Mini Casino DApp
Blockchain-Based Blackjack and Token Casino with Gamification

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1 Project Summary

This project presents a decentralized application (DApp) that functions as a mini casino platform. It features an on-chain, playable game of Blackjack and Slots Machine supported by an ERC-20 token (CTKN) that players use as casino chips. Players can acquire CTKN by swapping ETH and can later sell them back to the contract.

2 Ethereum Network and Deployment

- **Testnet Used:** Sepolia Ethereum Testnet
- **Live Demo:** https://kacok007.github.io/casino-dapp/
- **Source Code:** GitHub Repository

3 Smart Contract Overview

3.1 CasinoToken (ERC-20)

- Custom token: `CTKN`
- Exchange rate: 1 ETH = 10,000,000 CTKN
- Users can buy/sell CTKN using ETH
- Owner can withdraw ETH and mint new tokens

3.2 CasinoGame

- Unified contract supporting:
    - Blackjack with actual playable logic and deck tracking
    - Slots Machine with random number generation
- Pseudo-randomness using `block.timestamp` and `block.difficulty`
- Game state management for Blackjack and Slots

4 Functionality Demonstration

4.1 Blackjack Gameplay

- Users start a game with CTKN as the bet
- The deck is shuffled and cards drawn without replacement
- Users interact via `hit()` and `stand()` functions
- Dealer logic follows standard Blackjack rules
- Outcomes include win, loss, push, or bust
- Winnings are automatically transferred to the user's balance
- Game state is reset after each round

4.2   Slots Machine

- Users can play Slots with CTKN as the bet
- Random number generation determines slot outcomes
- Payouts are based the randomly generated numbers:
  - Jackpot: 10x payout
  - Small Win: 2x payout
  - No match: 0 payout
- Game state is reset after each round
- Winnings are automatically transferred to the user's balance

4.3   Token Swap System

- Users can buy CTKN tokens by sending ETH
- Tokens are transferred directly from the contract's balance
- Selling CTKN transfers ETH back to the user
- Exchange rate is safely handled using wei units to avoid precision issues
- Users can check their CTKN balance via the contract

5   Frontend Features

- React + Vite web interface
- MetaMask wallet integration
- Live CTKN balance, swap UI, and interactive Blackjack game
- Deployed to GitHub Pages

6   User Interface

7   Testing and Logs

Manual Testing

Feature	Action	Result
Buy CTKN	Sent 0.01 ETH	Received 100,000 CTKN
Sell CTKN	Sold 10,000 CTKN	Received 0.001 ETH
Start Blackjack	Bet 100 CTKN	Game began with dealt cards
Hit/Stand	Played round	Contract resolved outcome correctly

Console Output Example

```
[MetaMask] Sent 0.01 ETH
[CasinoToken] TokensPurchased: 0x123...abc bought 100000 CTKN
[CasinoGame] Blackjack started with 100 CTKN
[Blackjack] Player hit: drew 7
[Blackjack] Player stood: Dealer wins
```

8   Future Features

- Slots and Roulette integration
- Profit-sharing through CTKN staking
- On-chain achievements and NFT reward system

- Leaderboard and player performance metrics

- Chainlink VRF for secure randomness

Conclusion

This project showcases the integration of smart contracts, ERC-20 token economics, game logic, and a full-stack frontend to create an engaging, interactive decentralized casino DApp. With a strong foundation in place, future enhancements can bring richer gameplay and player incentives.