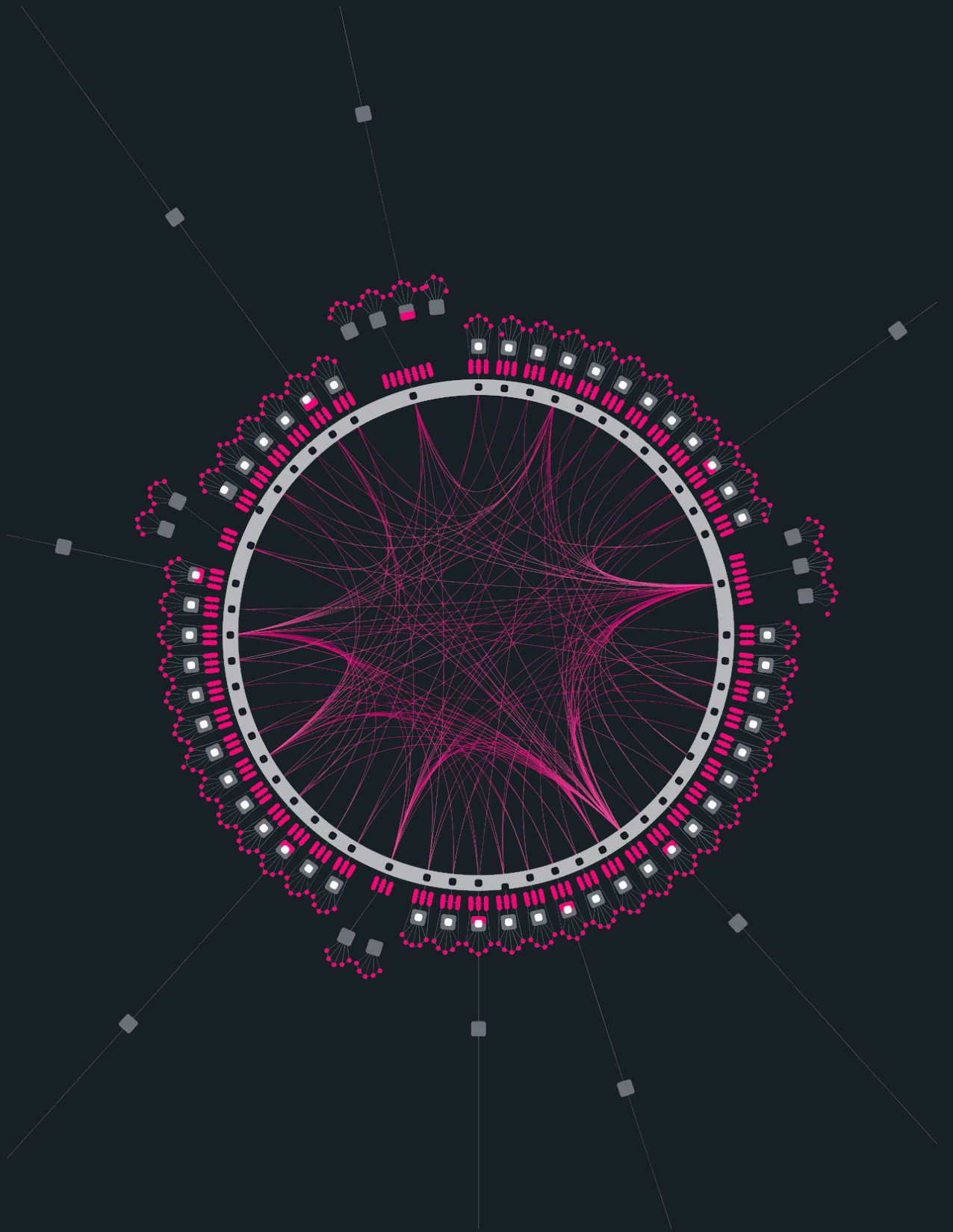
Polkadot Hacker Guide



Start developing on Polkadot

Welcome to the Polkadot Hacker Guide.

We recommend you download this PDF to your desktop for the best experience.

Table of Contents

Not signed up for the Encode hackathon yet?
It's running 9 Nov - 17 Jan. Sign up here. All are welcome.

Hacker Checklist

Start here:

✓ Join the official Polkadot Discord for questions and support

✓ Tune into the Polkadot workshops (workshop 1, workshop 2, Encode calendar)

✓ Watch Gavin Wood tell the Polkadot story in this 7 minute video

✓ Ask questions during weekly Office hours (Substrate Seminar, every Tuesday 2pm UTC)

✓ Join the Acala, Moonbeam, Phala and Plasm Discord channels

Resources

First, the basics...

Polkadot is a sharded, multichain network founded by Dr. Gavin Wood, the co-founder and former chief technology officer of Ethereum and creator of the Solidity programming language. The Polkadot network is a meta protocol that solves many challenges that have hindered the growth of legacy blockchains, including scalability, governance, security, and interoperability.

Kusama is also a sharded, multichain network founded by Dr. Gavin Wood, built using the Substrate framework and nearly the same codebase as Polkadot. Kusama is a network built as a risk-taking, fast-moving ‘canary in the coal mine’ alongside its cousin Polkadot.

Substrate is a blockchain development framework for the Kusama and Polkadot ecosystem. It features a completely generic state transition function and modular components for consensus, networking, and configuration. Despite being "completely generic", it comes with both standards and conventions, particularly with the Substrate runtime module library (FRAME)

Resources

Hackathon Support
- Polkadot Discord

Documentation
- Polkadot wiki
- Whitepaper
- Lightpaper
- FAQ

Utilities and libraries
- PolkadotJS
- API documentation

Network information
- Network telemetry information
- Polkascan
- Subscan
- Polkastats

Github
- Polkadot Github

Videos
- Polkadot Technical Explainer Videos
- Web3 MOOC: Blockchain fundamentals
- Polkadot Youtube Channel
- Polkadot Crowdcast

Events
- Polkadot Decoded

Resources

substrate_

Documentation
- Substrate Knowledge Base
- Rust documentation
- Substrate GitHub

Tutorials
- Tutorials
- Substrate Recipes (working code examples)

Templates
- Node template
- Front-end template
- Web-based VS Code like IDE
- VueJS-based starter kit for Substrate chains

Videos
- Intro to Substrate codebase and FRAME pallet
- Substrate Seminar playlist
- Substrate tutorial videos

Channels
- Stack Overflow
- Parity Technologies YouTube channel

Useful Substrate FRAME Pallets
- Multi-Signature Pallet
- Proxy Pallet
- Identity Pallet
- Utility Pallet

Workshops

Workshop 1: Polkadot and Substrate Introduction

Dan Forbes
Developer Advocate,
Parity

Date: November 19th
https://us02web.zoom.us/j/85212202651

Learn the basics of Substrate development for the Polkadot ecosystem in this hour-long technical discussion, which will include a guided code walkthrough. Topics will include the philosophy & design of Substrate, runtime development with FRAME, and resources for getting started *today*.

Workshop 2: Substrate Enterprise Demo

Dan Forbes
Developer Advocate,
Parity

Steve Degosserie
Runtime Engineer,
Parity

Date: TBD
https://us02web.zoom.us/j/83635650879

In this intermediate workshop, participants will dive deeper into Substrate and explore how it can be applied to real-world problems that exist today. Parity Runtime Engineer Steve Degossiere will describe and demonstrate an end-to-end application built on Substrate. Topics will include access control with FRAME's Origin primitive, an introduction to off-chain workers, and the Polkadot-JS family of client libraries.

Workshops

Workshop 3: TBD

?

Date: Wednesday,

Workshop 4: TBD

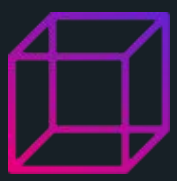
?

Date: TBD

Polkadot Challenges

Easy
Onboarding
$6,000

Intermediate
Build a dapp
$20,000



Hard
Build a blockchain
$10,000

Polkadot Challenges

Easy: Onboarding

Complete up to 6 entry-level Substrate tutorials to begin learning how to build with Polkadot and Substrate.

Prizes are **$6,000** total: Each submission can earn $25 USD per challenge (up to 6 total). The first 40 submissions per challenge are eligible for the prize.

In other words, the first 40 valid submissions can earn up to **$150 USD** for solving six easy onboarding challenges.

Polkadot Challenges

Easy: Onboarding

Challenge 1: Launch a local Substrate development chain

In this beginner challenge you will learn how to launch a local substrate chain and perform certain actions on it.

Use the Substrate Node Template to launch a local development chain and use the Front-End Template to make a balance transfer and make an on-chain remark with your GitHub username.

Submission requirements
Provide a screenshot that shows the finalized transaction. Example below:

Resources

- Substrate Node Template
- Substrate Dev Hub: Create your first Substrate Chain
- Substrate Front-End Template
- On-Chain Remark API Documentation

Polkadot Challenges

Easy: Onboarding

Challenge 2: Front-End Javascript

Use Polkadot-JS or the Front-End Template to write a web page (hosted on GitHub pages or similar) that displays information about the latest block on Kusama, Polkadot or any other Substrate-based chain. Include a component to search for a block by number (height) and/or hash.

Submission requirements
Provide links to your source code and deployed web page.

Resources
- Polkadot-JS API
- Substrate Front-End Template

Polkadot Challenges

Easy: Onboarding

Challenge 3: Run A Polkadot Node And Add It To Telemetry

Download the latest binary release or build Polkadot or Kusama from source, and run your node. Add it to telemetry as per the README instructions, and let us know when your node appears in the telemetry.polkadot.io list!

Submission requirements

The node has to be on telemetry, fully synced, for at least 24 hours. The syncing will take a while, so be patient. Pro tip: run it with the `--wasm-execution=compiled` flag to quadruple sync speed!

Resources

- https://github.com/paritytech/polkadot/releases
- https://github.com/paritytech/polkadot/#connect-to-polkadot-mainnet

Polkadot Challenges

Easy: Onboarding

Challenge 4: FRAME Identity

Substrate-based chains which implement the Identities pallet let users of the chain set some on-chain metadata through which to identify their accounts. Kusama and Polkadot come with identities built in, but on node-template you have to manually extend the chain. Do it. Add the identity pallet to the node template, then register an identity of an account on your local development chain.

Submission requirements

Register an account's identity on your local node-template chain. Add as many fields as you want, but at least one. See resources for a full guide on how to do this on a chain which supports setting identities. Once you've done this, send us a screenshot of that identity visible in Polkadot JS Apps connected to your local chain. Important: Make sure the fields clearly show a value through which we can contact you. E.g. the twitter field should have a valid twitter username, or the email field should have a valid email. We'll use this to get in touch with you, so if you don't have this info in your account's identity, we can't verify the completion of the task!

Resources

- Polkadot Wiki: Identity
- https://github.com/paritytech/polkadot/releases
- PolkadotJS Apps
- FRAME Identity Module
- Rust docs: Identity Module
- Substrate Node Template
- How to add a FRAME pallet to a Substrate Node

Polkadot Challenges

Easy: Onboarding

Challenge 5: FRAME Multisig

Add the Multisig pallet to the Node Template and create a Polkadot-JS script to make a multisig transaction. Use the Front-End Template to create a multisig UI component.

Submission requirements

Provide a link to your GitHub repository and a screenshot of your multisig UI component.

Resources

- FRAME Multisig pallet
- Substrate Node Template
- Polkadot-JS API
- How to add a FRAME pallet to a Substrate node

Polkadot Challenges

Easy: Onboarding

Challenge 6: FRAME Development

Update the Pallet Template to include a storage item for a custom struct. Add at least one dispatchable function to interact with the new storage item. Add the necessary types to the Front-End Template to interact with the new dispatchable.

Submission requirements

Provide a link to a GitHub repository that includes the Node Template with the updated pallet as well as the updated front-end template.

Resources

- Substrate Pallet Template
- Using and storing structs
- Extending types
- Substrate Front-End Template

Polkadot Challenges

Intermediate: Build a DApp

With Polkadot, DApps are built on parachains with smart contract functionality at the parachain layer, which in the very near future, will begin connecting to Polkadot's Relay Chain. **In this challenge, build a DApp on a Polkadot parachain candidate of your choice: Acala, Moonbeam, Phala, or Plasm.**




Total prizes: $20,000

Acala
$3k 1st place
$2k 2nd place

Plasm
$3k 1st place
$2k 2nd place

Moonbeam
$3k 1st place
$2k 2nd place

Phala
$3k 1st place
$2k 2nd place

***Important: Each team can only make a submission to one of the four parachain challenges. Any team submitting to more than one challenge will be asked to choose only one submission to be considered your valid submission for the intermediate challenge.**

A decentralized finance hub and stablecoin platform powering cross blockchain liquidity and applications on Polkadot

Acala Network

Acala is the decentralized financial hub of Polkadot, making it fast and easy to use financial applications available to everyone. The platform offers a suite of financial primitives: a multi-collateralized stablecoin backed by cross-chain assets like Bitcoin, a trustless staking derivative, and a decentralized exchange to unleash liquidity and power financial innovations.

The Challenge

Option 1: Build an order-based exchange that allows people to create, view, and take orders to trade different tokens. To maximize the chance of winning, please implement some additional features. Here are some examples, but use your imagination:

- A nice front-end for user to interact with
- On-chain automatic order-matching (please consider the complexity and on-chain execution performance)
- Off-chain automatic order-matching via off-chain workers
- Advanced order types such as limited order, or order with expiration
- Auction

Option 2: Open hack for any DeFi-related dapp.

Getting Started

- Join the Acala Discord
- Open Runtime Module Library (ORML) Workshop
  - Video
  - Github
- Video: Build Cross-chain DeFi with Acala
- Github
  - Open Runtime Module Library
  - Substrate Node Template
- Polkadot-JS
- Acala Wiki
- Acala Apps
- Acala JS SDK

Moonbeam is an Ethereum-compatible smart contract parachain on Polkadot.

Moonbeam is the easiest on-ramp for building an application on Polkadot. As an Ethereum-compatible smart contract platform, Moonbeam makes it easy to use popular Ethereum developer tools to build or redeploy Solidity projects in a Substrate-based environment. Moonbeam has unmatched Ethereum compatibility:

Minimal Changes: if you have an existing contract, it will work right away with no need to rewrite or reconfigure

Languages: write smart contracts in Solidity or anything that compiles to Solidity bytecode

Use Existing Tools and dApp Front-Ends: connect popular tools like MetaMask, Remix, and Truffle via a complete set of Web3 RPC endpoints. Use well known Javascript libraries such as Web3.Js or Ethers.Js.

Unified Accounts, Addresses, and Signatures: use your existing Ethereum H160 accounts & ECDSA signatures to interact with Moonbeam

Publish-Subscribe Capabilities: subscribe to contract events and updates about on-chain transactions, balances, and more

The Challenge

For this hackathon, you will be using Moonbase Alpha*, which is Moonbeam's TestNet. Some ideas to get you started:

- Create a block explorer for Moonbeam
- Build a new NFT-based game or application
- Create an NFT marketplace using the ERC-721 token standard
- Open Hack

While it's possible to re-deploy an existing Solidity application to Moonbeam, the prizes will be awarded based on overall value-add to the ecosystem, so it is unlikely that you will win that way.

Getting Started

1. Join the Moonbeam Discord
2. View the Moonbeam GitHub repo
3. Connect to the TestNet
4. Request TestNet tokens
5. Configure MetaMask
6. Subscribe to events
7. Use precompiled contracts
8. Moonbeam Truffle Box

*Please note that Moonbase Alpha is a TestNet currently in active development. From time to time, we may need to purge the chain in order as we release an update. You will be notified in advance before this occurs, but you should keep a backup of your project just in case.

Blockchain confidentiality on Polkadot with trusted computing

Phala is a Substrate-based confidential smart contract blockchain on which you can develop confidentiality-preserving and privacy-first blockchain apps. We are a member of the Substrate Builders Program and a recipient of a Web3 Foundation Grant.

The Challenge

During this hackathon, you will learn how to build a confidential contract on Phala Network and interact with the contract from the Web UI. We are thrilled about what kinds of dapps will be built on Phala with confidential contracts. **Here's some directions we suggest, but you are free to build anything you want**:

- Defi with secrets (e.g lending or derivative contract without showing your position)
- Create a NFT with secrets (e.g secret vaults / lottery bundles and chases)
- Personal information related apps (e.g password manager, notebook, personal IPFS file storage, virtual floating bottle)
- Information incomplete PVP games

Phala Network will release the pre-mainnet by the end of 2020. So it's very likely that you can get your application deployed on our mainnet for real! And if your work can benefit the ecosystem, you could get sponsored from the Phala treasury as well.

Getting Started

- Introduction on the Phala Wiki
- Phala Github (We also have the ready-to-hack code templates on Github)
- Prepare the local development environment
- Build the first confidential contract

Faster, cheaper, and interoperable Ethereum-compatible smart contract platform on Polkadot

Plasm, built by Stake Technologies, is a multi-virtual machines scalable smart contract platform on Polkadot supporting cutting-edge layer2 solutions. Recently, Plasm Network announced the vision of an Ethereum compatible network and supported the Ethereum Virtual Machine on it's testnet. The Polkadot Relay Chain doesn't support smart contract functionalities by design. Thus, all DApps developers need at least one Parachain that supports smart contracts. When it comes to smart contracts, we believe that scalability is the most fundamental issue we have to solve. That's why we are implementing layer2 solutions on the top of Plasm Network.

The Challenge

For this challenge, build a dapp on Plasm's blockchain. The challenge is intentionally open-ended, allowing you complete flexibility to build whatever is on your mind.

Getting Started

Join the Plasm Discord
Documentation
Plasm GitHub
Plasm Network Documentation EVM
Plasm App
Demo Video
We are hiring software engineers!

Polkadot Challenges

Hard: Build a Blockchain

Substrate is the framework used to build custom blockchains compatible with Polkadot. In this challenge, build a custom blockchain using Substrate that could eventually become a platform within the Polkadot ecosystem, similar to the parachain candidates above.

Total prizes: $10,000

1st place: $6,000

2nd place: $4,000

Prizes also include:

- Fast-tracked to a call with the **Substrate Builders Program** lead team
- Fast-tracked to discussion about a potential grant with **Web3 Foundations Grants** team
- Polkadot and Kusama swag
- Feature in Polkadot social media

Polkadot Challenges

Hard: Build a Blockchain

‘Build a Blockchain’ ideas in no particular order

- **Decentralized Finance (DeFi) chains**
  - Stablecoin
  - Insurance platforms
  - Yield aggregators
  - Decentralized exchange (DEX) aggregators
  - Derivatives
  - No-loss lotteries
  - Decentralized futures
  - Permissionless options trading
  - Flash loans
  - Credit risk protocols for lending and borrowing
  - Interest free loans (ie. Liquity)
  - Non-custodial mimetic trading for synthetics
  - Fixed interest rate loans (ie. Notional Finance)

- **Decentralised autonomous organizations (DAOs) chains**
  - General DAO
  - Decentralised marketplace
  - Innovative governance (e.g. Participation Lotteries on Kusama)
  - DAO infrastructure

- **Other chains**
  - Privacy (e.g. SubstraTEE)
  - Gaming-based chain, for example Amethyst + Substrate
  - Prediction Market (like Polymarket/Augur/Catnip.Exchange)
  - Computation chain (like Golem)
  - Content, social networking or storage
  - Decentralised identity
  - Public voting
  - Licensing chain
  - Other consensus mechanisms integrated into substrate

- For past submissions, see the Hackusama blockchain challenge winners.

After the Hackathon

WEB3 FOUNDATION GRANTS

General Grants Program
The standard program offers funding of up to $100k for technical grants. See our Grant Github repository for more information.

Apply here

Open Grants Program
This program offers funding for smaller technical grants of up to $30k. These applications are tracked transparently on GitHub.

Apply here

SUBSTRATE BUILDERS PROGRAM

The Substrate Builders Program directly supports you by bringing you Parity's extensive resources, taking your Substrate ecosystem project to the next level:

- Technical support
- Community support
- Funding support
- Business Development support
- Strategy and Feedback

Learn more here

After the Hackathon

TREASURY

The Treasury is a pot of funds collected through transaction fees, slashing and staking inefficiencies. One way of administering these funds is via a spending proposal. If approved by the Council, which in this sense is in charge of guarding and administering these funds, community members can receive funding for the development of projects that give traction to the network.

Polkadot treasury

- 15/22 proposals approved
- Total funded: 90k DOT
- Average funding: 6,5k DOT
- Treasury total: 9M+ DOT

Kusama treasury

- 33/55 proposals approved
- Total funded: 56k KSM
- Average funding: 1,7k KSM
- Treasury total: 239k KSM

FUTURE HACKATHONS

We are continuously organising and participating in hackathon and developer incentivising programs. To stay in the loop with all the future hackathons **subscribe** to our newsletters and keep an eye open. The get a sense of past hackathons, have a look at **Hackusama** and **Hello World! by Polkadot**.

AMBASSADOR PROGRAM

We already know that you're out there. Every day, we interact with scores of Polkadot enthusiasts around the globe, who understand the vast potential of the platform and want to help promote it—and now it's your chance to help us take our efforts to a whole new level. **Apply here** and take your first step to becoming a Polkadot Ambassador and join the 415+ people in 68 countries around the world who are contributing to the network.

Let’s Connect

Polkadot

- Polkadot Twitter
- Polkadot Reddit
- Polkadot Discord
- Polkadot Telegram
- Polkadot Newsletter

KUSAMA

- Kusama Twitter
- Kusama Reddit
- Kusama Discord
- Kusama Telegram
- Kusama Newsletter

substrate_

- Substrate Twitter
- Substrate Reddit
- Substrate Discord
- Substrate Seminar
- Substrate Newsletter