

Purpose Binary Trees
Due Tuesday March 8th

You have been hired by Universal Manufacturing Division to create a new computer game. Since it has been a hard week listening to boring lectures in CIS 350 you are uninspired and so you have decided to create a 20 twenty questions game. In this version the computer asks the player 20 questions in order to guess an animal. To make it more challenging, if the player stumps the computer, you want the computer to learn this new animal so that next time they play the game. So if the computer is stumped, then the computer asks the player for an additional question to distinguish that animal. For example here is a typical game

Computer	Human
Is it a mammal?	yes
Is it bigger than a bread box?	no
Does it walk itself?	yes
Is it a cat?	yes
Another Win for Machine Intelligence! Want to play again?	

Computer	Human
Is it a mammal	yes
Is it bigger than a bread box	no
Does it walk itself	yes
Is it a cat	no
Give me a question to distinguish it from a cat?	Does it eat sunflower seeds?
Give the response (yes/ no) and the new animal	yes hamster
Have you been upgraded? Want to play again?	

The next time the game is played the computer will be able to guess hamster.

Input

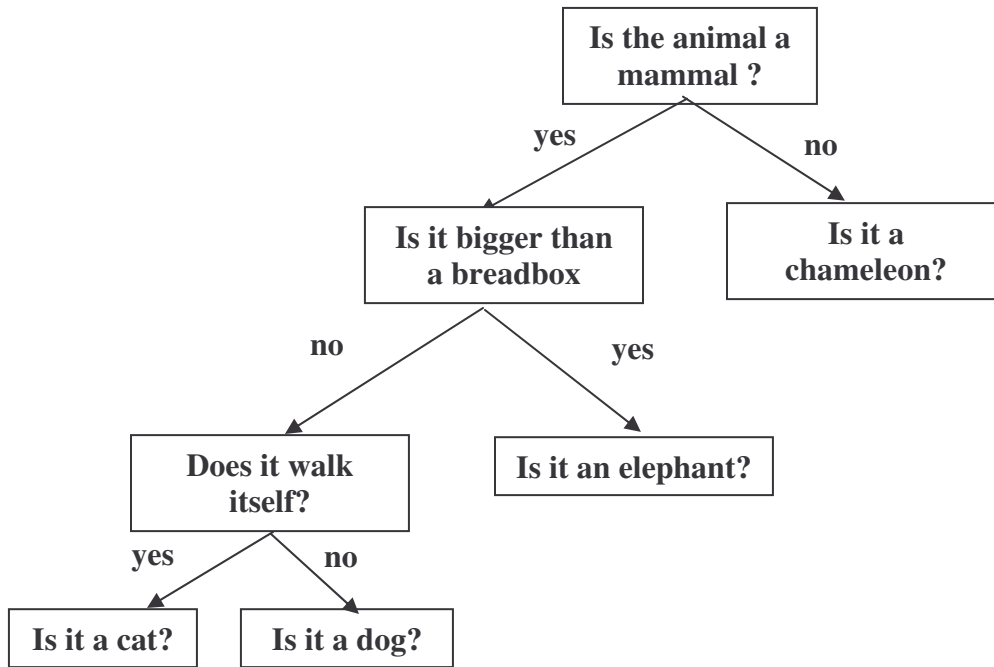
All interactions with humans will be done through the keyboard. The human will only guess yes or no. If the computer runs out of questions, then it will prompt the user for a new question to distinguish the animal from the one that computer guessed and a new animal. The list of questions and animals that the computer has learned is stored on the hard drive and is read in automatically at the start of execution.

Output

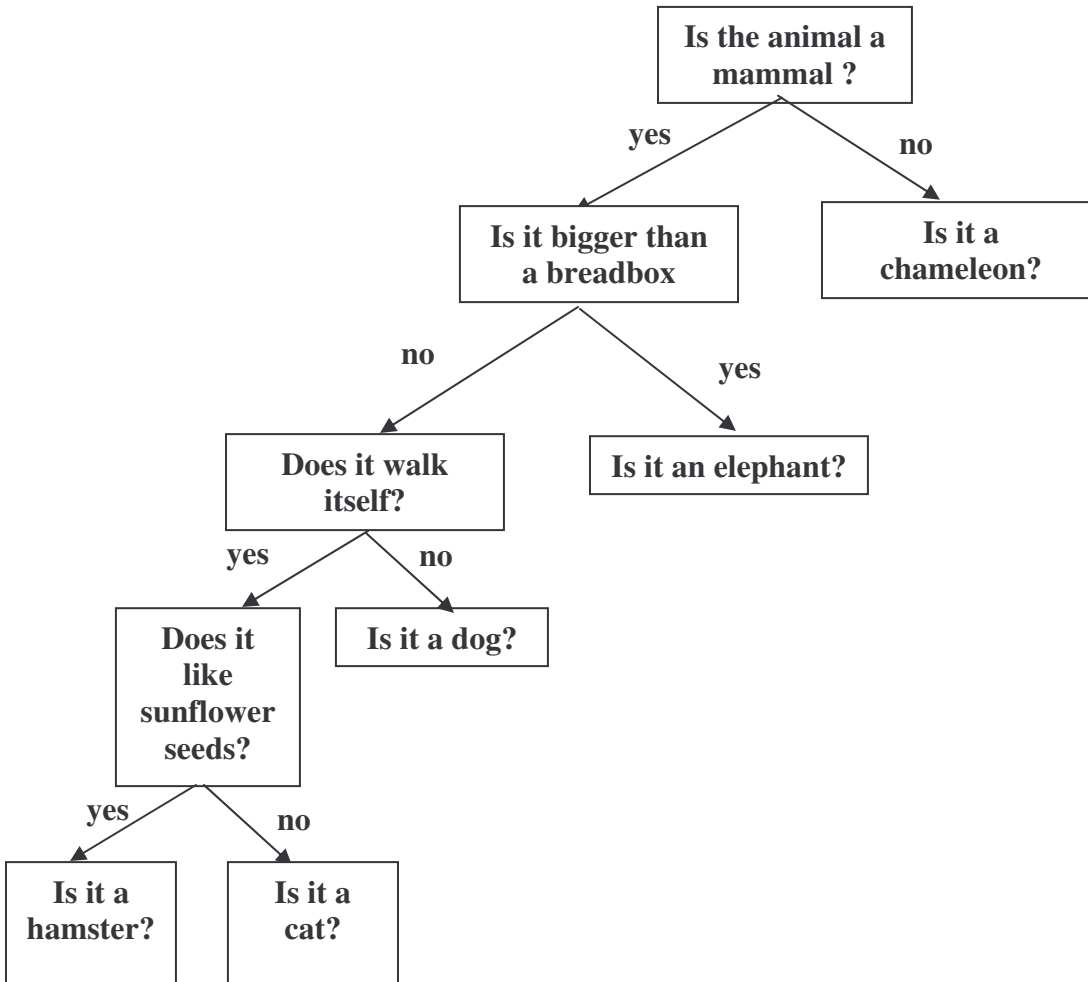
All interactions with humans is done through the keyboard. However the computer will automatically save all the questions and animals it knows to a file at the end of execution.

File

The file format is totally at the discretion of the student. You may find it helpful to store more than questions in each node. The file will initially store the following tree:



Initial Tree



Initial Tree after additional question and hamster

Grading (what to turn in)

What ■ indicates program/other is memo	Points	Due Thursday Feb 17	Due Tuesday March 8th
External Documentation	8		
Your Name	1	X	
Description of the problem	2	X	
Input Specification	1	X	
Output Specification	1	X	
Algorithm Description (english or UML)	5	X	
Data Structure	10		
main data structure "structure"	1		X
member functions / functions pre/post conditions for each	3	X	
Implementation and discussion.	3		X
Analysis	17		
How many animals are possible to identify with 20 questions? On a 1 gig machine, where the tree takes up 10 meg estimate the number of animals you can store and the number you can identify in a reasonable amount of time.	3	X	
Worst and/or average case time analysis for each function	4		X
Worst and/or average case space analysis for each function	4		X
Test Plan	3	X	
Sample Runs	3		X
Program Listing Style	15		
Your Name	1	X	
Description of the problem	2	X	
Variable Names	3		X
Data Dictionary	2		X
Pre/post conditions	3	X	
Length of functions	2		X
Use of white space	2		X
Functionality	50		
Main	5	X	
Inputs questions/answers	5		X
Reads the file correctly	5		X
Outputs questions/answers	5		X
Writes File correctly	5		X
Creates Tree	10		X
Walks Tree	5		X
Updates Tree	10		X