Array List

2190101: Computer Programming

# Objectives

* Understand the difference between array and ArrayList
* Be able to choose between array and ArrayList
* Be able to create and use ArrayList
* Be able to apply ArrayList in real-world problems

# Outlines

1. A limitation of array [ArrayExample.java]
2. Know why to use ArrayList [ArrayListExample.java]
3. Commands in ArrayList [ArrayListExample2.java]
4. ArrayList of Integer [ArrayListExample3.java]
5. ArrayList Appication [SchoolLottery.java]
6. Exercise in ArrayList Application

# 1. A limitation of array [ArrayExample.java]

**public** **class** ArrayExample {

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

// Let's work with a simple array

String[] simpleArray = **new** String[3];

simpleArray[0] = "Somchai";

simpleArray[1] = "Pat";

simpleArray[2] = "Sam";

// simpleArray[3] = "Somjai";

}

}

# 2. Know why to use ArrayList [ArrayListExample.java]

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

**public** **class** ArrayListExample {

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

ArrayList<String> students = **new** ArrayList<String>(3);

students.add("Somchai");

students.add("Pat");

students.add("Sam");

students.add("Somjai");

System.***out***.println(students.toString());

}

}

# 3. Commands in ArrayList [ArrayListExample2.java]

* toString()
* add( index, object )
* get( index )
* set( index, new object )
* remove( object )
* remove( index )
* indexOf( object )

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

**public** **class** ArrayListExample2 {

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

ArrayList<String> students = **new** ArrayList<String>(3);

students.add("Somchai");

students.add("Pat");

students.add("Sam");

// via "toString" method

System.***out***.println(students.toString() + "\n");

// add more student

System.***out***.println("Add more student.");

students.add(1,"Somjai");

System.***out***.println(students.toString() + "\n");

// get method

System.***out***.println("Test get method.");

System.***out***.println("Student at index 1 is "+students.get(1) + ".\n");

// set method

System.***out***.println("Test set method.");

students.set(0,"Chai");

System.***out***.println(students.toString() + "\n");

// remove(object) method

System.***out***.println("Let's remove one student from the ArrayList.");

students.remove("Sam");

System.***out***.println(students.toString() + "\n");

// remove(index) method

System.***out***.println("Remove more student.");

students.remove(1);

System.***out***.println(students.toString() + "\n");

// indexOf method

System.***out***.println(students.indexOf("Chai"));

System.***out***.println(students.indexOf("Sam"));

}

}

# 4. ArrayList of Integer [ArrayListExample3.java]

There are three ways to initialize ArrayList

* ArrayList() builds an empty arraylist
* ArrayList(Collection c) builds an array list that is initialized with the elements of the collection c
* ArrayList(int capacity) builds an array list with a specified capacity

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

**public** **class** ArrayListExample3 {

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

ArrayList<Integer> numbers = **new** ArrayList<Integer>(3);

numbers.add(2);

numbers.add(3);

numbers.add(4);

// via "toString" method

System.***out***.println(numbers.toString() + "\n");

// add more student

System.***out***.println("Add more student.");

numbers.add(1,99);

System.***out***.println(numbers.toString() + "\n");

// get method

System.***out***.println("Test get method.");

System.***out***.println("Number at index 1 is " + numbers.get(1) + ".\n");

// set method

System.***out***.println("Test set method.");

numbers.set(0,999);

System.***out***.println(numbers.toString() + "\n");

// remove(index) method

System.***out***.println("Let's remove one number from the ArrayList.");

numbers.remove(3);

System.***out***.println(numbers.toString());

}

}

# 5. ArrayList Appication [SchoolLottery.java]

In this program, user can enter a list of gamblers from keyboard, which can be duplicated. The program stops getting the list when an empty name (“”) is entered. Then, it will draw the lucky one ☺.

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

**public** **class** SchoolLottery{

**private** ArrayList<String> entries; // holds Student references

**public** SchoolLottery(){

entries = **new** ArrayList<String>();

}

**public** **void** addStudents(){

// prompts for student names

// adds students to entries list

// allow duplicate entries

Scanner input = **new** Scanner(System.***in***);

**int** studentNum = 0;

System.***out***.println("Please Enter to end input");

System.***out***.print("Name" + ++studentNum + ": ");

String name = input.nextLine();

**while** (!name.equals("")){ // signals end of data

entries.add(name);

System.***out***.println(name + " entered in the lottery.");

System.***out***.print("\nName" + ++studentNum + ": ");

name = input.nextLine();

}

pickWinner();

}

**public** **void** pickWinner(){

// chooses a random entry and displays winners name

**int** numEntries = entries.size(); // size of ArrayList

**if**(numEntries == 0)

System.***out***.println("\*\*\* No participants \*\*\*");

**else**{

Random random = **new** Random();

String winner = entries.get(random.nextInt(numEntries));

System.***out***.print("\n\*\*\* The winner is " + winner + " \*\*\*");

}

}

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

SchoolLottery lottery = **new** SchoolLottery();

lottery.addStudents();

}

}

# 6. Exercise in ArrayList Application (SchoolLotteryFromFile.java)

Update the program “SchoolLottery.java” (Application in ArrayList) to obtain the list from file instead of keyboard. Also, a name in the list cannot be duplicated.