# 简介/问题描述

## 待解决问题的解释

**猴子摘香蕉：**

一个房间里，天花板上挂有一串香蕉，有一只猴子可在房间里任

意活动（到处走动，推移箱子，攀登箱子等）。设房间里还有一只可

被猴子移动的箱子，且猴子登上箱子时才能摘到香蕉，问猴子在某一

状态下（设猴子位置为 A，箱子位置为 B，香蕉位置在 C），如何行动

可摘取到香蕉。

## 问题的形式化描述

Define state predicates as following:  
 Site(x,y): x is at y;  
 Hang(w,y): w is hanging on y;  
 On(z): z is standing on the box;  
 Holds(z): bananas are held by z;

Define 4 operations:  
 Goto(u,v): monkey goes to v from u;  
 PushBox(v,w): monkey goes to w from v with boxes;  
 ClimeBox: monkey climbs up box;  
 Grasp: monkey gets the banana;  
  
Define initial state:  
 S\_0 = Site(Monkey, a)  
 && Hang(banana, b)  
 && Site(Box, c)  
 && !On(Monkey)  
 && !Holds(Monkey)  
  
Define final state:  
 S\_g = Site(Monkey, b)  
 && !Hang(banana, b)  
 && Site(Box, b)  
 && On(Monkey)  
 && Holds(Monkey)

## 解决方案介绍（原理）

利用谓词逻辑表示法的原理，定义相应的初始状态和终止状态。在具体代码实现中，将某个物体的状态表示为某个类的属性；将操作定义为一个函数，条件部分用if语句表示，动作部分用来执行具体的操作。

# 算法介绍

## 所用方法的一般介绍

在定义了对应的谓词、操作后，使用暴力搜索，搜索最后的状态

## 算法伪代码

# 算法实现

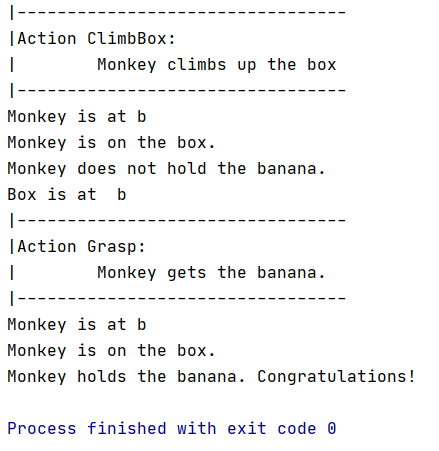
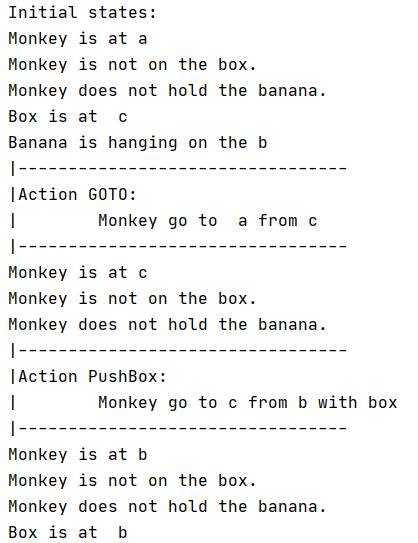
## 实验环境与问题规模

## 数据结构

## 实验结果

Monkey holds the banana. Congratulations!

## 系统中间及最终输出结果（要求有屏幕显示）



# 总结及讨论（对该实验的总结以及任何该实验的启发）

# 参考文献

无

# 附录—源代码及其注释（纸质版不需要打印）

*"""  
Define state predicates as following:  
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 && Site(Box, c)  
 && !On(Monkey)  
 && !Holds(Monkey)  
  
Define final state:  
 S\_g = Site(Monkey, b)  
 && !Hang(banana, b)  
 && Site(Box, b)  
 && On(Monkey)  
 && Holds(Monkey)  
"""  
  
# Define the monkey class*class monkey:  
 def \_\_init\_\_(self, site, On, Holds):  
 self.site = site  
 self.On = On  
 self.Holds = Holds  
 self.report()  
  
 def report(self):  
 print(**"Monkey is at"**, self.site)  
 if self.On:  
 print(**"Monkey is on the box."**)  
 else:  
 print(**"Monkey is not on the box."**)  
 if self.Holds:  
 print(**"Monkey holds the banana. Congratulations! "**)  
 else:  
 print(**"Monkey does not hold the banana."**)  
  
  
*# Define the box class*class box:  
 def \_\_init\_\_(self, site):  
 self.site = site  
 self.report()  
  
 def report(self):  
 print(**"Box is at "**, self.site)  
  
*# Define the banana class*class banana:  
 def \_\_init\_\_(self, y):  
 self.hang = y  
 print(**"Banana is hanging on the "** + y)  
  
  
*# Monkey goes to u from v*def Goto(monkey, u, v):  
 print(**"|---------------------------------"**)  
 print(**"|Action GOTO:"**)  
 print(**"| Monkey go to "**, u, **"from"**,v)  
 print(**"|---------------------------------"**)  
 if (~monkey.On) and (monkey.site == u):  
 monkey.site = v  
 monkey.report()  
  
*# Monkey goes to v from w with box*def PushBox(monkey, box, v, w):  
 print(**"|---------------------------------"**)  
 print(**"|Action PushBox:"**)  
 print(**"| Monkey go to"**, v, **"from"**,w,**"with box"**)  
 print(**"|---------------------------------"**)  
 if ~monkey.On and monkey.site == v and box.site == v:  
 monkey.site = w  
 box.site = w  
 monkey.report()  
 box.report()  
  
*# Monkey climbs up box*def ClimbBox(monkey, box):  
 print(**"|---------------------------------"**)  
 print(**"|Action ClimbBox:"**)  
 print(**"| Monkey climbs up the box"**)  
 print(**"|---------------------------------"**)  
 if monkey.site == box.site and ~monkey.On:  
 monkey.On = True  
 monkey.report()  
 box.report()  
  
*# Monkey trys to get banana*def Grasp(monkey, box, banana):  
 print(**"|---------------------------------"**)  
 print(**"|Action Grasp:"**)  
 print(**"| Monkey gets the banana."**)  
 print(**"|---------------------------------"**)  
 if monkey.On and box.site == banana.hang:  
 monkey.Holds = True  
 banana.hang = False  
 monkey.report()  
  
  
if \_\_name\_\_ == **"\_\_main\_\_"**:  
 print(**"Initial states:"**)  
 Monkey = monkey(**"a"**, False, False)  
 Box = box(**"c"**)  
 Banana = banana(**"b"**)  
  
 Goto(Monkey, Monkey.site, Box.site)  
 PushBox(Monkey, Box, Box.site, Banana.hang)  
 ClimbBox(Monkey, Box)  
 Grasp(Monkey, Box, Banana)