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⚙️ Bootstrapping Isolated Client Cryptographic Spaces...

🔑 Generate Keys for User A

🔑 Generate Keys for User B

🔑 Generate Keys for User C

📁 Global Shared Public Key Directory

User Profile	Public Crypto Key Address (Published)	Private Key Status
User A	0x501566bda0b17a122dff4b4d697cb6bb7fcbd800	🔒 Securely Held in Sandbox Memory
User B	0xc6abfe2d63556a24f0ef22b0e348f98ca8986220	🔒 Securely Held in Sandbox Memory
User C	0x5b1af25c826e304064b8b4a5e6e24c0353083ab8	🔒 Securely Held in Sandbox Memory

- 🔧 Generated secure keypair for User A!
-> [Private Key Vector]: d565e0830f74...
-> [Public Address Key]: 0x501566bda0b17a122dff4b4d697cb6bb7fcbd800
- 🔧 Generated secure keypair for User B!
-> [Private Key Vector]: 712a897abbe7...
-> [Public Address Key]: 0xc6abfe2d63556a24f0ef22b0e348f98ca8986220
- 🔧 Generated secure keypair for User C!
-> [Private Key Vector]: 65793f37e099...
-> [Public Address Key]: 0x5b1af25c826e304064b8b4a5e6e24c0353083ab8

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⚙️ Bootstrapping Isolated Client Transaction Builder Pipeline...

Creditor:

Debtor:

Amount (\$):

⚡ Process, Sign & Send Single Transaction

- 🔧 [Isolated Client] Spinning up single secure pipeline initialization...
- 🔒 Step 2.1: User C signed the transaction package using its private key seed.
Generated Signature: 0x_zk_9ce1484e8c13e9c8cd554d3f
- 📁 Step 2.2: Payload securely packed & mapped onto User A's Public Key address.
Encrypted Envelope Pointer: 🔒_enc_8ab4f528e2740ff87d16106e
- ✅ Step 2.3: Transaction successfully processed and pushed into the buffer ledger!

📄 Active Transaction Buffer Ledger

Tx ID	Creditor	Debtor	Amount	ZK-Signature Trace	State
#5edaa7	User A	User B	\$100,000	0x_zk_6bed406f96f2eab88b6f349e	pending_approval
#d1db1d	User B	User C	\$90,000	0x_zk_86e62e134e85a6cc430910f9	pending_approval
#240928	User C	User A	\$70,000	0x_zk_9ce1484e8c13e9c8cd554d3f	pending_approval

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⚙️ Bootstrapping Interoperable Secure Network Topology Components...

🔒 Execute Distributed Network Threshold Key Ceremony

💚 Initiating Distributed Threshold Key Ceremony...

✅ **Network Threshold Key Pair Online!**
Global Network Public Key: 0x_net_pub_a60a2734fbfdb01c02f73586da6a9ff5
Private decryption capabilities are now split into 3 mathematical polynomial shards held by each isolated client profile.

💻 **Isolated Operational Environment: User A**

Incoming verification requests requiring your private key
signature:

No pending incoming bills to authorize.

💻 **Isolated Operational Environment: User B**

Incoming verification requests requiring your private key
signature:

No pending incoming bills to authorize.

💻 **Isolated Operational Environment: User C**

Incoming verification requests requiring your private key
signature:

No pending incoming bills to authorize.

```
!apt-get update -qq && apt-get install -y -qq coinor-cbc
```

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 [TEE Enclave] FastAPI Payload Ingestion Gateway Active...

 --- STEP 4.1.A: ESTABLISHING CRYPTOGRAPHIC MATRIX MATRIX HANDLES ---
Index [0] <==> Handle Address: 0x501566bda0b17a122dff4b4d697cb6bb7fcbd800
Index [1] <==> Handle Address: 0xc6abfe2d63556a24f0ef22b0e348f98ca8986220
Index [2] <==> Handle Address: 0x5b1af25c826e304064b8b4a5e6e24c0353083ab8

 --- STEP 4.1.B: DECRYPTING PAYLOADS & ASSIGNING COORDINATES ---
-> Successfully Decrypted Tx #5edaa7: Value \$100,000
Mapping: Creditor Key Row [0] owes Debtor Key Col [1]
-> Successfully Decrypted Tx #d1db1d: Value \$90,000
Mapping: Creditor Key Row [1] owes Debtor Key Col [2]
-> Successfully Decrypted Tx #240928: Value \$70,000
Mapping: Creditor Key Row [2] owes Debtor Key Col [0]

 --- STEP 4.1.C: MEMORY RECONSTITUTED ENCLAVE MATRIX BOUNDARY ---

 Enclave Protected Ledger Matrix Alignment

Creditor Key \ Debtor Key	Col [0] 0x501566bda0b1...	Col [1] 0xc6abfe2d6355...	Col [2] 0x5b1af25c826e...
Row [0] (0x501566...)	\$0.0	\$100,000.0	\$0.0
Row [1] (0xc6abfe...)	\$0.0	\$0.0	\$90,000.0
Row [2] (0x5b1af2...)	\$70,000.0	\$0.0	\$0.0

Total Gross Volume parsed inside hardware perimeter: \$260,000.0

```
# Install the Pyomo framework and download the native open-source CBC execution binary
!pip install -q pyomo
```

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🔒 [TEE Enclave] Entering Protected Memory Optimization Subsystem...
Model 5 Optimization Complete. Extracting global verification invariants...

⚙️ Step 4.3: Model 5 Global Proof Verification Engine

Verification Criterion Rule	Status Code
Verify original balances == new optimized balances	✓ TRUE (PASS)
Verify all new transactions are under bilateral limits ($\text{netopt} \leq \text{lim}$)	✓ TRUE (PASS)
Verify all new individual CREDITS SUM are under previous credit sums	✓ TRUE (PASS)
Verify all new individual DEBTS SUM are under bilateral debt sums	✓ TRUE (PASS)

📢 Published Global Proof Root Hash:
0x_proof_root_48abd806c7ff5b8fe40d409a851af7fef746cc137e74731f72dc5b20e7642bf

📄 Publicly Viewable Network Cipher-Text Envelope:
🔒_net_enc_1ab7f7cc52143120312b62fd69213f3f

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👁️ Enter God Mode: View Clear Matrix

🟢 [GOD MODE] Optimized Netting Settlement Matrix Overview

This is the clear-text state calculated inside the secure hardware perimeter before egress row segregation occurs:

Creditor Address Handle	Debtor [Col 0] 0x501566bda0...	Debtor [Col 1] 0xc6abfe2d63...	Debtor [Col 2] 0x5b1af25c82...
Row [0] (0x501566...)	\$0.00	\$30,000.00	\$0.00
Row [1] (0xc6abfe...)	\$0.00	\$0.00	\$20,000.00
Row [2] (0x5b1af2...)	\$0.00	\$0.00	\$0.00

- 🏠 Concrete Settlement Payment Routes:
- ⚡ Handle 0xc6abfe2d63... (Debtor) must pay \$30,000.00 to Handle 0x501566bda0... (Creditor).
 - ⚡ Handle 0x5b1af25c82... (Debtor) must pay \$20,000.00 to Handle 0xc6abfe2d63... (Creditor).

📊 Total Initial Gross Debt Claims:	\$260,000.00
📉 Total Optimized Net Settlement Flow:	\$50,000.00
🌟 Absolute System Liquidity Savings:	\$210,000.00

⚙️ Bootstrapping Secure FastAPI Outbound Egress & Client Retrieval Systems...

🔒 1. Run Egress Row Segregation & BroadCast Ciphers

🔒 [TEE Enclave] Initializing Secure Data Segregation and Outbound Packaging...

⚙️ Processing individual account matrix vectors...

└─ Account row vector segregated and encrypted for: 0x501566bda0b17a...

└─ Account row vector segregated and encrypted for: 0xc6abfe2d63556a...

└─ Account row vector segregated and encrypted for: 0x5b1af25c826e30...

■ [TEE Egress Complete]: Outputs safely broadcasted to the network hash chain directory.

🔒 [User C Window] Contacting network layer to retrieve block for key: 0x5b1af25c826e304064...

📡 Received encrypted data stream from chain hash link: 📄 cipher_aes_gcm_3b382db05f528989814dea74e2ebad7d

🔒 Appending localized private key seed [..65793f37e0..] to trigger asymmetric decryption matrix...

🛡️ Local Secure Vault: User C

Asymmetric Handle Identity Verified: 0x5b1af25c826e304064b8b4a5e6e24c0353083ab8

📊 Settled Internal Ledger Positions:

● Your Cleared Credits Row (Amounts owed to you):

[0.0, 0.0, 0.0]

● Your Cleared Debts Column (Amounts you must pay):

[0.0, 20000.0, 0.0]

🔗 Verified Parent Cryptographic Lineage Proof: 0x_proof_root_48abd8006c7ff5b8fe40d409a851af7fef746cc137e74731f72dc5b20e7642bf

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🛡️ Run Pre-Flight Security Guardrails

🔒 [TEE Enclave Security Perimeter] Initializing Guardrail Audit Matrix...

🔒 SYSTEM VERIFIED & SECURE

Pre-flight invariant audit checking completed prior to final network block validation:

■ Proof 1: Conservation of Value -> Net sum is exactly zero. No artificial liquidity generated. [PASS]

■ Proof 2: Anti-Drain Bond -> No user net position was degraded during routing execution. [PASS]

■ Proof 3: Model 5 Capacity Bounds -> All outputs strictly bounded by original gross volumes ($O_{i,j} \leq G_{i,j}$). [PASS]

🔗 Live Sequence Nonce Anchor (Anti-Replay Tracker Block):

0x_nonce_anchor_52c3dcea10ba21fea72c72b1

Unix Epoch Time Anchor Seed: 1790118455