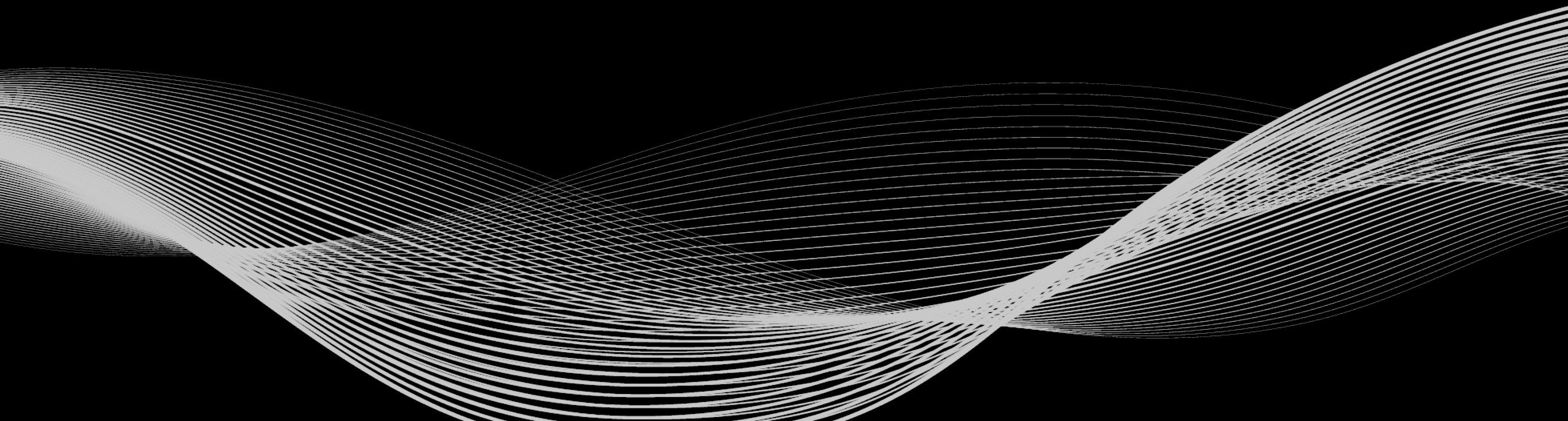


Substrate 快速入门与实战

讲师: Bryan





第二节课



创建多节点网络



创建多节点网络

- `cargo run --release -- \`
- `--base-path data/node1 \`
- `--chain=local \`
- `--alice \`
- `--node-key`
`00`
`000000000000000001 \`
- `--telemetry-url ws://telemetry.polkadot.io:1024 \`
- `--validator`



创建多节点网络

- `cargo run --release -- \`
- `--base-path data/node2 \`
- `--bootnodes /ip4/127.0.0.1/tcp/30333/p2p/
QmRpheLN4JWdAnY7HGJfWFNbfkQCb6tFf4vvA6hgjMZKrR \`
- `--chain=local \`
- `--bob \`
- `--port 30334 \`
- `--telemetry-url ws://telemetry.polkadot.io:1024 \`
- `--validator`



常用命令行参数



命令行参数

- --chain local
- --chain dev
- --chain fir
- --validator
- --node-key
- --base-path path
- --port 30333
- --bootnodes multiaddr
- --telemetry-url url
- --name bryan
- --ws-port 9944
- --rpc-port 9933
- --ws-external
- --rpc-external
- --rpc-cors all
- --pruning mode



命令行参数

- `--force-authoring`
- `--execution native`
- `--log runtime=debug`
- `--log sync,afg=trace`
- `--keystore-path`



命令行参数

- purge-chain
 - --chain <chain name or path>
- build-spec
 - --chain <chain name or path>
 - --raw



Substrate 架构一览

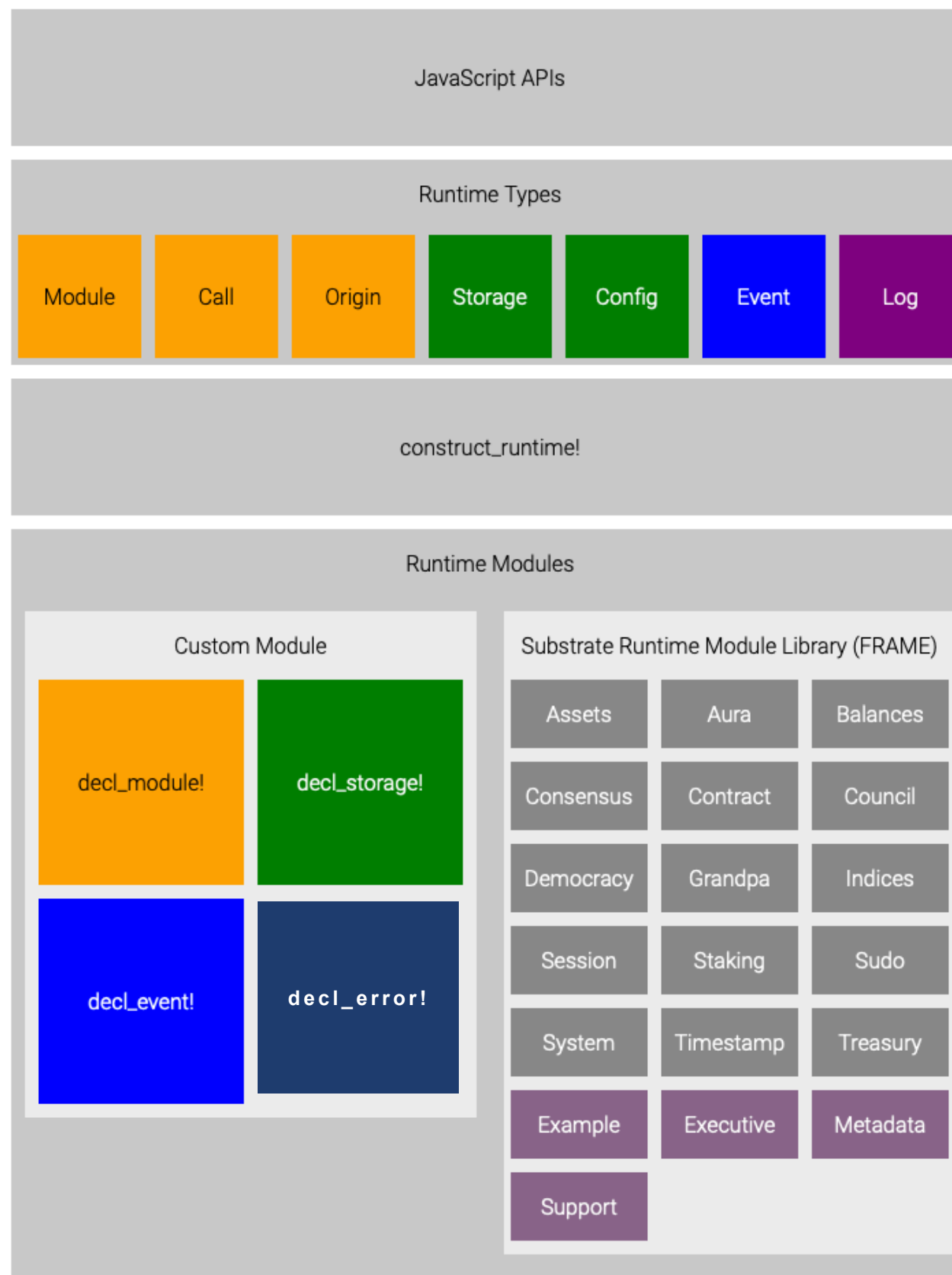


Substrate 架构一览

- Substrate 框架包括了
 - BABE/Grandpa 混合共识机制
 - 通用交易池
 - Metadata 元数据系统
 - SRML (Substrate Runtime Module Library)



Substrate 架构一览





Substrate 架构一览: Runtime

- 数据结构的定义
- Block Header 区块头
- Block 区块
- Extrinsic 外部消息
- Transaction 用户交易
- Inherent 固有消息

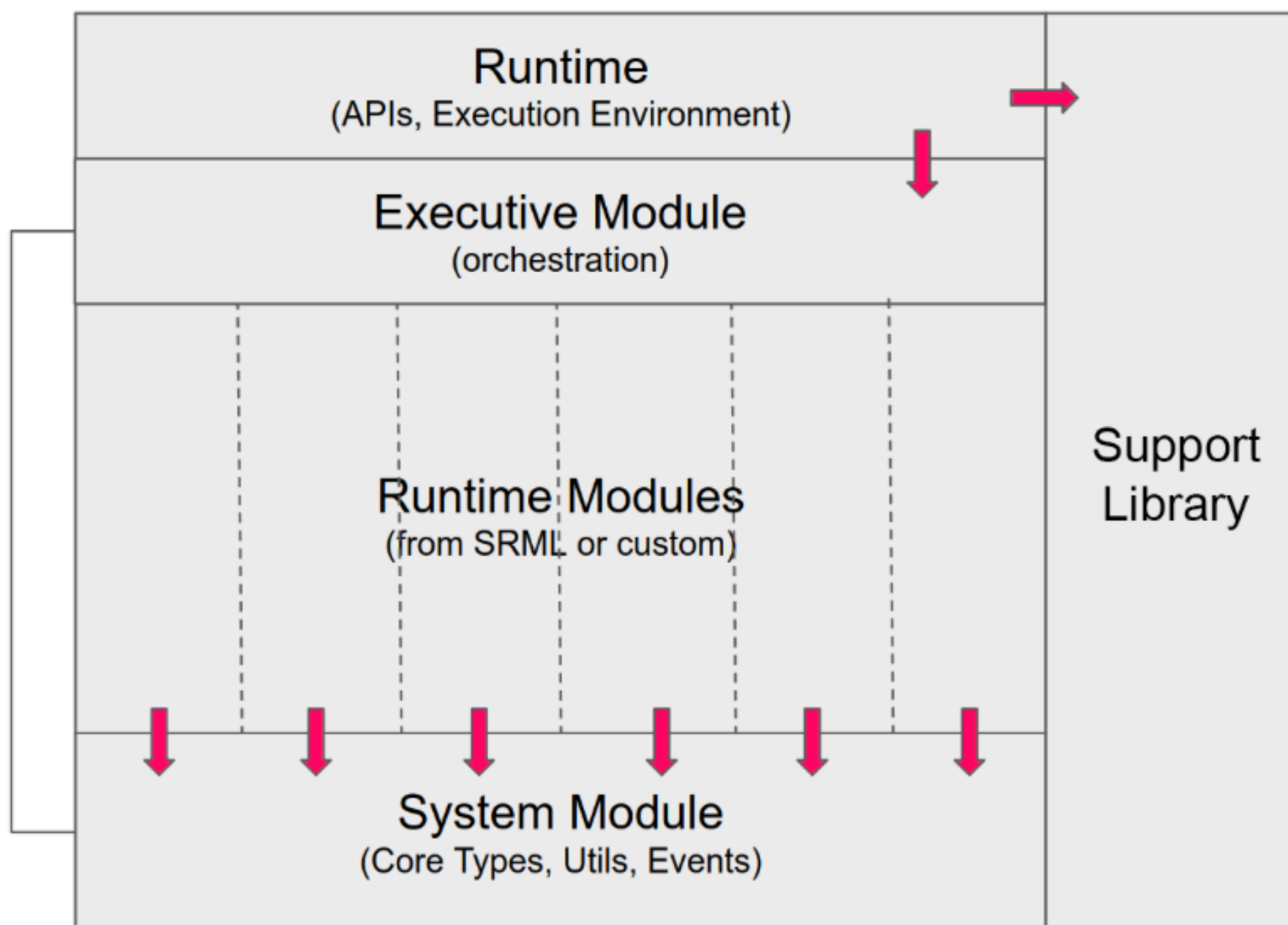


Substrate 架构一览: FRAME (SRML)

- FRAME: 链上逻辑开发框架, 原先叫做 Substrate Runtime Module Library (SRML)
- Pallet: 用来打造链上逻辑的Rust模块
- FRAME: Framework for Runtime Aggregation of Modularised Entities
- FRAME is our framework for developing new Substrate pallets. Pallets are a special kind of Rust module from which Substrate runtimes can be composed. Each pallet has its own discrete logic which can modify the features and functionality of your blockchain's state transition function.



Substrate 架构一览: FRAME





Substrate 架构一览: Runtime

- Core
 - version
 - execute_block
 - initialize_block
- Metadata
 - metadata
- TaggedTransactionQueue
 - validate_transaction
- BlockBuilder
 - apply_extrinsic
 - finalize_block
 - inherent_extrinsics
 - check_inherents
 - random_seed
- OffchainWorkerApi
- GrandpaApi
- BabeApi
- AuthorityDiscoveryApi



Substrate 架构一览: FRAME

■ 核心模块

- Executive
- System

■ 共识机制

- Babe
- Authorship
- Finality Tracker
- Grandpa
- Session
- Offences
- ImOnline

■ 治理

- Council
- Membership
- Elections
- Democracy
- Sudo
- Treasury
- 时间
- Timestamp

■ 资金账户管理

- Indices
- Balances
- GenericAsset
- Staking
- Nicks

■ 智能合约

- Contracts
- EVM

■ 辅助

- Support
- Metadata
- RandomnessCollectiveFlip
- Utility



Substrate Module 组成



Substrate Module 组成

- Trait
 - 定义模块相关类型
- decl_event
 - 定义模块事件
- decl_storage
 - 定义存储数据
- decl_module
 - 包括了 dispatchable method 可外部调用的函数
 - on_initialize / on_finalize 区块初始/结束接口
 - offchain_worker 链下执行机
- decl_error
 - 提供错误代码



Substrate Module 组成

- 文档
 - <https://substrate.dev>
 - <https://crates.parity.io>



项目文件结构简介



作业



作业

- 设计加密猫模块
- 数据结构
- 存储定义
- 可调用函数
- 算法伪代码



作业: 例子

- 数据结构:
 - ERC20
 - struct Token
 - name: string
 - symbol: string
 - decimals: u32
- 链上存储:
 - tokens: map TokenId => Token
 - freeBalance: map => (TokenId, Address) => u256
- 外部函数:
 - balanceOf(Address): u256
 - transfer(from: Address, to: Address, u256 amount): bool



作业

- 需求
 - 链上存储加密猫数据
 - 遍历所有加密猫
 - 每只猫都有自己的dna, 为128bit的数据
 - 设计如何生成dna (伪代码算法)
- 每个用户可以拥有零到多只猫
- 每只猫只有一个主人
- 遍历用户拥有的所有猫



一块链习

THANK YOU!

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