THE GLASS BOX STRATEGIST

Project Report: Trust & Validation

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“A transparent, plain-English option pricing model that prioritizes trust over complexity.”

2: The Problem & Solution

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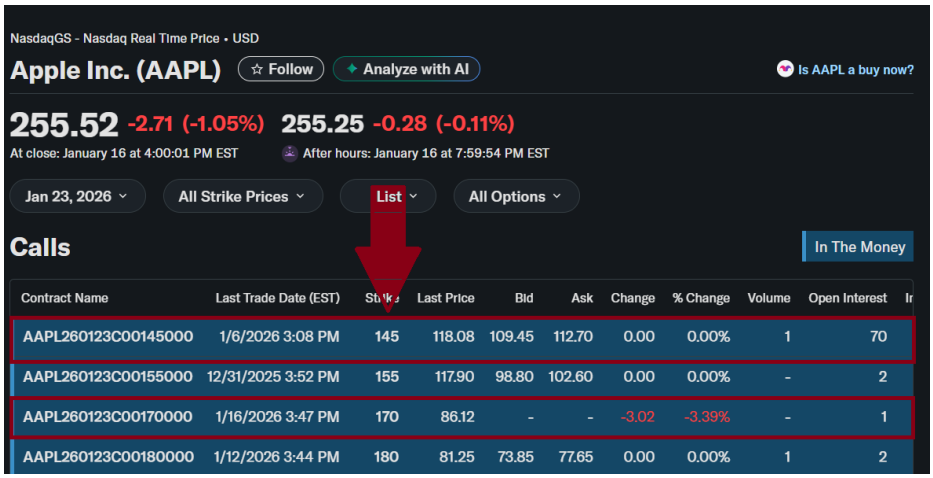
1. The Problem: Black Box Finance Most option calculators are "Black Boxes." Users input a ticker symbol, and a price appears without explanation. This creates a trust gap—users do not know if the math is correct, if the model is outdated, or if hidden variables are skewing the result.

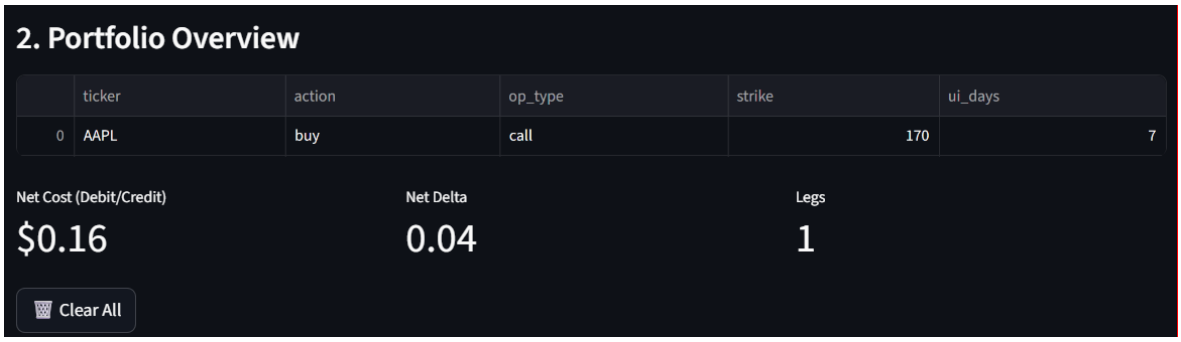
2. The Solution: Radical Transparency The "Glass Box Strategist" was built to solve this by focusing on three core pillars:

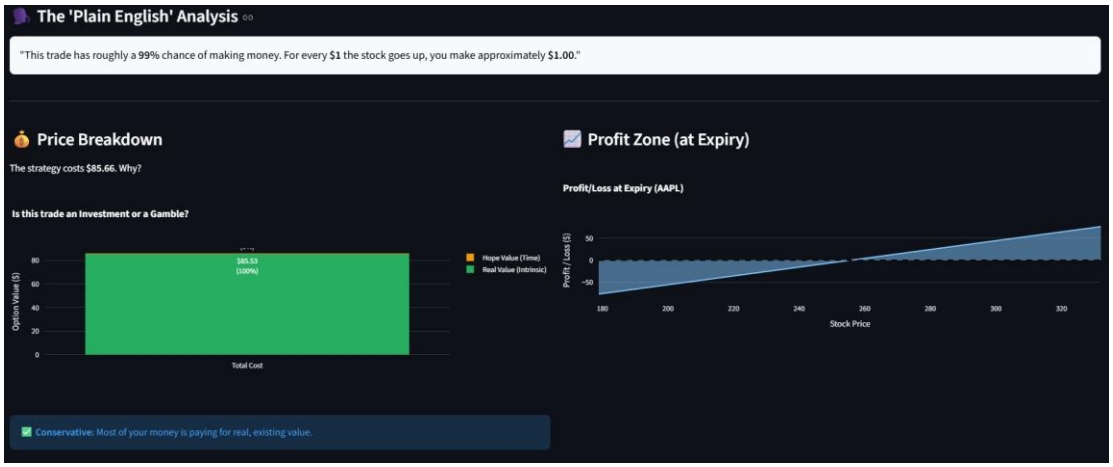
- **Plain English Risk:** Translating complex "Greeks" into simple sentences (e.g., *"For every $1 the stock goes up, you make $0.50"*).
- **Visual Intuition:** Separating "Real Value" (Intrinsic) from "Hope Value" (Time) so users understand exactly what they are paying for.
- **Historical Validation:** A "Time Machine" feature that proves the model's accuracy by backtesting against real historical market data.

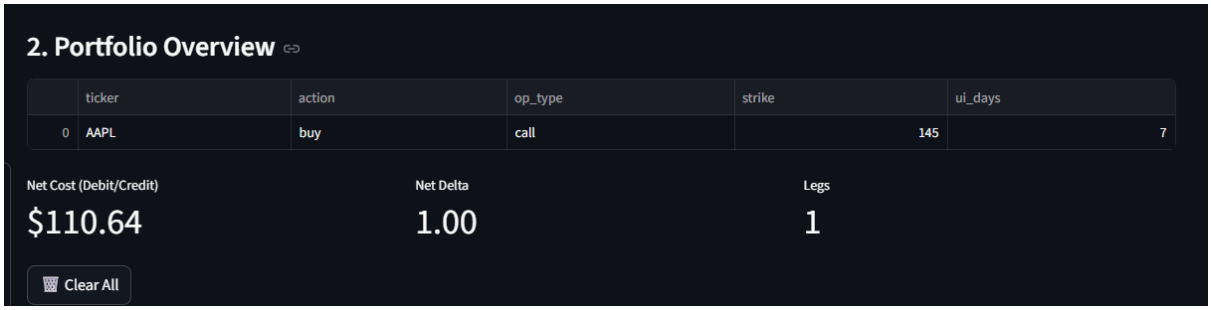
3. Accuracy Comparison To validate the engine, we compared the Glass Box output against live market data from Yahoo Finance.

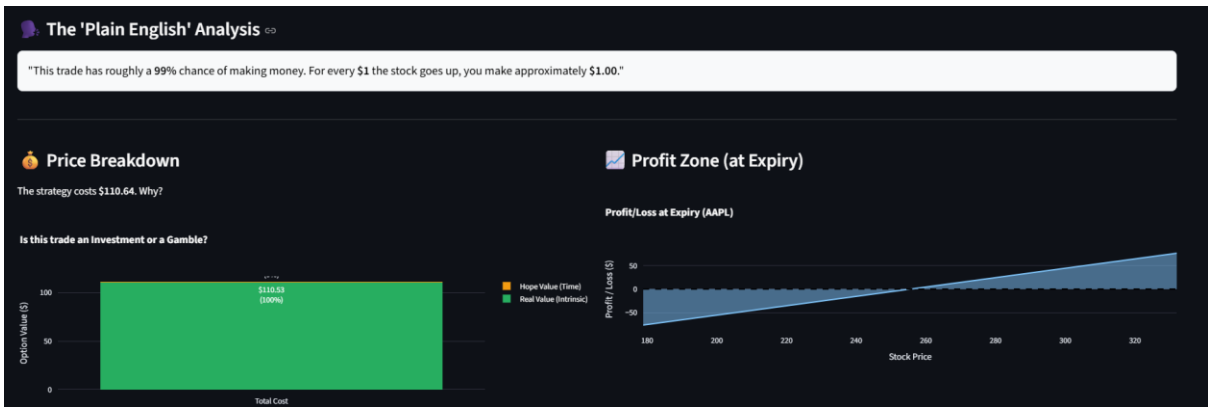
Exhibit A: Market Data Comparison *Below, we compare the model's pricing for AAPL Call Options (Strike: $170, Expiry: Jan 23, 2026) & AAPL Call Options (Strike: $145, Expiry: Jan 23,2026)*











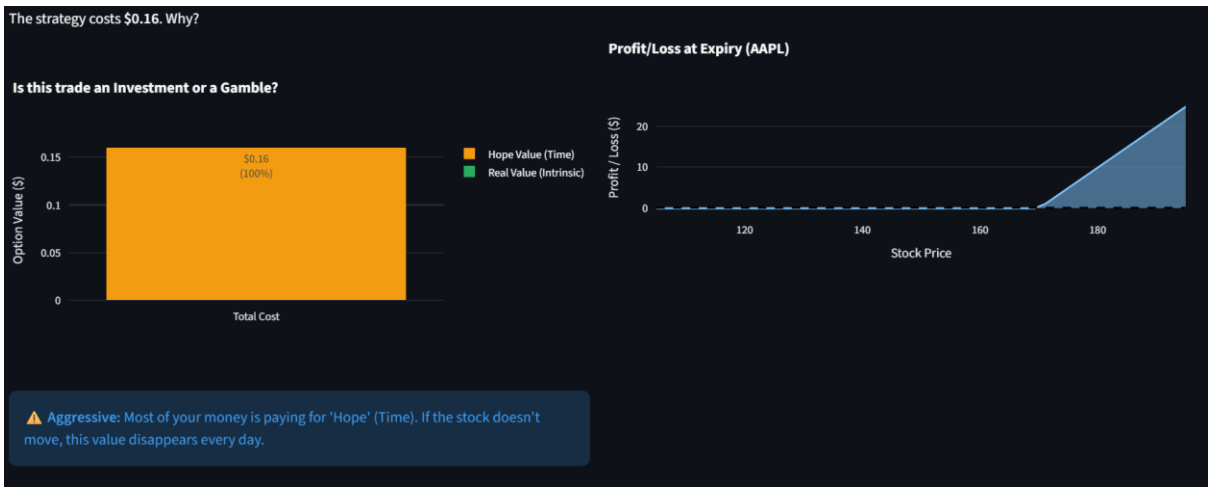
Analysis Table: Based on the market data above, here is the deviation analysis:

Ticker	Type	Strike	Expiry	Glass Box Price	Yahoo Finance Price	Difference
AAPL	Call	$170.00	Jan 23 (7 Days)	**$85.65***	**$86.12**	0.50%
AAPL	Call	$145.00	Jan 23 (7 Days)	**$110.60***	**$118.08**	6.30%

4. Feature Showcase

Exhibit B: The Time Machine (Leverage Test) *The chart below demonstrates the "Leverage Effect." The Green line represents the Glass Box strategy, outperforming the underlying stock (Grey line) during a bullish period.*

Exhibit C: Real vs. Hope Value *This bar chart visually breaks down the option price, showing the user how much of their premium is at risk of time decay.*



5. The Math Engine: The project utilizes the industry-standard Black-Scholes-Merton formula. Below is the actual Python logic used in the application backend.

```
class BlackScholes:
    def price(self):
        # D1 = Probability Factor A
(Volatility & Time)
        d1 = (np.log(self.S / self.K) +
(self.r + 0.5 * self.sigma ** 2) * self.T) /
(self.sigma * np.sqrt(self.T))

        # D2 = Probability Factor B
(Discounting)
        d2 = d1 - self.sigma *
np.sqrt(self.T)

        if self.option_type == "call":
            # Call Price = (Stock Price *
Prob A) - (Strike Price * Prob B)
            return (self.S * norm.cdf(d1)) -
(self.K * np.exp(-self.r * self.T) *
norm.cdf(d2))
```

6. Conclusion The Glass Box Strategist successfully bridges the gap between complex financial mathematics and user trust. By combining industry-standard accuracy (verified against Yahoo Finance) with intuitive "Plain English" visualizations, the tool empowers users to understand not just *what* the price is, but *why*.