



Now that we have the basics covered, lets dive into some Logic and Argument “symbolic” constructions.

Stage 0 — System Validity

Checks that the system is ready and the instrument is tradable.

Predicates:

- P0.1: System operational
- P0.2: Market data valid
- P0.3: Instrument tradable

Stage decision:

- $S0 = \text{SystemStateValid} = P0.1 \wedge P0.2 \wedge P0.3$

Implication:

- If S_0 is FALSE \rightarrow NO_TRADE

Formally:

1. $S_0 = P_{0.1} \wedge P_{0.2} \wedge P_{0.3}$
2. $\neg S_0 \rightarrow \text{NO_TRADE}$

Stage 1 — Risk Soundness

Ensures the trade is within risk limits.

Predicates:

- P1.1: Max loss known
- P1.2: Equity > 0
- P1.3: Base size $q_0 \geq 1$
- P1.4: Loss \leq budget

Stage decision:

- $S_1 = \text{RiskBounded} = P_{1.1} \wedge P_{1.2} \wedge P_{1.3} \wedge P_{1.4}$

Dependencies:

- Only evaluated if $S_0 = \text{TRUE}$

Implication:

- $\neg S_1 \rightarrow \text{NO_TRADE}$

Formally:

1. $S_1 = P_{1.1} \wedge P_{1.2} \wedge P_{1.3} \wedge P_{1.4}$
2. $S_0 \wedge \neg S_1 \rightarrow \text{NO_TRADE}$

Stage 2 — Structural Validity

Ensures strategy structure and exposure are sound.

Predicates:

- P2.1: Strategy topology valid

- P2.2: Credit/risk ratio valid
- P2.3: Greeks within limits
- P2.4: Liquidity sufficient

Stage decision:

- $S2 = \text{TradeStructurallyValid} = P2.1 \wedge P2.2 \wedge P2.3 \wedge P2.4$

Dependencies:

- Only evaluated if $S1 = \text{TRUE}$

Implication:

- $\neg S2 \rightarrow \text{NO_TRADE}$

Formally:

1. $S2 = P2.1 \wedge P2.2 \wedge P2.3 \wedge P2.4$
2. $S1 \wedge \neg S2 \rightarrow \text{NO_TRADE}$

Stage 3 — Context Validity

Ensures market and macro context allow the trade.

Predicates:

- P3.1: Regime permitted
- P3.2: MTF coherence
- P3.3: No macro halt

Stage decision:

- $S3 = \text{ContextValid} = P3.1 \wedge P3.2 \wedge P3.3$

Dependencies:

- Only evaluated if $S2 = \text{TRUE}$

Implication:

- $\neg S3 \rightarrow \text{NO_TRADE}$

Formally:

1. $S3 = P3.1 \wedge P3.2 \wedge P3.3$
2. $S2 \wedge \neg S3 \rightarrow \text{NO_TRADE}$

Stage 4 — Fuzzy Confidence

Computes confidence from soft signals.

Predicates:

- P4.1: Soft signals normalized
- P4.2: Weights valid

Stage decision:

- $S4 = \text{FuzzyConfidenceComputable} = P4.1 \wedge P4.2$

Dependencies:

- Only evaluated if $S3 = \text{TRUE}$

Implication:

- $\neg S4 \rightarrow \text{NO_TRADE}$

Formally:

1. $S4 = P4.1 \wedge P4.2$
2. $S3 \wedge \neg S4 \rightarrow \text{NO_TRADE}$

Stage 5 — Volatility Penalty

Checks that volatility observations are valid.

Predicates:

- P5.1: Volatility observable
- P5.2: Volatility bounds defined

Stage decision:

- $S5 = \text{VolatilityPenaltyComputable} = P5.1 \wedge P5.2$

Dependencies:

- Only evaluated if $S4 = \text{TRUE}$

Implication:

- $\neg S5 \rightarrow \text{NO_TRADE}$

Formally:

1. $S5 = P5.1 \wedge P5.2$
2. $S4 \wedge \neg S5 \rightarrow \text{NO_TRADE}$

Stage 6 — Scaling Soundness

Ensures position scaling factor g is valid.

Predicates:

- P6.1: $0 \leq g \leq 1$
- P6.2: g increases with confidence
- P6.3: g decreases with volatility

Stage decision:

- $S6 = \text{ScalingSound} = P6.1 \wedge P6.2 \wedge P6.3$

Dependencies:

- Only evaluated if $S5 = \text{TRUE}$

Implication:

- $\neg S6 \rightarrow \text{NO_TRADE}$

Formally:

1. $S6 = P6.1 \wedge P6.2 \wedge P6.3$
2. $S5 \wedge \neg S6 \rightarrow \text{NO_TRADE}$

Stage 7 — Final Decision

Computes the final executable position.

Predicates:

- P7.1: $q_0 > 0$

- P7.2: $g > 0$

Stage decision:

- $S7 = \text{TradeExecutable} = P7.1 \wedge P7.2$
- Final position size: $q = \text{floor}(q_0 \times g)$

Dependencies:

- Only evaluated if $S6 = \text{TRUE}$

Implications:

- $S7 \rightarrow \text{EXECUTE}$
- $\neg S7 \rightarrow \text{NO_TRADE}$

Formally:

1. $S7 = P7.1 \wedge P7.2$
2. $S6 \wedge S7 \rightarrow \text{EXECUTE}$
3. $S6 \wedge \neg S7 \rightarrow \text{NO_TRADE}$

Overall Logical Flow

The **full chain of inference** can be written as *nested Modus Ponens* conditions:

$$S0 = P0.1 \wedge P0.2 \wedge P0.3$$

$$S1 = P1.1 \wedge P1.2 \wedge P1.3 \wedge P1.4$$

$$S2 = P2.1 \wedge P2.2 \wedge P2.3 \wedge P2.4$$

$$S3 = P3.1 \wedge P3.2 \wedge P3.3$$

$$S4 = P4.1 \wedge P4.2$$

$$S5 = P5.1 \wedge P5.2$$

$$S6 = P6.1 \wedge P6.2 \wedge P6.3$$

$$S7 = P7.1 \wedge P7.2$$

$$\text{IF } \neg S0 \rightarrow \text{NO_TRADE}$$

ELSE IF $\neg S1 \rightarrow NO_TRADE$
ELSE IF $\neg S2 \rightarrow NO_TRADE$
ELSE IF $\neg S3 \rightarrow NO_TRADE$
ELSE IF $\neg S4 \rightarrow NO_TRADE$
ELSE IF $\neg S5 \rightarrow NO_TRADE$
ELSE IF $\neg S6 \rightarrow NO_TRADE$
ELSE IF $S7 \rightarrow EXECUTE$
ELSE $\rightarrow NO_TRADE$

This is the **soundness-preserving modus ponens inference chain** captured in the attached Graphviz diagram.