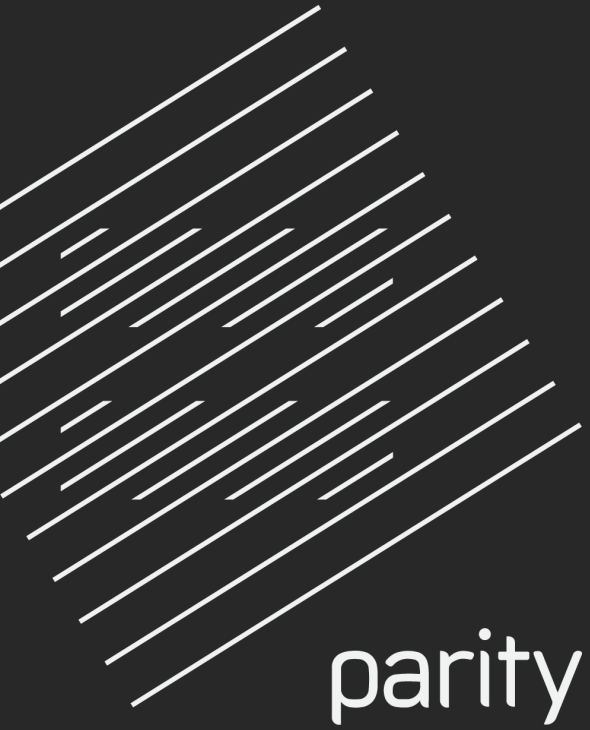

Building a TicTacToe Parachain

Joshy Orndorff
Software developer @ Parity Technologies Ltd.

joshy@parity.io | @JoshOrndorff

Joshy Orndorff - Parity Technologies

- Former Physicist
- Former High School Teacher
- Substrate DevHub Team
- Substrate Seminar
- I <3 Presenting

Ask Questions!

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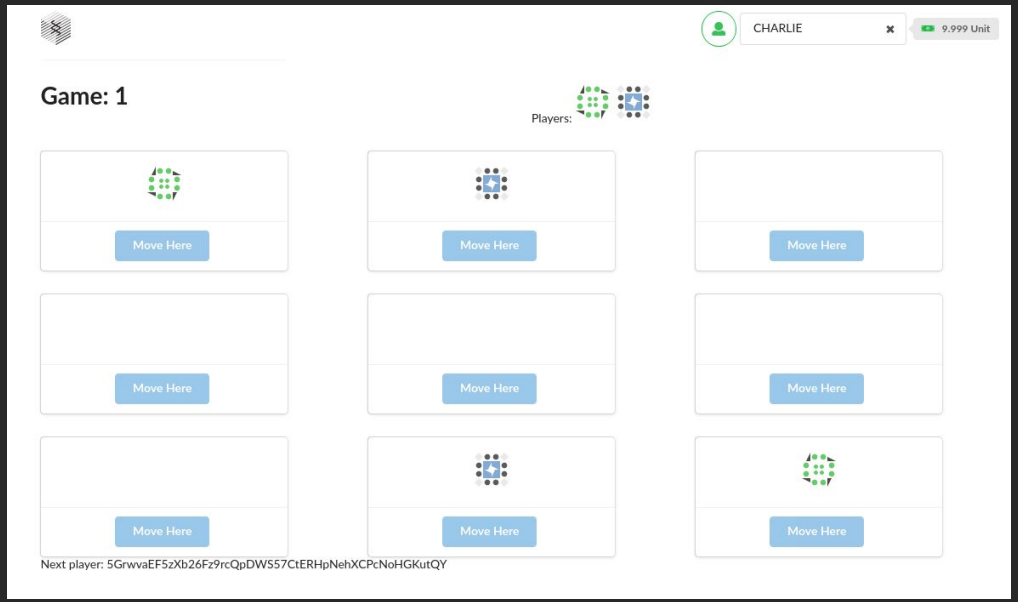
Tic Tac Toe Demonstration



- Node: https://github.com/JoshOrndorff/TicTacToe
- Frontend: https://github.com/JoshOrndorff/TicTacToe-frontend/

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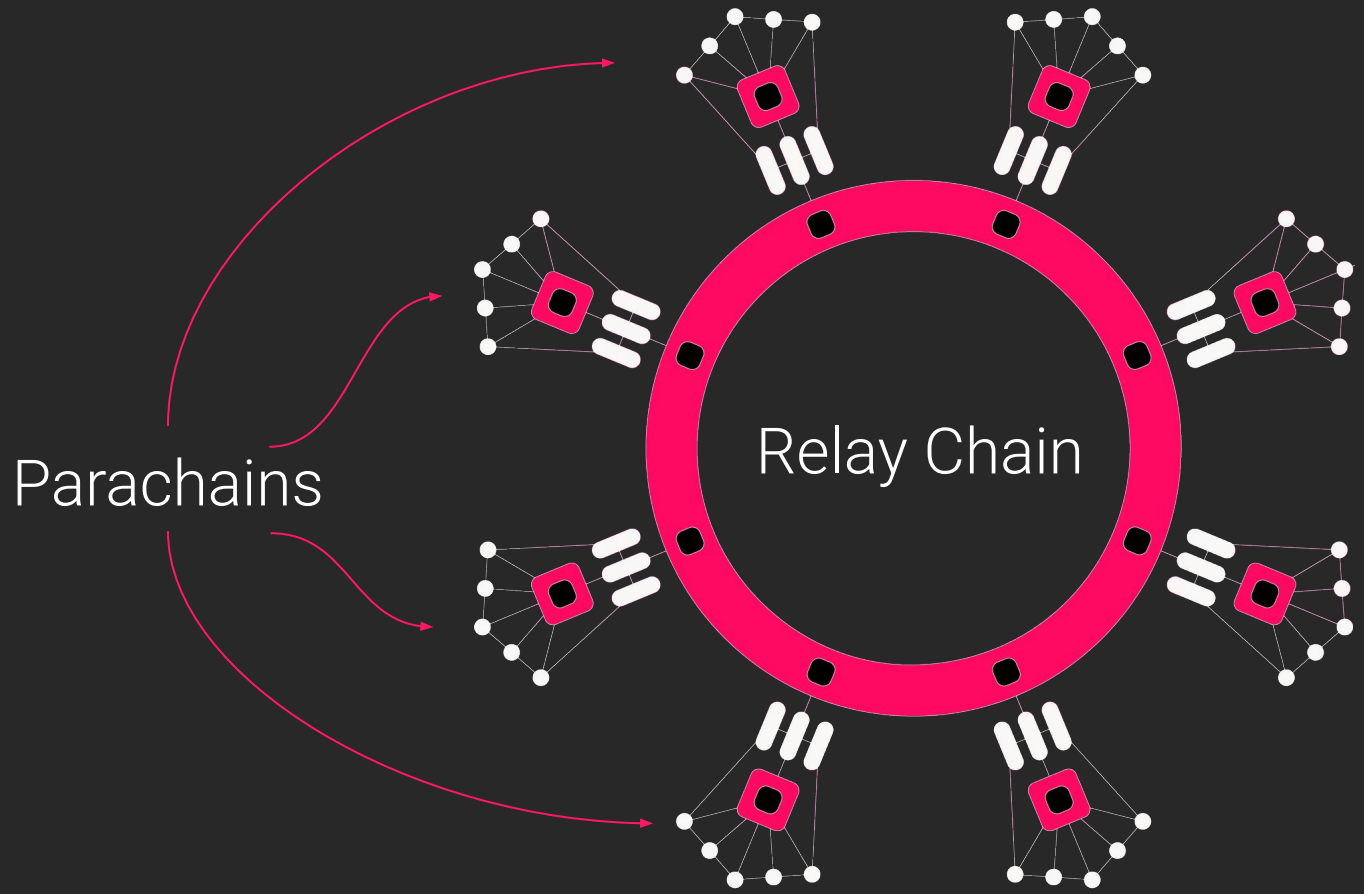

Multichain Architecture

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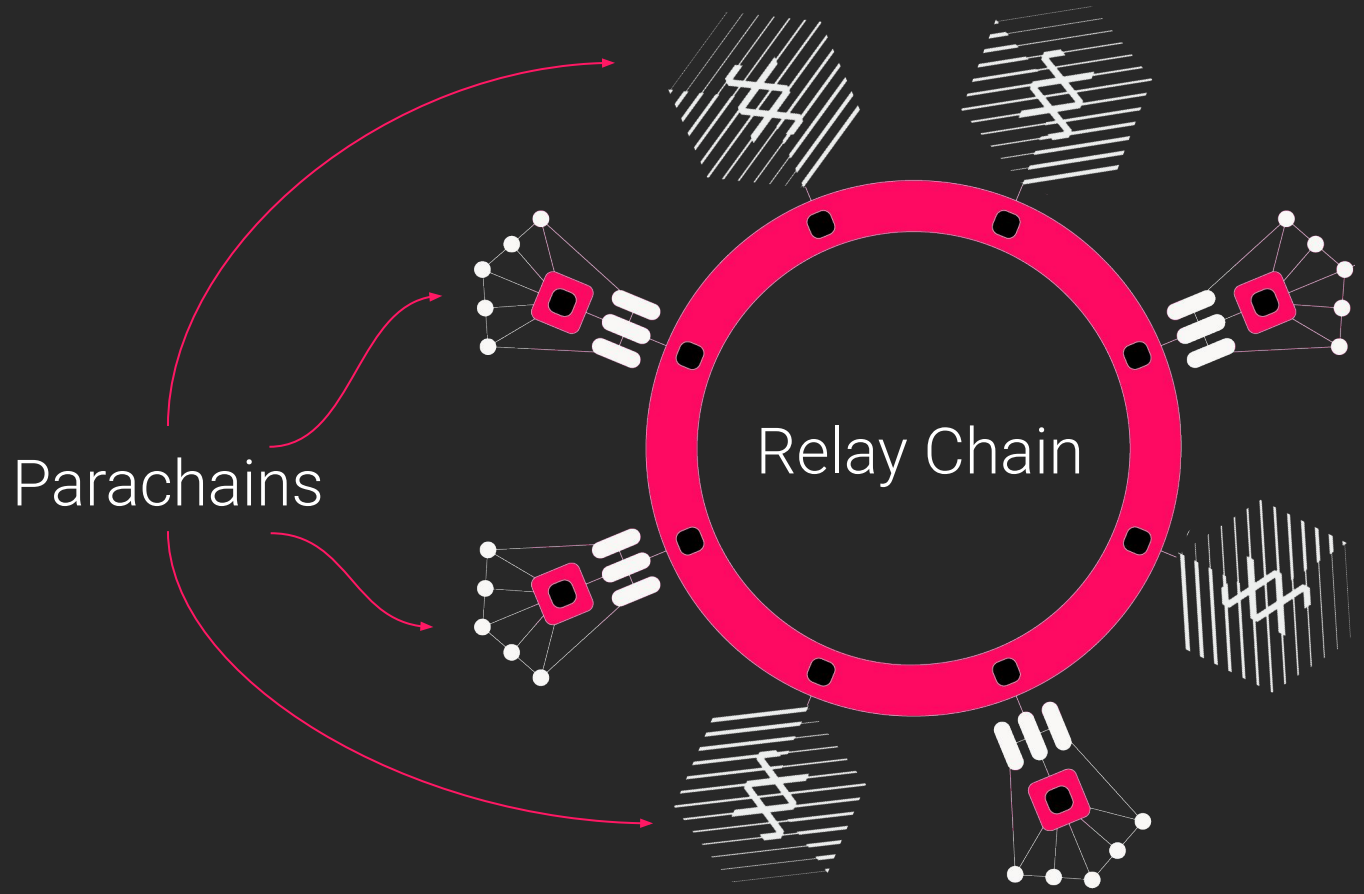

Multichain Architecture

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What is Substrate?

Substrate provides all the core components of a Blockchain:

- Database Layer
- Networking Layer
- Transaction Queue
- Consensus Engine
- Library of Runtime Modules

Each of which can be customized and extended.

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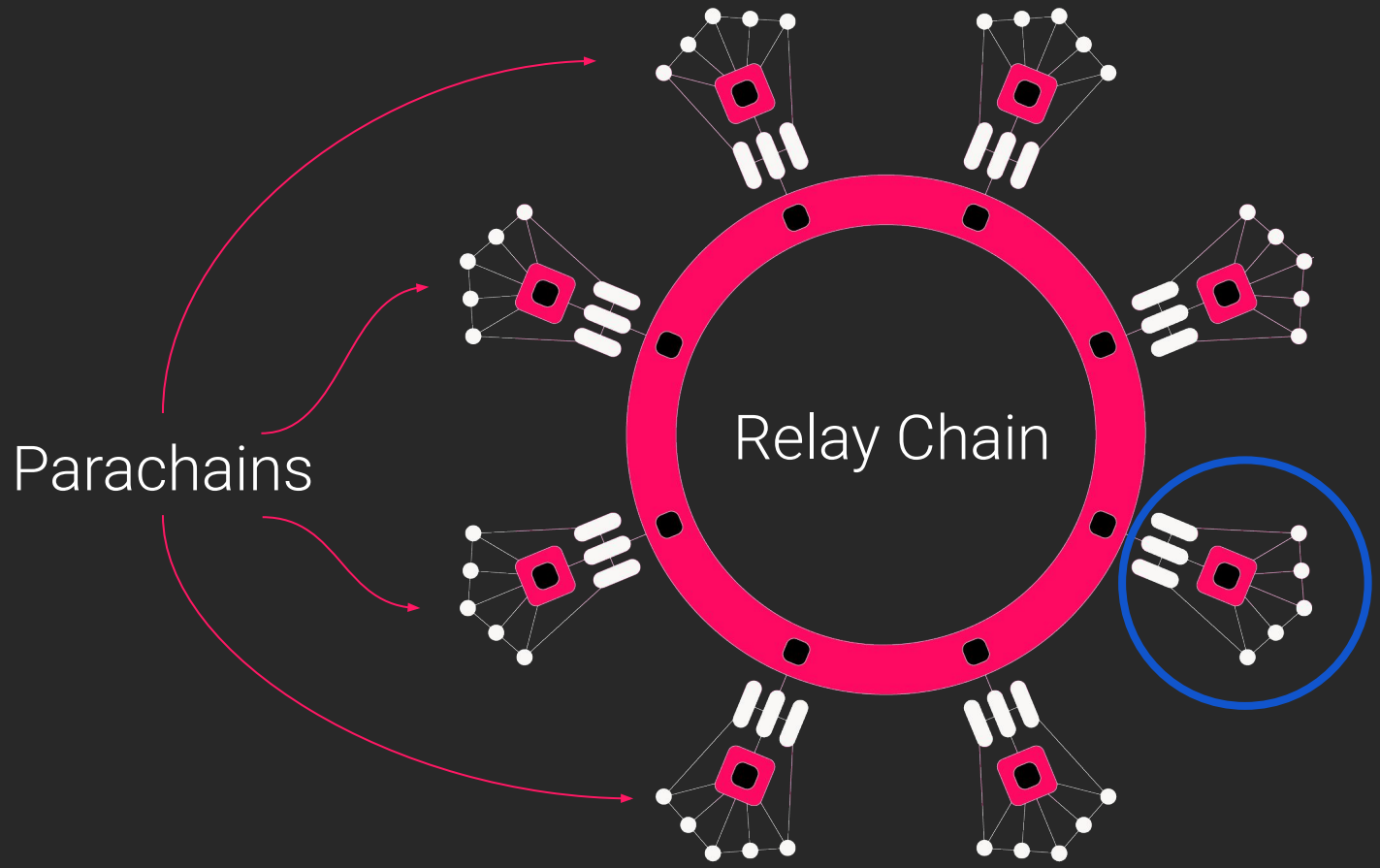

Multichain Architecture

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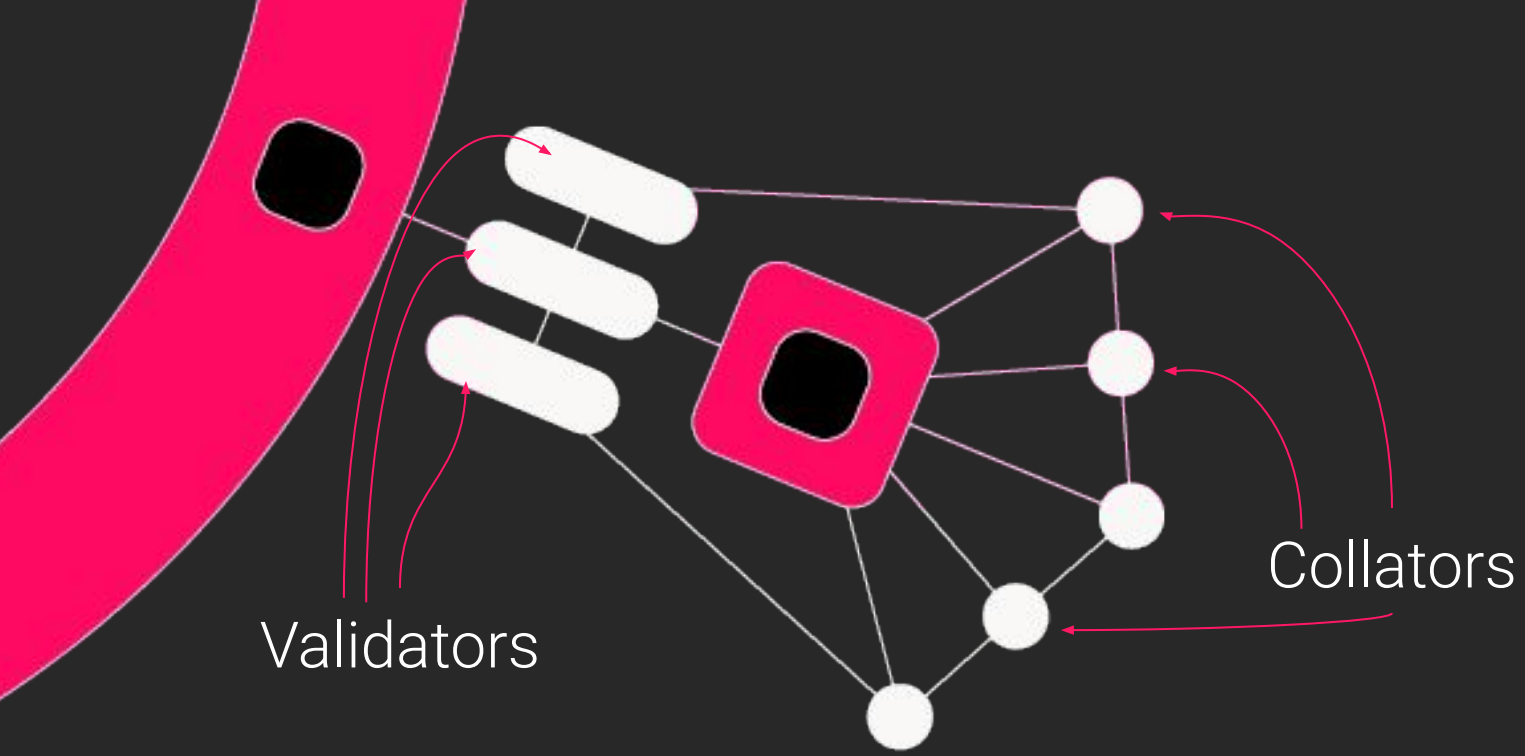

Parachain Architecture

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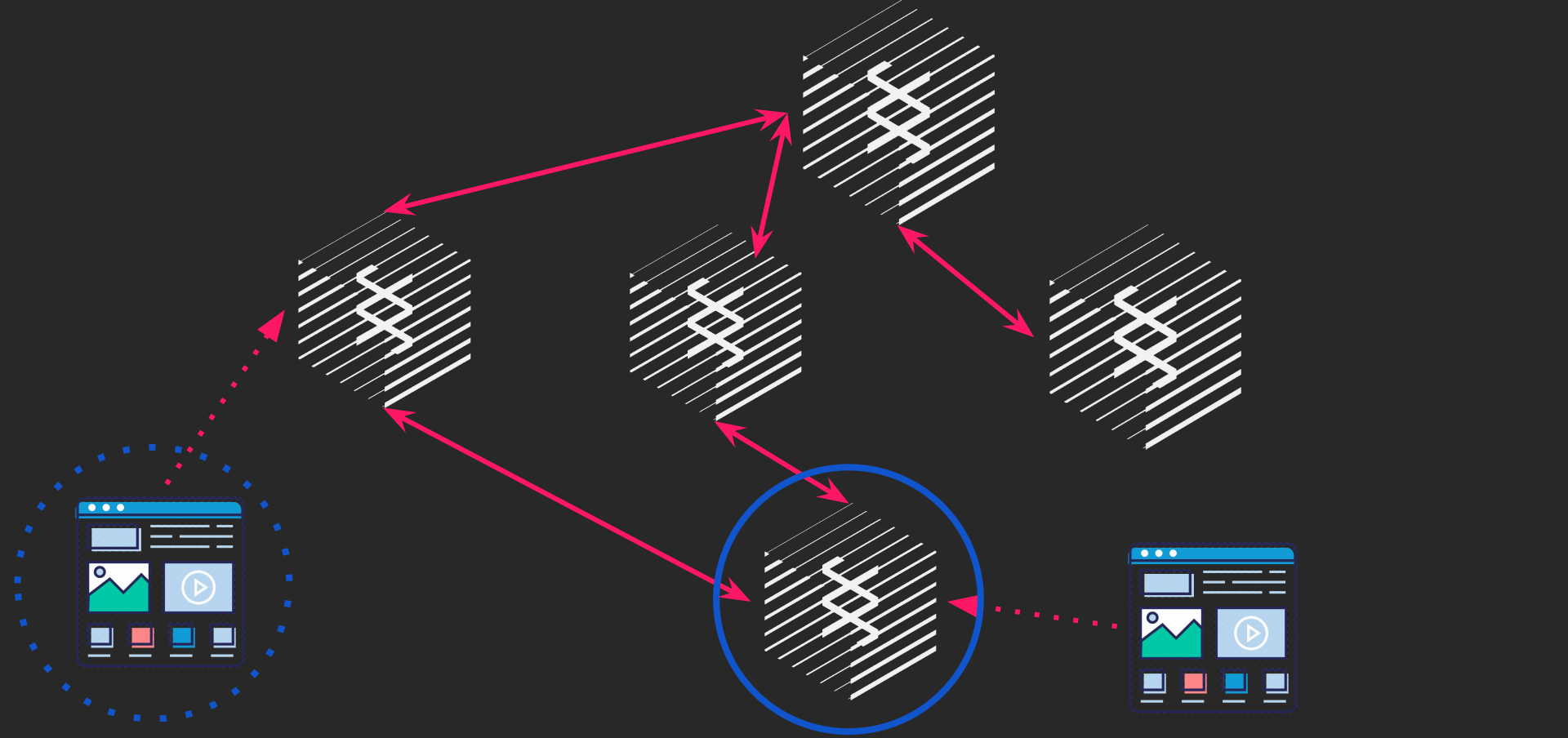

Realistic Parachain Architecture

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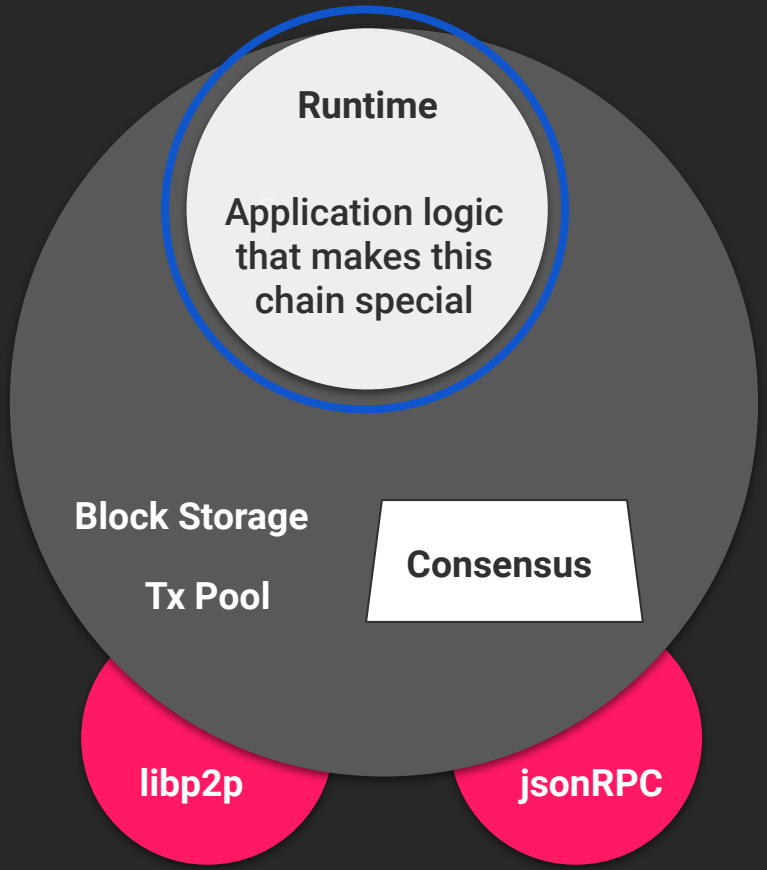
Architecture of a Substrate Node

Written in Rust
Built into Wasm
(& native)

Written in Rust
Built into native



The Substrate Runtime

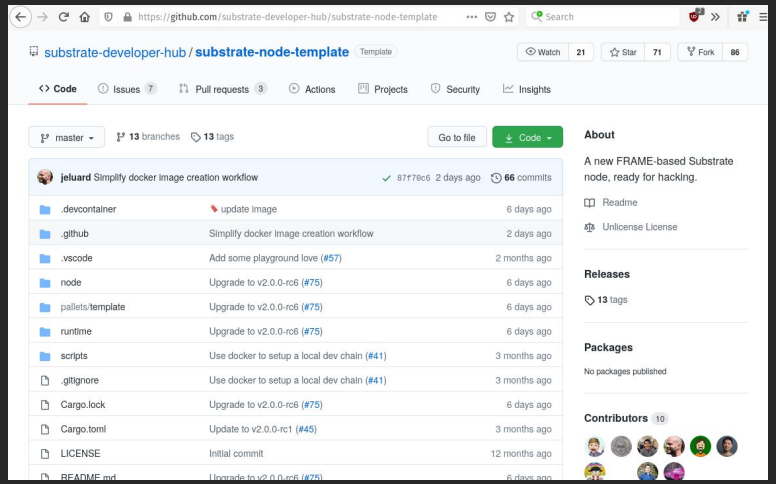
The runtime is the **application logic** of the blockchain.

It is composed of **Pallets**.

Mix and Match Pallets			
assets	Tic Tac Toe	balances	collective
contracts	democracy	elections	grandpa
evm	nft	indices	membership
offences	session	staking	sudo
system	timestamp	treasury	and more...

Questions?

Pallet Development



- Substrate Node Template
  - Declaring Events
  - Declaring Errors
  - Declaring “Dispatchables” (aka transactions)
- Claiming wins is unique on the blockchain
- Adding the pallet to Runtime
- Learn a LOT more at substrate.dev

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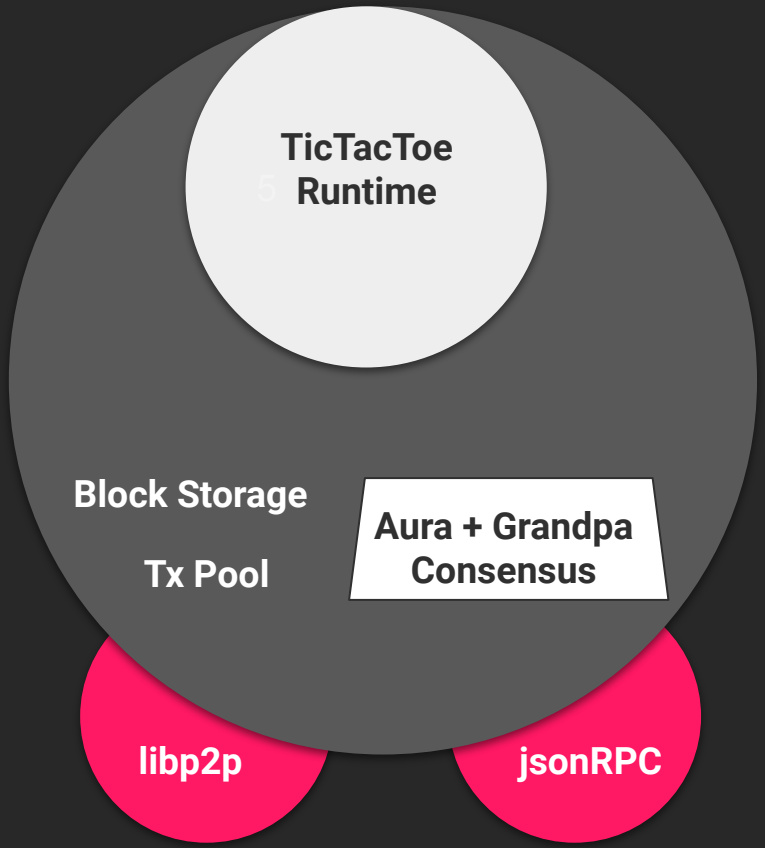
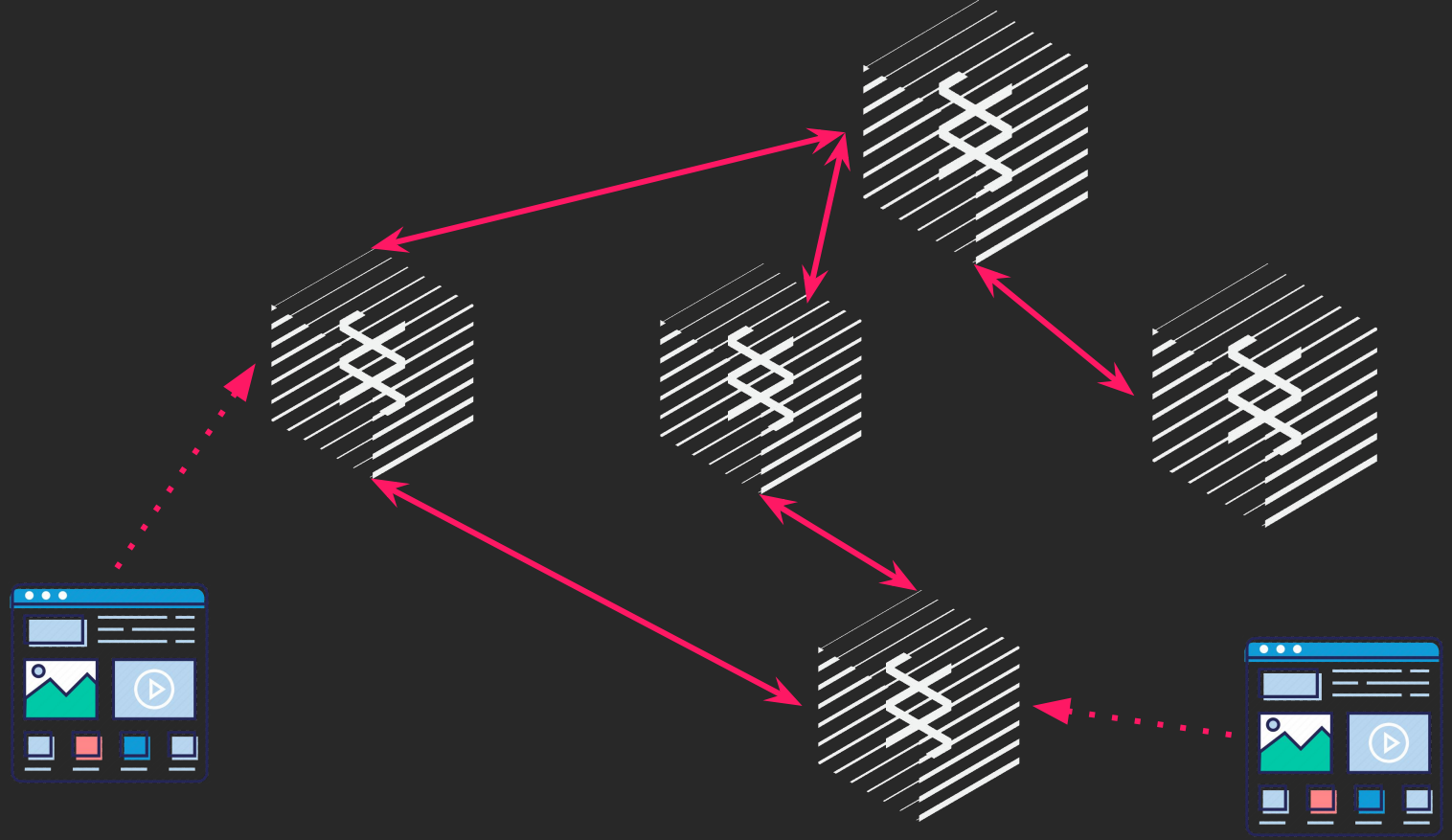
Architecture of the TicTacToe Node



Questions?



TicTacToe Network Architecture

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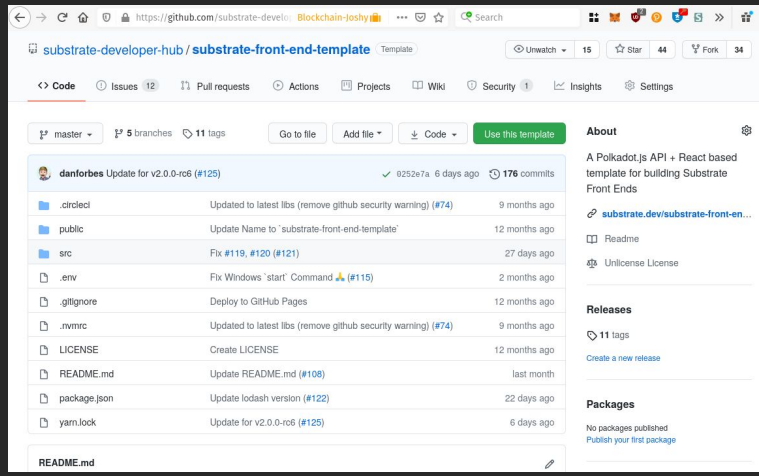
Front End Development

- Front End Template
  - Write react components
  - Automated win-checking logic
  - Automatically claim win for user
  - Don’t let user go out of turn
- Learn a LOT more at substrate.dev



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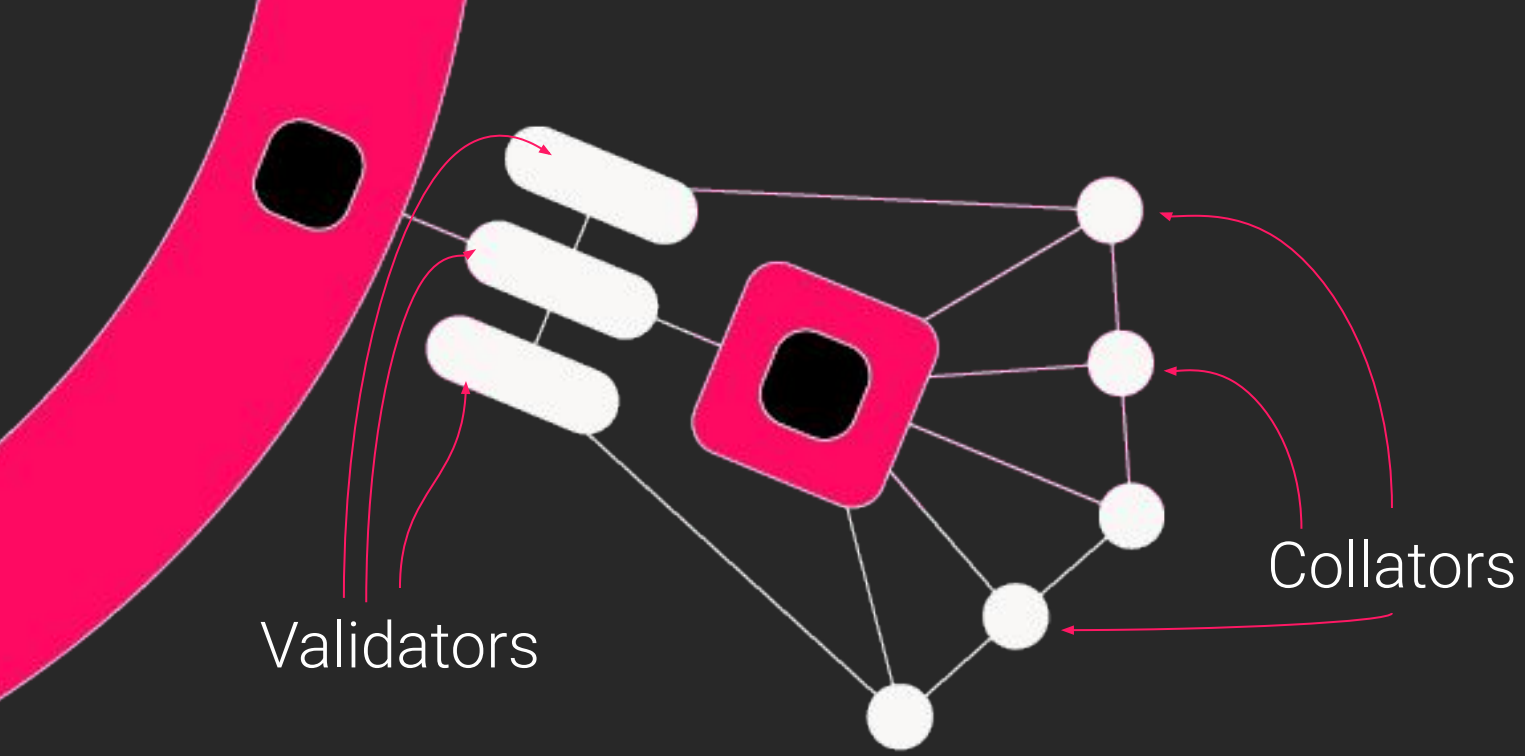
Questions?



Parachain Architecture

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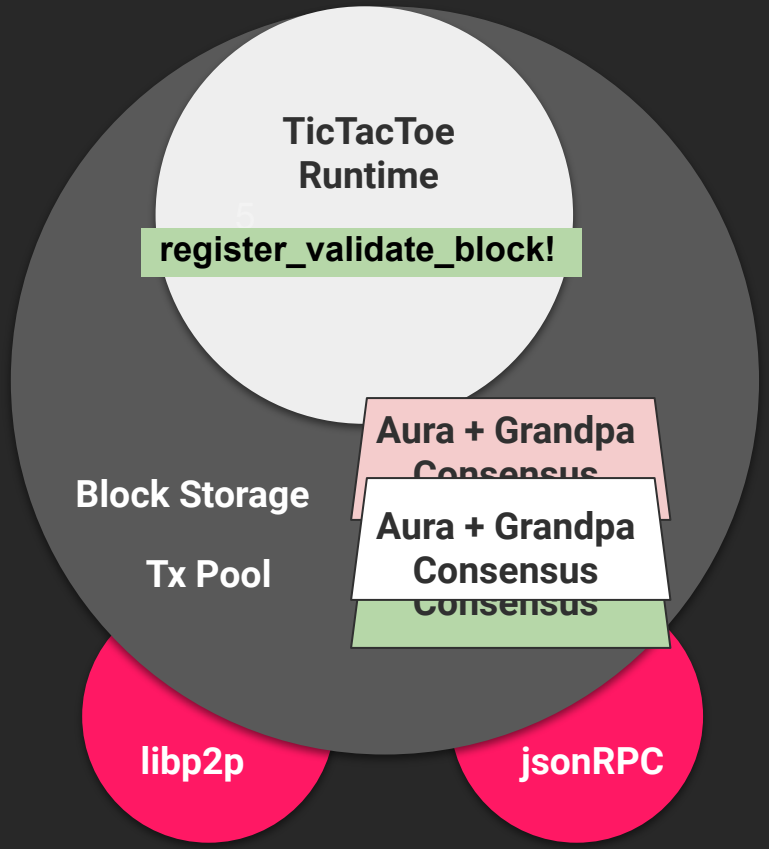
Cumulus: Write Parachains with Substrate

Cumulus turns your Substrate runtime into a Parachain.

- Tracks relay chain's finality
- Add one line to your runtime
- Built-in block authoring logic

Parachain Conversion

```
-       initial_authorities: Vec<(AuraId, GrandpaId)>,
        root_key: AccountId,
        endowed_accounts: Vec<AccountId>,
-       _enable_println: bool,
+       id: ParaId,
    ) -> GenesisConfig {
        GenesisConfig {
                frame_system: Some(SystemConfig {
-                       // Add Wasm runtime to storage.
                        code: wasm_binary.to_vec(),
                        changes_trie_config: Default::default(),
                }),
                pallet_balances: Some(BalancesConfig {
-                       // Configure endowed accounts with initial balance of 1 << 60.
-                       balances: endowed_accounts.iter().cloned().map(|k|(k, 1 << 60)).collect(),
-               }),
-               pallet_aura: Some(AuraConfig {
-                       authorities: initial_authorities.iter().map(|x| (x.0.clone())).collect(),
-               }),
-               pallet_grandpa: Some(GrandpaConfig {
-                       authorities: initial_authorities.iter().map(|x| (x.1.clone(), 1)).collect(),
-               }),
-               pallet_sudo: Some(SudoConfig {
-                       // Assign network admin rights.
-                       key: root_key,
+                       balances: endowed_accounts
+                               .iter()
+                               .cloned()
+                               .map(|k| (k, 1 << 60))
+                               .collect(),
                }),
+               pallet_sudo: Some(SudoConfig { key: root_key }),
+               parachain_info: Some(ParachainInfoConfig { parachain_id: id }),
        }
```



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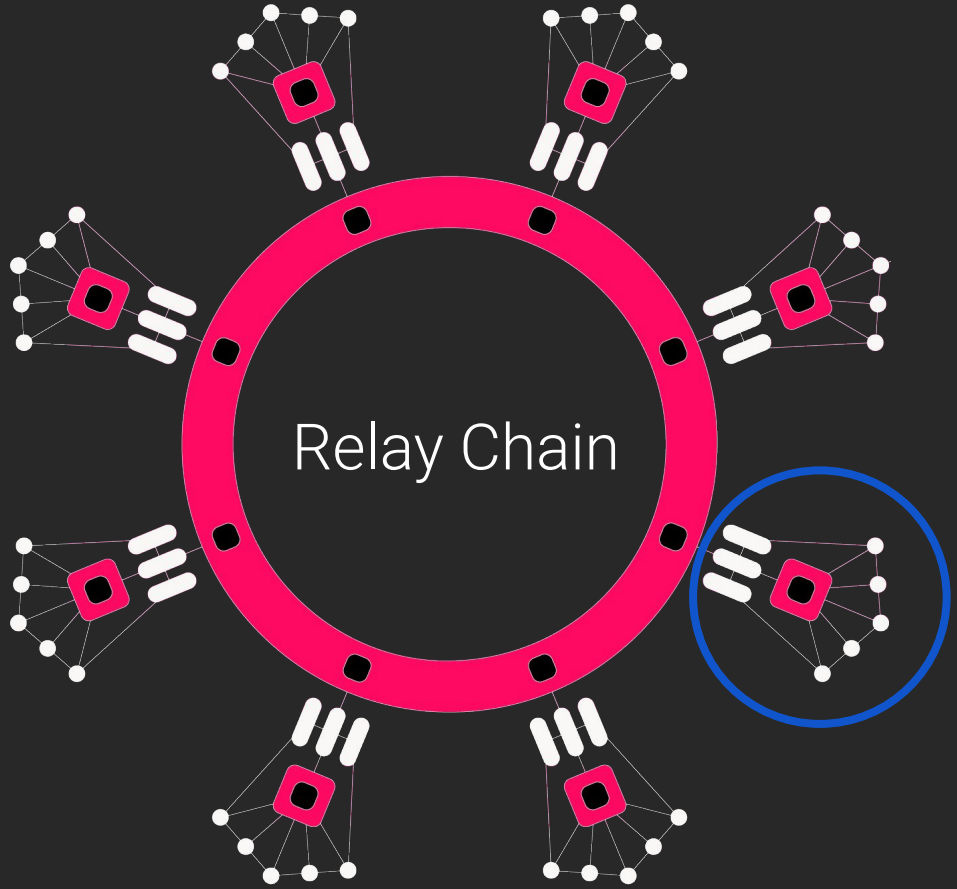
Questions?



Learn to register your parachain with our Cumulus Tutorial

substrate.dev/cumulus-workshop/

Multichain Architecture

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