Lab 3: Bulls and Cows

Due: 18:00, 08 Feb 2012 (Fri) Full marks: 100

Introduction

In this lab, we are going to look at a variation of the interesting pencil and paper game called "Bulls and Cows"[1]. The game requires two players. One player is called the "Master" and the other player is called the "Guesser". The Master thinks of an *n*-digits secret number (where *n* is at least 3 and at most 7), and the Guesser tries to guess the *n*-digits secret number. At each turn the Guesser tries an *n*-digits number, the Master provides the following clues, indicating how close it is to the secret number:

- The number of Bulls – digits correct in the right position.
- The number of Cows – digits correct but in the wrong position.

Note: In case the secret number has repeated digits, the requirement is that each digit can only count towards Bulls or Cows once, and Bulls are counted before Cows. For example, if the secret number is 43443, the clue for the guess 34543 is 2 Bulls (i.e. the last two digits) and 2 Cows (i.e. the first two digits).

Program Specification

Create a new project in NetBeans named (`BullsAndCows`) and write a Java program (`BullsAndCows.java`) to implement the game "Bulls and Cows". The standard Java classes: **`String`**, **`StringBuilder`**, and **`JOptionPane`** are useful. Find in the API specification (http://docs.oracle.com/javase/7/docs/api/) to see which methods are related and useful.

Program Flow

Your Java program must execute the following steps in order.

1. The program must start by displaying a dialog, prompting the Master to input the length (i.e. number of digits) of the secret number. The length of the secret number must be at least 3-digits and at-most 7-digits. If the Master's

[1] URL: http://www.papg.com/show?1

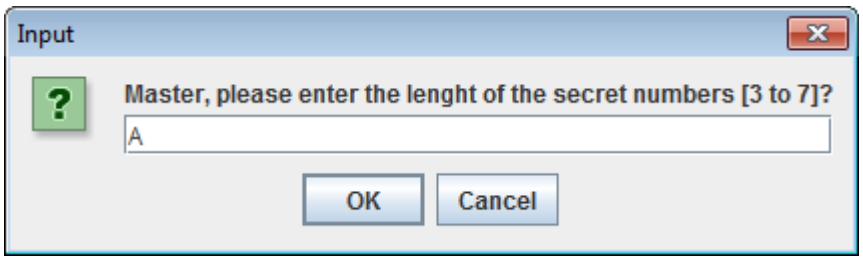
input is invalid, display a dialog with warning message asking the user to try again until a valid input is made.

2. Next, the program must display a dialog prompting the Master to input the secret number. The length must be equal to the value input in Step 1. The secret number may contain repeated digits, and may contain leading zeros (e.g. "0011" is a valid 4-digits secret number). If the Master's input is invalid, display a dialog with warning message asking the user to try again until a valid input is made.
3. After getting the secret number, the program must **repeatedly** display a dialog prompting the Guesser to input a number as guess, until the game finished. Again, the length of the number must be equal to the value input in Step 1. If the Guesser's input is invalid, display a dialog with warning message asking the user to try again until a valid input is made. At each turn the Guesser input a number as guess, the dialog should display **all the guesses** tried so far, also the number of Bulls and Cows for each of the guesses. The rules for counting the number of Bulls and Cows are already given in the Introduction. The game finishes when the number input by Guesser is exactly the same as the secret number (i.e. all digits scored Bulls).

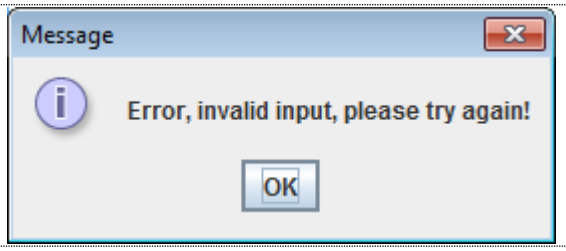
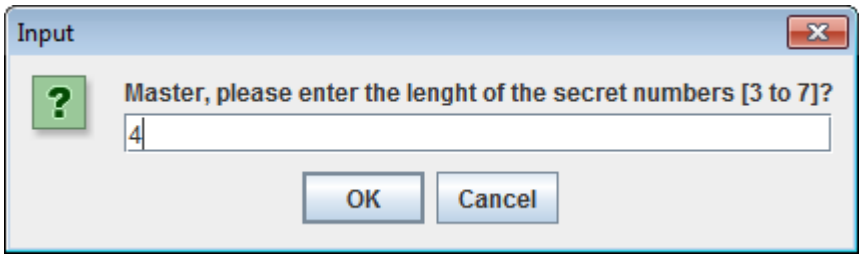
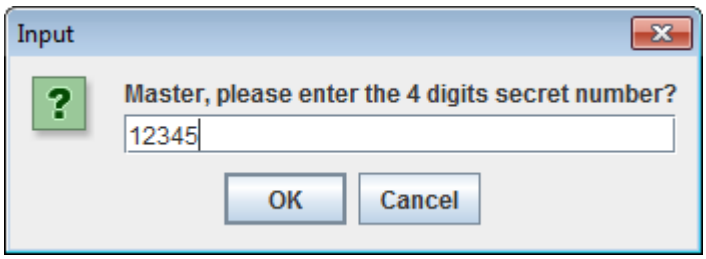
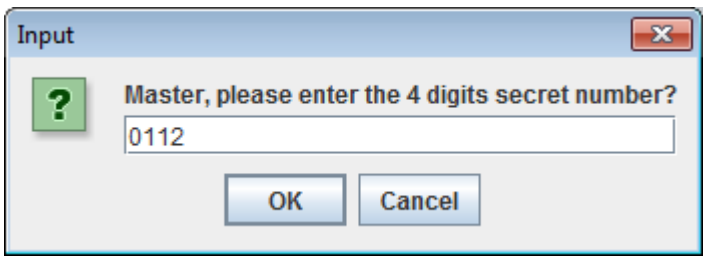
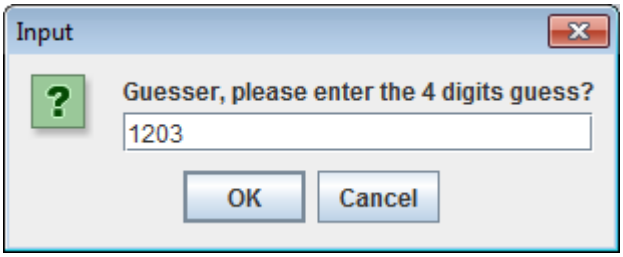
Note: In all the dialogs, you can assume that *the user does not click the "Cancel" or "Close window" buttons*.

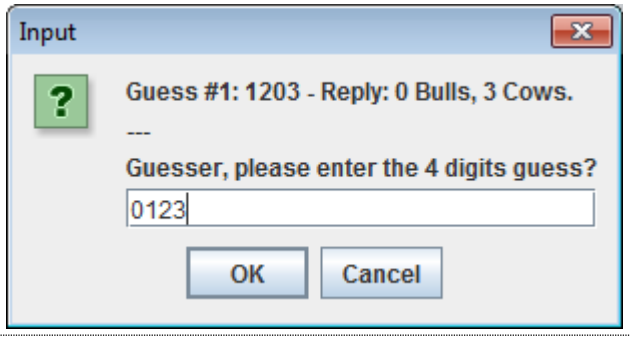
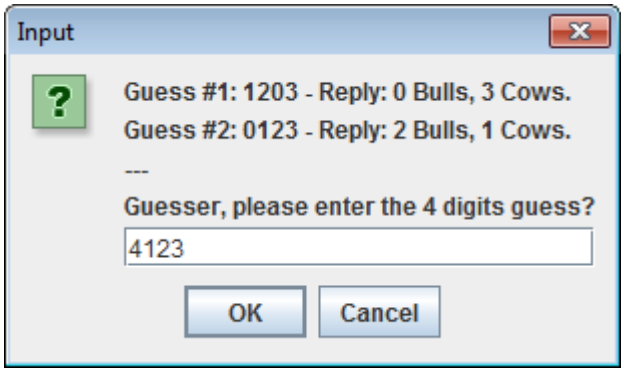
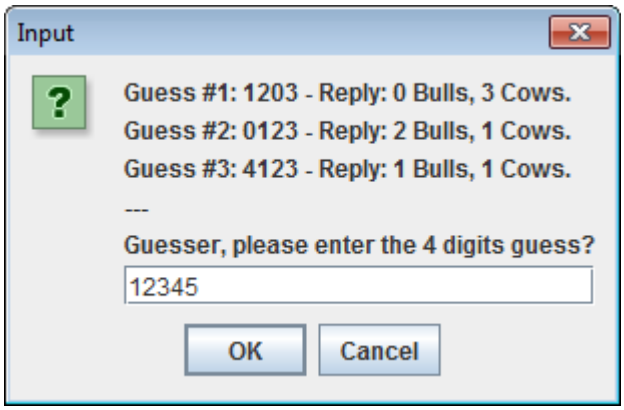
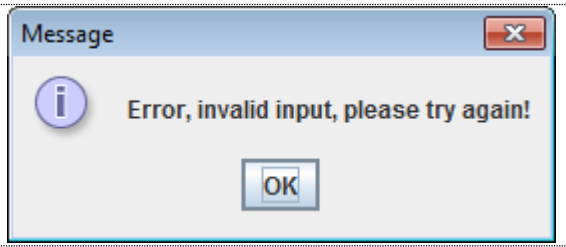
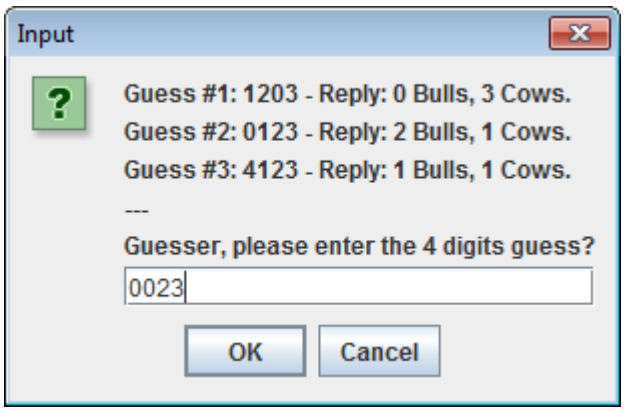
Sample Program run

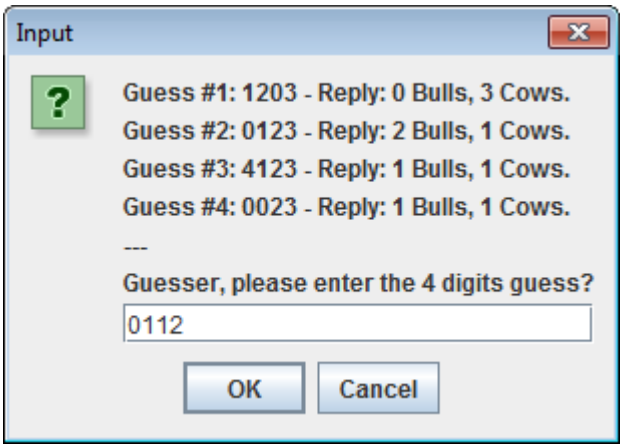
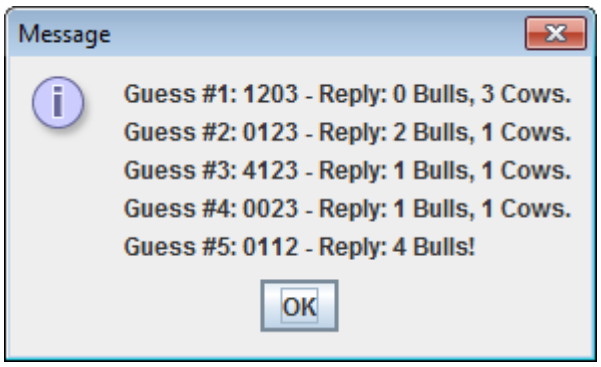
The following shows a sample run of the program. The **bold blue** text is user input. Please take note that your program output must be exactly the same as the sample program runs (i.e., same text, same symbols, same letter case, same number of spaces, etc.). Otherwise, it will be considered as wrong, even if you have computed the correct result.



Type **A** and then click **OK**.

	Click **OK**.
	Type **4** and then click **OK**.
	Type **12345** and then click **OK**.
	Click **OK**.
	Type **0112** and then click **OK**.
	Type **1203** and then click **OK**.

	Type **0123** and then click **OK**.
	Type **4123** and then click **OK**.
	Type **12345** and then click **OK**.
	Click **OK**.
	Type **0023** and then click **OK**.

	Type **0112** and then click **OK**.
	Click **OK**, and the program terminates.

Submission

Submit the source file `BullsAndCows.java` to CU e-Learning System (i.e. the entry "**lab03 – Bulls and Cows**" under "**Lab Works**").

== END ==

