Trust16: A Blockchain-Based Game of Strategy and Cooperation

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Abstract

Trust16 is an innovative blockchain-based game that explores the dynamics of trust, cooperation, and competition in a digital environment. Built on the Aptos network, this pioneering platform combines elements of game theory, social psychology, and cryptographic technology to create a unique gaming experience with far-reaching implications for research and social good.

This whitepaper outlines the game mechanics, technical architecture, tokenomics, reputation system, and long-term vision of Trust16, presenting a comprehensive overview of a project that aims to push the boundaries of blockchain gaming while contributing to meaningful social and scientific progress.

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1 Executive Summary

Trust16 is a groundbreaking blockchain-based game that challenges players to navigate the delicate balance between cooperation and competition. Key features include:

- Multiple game modes catering to different player preferences and time commitments
- A unique tokenomics model with community-boosting dual allocation

- A sophisticated reputation system rewarding long-term engagement and positive behavior
- Dynamic character traits that evolve with seasonal variations
- Integration of AI bots for practice and consistent gameplay availability
- A content creator campaign to foster community growth and engagement

Trust16 aims to not only provide an engaging gaming experience but also serve as a valuable tool for research into human behavior, decision-making processes, and the dynamics of trust in incentivized environments.

2 Introduction

In an era where trust is increasingly valuable yet scarce, Trust16 emerges as a social experiment disguised as a game. It explores human nature, decision-making processes, and the dynamics of trust in a controlled, blockchain-powered environment. By incentivizing both cooperation and competition, Trust16 creates a complex ecosystem where strategy, psychology, and game theory intersect.

The name "Trust16" encapsulates the core concept of the game - trust - and the 16 unique character traits that players can embody. This duality represents the game's focus on both individual strategy and the broader dynamics of group interaction.

3 Game Mechanics

Trust16 offers three distinct game modes, each designed to cater to different player needs and time commitments:

3.1 Campaign Mode

- Purpose: Tutorial and trait introduction
- Players compete against AI bots
- Gradually introduces game mechanics and strategies
- Features all 16 character traits for players to interact with

3.2 Short Game Mode

- Duration: 5 rounds
- Fast-paced PvP matches
- Players make quick decisions to cooperate or compete in each round
- High-stakes final round

3.3 Long Game Mode

- Duration: Variable, based on player-set chat time
- In-depth PvP matches with strategic elements
- Includes a chat phase for negotiation and strategy discussion
- Single round with higher stakes

3.4 Short Game Mode Mechanics

The Short Game Mode in Trust16 is designed to create a fast-paced, strategic experience that encapsulates the core dynamics of trust and betrayal. Here's a detailed breakdown of how it works:

3.4.1 Setup

- Each player deposits 10 TRUST
- The rewards pool contributes 20 TRUST
- Total Game Pool starts at 40 TRUST

3.4.2 Rounds

The game consists of 5 rounds. In each round:

- Players simultaneously choose to either Cooperate (Green) or Compete (Red)
- Choices are revealed, and TRUST is redistributed based on the decisions

3.4.3 TRUST Distribution

- If both players Cooperate (Green-Green):
  - Each player receives 2 TRUST (1/5 of their deposit) + 2 TRUST (1/10 from game rewards pool)
- If one player Competes and the other Cooperates (Red-Green):
  - Competing player receives: Their previous balance + Cooperating player's previous balance + 2 TRUST (1/5 of Cooperating player's deposit)
  - Cooperating player receives: 2 TRUST (1/10 from game rewards pool)
- If both players Compete (Red-Red):
  - In rounds 1-4: Both players receive 0 TRUST, and the round's TRUST goes back to the Game Pool
  - In the final round (Round 5): Both players receive 0 TRUST, and all TRUST in the game (40 TRUST) goes back to the main rewards pool

3.4.4 Game Pool Dynamics

- The Game Pool starts at 40 TRUST
- It decreases as players accumulate TRUST through cooperation
- It can increase if both players compete in non-final rounds
- In the final round, if both players compete, the Game Pool resets to 40 TRUST and returns to the main rewards pool

3.4.5 Final Outcomes

At the end of the 5 rounds, several outcomes are possible:

- One player may have more TRUST than the other
- Both players may have equal TRUST (not zero)
- Both players may end with zero TRUST (if both compete in the final round)
- Any remaining TRUST in the Game Pool stays there (unless both compete in the final round)

3.5 Example Scenarios

To illustrate the diverse outcomes possible in Trust16's Short Game Mode, we present four scenarios:

3.5.1 Scenario 1: Dramatic Reversal (Player 1 < Player 2)

Players: Alice vs. Bob

- Round 1 (Green-Green): Alice: 4, Bob: 4, Pool: 32
- Round 2 (Green-Green): Alice: 8, Bob: 8, Pool: 24
- Round 3 (Red-Green): Alice: 18, Bob: 2, Pool: 20
- Round 4 (Green-Green): Alice: 22, Bob: 6, Pool: 12
- Round 5 (Green-Red): Alice: 2, Bob: 30, Pool: 8

End results: Alice: 2, Bob: 30, Pool: 8

This scenario demonstrates how a final round betrayal can dramatically reverse fortunes.

3.5.2 Scenario 2: Early Advantage (Player 1 < Player 2)

Players: Charlie vs. Diana

- Round 1 (Green-Green): Charlie: 4, Diana: 4, Pool: 32
- Round 2 (Green-Red): Charlie: 2, Diana: 10, Pool: 28
- Round 3 (Green-Green): Charlie: 6, Diana: 14, Pool: 20
- Round 4 (Green-Green): Charlie: 10, Diana: 18, Pool: 12
- Round 5 (Green-Green): Charlie: 14, Diana: 22, Pool: 4

End results: Charlie: 14, Diana: 22, Pool: 4

This scenario shows how an early competitive move can set the tone for the entire game.

3.5.3 Scenario 3: Balanced Outcome (Player 1 = Player 2 0)

Players: Eve vs. Frank

- Round 1 (Green-Green): Eve: 4, Frank: 4, Pool: 32
- Round 2 (Red-Green): Eve: 10, Frank: 2, Pool: 28
- Round 3 (Green-Red): Eve: 2, Frank: 14, Pool: 24
- Round 4 (Green-Green): Eve: 6, Frank: 18, Pool: 16
- Round 5 (Green-Green): Eve: 10, Frank: 22, Pool: 8

End results: Eve: 10, Frank: 22, Pool: 8

This scenario illustrates how alternating competition and cooperation can lead to a more balanced outcome.

3.5.4 Scenario 4: Mutual Distrust (Player 1 = Player 2 = 0)

Players: Grace vs. Henry

- Round 1 (Green-Green): Grace: 4, Henry: 4, Pool: 32
- Round 2 (Green-Green): Grace: 8, Henry: 8, Pool: 24
- Round 3 (Red-Green): Grace: 18, Henry: 2, Pool: 20
- Round 4 (Green-Red): Grace: 2, Henry: 22, Pool: 16
- Round 5 (Red-Red): Grace: 0, Henry: 0, Pool: 40

End results: Grace: 0, Henry: 0, Pool returns 40 to main rewards pool

This scenario showcases how mutual competition in the final round can negate all previous gains.

3.6 Core Mechanics

1. Setup: Players connect wallets and select bet amounts
2. Matchmaking: Smart contract pairs players with similar preferences
3. Decision Phase: Players choose to cooperate (green) or compete (red)
4. Outcome: Rewards are distributed based on choices as described in the Short Game Mode Mechanics

3.7 Trait System

- Character traits are assigned based on playstyle across all game modes
- Trait visibility and progression apply in all PvP modes
- Campaign mode introduces players to all traits through bot interactions

4 Technical Architecture

4.1 Blockchain Integration

Trust16 leverages the Aptos blockchain for its smart contract functionality, ensuring transparent and immutable game outcomes.

4.2 Smart Contract

The core smart contract handles:

- Player matching
- Bet escrow
- Outcome verification
- Reward distribution

4.3 Cryptographic Fairness

Verifiable Random Functions (VRFs) or commitment schemes are employed to ensure fair play and prevent result manipulation.

4.4 Frontend

A user-friendly interface built with React and Web3 libraries provides seamless wallet integration and game interaction.

5 Tokenomics and Game Economy

Trust16 introduces a unique, community-focused tokenomics model that provides direct value to players while simultaneously enriching the game's reward ecosystem.

5.1 Token Valuation and Purchase

- 1 TRUST = 0.05€ (or 1€ = 20 TRUST)
- Standard Purchase Example: For 10€, a total of 200 TRUST is minted

5.2 Community-Boosting Dual Allocation

When a player purchases TRUST tokens, the minted amount is equally split between the player and the game's Rewards Pool:

- Player Allocation: The player receives half of the total minted TRUST tokens
- Community Rewards Pool: The other half of the minted TRUST tokens is added directly to the game's Rewards Pool

Example:

- A player purchases 10€ worth of TRUST
- Total minted: 200 TRUST (10€ * 20 TRUST/€)
- The player receives 100 TRUST in their wallet
- Simultaneously, 100 TRUST is added to the Rewards Pool

5.3 Benefits of the Dual Allocation Model

1. Direct Player Value: Players receive a substantial amount of TRUST tokens for their purchase
2. Immediate Community Impact: Every purchase instantly grows the game's reward ecosystem
3. Enhanced Gameplay Experience: A continually growing Rewards Pool allows for more frequent and valuable events and tournaments
4. Aligned Incentives: Players are encouraged to invest in the game, knowing it directly enhances the experience for everyone
5. Transparent and Fair: Clear split between player benefit and community contribution

5.4 Rewards Pool Utilization

The Rewards Pool, boosted by this dual allocation system, is used to:

1. Fund larger prize pools for tournaments and special events
2. Provide enhanced bonuses for consecutive cooperative plays
3. Offer substantial rewards for the Content Creator Campaign
4. Create periodic "jackpot" events with significant TRUST token prizes
5. Support additional community-building and engagement initiatives

5.5 Economic Balancing Measures

To ensure long-term sustainability:

1. Regular Economic Audits: Continuous monitoring of token supply, distribution, and usage patterns
2. Seasonal Resets: The Rewards Pool partially resets each season, ensuring regular circulation of tokens
3. Dynamic Reward Scaling: Reward amounts may be dynamically adjusted based on the size of the Rewards Pool
4. Community Governance: Future implementation of governance mechanisms allowing long-term players to participate in economic decisions

6 Character Traits System

6.1 Core Traits

The game maintains 16 standard character traits:

1. Owl: Strategic planner with wisdom and insight
2. Fox: Clever tactician, outsmarting opponents
3. Serpent: Cunning manipulator of the game's twists
4. Dog: Trustworthy ally, standing by teammates
5. Raccoon: Opportunist, turning chaos into advantage

6. Lion: Fearless challenger, facing obstacles head-on
7. Chameleon: Adaptable player, blending with changing situations
8. Dolphin: Empathetic guide, navigating emotional waters
9. Cheetah: Quick decision-maker, seizing instant opportunities
10. Bear: Resilient endurer, standing firm against adversity
11. Wolf: Team player, thriving in cooperative environments
12. Peacock: Charismatic negotiator, excelling in social interactions
13. Elephant: Methodical and memory-driven, learning from past experiences
14. Honeybee: Industrious and community-oriented, contributing to the game's ecosystem
15. Raven: Intelligent problem-solver, finding creative solutions
16. Tiger: Bold risk-taker, not afraid to make daring moves

6.2 Seasonal Trait Variations

To keep the game dynamic and encourage strategic adaptation:

- Each season, 4-6 characters receive significant trait changes or "seasonal variants"
- Seasonal variants feature visual changes (themed skins) and adjusted trait behaviors
- Remaining characters receive minor trait tweaks to keep the meta fresh
- Occasional introduction of new characters (yearly) with potential retirement of underperforming ones

6.3 Trait Impact

- Traits are visible to opponents before and during matches
- They provide insight into a player's likely strategy and behavior

- Traits influence matchmaking to create diverse and interesting game dynamics
- Seasonal variations encourage players to adapt strategies and explore new playstyles

6.4 Trait Stability and Progression

Trust16 implements a trait stability system to reflect player experience and trait reliability:

1. Novice (10-24 games):
    - Initial trait unveiled
    - Represented by a black and white trait icon
    - Trait reassessed every 5 games
2. Adept (25-99 games):
    - Trait gains partial coloration
    - Reassessed every 10 games
    - Increased accuracy in trait prediction
3. Master (100+ games):
    - Fully colored trait icon
    - Trait reassessed every 25 games
    - Highest stability and prediction accuracy

7 Reputation System

Trust16 implements a sophisticated Reputation System, represented by a soulbound token, which reflects a player's standing within the community.

7.1 Reputation Basics

- Reputation is represented by a non-transferable (soulbound) token
- Reputation score ranges from 0 to 100 points
- Players start with 0 reputation upon joining Trust16

7.2 Reputation Formula

The reputation score (R) is calculated using the following formula:

$$R = \min(100, GP + CB + SS + CE + CP - RD) \tag{1}$$

Where:

- GP: Games Played (max 50 points)
- CB: Cooperative Behavior (max 20 points)
- SS: Successful Strategies (max 15 points)
- CE: Community Engagement (max 10 points)
- CP: Consistent Play (max 5 points)
- RD: Reputation Decay

Each component is calculated as follows:

1. Games Played (GP):

$$GP = \min(50, 0.5 * SG + LG) \tag{2}$$

   Where SG is the number of Short Games and LG is the number of Long Games played.

2. Cooperative Behavior (CB):

$$CB = \min(20, 0.1 * GC + 0.05 * CGC) \tag{3}$$

   Where GC is the number of 'Green' (Cooperative) choices and CGC is the number of Consecutive 'Green' choices.

3. Successful Strategies (SS):

$$SS = \min(15, 0.2 * W) \tag{4}$$

   Where W is the number of games won.

4. Community Engagement (CE):

$$CE = \min(10, E + V + C) \tag{5}$$

   Where E is points from events, V is points from voting, and C is points from content creation.

5. Consistent Play (CP):

$$CP = \min(5, 0.5 * D) \tag{6}$$

   Where D is the number of days played in the last 30 days.

6. Reputation Decay (RD):

$$RD = \max(0, I - 30) * 0.5 \tag{7}$$

   Where I is the number of inactive days.

7.3 Earning Reputation

- Playing games (primary factor)
- Choosing cooperative actions
- Winning games
- Participating in community events and governance
- Creating and sharing content
- Maintaining consistent play

7.4 Reputation Decay

To encourage active participation:

- Inactivity for 30 days: -0.5 points per day (until reaching 0 or resuming activity)

7.5 Reputation Tiers and Benefits

1. Novice (0-20 points):
   - Access to basic game modes
2. Apprentice (21-40 points):
   - Unlock customizable profile backgrounds
3. Adept (41-60 points):
   - Access to exclusive weekly tournaments

4. Expert (61-80 points):
    - Unlock invitation-only short games
    - Ability to create private game lobbies
5. Master (81-100 points):
    - Access to high-stakes game modes
    - Voting rights in game development decisions
    - Exclusive Master-tier cosmetic items

7.6 Special Game Modes (Unlocked at 75+ Reputation)

1. Invitation-Only Short Games:
    - Players can invite friends or high-reputation players for exclusive matches
    - Higher TRUST token stakes
    - Special trait bonuses active during these games
2. Strategy Duels:
    - 1v1 matches where players can set custom game parameters
    - Results highly impact reputation scores
3. Reputation Riskers:
    - High-risk, high-reward games where players can gain or lose significant reputation points

7.7 Reputation Display and Bragging Rights

- Reputation score prominently displayed on player profiles
- Special badges and titles for reaching reputation milestones
- Seasonal leaderboards for top reputation earners

8 Seasonal Play

8.1 Structure

- Seasons last for one month
- Each season has a unique theme or challenge
- Leaderboards track various performance metrics

8.2 Rewards

- Exclusive seasonal NFTs
- TRUST token rewards
- Special in-game titles or badges

8.3 Seasonal Challenges

- Unique gameplay modifiers each season
- Special trait-based missions or objectives
- Community-wide cooperative goals

8.4 End-of-Season Events

- Last Chance Tournaments with large portions of the Rewards Pool as prizes
- Cooperative Challenges with community-wide goals and bonus rewards
- Trait Boost Event for significant trait progression
- Token Burn Event for exclusive, limited-time rewards

9 AI Bot Mode

9.1 Purpose

- Practice mode for new players
- Available when human opponents are scarce
- Helps maintain game liquidity

9.2 AI Implementation

- Multiple difficulty levels
- Machine learning algorithms to mimic human play styles
- Regular updates to improve AI behavior

9.3 Bot Personalities

- AI bots designed to emulate different trait behaviors
- Provides players experience with various strategies

10 Content Creator Campaign

10.1 Eligibility Criteria

- Content creators must have a minimum of X followers/subscribers on their platform
- Content must be original and primarily focused on Trust16 gameplay, strategies, or community events

10.2 Reward Tiers

1. Bronze Tier: X-Y views - Reward: Z TRUST tokens
2. Silver Tier: Y-Z views - Reward: 2Z TRUST tokens + exclusive in-game title
3. Gold Tier: Z+ views - Reward: 3Z TRUST tokens + exclusive character skin + feature on Trust16 social media

10.3 Submission and Verification Process

- Creators submit their content through a dedicated portal on the Trust16 website
- Our team verifies view counts and content quality before approving rewards
- Automated tracking of view milestones for efficient reward distribution

10.4 Community Engagement Bonus

- Additional rewards for videos that generate high engagement (comments, likes, shares) relative to view count
- Encourages creators to foster community discussions and player interactions

10.5 Integration with Reputation System

- Content creation contributes to the Community Engagement (CE) component of the reputation score
- High-reputation creators receive priority consideration for official partnership opportunities

11 Serving the Public Good

11.1 Educational Tool

- Teaches game theory concepts interactively
- Demonstrates the importance of trust and cooperation
- Illustrates complex decision-making in strategic situations

11.2 Research Platform

- Provides a controlled environment for studying human behavior at scale
- Generates valuable data for social scientists, economists, and psychologists
- Facilitates cross-cultural studies on trust and cooperation

11.3 Skill Development

- Improves players' negotiation and communication skills
- Enhances strategic thinking and decision-making abilities
- Develops emotional intelligence through interpreting others' intentions

11.4 Social Awareness

- Highlights the impact of trust and mistrust in society
- Raises awareness about the importance of cooperation in solving global challenges
- Demonstrates how individual actions affect collective outcomes

11.5 Data Collection for Social Good

Trust16 will collect and analyze various statistics that can provide valuable insights:

1. Cooperation rates across different player traits and regions
2. Trust dynamics and the impact of communication
3. Economic behavior related to bet sizes and risk-taking
4. Decision-making patterns under various pressures
5. Group dynamics and the effect of individual traits on team performance
6. Learning and adaptation strategies over time
7. Reputation effects and their impact on gameplay
8. Patterns of forgiveness and retaliation
9. Ethical decision-making when personal and group benefits conflict

11.6 Ethical Considerations and Data Usage

To ensure that Trust16 serves the public good responsibly:

1. All data collection will be transparent and consensual
2. Player data will be anonymized to protect privacy
3. Collaborations with academic institutions will ensure rigorous analysis
4. Findings will be published in open-access formats
5. Ethical implications of research and its applications will be carefully considered

12 Future Roadmap

Trust16's development and expansion is planned in several phases:

12.1 Phase 1 (Launch)

- Core game mechanics implementation
- Basic trait system deployment
- Initial smart contract deployment on Aptos network

12.2 Phase 2 (Expansion)

- Introduction of TRUST token and economic model
- Seasonal play implementation
- Enhanced AI bot mode with trait-based personalities

12.3 Phase 3 (Ecosystem Growth)

- NFT marketplace integration
- Tournament mode with significant prizes
- Partnerships with other blockchain projects and academic institutions

12.4 Phase 4 (Research Integration)

- Collaboration with academic institutions for game theory research
- Publication of anonymized game data for scientific study
- Development of educational resources based on Trust16 insights

12.5 Phase 5 (Advanced Features)

- Cross-chain gameplay possibilities
- Enhanced NFT integration with trait-based collectibles
- Exploration of governance mechanisms for long-term players

13 Conclusion

Trust16 represents a pioneering effort in blockchain gaming, blending sophisticated game theory with cutting-edge technology. By creating a platform that is simultaneously a game, a social experiment, and a research tool, Trust16 aims to push the boundaries of what's possible in the realm of decentralized applications.

The game's unique features, including its community-boosting tokenomics, dynamic character traits, sophisticated reputation system, and content creator campaign, provide a rich and engaging player experience. At the same time, the focus on data collection and analysis for social good positions Trust16 as more than just a game—it's a potential catalyst for understanding and improving human cooperation and trust dynamics.

As we move forward, we invite players, developers, researchers, and institutions to join us in exploring the fascinating world of Trust16. Together, we can not only enjoy a compelling game but also contribute to meaningful insights that could shape our understanding of human behavior and social interactions in the digital age.

The future of Trust16 is bright, with plans for continuous improvement, expansion, and integration with the broader blockchain and research communities. We're excited to embark on this journey of discovery, entertainment, and social impact with our growing community of players and partners.