/\* Card.java

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\* Class: CSC 3410 MW 1:30-2:45

\* Date: 9/9/2013

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\* 1. Purpose: This program was created to initialize a deck of 52 cards,

\* shuffle the deck at least 20 times,

\* and print the old deck and the new deck of cards.

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\* 2. Solution: The solution to the problem was to create three methods,

\* one to initialize the deck, one to shuffle the deck and one to print the deck.

\* The first method InitializeDeck uses a nested for loop and an array to populate the Vector.

\* The second method shuffleDeck takes two parameters, a deck of type Vector<String> and a shuffle number of type int.

\* The algorithm used by this method is a loop that randomly swaps cards (Fisher-Yates shuffle variation).

\* The loop iterates through the Vector and each card in the deck gets swapped with another randomly chosen card.

\* (Some cards may be swapped more than once or with themselves which is why it is shuffled at least 20 times).

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\* 3. The data structures used in the program are Vectors and Arrays.

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\* 4. To use the program you must initialize a deck using the InitializeDeck method,

\* shuffle the deck using the shuffleDeck method,

\* and print the deck using the printDeck method.

\* The output is the old deck and the new shuffled deck.

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\* 5. This program consists of one class (cards.java) which carries out all of the methods

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**import** java.util.\*;

**public** **class** card {

//main method which executes the three methods required for this program

**public** **static** **void** main(String args[]){

Vector<String> myOldDeck = *initializeDeck*(); // original deck before shuffling

*printDeck*(myOldDeck); // print out the Old deck

System.*out*.println("\n\n\n"); //add some lines in between for readability on the console

Vector<String> myNewDeck = *shuffleDeck*(myOldDeck,20); // new deck that is now shuffled

*printDeck*(myNewDeck); // print out the New deck

}

//takes no parameters and is called in the beginning to create a new deck

**public** **static** Vector<String> initializeDeck(){

Vector<String> cards = **new** Vector<String>(52);

String[] number = {"2","3","4","5","6","7","8","9","10","Jack","Queen","King","Ace"}; //all possible card numbers

String[] suit = {"Hearts","Clubs","Spades","Diamonds"}; //all possible suits

//creates each card in the deck with the outer loop handling each suit and the inner handling all numbers

**for**(**int** i = 0;i < suit.length;i++){

**for**(**int** j = 0; j < number.length;j++){

cards.addElement(number[j] + " of " + suit[i]);

}

}

**return** cards;

}

//returns a new 52 deck card vector with all cards in order

//takes two parameters cards Vector and numOfShuffles int

//uses these parameters to shuffle the given Vector

**public** **static** Vector<String> shuffleDeck(Vector<String> cards,**int** numOfShuffles){

Random generator = **new** Random();

//outer for loop runs the shuffle 20 times

**for**(**int** i = 0;i<numOfShuffles;i++){

**int** count = 0;

//inner enhanced for loop is used to iterate through the Vector

**for**(String string: cards){

//for each element a random number is generated 0-51

**int** randIndex = generator.nextInt(52);

String tempString = string;

//the current element is set to the randomly chosen element

cards.set(count, cards.get(randIndex));

//the randomly chosen element is set to the current element

cards.set(randIndex, tempString);

//the card has now been swapped with another random card

count++;

}

}

**return** cards;

}

//returns a shuffled deck

//takes a deck Vector and prints it

**public** **static** **void** printDeck(Vector<String> cards){

//enhanced for loop prints each element in the deck

**for**(String string: cards)

System.*out*.println(string);

}

}