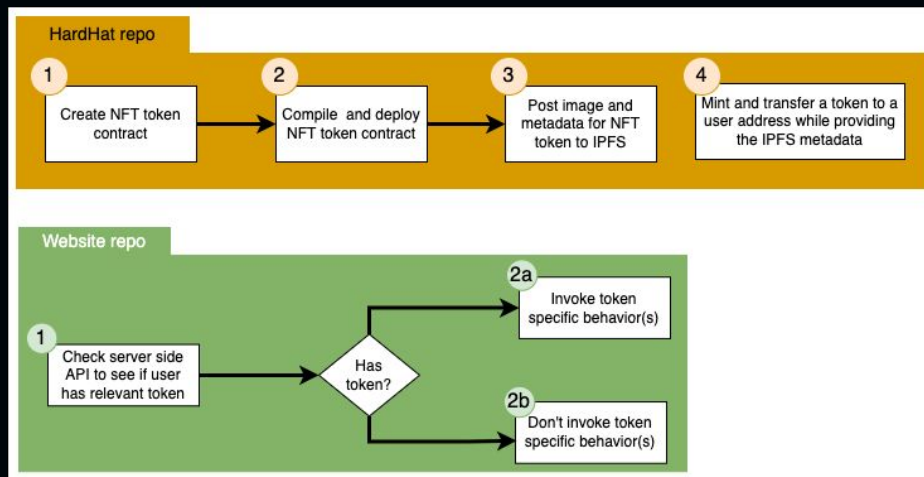


 = chain activity

 = application activity



The Big Picture



The Demo

blockchain JOURNAL

Thank you for your time...

Links to the code

<https://github.com/reselbob/reselcoin>

<https://github.com/BlockchainJournal/Wallet-Login-Demo>

<https://github.com/BlockchainJournal/Create-Tokengate-Demo>