

# White Paper:

## Decentralized Betting on Binary Outcomes

# Abstract

This white paper presents a decentralized betting platform enabling participants to wager on binary outcomes (e.g., Yes/No, True/False, or other dual-choice scenarios). Built on blockchain technology, the platform ensures transparency, fairness, and immutability while eliminating intermediaries. By leveraging smart contracts, the platform automates bet handling, outcome resolution, and reward distribution, creating a trustless ecosystem for binary prediction markets.

## Introduction

Betting on binary outcomes has applications in fields ranging from sports and entertainment to political forecasting and market predictions. Traditional systems often suffer from issues such as lack of transparency, unfair payouts, and reliance on centralized authorities.

This decentralized platform aims to address these challenges by utilizing blockchain technology. With features like automated bet management, verifiable results, and fair payout mechanisms, it offers a secure, efficient, and global solution for binary betting.

## Problem Statement

Traditional betting systems on binary outcomes suffer from significant challenges, including centralized control, lack of transparency, unfair payout mechanisms, accessibility barriers, and security risks. Centralized platforms require users to trust intermediaries, making them vulnerable to fraud, manipulation, and hacking. Opaque processes prevent users from verifying outcomes or payout fairness, while high fees and delays

discourage participation. Additionally, geographical restrictions and currency dependence limit accessibility, excluding many potential users. These challenges highlight the need for a decentralized solution that leverages blockchain technology to ensure trustless operations, transparent processes, fair payouts, global accessibility, and enhanced security for binary betting markets.

## Challenges with Traditional Betting

1. **Centralized Control:** Platforms rely on intermediaries to manage funds, determine outcomes, and distribute payouts, leading to trust issues and potential biases.
2. **Lack of Transparency:** Betting processes, odds calculations, and payout distributions are opaque, leaving users unable to verify fairness or correctness.
3. **Unfair Payouts:** High platform fees and delayed payments reduce user rewards and discourage participation.
4. **Security Vulnerabilities:** Centralized systems are prone to hacks, fund mismanagement, and operational failures, risking user funds and data.

## Our Solution

### ALPH Blockchain-Based Betting Solution

The ALPH blockchain offers a decentralized, transparent, and secure platform to facilitate betting on binary outcomes, such as the result of the upcoming U.S. Presidential Election. Using the RALPH programming framework, we can deploy a smart contract to manage bets, resolve outcomes, and distribute rewards in a trustless manner.

## Key Features

### 1. Decentralized Betting Management

Users can place bets on either of two binary outcomes—e.g., "Candidate A wins" or "Candidate B wins." The ALPH smart contract locks funds securely, tracks the total pool for each side, and ensures that bets cannot be tampered with.

### 2. Outcome Resolution with Decentralized Oracles

The contract integrates with ALPH oracles to fetch the official election results securely. This ensures that the outcome is resolved based on verified and tamper-proof data.

### 3. Dynamic Payout Rate Calculation:

Calculate the potential payout rate dynamically as users place their bets. This will allow participants to estimate the reward they would receive if their bet wins, based on the current pool sizes.

### 4. Fair Payout Distribution

Upon resolving the event, the contract automatically distributes funds from the losing side proportionally among winners. Payouts are calculated based on the size of each participant's bet relative to the total pool for their side.

### 5. Global Accessibility

Using ALPH's native token, the platform enables global participation without geographical or currency restrictions. Anyone with an ALPH wallet can place bets and claim rewards.

# Roadmap

## Phase 1: Foundation (Months 1-2)

### Smart Contract Development

- Build core betting contracts using Ralph (Alephium's smart contract language)
- Implement stateful UTXO model for bet management
- Develop token management system using Alephium's native token functionality
- Create test suite for smart contracts

### Architecture Setup

- Set up Alephium node infrastructure
- Configure development environment for Ralph
- Establish CI/CD pipeline
- Create contract deployment scripts

### Key Deliverables:

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- Core smart contracts (Betting, Pool Management)
- Basic test coverage

- Development environment documentation
- Initial security audit

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## **Phase 2: Core Features (Months 3-4)**

### **AMM Implementation**

- Develop pool-based liquidity system
- Implement dynamic odds calculation
- Create fee distribution mechanism
- Build emergency pause functionality

### **Oracle Integration**

- Integrate Alephium native oracle system
- Implement multi-source price feeds
- Create fallback mechanisms
- Build oracle verification system

### **Key Deliverables:**

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- Functional AMM system
- Working oracle integration
- Initial frontend prototype
- Technical documentation

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## Phase 3: User Interface (Months 4-5)

### Frontend Development

- Build React-based web interface
- Integrate Alephium wallet connection
- Implement real-time updates using WebSocket
- Create position management dashboard

### API Development

- Develop REST API endpoints
- Create WebSocket services
- Implement caching layer
- Build analytics backend

### Key Deliverables:

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- Working web interface
- Wallet integration
- API documentation
- User testing feedback

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## Phase 4: Risk Management & Testing (Months 6-7)

### Risk Systems

- Implement bet limits
- Create user risk profiles
- Develop anti-manipulation measures
- Build monitoring systems

### Testing & Auditing

- Comprehensive smart contract testing
- Security penetration testing
- Performance optimization
- External audit coordination

### Key Deliverables:

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- Risk management system
- Audit reports
- Performance metrics
- Bug bounty program launch

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## Phase 5: Beta Launch (Month 8)

### Testnet Deployment

- Deploy on Alephium testnet
- Community testing program
- Bug fixes and optimizations
- Documentation updates

### Mainnet Preparation

- Final security checks
- Liquidity provider onboarding
- Community engagement program
- Marketing initiatives

### Key Deliverables:

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- Testnet deployment
- User documentation
- Marketing materials
- Launch strategy

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## Phase 6: Launch & Growth (Months 9-12)

### Mainnet Launch

- Phased mainnet deployment
- Liquidity mining program
- Community governance setup
- Marketing campaign execution

### Platform Expansion

- Additional betting markets
- Mobile interface development
- Advanced analytics tools
- Cross-chain bridge exploration

### Key Deliverables:

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- Production platform
- Growth metrics
- Community governance
- Expansion roadmap

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# Technical Stack

## Smart Contracts

- Language: Ralph (Alephium)
- Testing: Alephium Test Framework
- Tools: Alephium CLI

## Frontend

- Framework: React
- State Management: Redux
- Wallet Connection: AlephiumConnect
- UI Components: Custom + shadcn/ui

## Backend

- Language: Typescript/Node.js
- Database: PostgreSQL
- Caching: Redis
- API: GraphQL/REST

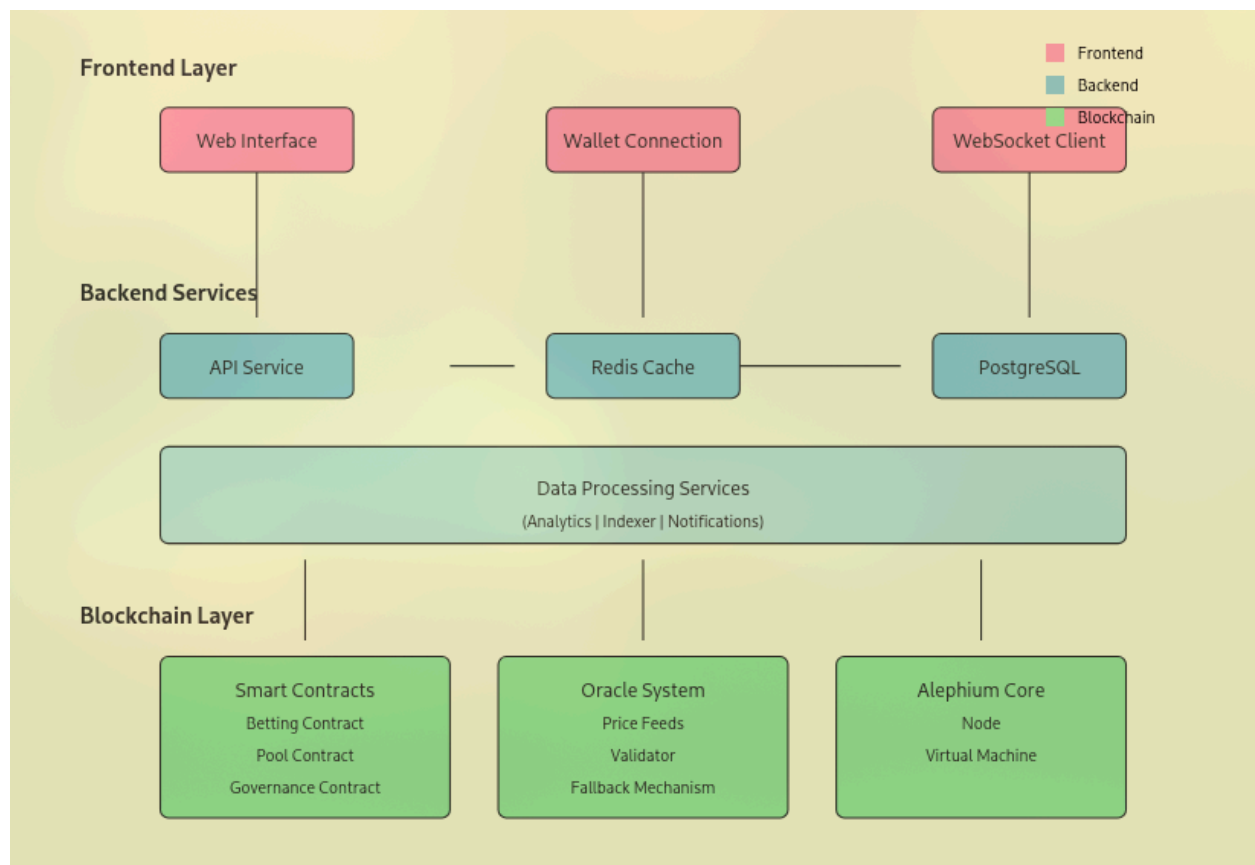
## Infrastructure

- Hosting: AWS/GCP
- CI/CD: GitHub Actions
- Monitoring: Grafana/Prometheus
- Security: CloudFlare

# Success Metrics

- Smart contract deployment success
- Transaction throughput
- User adoption rate
- Platform liquidity
- Market stability

## Architecture Diagram



# Conclusion

The proposed decentralized binary betting platform on Alephium blockchain provides a robust, transparent, and secure environment for prediction markets. By leveraging blockchain technology and smart contracts, we've addressed the core challenges of traditional betting systems.