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**LAB**

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TEB1113

Algorithm & Data Structure

*Lab 3*

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| --- | --- | --- | --- |
| **NO.** | **NAME** | **STUDENT ID** | **PROGRAM (IT / IS / CS / BM)** |
| **1.** | **CHENG PIN-JIE** | **21000548** | **CS** |

*Assoc. Prof. Dr Manzoor Ahmed Hashmani*

*Madam Maryam Omar Abdullah Sawad*

Homework 1

import java.util.Scanner;

class Bag {

// Attributes

private int[] arrBag;

private int currentItemLoc;

// Method

/\*

\* Postcondition: The Bag has been initialized

\* and it is now empty.

\*/

public Bag(int size) {

currentItemLoc = 0;

arrBag = new int[size];

}

/\*

\* Precondition: The bag is not full

\* Postcondition: The item (represent in integer) is being

\* added to the array (bag)

\*/

public void add(int entry) {

if (currentItemLoc < arrBag.length) {

arrBag[currentItemLoc] = entry;

currentItemLoc++;

} else {

System.out.println("The bag is full");

}

}

/\*

\* Precondition: The element must exist inside the bag.

\* Postcondition: If target was in the Bag, then

\* one copy of target has been removed from the

\* Bag, and the return value is true; otherwise the

\* Bag is unchanged and the return value is false.

\*/

public boolean remove(int entry) {

if (countOccur(entry) > 0) {

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

if (entry == arrBag[i]) {

for (int j = i; j < currentItemLoc; j++) {

arrBag[j] = arrBag[j + 1];

}

}

}

return true;

} else {

return false;

}

}

/\*

\* Precondition: Do not count the empty space.

\* Postcondition: The return value is the number

\* of integers in the Bag.

\*/

public int calcSize() {

int counter = 0;

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] != 0) {

counter++;

}

}

return counter;

}

/\*

\* Postcondition: The return value is the number

\* of copies of target in the Bag.

\*/

public int countOccur(int entry) {

int counter = 0;

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

if (entry == arrBag[i]) {

counter++;

}

}

return counter;

}

public void printAllItems() {

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] != 0) {

System.out.println(arrBag[i]);

}

}

}

/\* Precondition: Which item position shold be known

\* Postcondition: return the position of the item;

\*/

public int positionOf(int entry) {

int position = 0;

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] == entry) {

i = position + 1;

break;

}

}

return position;

}

}

public class Main {

public static void main(String[] args) {

Bag bag = new Bag(10);

// Use while loop to keep on asking user until user ends.

while (true) {

System.out.println("\_\_\_\_\_\_\_\_\_\_BAG\_\_\_\_\_\_\_\_\_");

System.out.println("[1] Add items");

System.out.println("[2] Remove items");

System.out.println("[3] Size of bag");

System.out.println("[4] Find the occurance of items");

System.out.println("[5] Find the position of item");

System.out.println("[6] Quit program");

// Use scanner to get user input

Scanner obj = new Scanner(System.in);

System.out.println("Enter your option: ");

String in = obj.nextLine();

int inInt = Integer.parseInt(in);

// Use switch case to alter the option and do the following:

switch (inInt) {

case 1: // Add item

System.out.println("What item you want to add: ");

Scanner obj1 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in1 = obj1.nextLine();

int inInt1 = Integer.parseInt(in1);

bag.add(inInt1);

System.out.println(" ");

continue;

case 2: // Remove item

System.out.println("What item you want to remove: ");

Scanner obj2 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in2 = obj2.nextLine();

int inInt2 = Integer.parseInt(in2);

bag.remove(inInt2);

System.out.println(" ");

continue;

case 3: // Calculate size of bag

bag.calcSize();

System.out.println("The size of the bag now is: " + bag.calcSize());

System.out.println(" ");

continue;

case 4: // Find occur

System.out.println("What item you want to count: ");

Scanner obj4 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in4 = obj4.nextLine();

int inInt4 = Integer.parseInt(in4);

System.out.println("The occurance of the item is " + bag.countOccur(inInt4));

System.out.println(" ");

continue;

case 5: // Find position

System.out.println("What item you want to find: ");

Scanner obj5 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in5 = obj5.nextLine();

int inInt5 = Integer.parseInt(in5);

System.out.println("The position of the item is " + bag.positionOf(inInt5));

System.out.println(" ");

continue;

case 6: // Quit program

System.out.println("Thank you!");

return;

}

}

}

}

Homework 2

**Program 1 – Reverse within one array**

import java.util.Scanner;

class Bag {

// Attributes

private int[] arrBag;

private int currentItemLoc;

// Method

/\*

\* Postcondition: The Bag has been initialized

\* and it is now empty.

\*/

public Bag(int size) {

currentItemLoc = 0;

arrBag = new int[size];

}

/\*

\* Precondition: The bag is not full

\* Postcondition: The item (represent in integer) is being

\* added to the array (bag)

\*/

public void add(int entry) {

if (currentItemLoc < arrBag.length) {

arrBag[currentItemLoc] = entry;

currentItemLoc++;

} else {

System.out.println("The bag is full");

}

}

/\*

\* Precondition: The element must exist inside the bag.

\* Postcondition: If target was in the Bag, then

\* one copy of target has been removed from the

\* Bag, and the return value is true; otherwise the

\* Bag is unchanged and the return value is false.

\*/

public boolean remove(int entry) {

if (countOccur(entry) > 0) {

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

if (entry == arrBag[i]) {

for (int j = i; j < currentItemLoc; j++) {

arrBag[j] = arrBag[j + 1];

}

}

}

return true;

} else {

return false;

}

}

/\*

\* Precondition: Do not count the empty space.

\* Postcondition: The return value is the number

\* of integers in the Bag.

\*/

public int calcSize() {

int counter = 0;

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] != 0) {

counter++;

}

}

return counter;

}

/\*

\* Postcondition: The return value is the number

\* of copies of target in the Bag.

\*/

public int countOccur(int entry) {

int counter = 0;

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

if (entry == arrBag[i]) {

counter++;

}

}

return counter;

}

public void printAllItems() {

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] != 0) {

System.out.println(arrBag[i]);

}

}

}

/\* Precondition: Item position shold be known

\* Postcondition: return the position of the item;

\*/

public int positionOf(int entry) {

int position = 0;

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] == entry) {

position = i + 1;

break;

}

}

return position;

}

/\* Use a 'temp' variable to store the original array.

\* and then swap the element with the last element of the

\* original element.

\*/

public void reverse(){

for (int i = 0; i < currentItemLoc/2; i++){

int temp;

temp = arrBag[i];

arrBag[i] = arrBag[currentItemLoc-i-1];

arrBag[currentItemLoc-i-1] = temp;

}

}

}

public class Main {

public static void main(String[] args) {

Bag bag = new Bag(10);

// Use while loop to keep on asking user until user ends.

while (true) {

System.out.println("\_\_\_\_\_\_\_\_\_\_BAG\_\_\_\_\_\_\_\_\_");

System.out.println("[1] Add items");

System.out.println("[2] Remove items");

System.out.println("[3] Size of bag");

System.out.println("[4] Find the occurance of items");

System.out.println("[5] Find the position of item");

System.out.println("[6] Reverse the items in the bag");

System.out.println("[7] Quit program");

// Use scanner to get user input

Scanner obj = new Scanner(System.in);

System.out.println("Enter your option: ");

String in = obj.nextLine();

int inInt = Integer.parseInt(in);

// Use switch case to alter the option and do the following:

switch (inInt) {

case 1: // Add item

System.out.println("What item you want to add: ");

Scanner obj1 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in1 = obj1.nextLine();

int inInt1 = Integer.parseInt(in1);

bag.add(inInt1);

System.out.println(" ");

continue;

case 2: // Remove item

System.out.println("What item you want to remove: ");

Scanner obj2 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in2 = obj2.nextLine();

int inInt2 = Integer.parseInt(in2);

bag.remove(inInt2);

System.out.println(" ");

continue;

case 3: // Calculate size of bag

bag.calcSize();

System.out.println("The size of the bag now is: " + bag.calcSize());

System.out.println(" ");

continue;

case 4: // Find occur

System.out.println("What item you want to count: ");

Scanner obj4 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in4 = obj4.nextLine();

int inInt4 = Integer.parseInt(in4);

System.out.println("The occurance of the item is " + bag.countOccur(inInt4));

System.out.println(" ");

continue;

case 5: // Find position

System.out.println("What item you want to find: ");

Scanner obj5 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in5 = obj5.nextLine();

int inInt5 = Integer.parseInt(in5);

System.out.println("The position of the item is " + bag.positionOf(inInt5));

System.out.println(" ");

continue;

case 6:

bag.reverse();

System.out.println("The items in the bag have been reversed.");

System.out.println(" ");

continue;

case 7: // Quit program

System.out.println("Thank you!");

return;

}

}

}

}

**Program 2 – Reverse using another bag.**

import java.util.Scanner;

class Bag {

// Attributes

private int[] arrBag;

private int[] arrBag2;

private int currentItemLoc;

// Method

/\*

\* Postcondition: The Bag has been initialized

\* and it is now empty.

\*/

public Bag(int size) {

currentItemLoc = 0;

arrBag = new int[size];

arrBag2 = new int[size];

}

/\*

\* Precondition: The bag is not full

\* Postcondition: The item (represent in integer) is being

\* added to the array (bag)

\*/

public void add(int entry) {

if (currentItemLoc < arrBag.length) {

arrBag[currentItemLoc] = entry;

currentItemLoc++;

} else {

System.out.println("The bag is full");

}

}

/\*

\* Precondition: The element must exist inside the bag.

\* Postcondition: If target was in the Bag, then

\* one copy of target has been removed from the

\* Bag, and the return value is true; otherwise the

\* Bag is unchanged and the return value is false.

\*/

public boolean remove(int entry) {

if (countOccur(entry) > 0) {

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

if (entry == arrBag[i]) {

for (int j = i; j < currentItemLoc; j++) {

arrBag[j] = arrBag[j + 1];

}

}

}

return true;

} else {

return false;

}

}

/\*

\* Precondition: Do not count the empty space.

\* Postcondition: The return value is the number

\* of integers in the Bag.

\*/

public int calcSize() {

int counter = 0;

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] != 0) {

counter++;

}

}

return counter;

}

/\*

\* Postcondition: The return value is the number

\* of copies of target in the Bag.

\*/

public int countOccur(int entry) {

int counter = 0;

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

if (entry == arrBag[i]) {

counter++;

}

}

return counter;

}

public void printAllItems() {

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] != 0) {

System.out.println(arrBag[i]);

}

}

}

/\* Precondition: Item position shold be known

\* Postcondition: return the position of the item;

\*/

public int positionOf(int entry) {

int position = 0;

for (int i = 0; i < currentItemLoc; i++) {

if (arrBag[i] == entry) {

position = i + 1;

break;

}

}

return position;

}

/\* Create another abg named arrBag2 to copy the original

\* array reversely.

\*/

public void reverse(){

for (int i = 0; i < currentItemLoc; i++){

arrBag2[i] = arrBag[currentItemLoc-i];

}

}

}

public class Main {

public static void main(String[] args) {

Bag bag = new Bag(10);

// Use while loop to keep on asksing user until user ends.

while (true) {

System.out.println("\_\_\_\_\_\_\_\_\_\_BAG\_\_\_\_\_\_\_\_\_");

System.out.println("[1] Add items");

System.out.println("[2] Remove items");

System.out.println("[3] Size of bag");

System.out.println("[4] Find the occurance of items");

System.out.println("[5] Find the position of item");

System.out.println("[6] Reverse the items in the bag");

System.out.println("[7] Quit program");

// Use scanner to get user input

Scanner obj = new Scanner(System.in);

System.out.println("Enter your option: ");

String in = obj.nextLine();

int inInt = Integer.parseInt(in);

// Use switch case to alter the option and do the following:

switch (inInt) {

case 1: // Add item

System.out.println("What item you want to add: ");

Scanner obj1 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in1 = obj1.nextLine();

int inInt1 = Integer.parseInt(in1);

bag.add(inInt1);

System.out.println(" ");

continue;

case 2: // Remove item

System.out.println("What item you want to remove: ");

Scanner obj2 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in2 = obj2.nextLine();

int inInt2 = Integer.parseInt(in2);

bag.remove(inInt2);

System.out.println(" ");

continue;

case 3: // Calculate size of bag

bag.calcSize();

System.out.println("The size of the bag now is: " + bag.calcSize());

System.out.println(" ");

continue;

case 4: // Find occur

System.out.println("What item you want to count: ");

Scanner obj4 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in4 = obj4.nextLine();

int inInt4 = Integer.parseInt(in4);

System.out.println("The occurance of the item is " + bag.countOccur(inInt4));

System.out.println(" ");

continue;

case 5: // Find position

System.out.println("What item you want to find: ");

Scanner obj5 = new Scanner(System.in);

System.out.println("Enter your item: ");

String in5 = obj5.nextLine();

int inInt5 = Integer.parseInt(in5);

System.out.println("The position of the item is " + bag.positionOf(inInt5));

System.out.println(" ");

continue;

case 6:

bag.reverse();

System.out.println("The items in the bag have been reversed.");

System.out.println(" ");

continue;

case 7: // Quit program

System.out.println("Thank you!");

return;

}

}

}

}