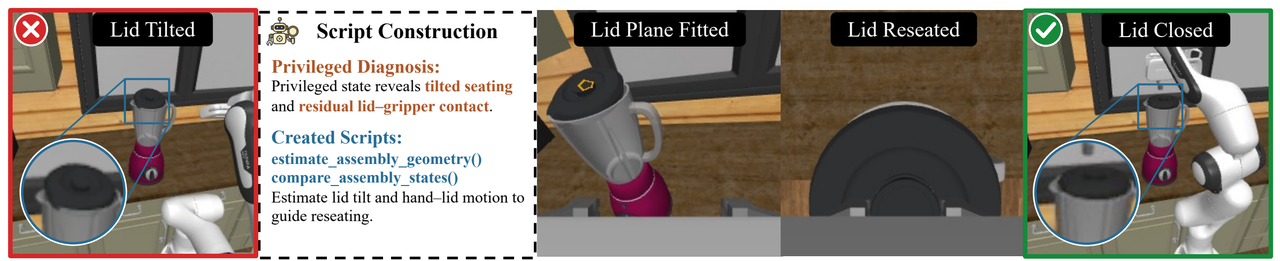
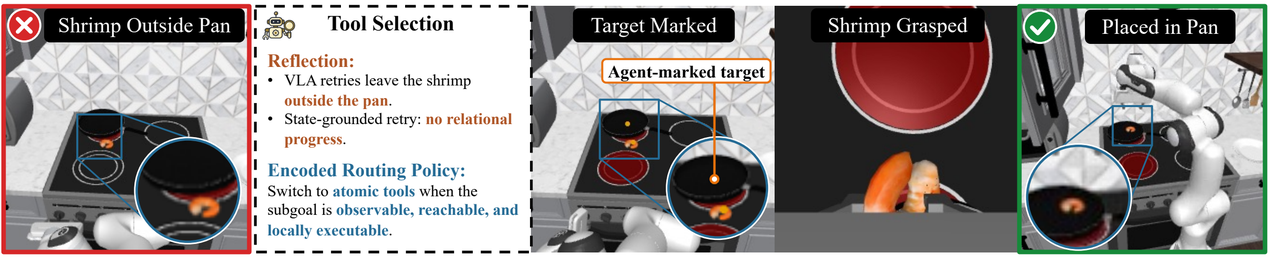
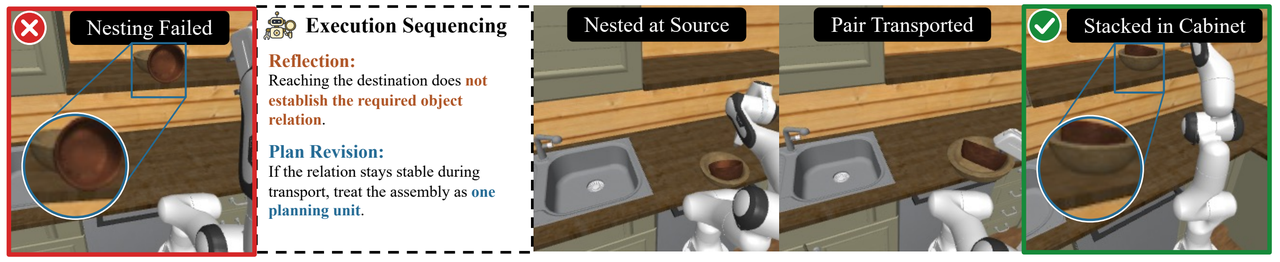

Insertion Failed
Parameter Computation
Diagnosis:
TCP alignment leaves the held tip end misaligned.
Encoded Function:
align_free_end()
• align segment axis → R
• TCP* = goal − R(tip − TCP)
Tip & Cup Located
Straw tip
Cup bottom
Tip Aligned
Released


Lid Tilted
Script Construction
Privileged Diagnosis:
Privileged state reveals tilted seating and residual lid–gripper contact.
Created Scripts:
estimate_assembly_geometry()
compare_assembly_states()
Estimate lid tilt and hand–lid motion to guide reseating.
Lid Plane Fitted
Lid Reseated
Lid Closed


Shrimp Outside Pan
Tool Selection
Reflection:
• VLA retries leave the shrimp outside the pan.
• State-grounded retry: no relational progress.
Encoded Routing Policy:
Switch to atomic tools when the subgoal is observable, reachable, and locally executable.
Target Marked
Agent-marked target
Shrimp Grasped
Placed in Pan


Nesting Failed
Execution Sequencing
Reflection:
Reaching the destination does not establish the required object relation.
Plan Revision:
If the relation stays stable during transport, treat the assembly as one planning unit.
Nested at Source
Pair Transported
Stacked in Cabinet