Comprehensive Assignment

CSI 2120 Programming Paradigms

Winter 2021

Part 3 (Prolog) due on April 14 at 23:00

Emmitt Heisz 300017758

Data structures

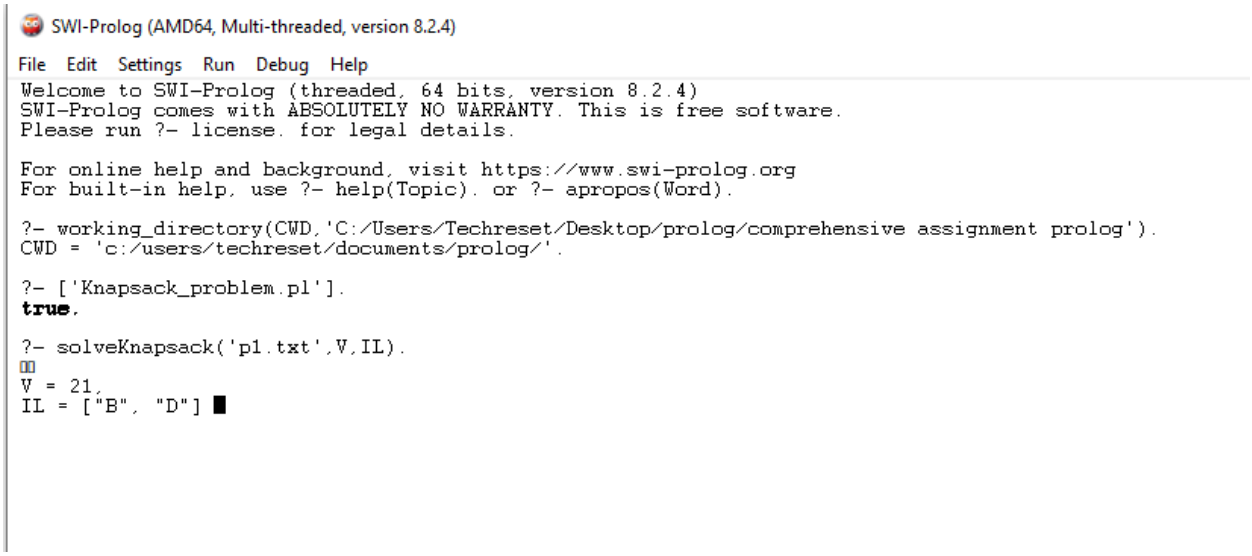
Object	Type	Description
Knapsack	Int[] (Array of integers)	A knapsack is represented by an array of integers. Each int represents an item that is in the knapsack. The value of the integer represents the index position of its corresponding item in the item's weights and values lists.
Table Row	Knapsack[] (Array of knapsacks)	A row in a table is represented by an array of knapsacks(array).

Predicates

Predicate	Description
sum_WorV (KS,IW,W)	This function returns either the weight or value of a knapsack(KS) depending on what the input is. If the List of item values is input in IW the predicate returns the bags value. If IW is given the List of items weights the predicate returns the bags weight. The returned value is passed back through W.
buildtable(N, T)	This predicate builds the first line in the table. It intiates every slot in the table with an empty bag and return the row to T.
nextrow(I,IW, IV,CR,T)	This calls the lager next row command with its initial conditions set. The larger predicate is described bellow
nextrow(I,J,IW, IV,CR,NR,T)	This predicate is used to return the next row to T after taking as input the current row CR, item values and weights IV,IW and the row number. J is initialized as 0 and NR is initialized as [] from the last predicate
max(K1,K2,IV,K)	This predicate, given 2 knapsacks K1 and K2 and the list of item values, returns the knapsack with the highest value to K

lastrow(N,IW, IV, CR, ER)	Given item values and weights IV, IW, this predicate loops for every item updating the table row by row and returns the last row in the table to ER
knapsack(C, IW, IV, V, IL)	This is called to solve the knapsack problem. It takes in Capacity C and the item values and weights IV, IW, and returns the value V of the knapsack and the knapsack itself
solveKnapsack(FN, V, IL)	This is called to solve the knapsack problem from file. It takes as input filename FN, reads the file and solves the problem. It returns the value V of the knapsack and the list of item names in the bag
tonames(KS,0,IN,[],IL).	To names is called to change the bag from a list of indexes to a list of names
buildlists(Str,N,A,B,C)	This predicate is used by the solveKnapsack predicate when reading the file to build a list for the Items weights, values, and names.

Solve p1 Example Result



Resources

https://www.swi-prolog.org/pldoc/man?section=libpl