# 🐵 Monkey-Banana Problem - Step by Step Explanation in Prolog

## 📌 Step 1: Understanding the Problem

- A **monkey** is in a **room**.
- **Bananas** are hanging from the ceiling.
- A **box** is present in the room.
- The monkey **wants to get the bananas**, but they are **too high** to reach.
- The monkey can do **four actions**:
    1. **Move** to another location.
    2. **Push** the box to another location.
    3. **Climb** onto the box.
    4. **Grab** the bananas when on the box.

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## 📌 Step 2: Understanding the State Representation

**How do we describe the current situation?**

state(Monkey_Position, Box_Position, Monkey_Has_Bananas)

This means:

- Monkey_Position → Where the monkey is in the room.
- Box_Position → Where the box is in the room.
- Monkey_Has_Bananas → Does the monkey have bananas? (noBananas or hasBananas)

**Example of a Starting State:**

state(a, b, noBananas).

This means:

✅ The monkey is in position A.
✅ The box is in position B.
✅ The monkey **does not** have the bananas (noBananas).

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📌 **Step 3: Defining the Actions (What the Monkey Can Do)**

**1️⃣ Moving to another position**

move(state(Monkey, Box, MonkeyHasBananas), NewMonkey, state(NewMonkey, Box, MonkeyHasBananas)).

✅ This means the **monkey can walk** from one place to another.
Example:

move(state(a, b, noBananas), c, state(c, b, noBananas)).

💡 The monkey moves from A to C.

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**2️⃣ Pushing the box**

push(state(Monkey, Monkey, MonkeyHasBananas), NewMonkey, NewBox, state(NewMonkey, NewBox, MonkeyHasBananas)).

✅ The monkey **can push the box** only if it is **next to the box**.
Example:

push(state(c, c, noBananas), c, c, state(c, c, noBananas)).

💡 The monkey pushes the box to C.

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**3️⃣ Climbing onto the box**

climb(state(Pos, Pos, MonkeyHasBananas), state(onBox, Pos, MonkeyHasBananas)).

✅ The monkey **can climb** on the box if it is **at the same position** as the box.
Example:

climb(state(c, c, noBananas), state(onBox, c, noBananas)).

💡 The monkey climbs on the box at position C.

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**Grabbing the bananas**

grab(state(onBox, BananaPos, noBananas), state(onBox, BananaPos, hasBananas)).

✅ The monkey **can grab the bananas** if:

- It is **on the box**
- The box is **under the bananas**
  Example:

grab(state(onBox, c, noBananas), state(onBox, c, hasBananas)).

💡 The monkey grabs the bananas at C.

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📌 **Step 4: Defining the Goal**

The **goal** is for the monkey to have the bananas:

goal_state(state(_, _, hasBananas)).

✅ This means:

- We **don't care** where the monkey and box are (_ means "any position").
- We **only care** that the monkey **has the bananas** (hasBananas).

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📌 **Step 5: Solving the Problem**

We use **Prolog** to find a solution.
The program will try different actions step by step until the monkey gets the bananas.

**Example Solution:**

?- solve(state(a, b, noBananas), Actions).

📌 **The output will be:**

Actions = [move(c), push(c, c), climb, grab].

✅ **Step-by-step actions taken by the monkey:**

1. move(c) → Monkey moves to **C**.
2. push(c, c) → Monkey **pushes the box** to **C**.
3. climb → Monkey **climbs** onto the box.
4. grab → Monkey **grabs the bananas**! 🎉

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📌 **Final Summary**

✅ **Monkey starts in position A.**
- ✅ **Moves to position C.**
- ✅ **Pushes the box to position C.**
- ✅ **Climbs onto the box.**
- ✅ **Grabs the bananas!** 🍌

💡 **Now the monkey successfully gets the bananas!** 🎉