

# CS101- Algorithms and Programming I

## Lab 04

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### Lab Objectives: `while` loops

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- For all labs in CS 101, your solutions must conform to the CS101 style guidelines (rules!)
  - **For all questions below you should use `while` loops (not `for` loops).**
1. Write a program, `Lab04_Q1.java` that inputs words from the user, until the user enters 'exit'. When the user enters 'exit' the program should display the word that comes *second* alphabetically. Your program should not be case sensitive.

#### Sample Runs:

```
Enter strings (exit to stop):
zebra
cat
dog
ant
bunny
exit
String that comes second alphabetically: bunny
```

```
Enter strings (exit to stop):
house
exit
Not enough input data...
```

```
Enter strings (exit to stop):
house
house
house
exit
Not enough input data...
```

```
Enter strings (exit to stop):
house
car
house
exit
String that comes second alphabetically: house
```

2. Write a program, Lab04\_Q2.java. Every ball has a coefficient of restitution which is a number between 0 and 1 which indicates how much energy is conserved when the ball hits a hard surface. If the coefficient is 0.9 it means the ball will reach 90% of its previous height after each bounce. Write a program that inputs the type of ball and the initial height and calculate and display how many times the ball will bounce when dropped from its initial height before it rises to a height of less than 10 centimeters. You should also display the total distance travelled by the ball before this point. Your program should validate the input as shown in the sample runs below.

Coefficients: tennis ball (0.7), basketball (0.75), superball (0.9), softball (0.3)

**Sample Runs:**

```
Enter Ball Type: Tennis Ball
Enter initial height(m): 8
Number of bounces: 13
Meters travelled: 44.89
```

```
Enter Ball Type: Golf Ball
Invalid Ball Type - Exiting...
```

```
Enter Ball Type: Tennis Ball
Enter initial height(m): eight
Height must be numeric value...
Enter initial height(m): ten
Height must be numeric value...
Enter initial height(m): 8
Number of bounces: 13
Meters travelled: 44.82
```

3. Write a program, Lab04\_Q3.java that determines if a word input by the user is a pair-word. A pair-word is a word where each character appears exactly two times. The program should not be case-sensitive, the case of the characters does not need to match.

**Sample Runs:**

```
Enter a word: momo
momo is a pair-word!
```

```
Enter a word: Beriberi
Beriberi is a pair-word!
```

```
Enter a word: mimimi
mimimi is not a pair-word!
```

```
Enter a word: mmmooo
mmmooo is not a pair-word!
```

```
Enter a word: mmoo
mmoo is a pair-word!
```