Seller side (strategies & campaign) | Auction platform | user simulation (behavioral) | recommender system (based on auction & user decide on what to show on elastic search)

Seller controls what items to sell, how much bid to make using different strategies (spending more but getting higher reach, mindful spending throughout, profitable, not profitable, risk seeking, aversing, etc.) deciding valuations and the change of methods after each time step.

Seller observes profits, user likeliness (estimated → clicks, conversions, CTR, ROI), auction platform outcomes to guess strategies to be able to mindfully decide on things.

updates estimated internal valuation based on circumstances

Success might mean diff. to diff. types of sellers to some higher reach, to some higher profits and to some other types risk aversion.

Seller → state: current remaining budget
active campaigns
past performance metrics
→ actions: bid up/down
enable/disable campaigns
budget allocation method change

→ Strategies: aggressive spender
conservative spender
ROI driven
risk averse
exploratory

→ evaluation: profit
reach
ROI stability
budget smoothness

Assumptions :- all sellers have finite budget
- discrete time steps
→ only past outcomes can be observed
→ users / other sellers cannot be seen (no privacy breach)

Aggressive spender → visibility & reach priority
→ allocate more budget to high-impression campaigns

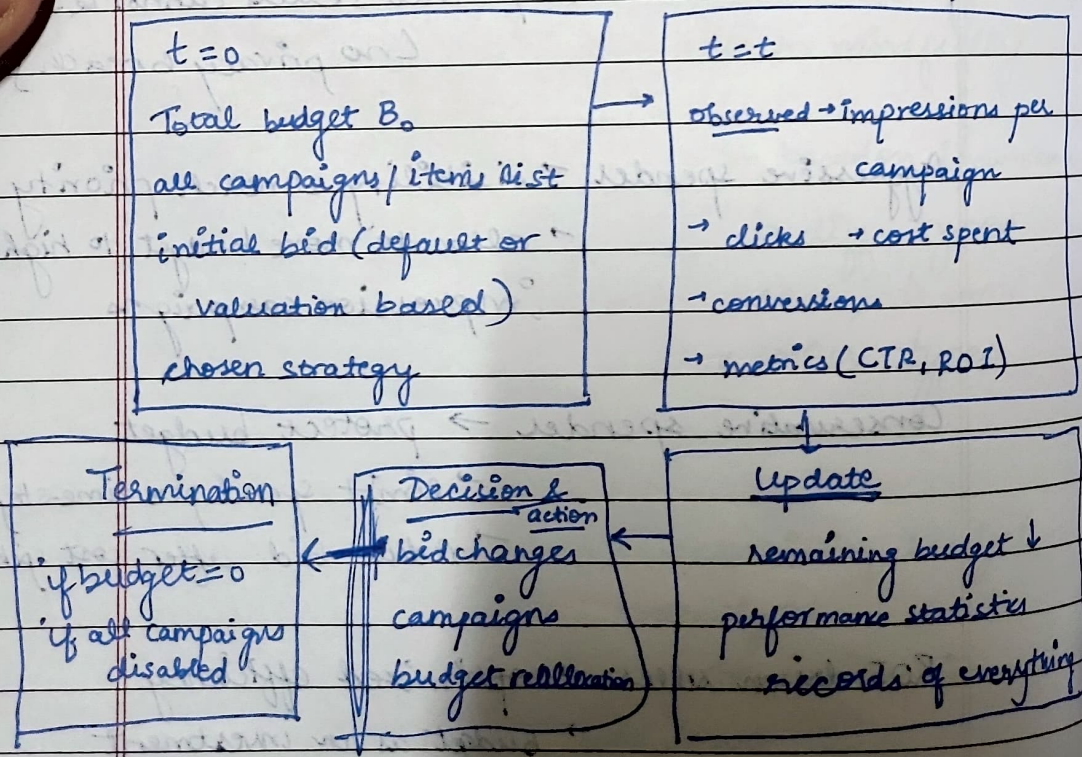
Conservative spender → protect budget
→ limit spend per time-step
→ reduce bid after cost spikes

ROI driven seller → optimized efficiency
→ budget as an investment
→ bids based on ROI
should be more +ve.

Risk-averse seller → minimise risk
→ avoid campaigns with high variance in outcomes
→ unstable ROI penalise
→ budget spent across multiple low risk campaigns.

Exploratory → testing, experimenting
→ compare results from past
→ short terms < information

observe previous (t-1) states
update current state, apply strategy rules
finally act on time step 't'.



Metrics efficiency: total profit, avg. ROI
exposure: reach, campaign longetivity
stability: ROI variance over time, budget smoothness