Espresso

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Build institution-controlled financial applications with real-time settlement, privacy, compliance controls, and access to global onchain liquidity.

Espresso is a blockchain purpose-built to serve as settlement infrastructure for other applications and blockchains. Each integrated system keeps its own execution environment, sequencer, and compliance rules. Espresso finalizes their transaction output through decentralized Proof of Stake consensus and makes that finality verifiable by other connected applications & blockchains through zero-knowledge proofs.

This documentation covers what Espresso is, what you can build on it, how it works, and how to integrate.

Ready to build? Talk to Espresso

What Can I Build?

Espresso is designed to support institution-grade financial applications including:

- **Stablecoins**: dedicated issuance environments with custom compliance rules, privacy controls, and access to onchain liquidity including USDC, USDT, and other Ethereum-issued assets
- **Payment networks**: application-specific environments with custom fee models, gasless end-user experiences, and crosschain settlement

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- **Tokenized assets and RWA**: high-performance environments with full compliance controls, DeFi compatibility, and privacy-preserving ownership records
- **Collateral management**: real-time crosschain position monitoring secured by zero-knowledge proofs, without trusted intermediaries

See example solutions

Key Properties

- **Control**: each environment defines its own rules for compliance, fees, ordering, and asset support; no shared state with other applications on Espresso
- **Privacy**: transaction data can be encrypted before submission; Espresso finalizes the encrypted sequence without decrypting it; only authorized participants holding the appropriate access keys can derive application state
- **Real-time settlement**: finality through decentralized Proof of Stake consensus, not sequencer confirmations or multisig coordination
- **Interoperability**: state finalized by Espresso can be verified by Ethereum and other connected chains through zero-knowledge proofs, without trusted intermediaries

Learn more about Espresso

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Espresso for Enterprise

For institutions digitizing assets, payments, and financial infrastructure. Run dedicated execution environments on your own rules, settled through Espresso and connected to broader onchain markets.

Companies and blockchains like Celo, ApeChain, Gate, Litecoin Foundation, and others have already chosen Espresso for the architectural freedom and native interoperability no monolithic chain can match.

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Enterprise deployments on Espresso get:

- **Dedicated environments**: sovereign execution with custom rules for fees, ordering, compliance, and asset support
- **Privacy-preserving settlement**: dedicated environments can keep transaction data encrypted, with only authorized participants able to derive application state
- **Shared finality**: a common finality layer that coordinates state across systems in real time
- **Security by consensus**: crosschain coordination secured by zero-knowledge proofs and decentralized Proof of Stake finality, reducing reliance on trusted intermediaries
- **Liquidity access**: state finalized by Espresso can be verified by Ethereum and other connected chains, so dedicated environments can stay connected to onchain liquidity including USDC, USDT, and other Ethereum-issued assets without giving up architectural control

See institutional deployments in action. Example Solutions

Example Solutions

Espresso is designed to support institutional applications such as collateral management, stablecoins, tokenized assets, and payment networks.

Collateral Management and Margin Monitoring

Real-time crosschain collateral with cryptographic proof of position across systems.

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Real-time collateral management requires a reliable, unified view of positions across multiple systems. Espresso's shared finality provides that foundation. Multiple collateral environments can run in parallel, scaling throughput linearly, while crosschain coordination secured by zero-knowledge proofs allows assets on one environment to serve as collateral in agreements on another.

- **Parallel environments**: multiple collateral application instances run concurrently, each scaling independently
- **ZK-secured crosschain coordination**: positions and collateral state are verifiable across environments without re-executing source logic or relying on trusted intermediaries
- **Real-time settlement**: Espresso finalizes a unified transaction sequence across all environments, giving risk systems a consistent, timely view of positions

A live Digital Assets Summit 2026 demo ↗ showed crosschain collateral management concepts at scale.

Stablecoin Issuance

A stablecoin that behaves like a traditional fintech payment platform, with blockchain settlement underneath.

- **Dedicated execution environment**: an application-specific environment with custom rules and settlement through Espresso
- **Interoperability**: connect to supported DeFi and blockchain ecosystems without making users manage bridge mechanics directly
- **Gas abstraction**: applications can abstract fee payment from end users where the product design supports it
- **Privacy**: transaction data remains private to authorized participants; only those with appropriate access can derive balances and activity

Modern stablecoins operate as full applications, combining fast crosschain movement, compliance controls, and DeFi interaction. Espresso provides the infrastructure to deliver this as a dedicated, institution-controlled product.

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Asset Tokenization and RWA

Tokenized assets on a high-performance, customizable environment with full compliance controls, interoperable with the broader blockchain ecosystem.

- **Dedicated infrastructure**: institutions retain control over issuance rules, compliance requirements, and access permissions
- **DeFi-compatible**: tokenized assets can be listed, traded, and used as collateral across DeFi
- **Privacy-preserving**: sensitive transaction data and ownership records can remain private to authorized participants

Payment Service Provider Applications

A dedicated application environment for enterprises building onchain payment networks: neobanks, payment processors, and fintech platforms.

- **Custom fee models**: flat, percentage-based, or zero, aligned with existing pricing structures
- **Gasless end-user experiences**: applications can remove gas fees entirely for end users; fee handling is a configuration decision at the execution environment level, not a network constraint
- **Compliance controls**: enforce access rules, transaction limits, and asset restrictions at the environment level
- **Crosschain settlement**: connect payment flows to broader blockchain markets through secure interoperability

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How It Works

Settlement and execution are separated. Each application environment has its own sequencer that orders transactions and streams them to Espresso. Espresso finalizes that stream through decentralized Proof of Stake consensus, establishing a definitive record of what happened. Each application then executes its own deterministic logic against that finalized transaction stream. For private applications, this includes decrypting transactions using access keys held only by authorized participants. Because Espresso's consensus ensures all clients observe the same finalized sequence, all authorized clients derive identical state.

Crosschain coordination uses cryptographic proofs. Applications that need to verify state or pass messages across environments do not reconstruct the full source state. Instead, coordination servers attach zero-knowledge proofs to crosschain messages, allowing destination environments to verify correctness without re-executing the source logic. This removes the need for trusted intermediaries in crosschain settlement.

Execution scales horizontally. Espresso does not execute transactions. Each environment runs its own execution logic, which means Espresso is not the throughput bottleneck. Multiple dedicated environments run in parallel, each scaling independently, and Espresso finalizes their output. Institutions can run high-throughput financial workloads across many parallel environments without any single execution environment becoming the constraint.

Espresso for Chains

For teams building dedicated chains across payments, consumer apps, DeFi, and application-specific deployments. Get settlement, security, and crosschain connectivity out of the box.

Chains built on Espresso get:

- **Control**: a dedicated environment built around your own requirements

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- **Configurability**: design the system around the product, not the other way around
- **Connectivity**: native interoperability with every other chain on Espresso
- **Performance**: fast finality on Mainnet today; the ability to scale to millions of transactions per second

Learn how chains build on Espresso. Custom Chain Infrastructure ↗

How to Work With Espresso

Each environment is fully customizable: fees, transaction ordering, VM extensions, compliance controls, and privacy configuration. Organizations benefit from the security of Espresso's validator network and connectivity to the broader blockchain ecosystem. Deployments can be built directly on Espresso or designed and operated by Espresso Systems.

The network offers fast finality on Mainnet today, with the ability to scale to millions of transactions per second. Crosschain collateral management use cases have been demonstrated live at Digital Assets Summit 2026 ↗.

Exploring asset digitization, digital payments, or tokenized financial products? Talk to the team ✉

About

Espresso Systems builds digital asset infrastructure for enterprises that demand speed and customizability without sacrificing architectural control. We believe the future of finance is multichain, and build with that thesis in mind. We design and operate production-grade applications on Espresso, a high-performance blockchain providing real-time settlement, fast finality, and the ability to scale to millions of transactions per second.

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Espresso Systems was founded in 2021 by Ben Fisch ↗, Benedikt Bünz ↗, Charles Lu ↗, and Jill Gunter ↗, and is backed by more than $50 million from Andreessen Horowitz, Sequoia Capital, Greylock Partners, Paxos, Gemini, and Coinbase Ventures.

The network is used by Offchain Labs (Arbitrum), Celo (Valora, MiniPay), Yuga Labs (ApeChain), Bitget (Morph Chain), Rarible (Rari Chain), and Litecoin (LitVM).

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