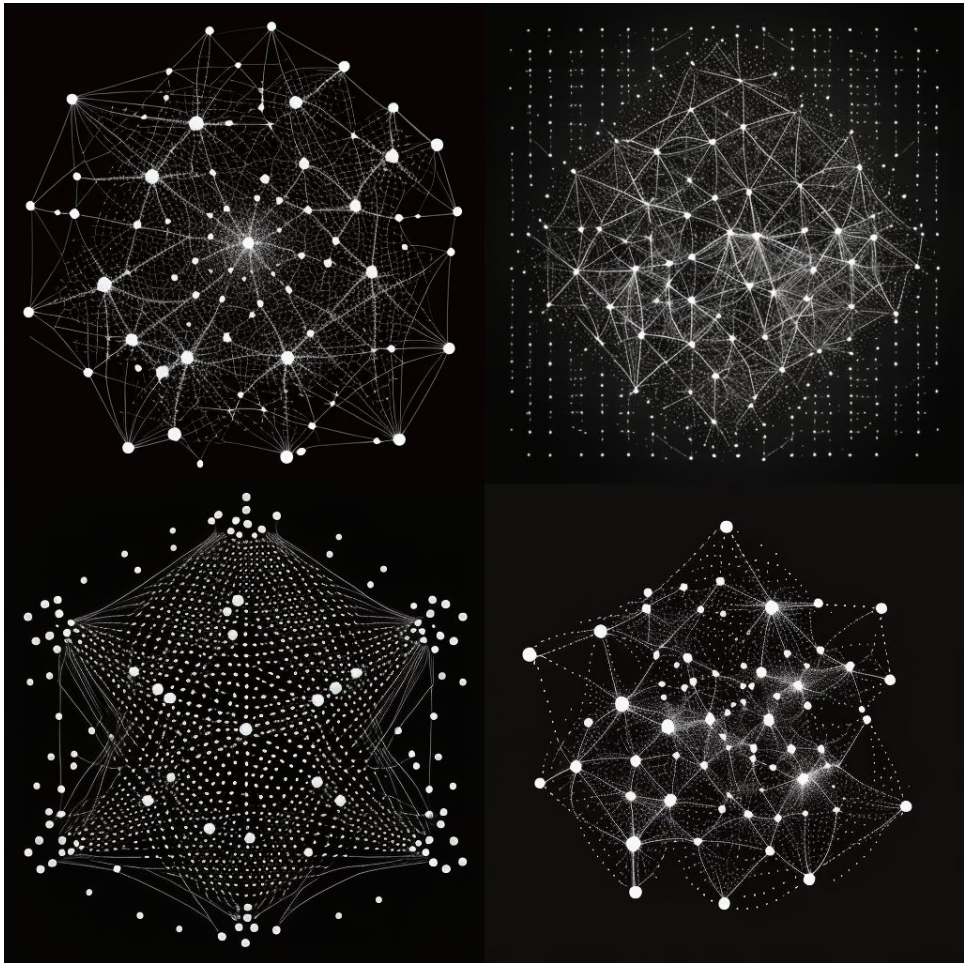
Lesson 6: Intro to the Lightning Network

Theory / Implementations / protocol vs app dev / Lightning Development environments

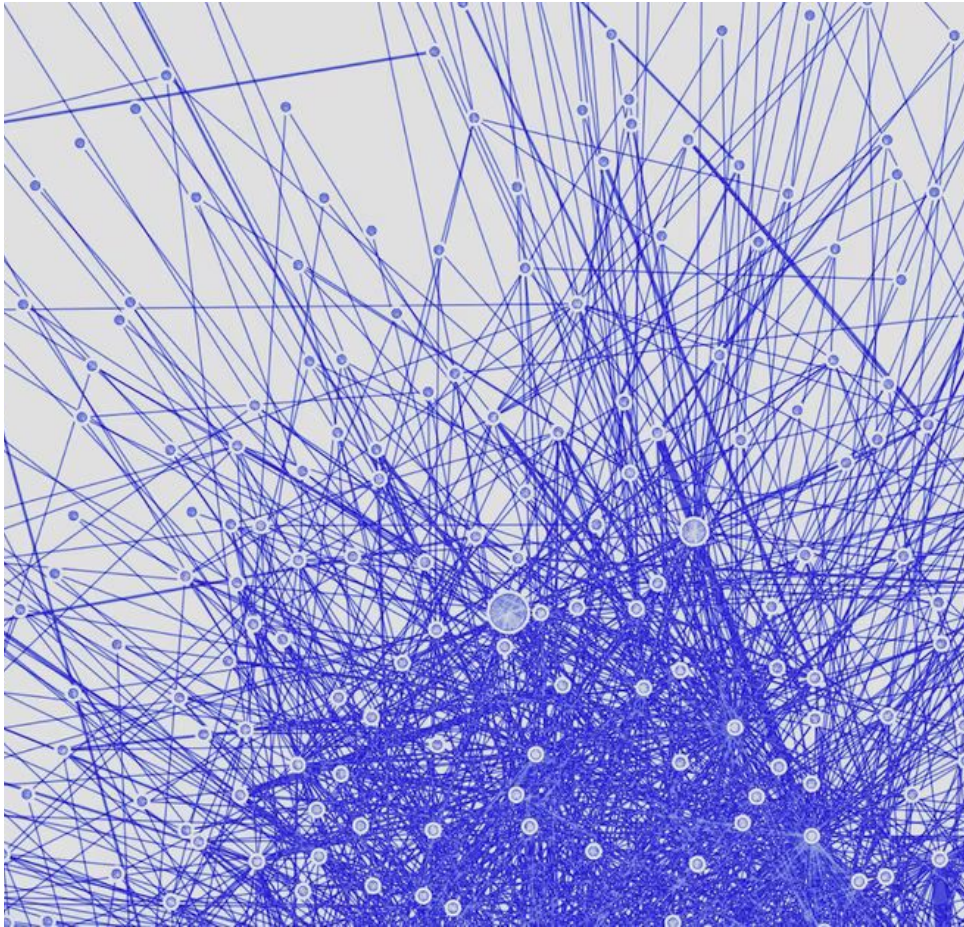
The Lighting Network

- **Second-layer solution:** Built on top of Bitcoin's blockchain for faster, more scalable transactions
- **Off-chain transactions:** Enables payments between users without recording every transaction on the blockchain
- **Micropayments:** Allows for small, instant transactions with very minimal fees, expanding the range of possible use cases for Bitcoin



Lightning Nodes

- **Network participants:** Lightning nodes are computers that participate in the Lightning Network by running compatible software
- **Routing payments:** Nodes help route transactions through the network by forwarding payments between channels
- **Decentralization:** A large number of nodes ensures the network remains decentralized and resistant to censorship or control by a single entity

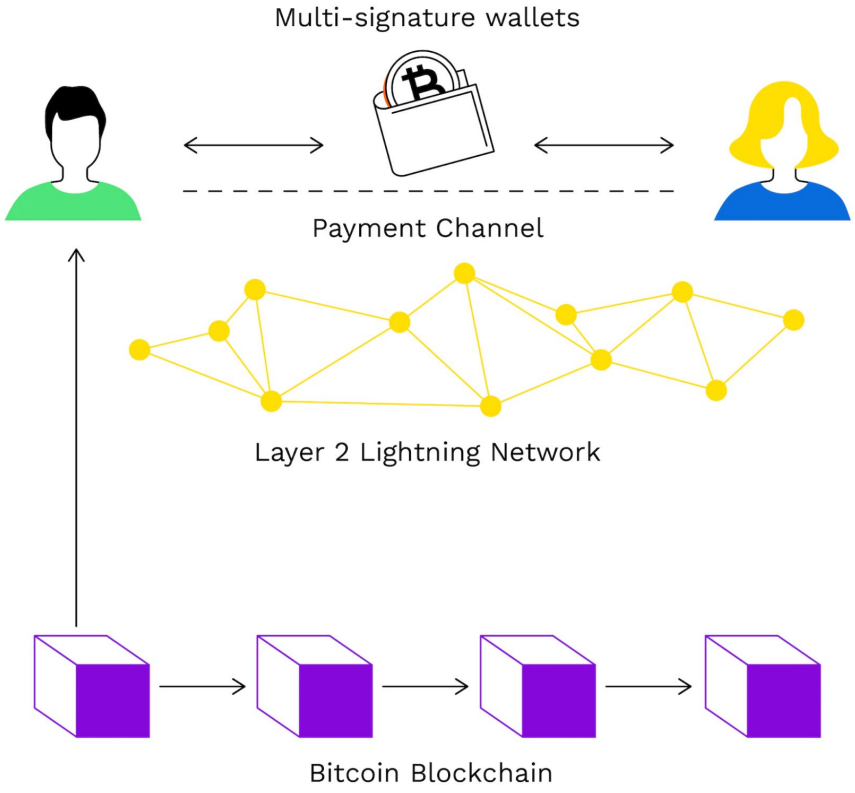


Lightning Channels

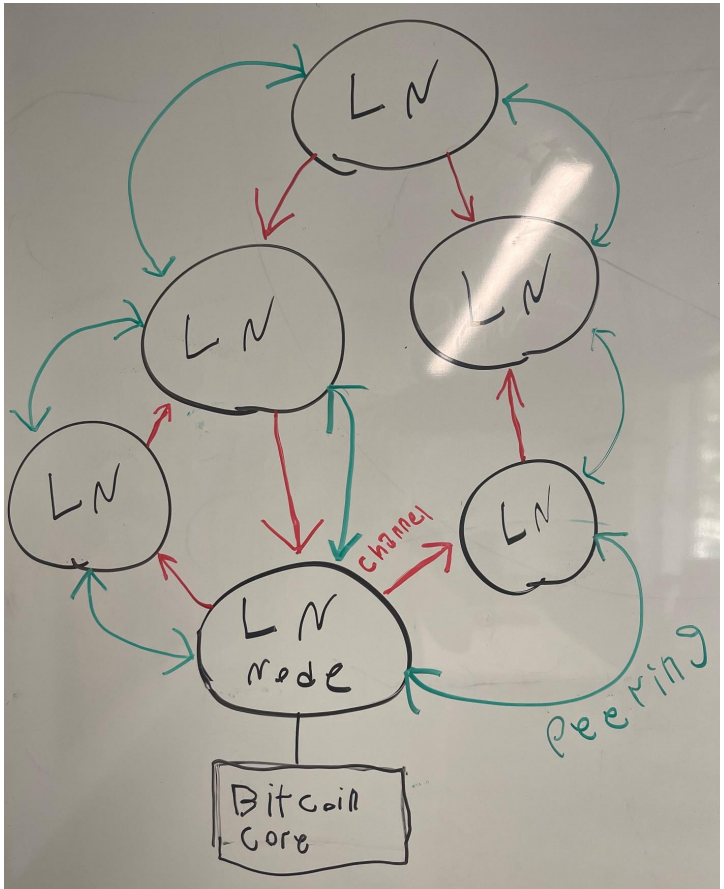
- **Payment channels:** Temporary, private channels between users allow for multiple transactions without requiring on-chain confirmations

- **Multi-signature wallets:** Both parties in a channel have control over funds, ensuring security and trust

- **Network of channels:** Users can route payments through multiple channels, even if they don't have a direct channel with the recipient

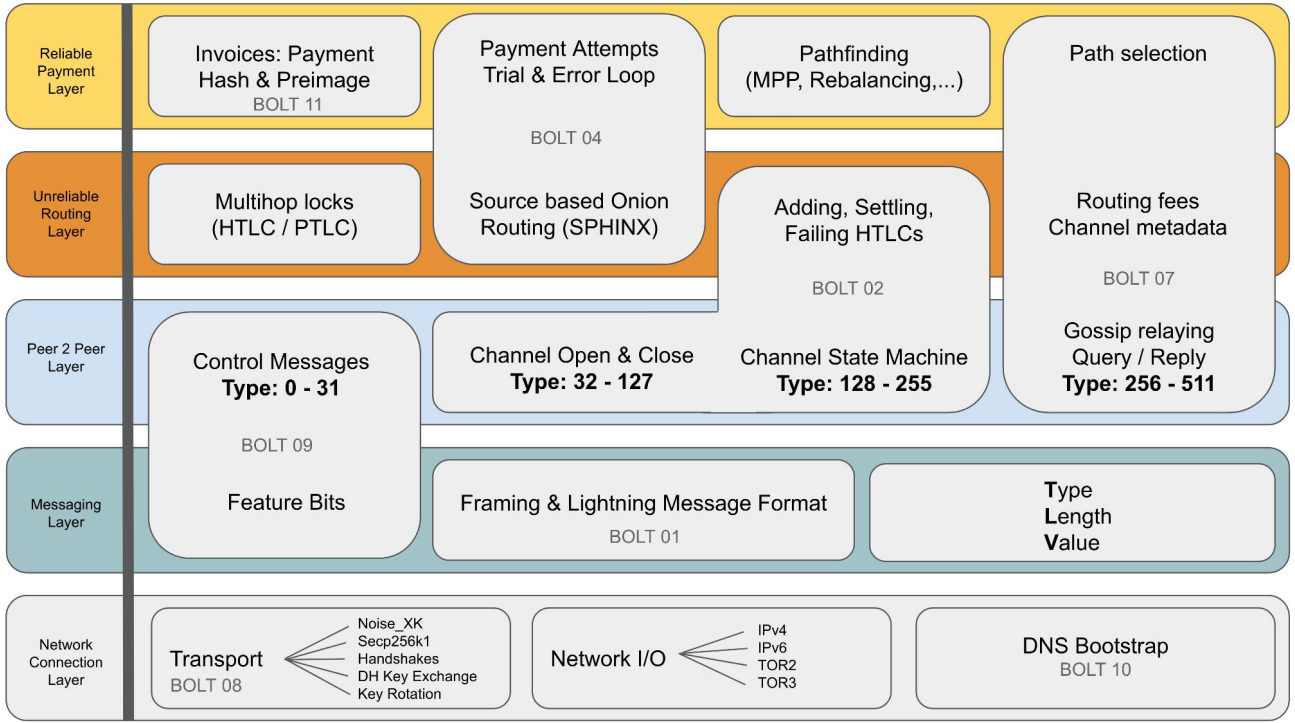


Lets rip it on the whiteboard



What is a Lightning implementation

A Lightning Network implementation is a software package that implements the Lightning spec, allows nodes to participate in the Lightning Network, and provides the necessary functionalities for a Lightning node



Protocol dev VS App dev

PlebDevs course #1
Frontend

User Interfaces (Mobile, Browser)

PlebDevs course #2
Backend

Application Server

Protocol Developer
Lightning

Lightning Network Node

Protocol Developer
Bitcoin

Bitcoin Node

The different Lightning Implementations

- **LND:**
  - Stands for “Lightning Network Daemon”
  - The most popular / widely used LN implementation
  - Developed by Lightning Labs, written in Go
  - Rich feature set and extensive documentation

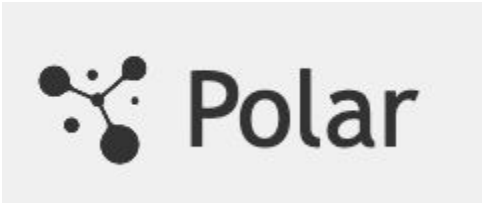
- **CoreLightning:**
  - Developed by Blockstream
  - Written in C, optimized for performance and reliability
  - Flexible plugin system for extended functionality
  - Feature rich

- **Eclair:**
  - Developed by ACINQ
  - Written in Scala, Highly scalable
  - User-friendly wallet app and mobile SDK for app development
  - Offers additional features such as channel management tools

- **LDK:**
  - Created by Spiral (formally Square crypto)
  - Written in Rust, focusing on safety and performance
  - Modular, customizable toolkit for building Lightning implementations and applications
  - Enables seamless integration with various Bitcoin wallets and applications

Setting up a local Lightning Development Environment

With https://polarlightning.com

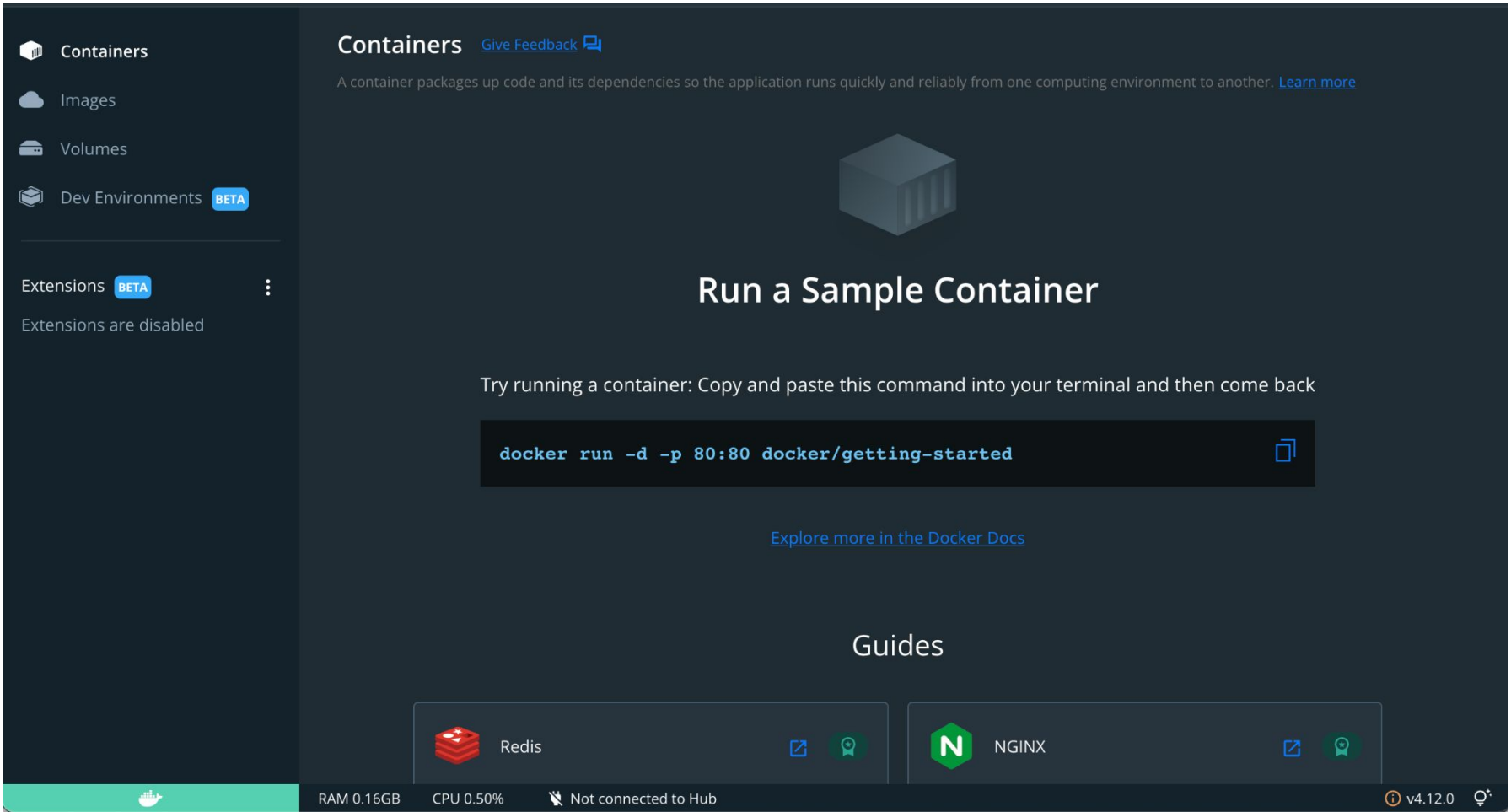


Install Docker Desktop and Polar

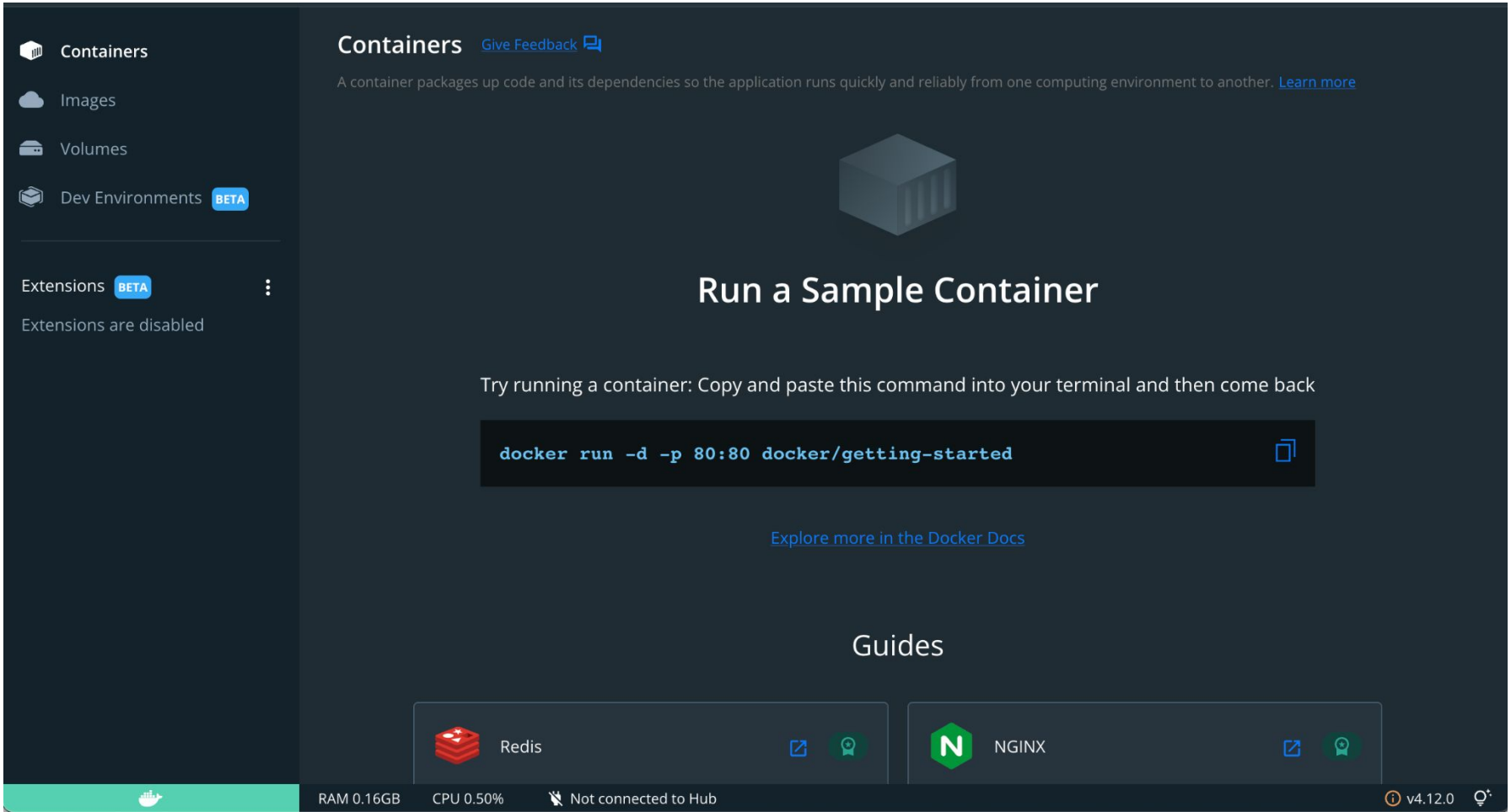
- Docker Desktop

- Polar

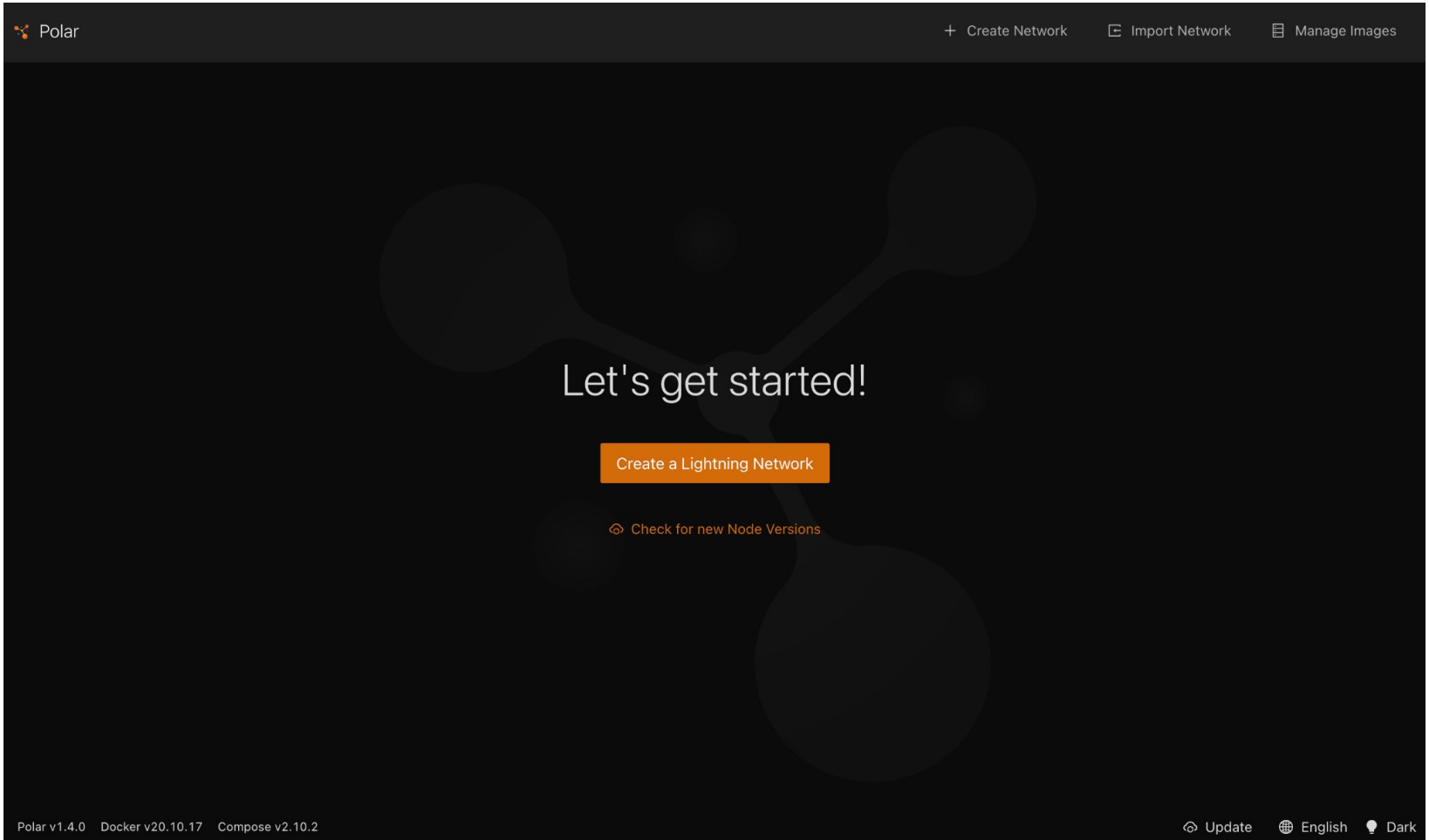
1. Open Docker Desktop, wait for it to start



1. Open Docker Desktop, wait for it to start

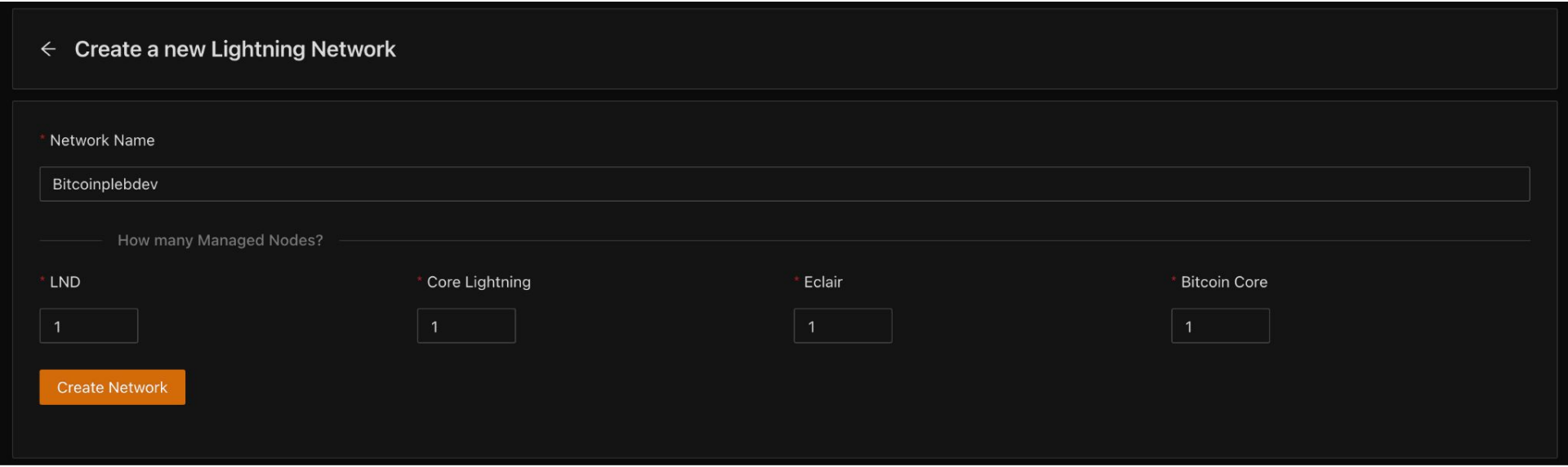


2. Open Polar, Create a Lightning network

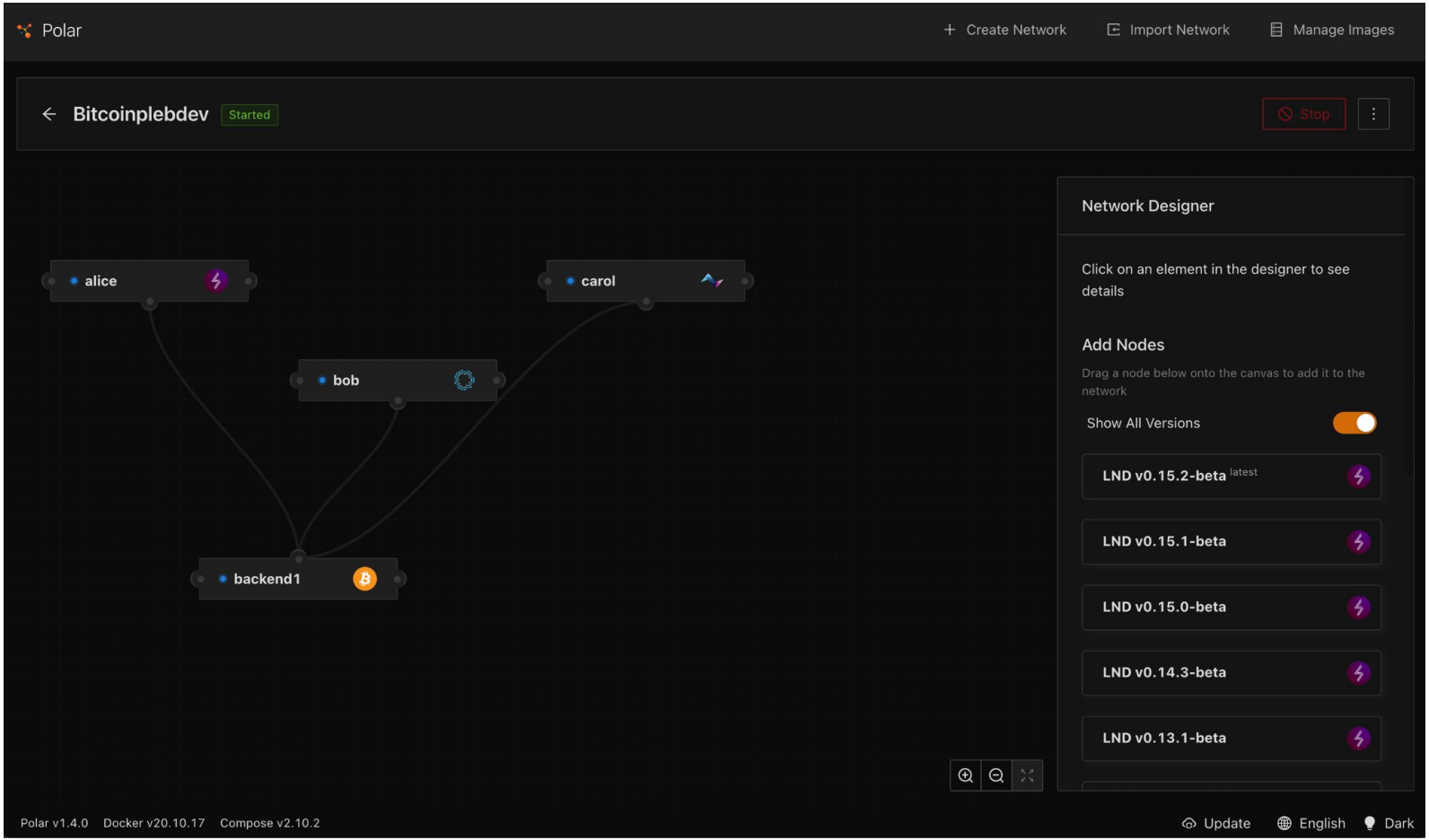


3. Create your network

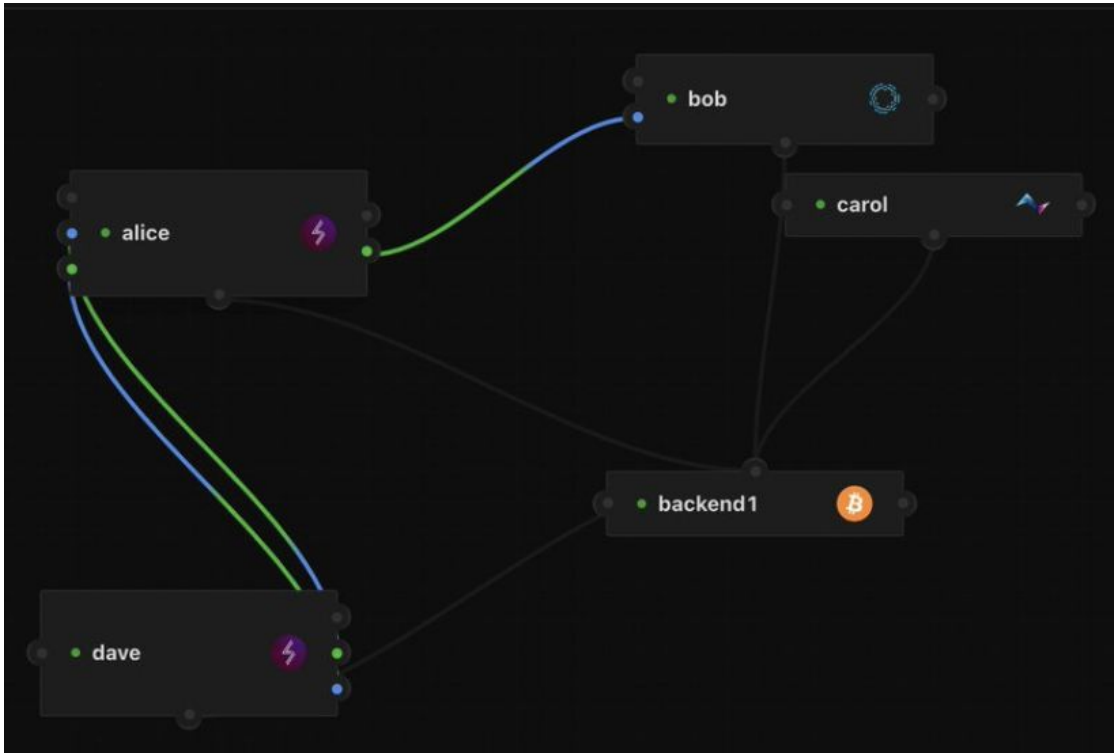
- Give it a name
- You can use the default network or customize it / add nodes
- Make sure that you have at least 1 Bitcoin Core node though



4. Click Start



Let's create some channels / invoices in Polar



Resources

- Bitcoin's Lightning Network, Simply Explained! - https://www.youtube.com/watch?v=rrr_zPmEiME
- A Technical Introduction to The Lightning Network - https://www.youtube.com/watch?v=E1n3sKKPD_k&t=330s
- The Lightning whitepaper - https://lightning.network/lightning-network-paper.pdf
- Lightning Series: Mastering Lightning with Andreas M. Antonopoulos & René Pickhardt - https://www.youtube.com/watch?v=zG8PZsHLung
- Understanding the Lightning Network (series) - https://bitcoinmagazine.com/technical/understanding-the-lightning-network-part-building-a-bidirectional-payment-channel-1464710791
- Mastering the Lightning Network Book (free) - https://github.com/lnbook/lnbook