Three Types of Reasoning Patterns in Current LLMs:

Q: "If a place receives less than 250 mm of precipitation annually, what climate does it likely have?", "Answer": "Arid"
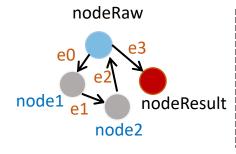(**nodeRaw**)

Pattern1: Completion Based Reasoning

If [c.F], Q?, (a)

Middle step:
What is the Feature a?
[a.F] == [c.F]

Conclusion: a

e0: What is the threshold of annual precipitation for <u>arid or desert climates</u>? (in sub question directly ask about correct answer)

node1: Arid or desert climates typically have an annual precipitation threshold of less than 250 millimeters (10 inches)

e1: What is the final answer?
nodeResult: Arid

Pattern2: Forward Reasoning

If [c.F], Q?, (a)
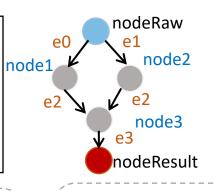
Middle step:
What is the def. of x?
[def.] ➜ [c.F]

Conclusion: a

e0: What is the <u>definition and classification</u> of climate types?

node1: arid (less than 250 mm), semi-arid (250-500 mm), humid subtropical (1,000-2,000 mm), and tropical wet (over 2,000 mm).

e1: More characteristics of an arid? (reason by narrowing down) (ask for details like human thinking)
node2: …

e2: What is the final answer?
nodeResult: Arid

Pattern3: Combination + Verify

If [c.F], Q?, (a)

Middle step:
(1). def. of x?
(2). What is F a
3. If: [def.] = [a.F]?

Conclusion: a

e0: <u>Definition and classification</u> of climate types?

node1:…   (e0, e1) are two distinct steps, e1 directly knows answer; e0 try to reflect def.

e1: What are the characteristics of an arid?
node2: …

e2: Does arid satisfy the queestion?
node3: Yes
e3: What is the final answer?
nodeResult: Arid