AI Oracle Network - Product Requirements Document

Executive Summary

Project Name: OracleAI (or similar)
Tagline: "Resolve prediction markets in seconds, not days"
Platform: BNB Chain
Timeline: 4 weeks (Hackathon MVP)

Vision
Transform prediction market infrastructure by providing instant, AI-powered oracle resolution for objective events, reducing settlement time from 24-48 hours to under 1 minute while maintaining accuracy and decentralization.

Problem Statement

Current Pain Points
1. Slow Resolution: UMA's Optimistic Oracle takes 24-48 hours to settle markets
2. Capital Inefficiency: Traders' funds locked during dispute periods
3. Poor UX: Users wait days to claim winnings, killing engagement
4. Market Limitations: Slow oracles prevent time-sensitive markets (live sports, breaking news)
5. Vulnerability Window: Long dispute periods increase manipulation risk in low-liquidity markets

Market Opportunity
- Polymarket processes $2B+ monthly volume but relies on slow oracles
- CZ identified prediction market oracles as key opportunity area
- Sports betting market alone: $200B+ annually
- Real-time resolution unlocks new market categories

Solution Overview

Core Product
An AI-powered oracle network that:
1. Instantly verifies objective outcomes using multi-source data aggregation
2. Provides confidence scoring for resolution quality
3. Escalates uncertainty to human arbitrators or UMA OO fallback
4. Operates on BNB Chain with cross-chain compatibility
5. Generates revenue through per-resolution fees

Key Innovation

Multi-agent AI system that cross-references multiple data sources (APIs, web scraping, social media) to achieve consensus on objective outcomes with cryptographic proof of verification process.

Target Users

Primary Users (MVP)

1. Prediction Market Platforms: Polymarket alternatives, new protocols
2. DeFi Developers: Building prediction market features
3. Market Makers: Requiring fast settlement for capital efficiency

Secondary Users (Post-MVP)

4. Sports Betting Platforms
5. Event-based DeFi Protocols (insurance, derivatives)
6. DAO Governance (objective proposal outcomes)

Core Features (MVP)

1. AI Resolution Engine

Priority: P0 (Critical)

Functionality:
- Multi-source data aggregation for event verification
- Support for initial domains:
  - Sports outcomes (scores, winners)
  - Cryptocurrency prices (BTC/ETH at timestamp)
  - Election results (US only for MVP)
- LLM-based reasoning for context understanding
- Confidence scoring (0-100%)

Technical Requirements:
- Claude/GPT-4 integration for event interpretation
- Web scraping (ESPN, AP News, CoinGecko, etc.)
- API integration (SportsRadar, CryptoCompare, Google News)
- Minimum 3 independent sources for consensus
- Resolution time: <60 seconds for 95% of events

Success Metrics:
- 98%+ accuracy vs. ground truth
- Sub-60 second average resolution time

- 90%+ confidence score on resolved events

2. Smart Contract Infrastructure
Priority: P0 (Critical)

Components:

A. Oracle Registry Contract
```solidity
- registerMarket(marketId, eventDescription, resolutionCriteria)
- submitResolution(marketId, outcome, confidenceScore, proofHash)
- challengeResolution(marketId, stake)
- finalizeResolution(marketId)
B. Dispute Resolution Contract
- Stake-based challenges (minimum 1 BNB)
- 2-hour challenge window for high-confidence (>90%) resolutions
- 12-hour window for medium-confidence (70-90%)
- Automatic escalation to UMA OO for low-confidence (<70%)

C. Fee Collection Contract
- Per-resolution fees (0.1% of market volume, min $5)
- Arbitrator reward distribution
- Treasury management

Technical Requirements:
- Deploy on BNB Chain testnet (week 2) and mainnet (week 4)
- Gas optimization for <$0.50 per resolution
- Upgradeable proxy pattern for iterative improvements
- Event emission for off-chain indexing

3. Data Verification Pipeline
Priority: P0 (Critical)

Architecture:Event → Multi-Agent System → Consensus → Proof Generation → On-Chain Submission
Agents:
1. Scraper Agent: Collects data from web sources
2. API Agent: Fetches structured data from APIs
3. Validator Agent: Cross-references and detects conflicts
4. Reasoning Agent: LLM-based interpretation of ambiguous cases
```

5. Proof Agent: Generates cryptographic proof of verification process

Data Sources (MVP):
- Sports: ESPN API, TheScore, official league sites
- Crypto: CoinGecko, CoinMarketCap, Binance API
- Elections: AP Election API, major news outlets (NYT, BBC, Reuters)

Proof System:
- IPFS storage of raw data snapshots
- Merkle tree of source URLs + timestamps
- Signed attestation from AI agents
- On-chain proof hash for verifiability

4. Web Dashboard
Priority: P1 (High)

Pages:

A. Home/Explorer
- Live feed of recent resolutions
- Resolution time vs. UMA OO comparison
- Accuracy statistics
- Total markets resolved

B. Market Resolution Request
- Submit market for resolution
- Input: Market ID, event description, resolution criteria
- Real-time status updates
- Display confidence score and proof

C. Verification Proof Viewer
- Show all data sources used
- Display AI reasoning process
- Link to IPFS proof data
- Timestamped audit trail

D. Analytics Dashboard
- Resolution speed metrics
- Domain-specific accuracy rates
- Fee revenue tracking
- Top integrated platforms

Technical Stack:
- React + TypeScript frontend
- TailwindCSS for styling
- Web3.js/ethers.js for blockchain interaction
- Real-time updates via WebSocket

5. Developer API
Priority: P1 (High)

Endpoints:

```javascript
POST /api/v1/resolve
{
  "marketId": "string",
  "eventDescription": "string",
  "resolutionCriteria": "string",
  "domain": "sports|crypto|elections"
}

Response:
{
  "outcome": "Yes|No|Invalid",
  "confidence": 95,
  "proofHash": "0x...",
  "sources": ["url1", "url2", "url3"],
  "resolutionTime": 42, // seconds
  "txHash": "0x..." // BNB Chain transaction
}

GET /api/v1/status/{marketId}
GET /api/v1/proof/{marketId}
GET /api/v1/analytics
```

Authentication:
- API key generation in dashboard
- Rate limiting: 100 requests/hour (free tier)
- Premium tier: 1000 requests/hour

Non-Functional Requirements

Performance
- 95th percentile resolution time: <60 seconds
- 99th percentile resolution time: <5 minutes
- API latency: <200ms (excluding AI processing)
- Dashboard load time: <2 seconds

Security
- Multi-signature control for treasury
- Rate limiting to prevent spam
- Secure API key storage
- IPFS proof immutability
- Smart contract audit before mainnet

Scalability
- Handle 1,000 resolutions/day (MVP)
- Support 10,000+ registered markets
- Multi-region API deployment
- Horizontal scaling for AI agents

Reliability
- 99.5% uptime SLA
- Fallback to UMA OO on AI failure
- Redundant data source fallbacks
- Automated health monitoring

Revenue Model

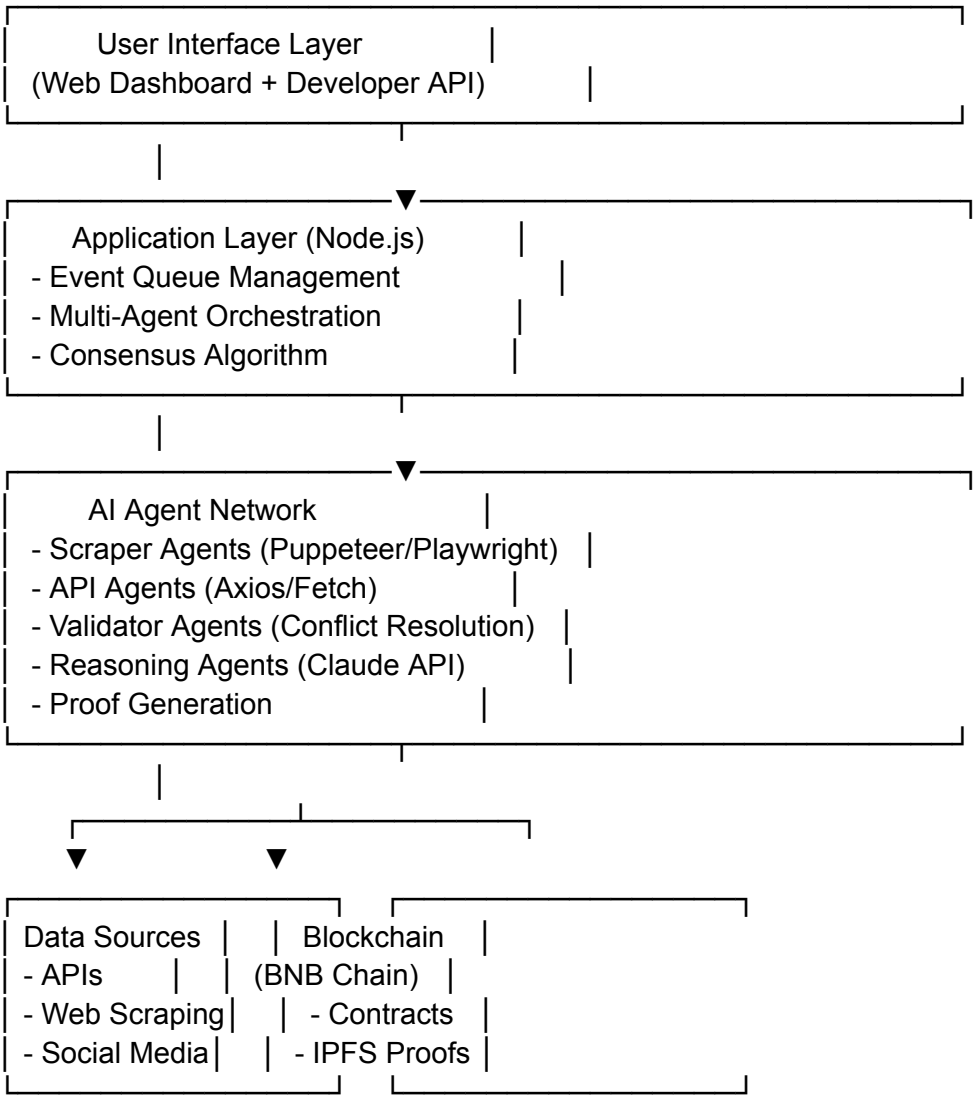
Fee Structure
1. Per-Resolution Fee: 0.1% of market volume (minimum $5 USD in BNB)
2. API Subscription Tiers:
   - Free: 100 requests/hour
   - Pro: $99/month - 1,000 requests/hour + priority support
   - Enterprise: Custom pricing - Unlimited + SLA + dedicated infrastructure

3. Dispute Fees: 2% of staked amount on unsuccessful challenges

Revenue Projections (Year 1)
- Assumption: 5,000 markets resolved/month at $20 avg fee = $100K/month
- API subscriptions: 50 Pro users = $5K/month
- Total: ~$1.26M ARR (conservative)

Technical Architecture

System Components



Tech Stack

Backend:
- Node.js + TypeScript
- Express.js for API
- Bull/BullMQ for job queues
- Redis for caching
- PostgreSQL for metadata storage

AI/ML:
- Anthropic Claude API (primary LLM)

- LangChain for agent orchestration
- Puppeteer for web scraping
- Axios for API calls

Blockchain:
- Solidity 0.8.x
- Hardhat development environment
- OpenZeppelin contracts
- Ethers.js for interactions

Infrastructure:
- Docker containers
- AWS/GCP for hosting
- IPFS (Pinata) for proof storage
- BNB Chain RPC nodes

Development Phases

Week 1: Foundation

Goal: Core AI resolution engine + basic smart contracts

Deliverables:
- [ ] Multi-agent system architecture
- [ ] Sports outcome resolution (NBA/NFL)
- [ ] Crypto price resolution (BTC/ETH)
- [ ] Basic smart contracts (Registry + Resolution)
- [ ] IPFS proof storage integration

Team Allocation:
- Backend Dev: AI agent implementation
- Smart Contract Dev: Contract development
- Full-stack Dev: Basic API endpoints

Week 2: Integration & Testing

Goal: End-to-end resolution flow on testnet

Deliverables:
- [ ] Complete smart contract suite deployed on BNB testnet
- [ ] Web dashboard (basic UI)
- [ ] API documentation (Swagger/Postman)

- [ ] Unit tests (80% coverage)
- [ ] Integration tests for resolution flow
- [ ] Test resolutions for 10+ real events

Team Allocation:
- All devs: Integration work
- QA: Test case development
- PM: Documentation

Week 3: Refinement & Demo Prep
Goal: Polish UX, add analytics, prepare demo

Deliverables:
- [ ] Enhanced dashboard with analytics
- [ ] Proof viewer page
- [ ] Speed comparison vs. UMA OO
- [ ] Gas optimization
- [ ] Demo script preparation
- [ ] Video recording (rough cut)

Team Allocation:
- Frontend Dev: Dashboard polish
- Backend Dev: Performance optimization
- PM: Demo preparation

Week 4: Launch & Submission
Goal: Mainnet deployment, final demo, submission

Deliverables:
- [ ] Smart contract audit (automated tools)
- [ ] Mainnet deployment on BNB Chain
- [ ] Final demo video (5 min max)
- [ ] GitHub repo cleanup + README
- [ ] DoraHacks submission
- [ ] Resolve 3+ real mainnet markets for demo

Team Allocation:
- All hands: Final polish
- PM: Submission materials
- Marketing: Demo video editing

Success Metrics (Hackathon)

Technical Metrics
- ✅ Resolve ≥20 test events with 95%+ accuracy
- ✅ Average resolution time <60 seconds
- ✅ Smart contracts deployed on BNB mainnet
- ✅ Zero critical vulnerabilities in contracts
- ✅ Working API with documentation

Demo Metrics
- ✅ Side-by-side comparison: AI Oracle (30s) vs. UMA OO (48h)
- ✅ Live resolution of ongoing event during demo
- ✅ Display proof verification system
- ✅ Show revenue potential ($100K+ ARR)

Submission Quality
- ✅ Clean, documented GitHub repo
- ✅ 5-min demo video showing full flow
- ✅ Clear differentiation from existing solutions
- ✅ Obvious revenue model
- ✅ Post-hackathon roadmap

Risks & Mitigation

Technical Risks

Risk	Impact	Mitigation
	--	
AI hallucination/errors	High	Multi-source verification, confidence thresholds, UMA fallback
Data source unavailability	Medium	Redundant sources (min 5 per domain), graceful degradation
BNB Chain congestion	Low	Gas optimization, batch processing, fallback RPC nodes
API rate limits	Medium	Multiple API keys, caching, paid tiers

Business Risks

Risk	Impact	Mitigation
	--	
Low adoption	High	Free tier, easy integration, clear docs, demo integrations

| Competition from established oracles | Medium | Speed advantage, better UX, lower costs |
| Regulatory uncertainty | Low | Focus on objective events, no prediction market operation |

Execution Risks

Risk	Impact	Mitigation
	--	
Timeline slippage	High	Agile sprints, daily standups, MVP focus (cut scope if needed)
Team bandwidth	Medium	Clear role allocation, prioritized backlog
Smart contract bugs	Critical	Automated testing, OpenZeppelin libraries, audit tools

Post-Hackathon Roadmap

Phase 1 (Months 1-3): Production Readiness
- Full smart contract audit (CertiK/OpenZeppelin)
- Expand to 10+ event domains
- Partner with 2-3 prediction market platforms
- Implement economic security (staking for resolvers)

Phase 2 (Months 4-6): Scale & Decentralization
- Launch decentralized resolver network (anyone can run nodes)
- Cross-chain expansion (Ethereum, Polygon, Arbitrum)
- DAO governance for dispute resolution
- Mobile SDK for developers

Phase 3 (Months 7-12): Market Leadership
- AI model training on historical resolution data
- Real-time market creation tools
- Enterprise partnerships (sports betting platforms)
- Token launch for network incentives

Team Requirements

Hackathon Team (Minimum 3 people)

Required Roles:
1. Full-Stack Developer (Lead)
   - Node.js backend + AI agent orchestration
   - React frontend
   - Smart contract integration

2. Smart Contract Developer
   - Solidity development
   - Security best practices
   - BNB Chain deployment

3. Product Manager / Designer
   - Demo preparation
   - Documentation
   - Video editing
   - UI/UX guidance

Optional (Nice-to-have):
4. ML Engineer for advanced AI logic
5. DevOps for infrastructure

Appendix

A. Sample Event Types (MVP)

Sports:
- "Did the Lakers win on Nov 8, 2025?" → Verify ESPN/TheScore/NBA.com
- "Was the final score Lakers 115 - Warriors 110?" → Exact score verification

Crypto:
- "Was BTC above $50,000 on Nov 8, 2025 at 12pm UTC?" → CoinGecko/CMC APIs
- "Did ETH reach $3,000 this week?" → Historical price data

Elections:
- "Who won the mayoral race in NYC?" → AP Election API verification

B. Confidence Scoring Logic

Confidence = (Source Agreement × 0.6) + (Source Quality × 0.3) + (Timeliness × 0.1)

Source Agreement: % of sources agreeing on outcome
Source Quality: Weighted score based on source reputation
Timeliness: Recency of data (<1hr = 100%, >24hr = 50%)

Resolution Action:
- >90% confidence → Instant resolution with 2hr challenge window
- 70-90% confidence → 12hr challenge window
- <70% confidence → Escalate to UMA OO or human arbitrators

C. Gas Cost Estimates (BNB Chain)

- Market registration: ~50,000 gas (~$0.10)
- Resolution submission: ~80,000 gas (~$0.15)
- Challenge initiation: ~60,000 gas (~$0.12)
- Finalization: ~40,000 gas (~$0.08)

Total per market: ~$0.45 (vs. UMA's ~$5-10 on Ethereum)

D. Demo Script Outline (5 min)

0:00-0:30: Problem (show Polymarket 48hr wait, capital locked)
0:30-1:30: Solution walkthrough (architecture diagram, AI agents)
1:30-3:00: Live demo (resolve real event in <60s, show proof)
3:00-4:00: Dashboard tour (analytics, speed comparison, revenue)
4:00-4:30: Technical highlights (smart contracts, BNB Chain)
4:30-5:00: Vision & roadmap (market opportunity, post-hackathon)

Conclusion

OracleAI addresses the 1 priority identified by YZi Labs and CZ: fast, reliable oracle resolution for prediction markets. By combining AI agents with cryptographic proofs and BNB Chain's efficiency, we enable instant market settlement while maintaining decentralization and accuracy.

Key Differentiators:
1. 100x faster than UMA OO (30s vs. 48h)
2. Multi-source AI verification with proof
3. Clear revenue model ($1M+ ARR potential)
4. Built on BNB Chain (low fees, fast finality)
5. Fallback to UMA OO for edge cases

This positions us to win the hackathon and build a sustainable, high-impact business in the prediction market infrastructure space.

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