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AD315 Discrete Math

Term Project Requirements and Summary

**Requirements Summary**

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| Project Name & Concept: | School Supplies Online Store |
| Number Conversion | When user enters a store, he get’s asked if he would like to to convert US dollars to bitcoins. Ne number conversion converts decimal to binary |
| Prime Numbers/Cipher | I will use to cipher to encrypt , decrypt user’s password.  Using Fibonnachi sequence as a cipher. This will implement recursion as well. Each letter in the alphabet corresponds to the Fibonacchi number |
| Set Theory | Items in the Inventory of the online store will be stored in a set. Some categories are stored in the dictionary and some are stored in the sets.  The shopping cart is a set as well.  After the customer adds the item to his cart, he will be adding them to the new set.  Set unions implemented in categories “All Stationary”, “All Electronics”.  Set intersections implemented in showing the customer the items that are in electronics besides the laptops. So *otherElectronics* is a intersection of all electronics and laptops.  I also added the the union of dictionaries.  Please see Data.py for set operations |
| Permutations/Combinations | **Combinations:** Printing combinations of other items that can be an add-on to the current item in the cart (or if no cart, the item user is going to purchase).  *“Users also bought:*  *{pen, erasor},*  *{erasor, pencil sharpener},*  *{notebook, pen, eraser, sharpener}”*  **Permutations:** Used to help the user generate a possible user name.  Program asks for the users first, last names and his favourite super hero and creates all possible permutations of words that will compose a user name.  Than a customer can choose one and the username will be created based on that permutation with adding some random numbers in between the words  For example, the user enters *Iryna Sherepot Supermario*, the program will print the following permutations:  *Your possible usernames are:*  *1. { Iryna Sherepot Supermario }*  *2. { Iryna Supermario Sherepot }*  *3. { Sherepot Supermario Iryna }*  *4. { Super Mario Iryna Sherepot }*  *5. { Super Mario Sherepot Iryna }*  *Please enter your choice:* |
| Probability | Little lottery: If a customer purchases pencil sharpener(or any item), he gets a surprise random item added for free. He enter swhat item he would like the most, and the program will calculate the probability of him getting one. The probability will be different for each item, as the store will have different amounts of different items and some quantities as 0. |
| Algorithms | Customer can sort inventory by price . Binary search Tree traversal used to print a sort by price of the inventory. |
| Recursion | Recursion is used to compute factorials while computing the probability of the items being chosen  Also recursion is used to populate the BST of merchandise.  Also recursion is used in creating the Fibonacci numbers array to use in the cipher |
| Trees | Creates a BST based by price of items. First thing that the program will print right after saying *Welcome to the store* |
| Finite State Machine | The program would show different states that the customer is on the website. For example when he/she didn’t add anything to the cart – one state, when added an item – different state, when paid – another different state |

**Instructions:**

This is a text based online store game. Run the main method first. The user see’s the Welcome greeting and sorted merchandise using inorder traversal of BST made of items in the store.

The program will ask the user if he would like to convert currency. If he does – it takes him/her to the currency conversion state where he enters decimal value of the us dollars and the program will print the output converted money to the binary number(it’s called bitcoins in this store). If the user does not wish to convert currency, the program takes him to the list off all categories in the store.

In this state the user picks one category by entering the number corresponding to it(it will be printed).

After that the user can see all the items in the category. He can write the name of items separated become and following space (has to match exactly) and it will be added to the cart. After user entered all item name, he will be taken to the cart state

In the cart state he will see his items in the cart printed and his total. Below the cart the computer will show user the merchandize suggestions and will ask him if he would like to add any of these to his cart. He can choose 1 or 2 for Yes or No respectfully. After that the updated cart will print

The program will ask the user if he would like to proceed further. If user chooses yes – it will take him to the create username state, If not – back to the store categories state.

The program will create a username for the user using his first name, last name and favorite superhero.

It will create all possible permutations of these words and offer user choose one. After user chooses one, it will add some random numbers in between permutation works and will create the username based on chosen permutation.

After the username is created, the program will encode the password entered by the user.

After this it will ask him if he would like to play the lottery of winning one free item with purchase today. It will print all possibilities of winning items that are in the lottery inventory.

After the lottery, the user will go to the checkout. The cart will show again and he needs to enter 16-digit card number followed by expiration date and zip code, separated by comas, no spaces.

If the card input is validated correctly – than the game is over and thank you message is printed. If the user entered wrong input – than he will do it again.