

## Hands #2 - Solving Problems Involving Strings

### Problem Types:

- **Searching Strings**
- **Generate Strings**
- **Manipulating Strings**
- **Sorting Strings**
- **Codes**

### String Practice Problems

On the following pages, there are 9 sample problems. The dat files and solutions to these problems are provided in a separate folder.

The solutions are based on Java 5.0. I have used meaningful variable names to make the code more readable. Students in contest situations would certainly use shorter variable names and possibly more anonymous variables.

Problem	New Key Concepts
pr21 - Count Letter	count the number of times a letter occurs in a <code>String</code> ; <code>charAt</code>
pr22 - Number Line	number of data sets is not given; <code>else-if</code> ladder
pr23 - Remove Duplicates	<code>indexOf</code> ; <code>&amp;&amp;</code> ; concatenation;
pr24 - Scrambled Words	odd/even cases
pr25 - Comment Statements	<code>StringBuffer</code> ; <code>delete</code> method
pr26 - Decode It	<code>char</code> cast; add integers to <code>chars</code>
pr27 - Pig Latin 1	<code>substring(int)</code> ; <code>substring(int, int)</code> ; concatenation
pr28 - Alphabet	adding <code>chars</code> and use of mod to generate output
pr29 - Character Remover	linear search; <code>indexOf</code> ; <code>charAt</code>

## pr21 - Count Letters

<b>Problem:</b>	Write a program to count the number of times the first letter of a string appears in the string. Be sure to count the first letter in your count.
<b>Input:</b>	The first line of the data set is an integer that represents the number of lines that follow. Each of the remaining lines contain a string.
<b>data file:</b>	pr21
<b>Output:</b>	Output the letter being searched for, a colon, a space, and the number of times the letter appears.
<b>Assumptions:</b>	All characters in the string will be uppercase letters of the alphabet.
<b>Sample Input:</b>	3 PETER PIPER PICKED A PECK OF PICKLED PEPPERS AUSTIN IS AWESOME IN MAY JAVA IS MY FAVORITE LANGUAGE
<b>Sample Output:</b>	P: 9 A: 3 J: 1

## pr22 - Number Line

<b>Problem:</b>	Write a program that will make a number line with one character printed for each integer $0 - N$ , where $N$ is the numbers of characters to be printed past 0. All the characters to be printed are hyphens (-) except for each number divisible by 5. A 5 will be printed and each number ending in 5 and a 0 will be printed for each number ending in 0.
<b>Input:</b>	The only line of data contains a series of positive integers. Each integer represents a new number line with the number of characters to be printed after the initial 0 on that number line.
<b>data file:</b>	pr22
<b>Output:</b>	Each integer in the input line represents a new number line. Output the number line with only 0, 5, and -.
<b>Assumptions:</b>	$N$ is a positive integer in the range $1 \dots 50$ .
<b>Sample Input:</b>	3 19 30
<b>Sample Output:</b>	0--- 0----5----0----5---- 0----5----0----5----0----5----0

## pr23 - Remove Duplicates

<b>Problem:</b>	Write a program that removes the duplicate letters in a string and prints the remaining letters in their original order.
<b>Input:</b>	The first line of the data set is an integer that represents the number of lines that follow. Each of the remaining lines contains a string of one or more words consisting of only uppercase letters of the alphabet. There is exactly one space between words.
<b>data file:</b>	pr23
<b>Output:</b>	Each letter is output only the first time it occurs in the string. No spaces will be output.
<b>Assumptions:</b>	None
<b>Sample Input:</b>	4 PETER PIPER PICKED A PECK OF PICKLED PEPPERS AUSTIN IS AWESOME IN MAY TEXAS UIL JAVA IS MY FAVORITE LANGUAGE
<b>Sample Output:</b>	PETRICKDAOFLS AUSTINWEOMY TEXASUIL JAVISMYFORTELNUG

## pr24 - Scrambled Words

<b>Problem:</b>	Write a program that will unscramble the letters of a word. You will be given a jumbled word and you are to write the original word. The original word is jumbled as follows: the 1 <sup>st</sup> and 2 <sup>nd</sup> letters are switched, the 3 <sup>rd</sup> and 4 <sup>th</sup> letters are switched, etc. If there are an odd number of letters, the last letter is placed in front.
<b>Input:</b>	The first line of the data set is an integer that represents the number of lines that follow. Each of the remaining lines contains one word consisting of only uppercase letters of the alphabet.
<b>data file:</b>	pr24
<b>Output:</b>	The unscrambled words.
<b>Assumptions:</b>	None
<b>Sample Input:</b>	2 NOCNTANETAOI NUCSARBMEL
<b>Sample Output:</b>	CONCATENATION UNSCRAMBLE

## pr25 - Comment Statements

<b>Problem:</b>	Write a program that will remove all the comments statements from a line of code. All comments will begin with <code>/*</code> and end with <code>*/</code> .
<b>Input:</b>	The first line of the data set is an integer that represents the number of lines of code that follow. Each of the remaining lines contains one sentence with less than 60 characters. All letters are uppercase.
<b>data file:</b>	pr25
<b>Output:</b>	Output each line without the comments and without the <code>/*</code> and <code>*/</code> . If a line has no comments, output the line. Leading spaces should be printed. Trailing spaces are immaterial.
<b>Assumptions:</b>	Each line that contains a <code>/*</code> will also contain an <code>*/</code> . Each line will have at most one comment.
<b>Sample Input:</b>	<pre>4 /* Program author: Nick */ import java.io.*; public class Fun() { /*This is a fun program*/ public static void main (String[] args) { int x, /* Number of cases */y;</pre>
<b>Sample Output:</b>	<b>(note spaces before <code>import</code> and <code>y</code>)</b> <pre>import java.io.*; public class Fun() { public static void main (String[] args) { int x, y;</pre>

## pr26 - Decode It

<b>Problem:</b>	Nick and Houston are writing notes to each other using a cipher alphabet code. Write a program to decode their messages. A cipher alphabet code is a code that moves letters $n$ number of spaces down the alphabet and when $z$ is reached, the code wraps back to $A$ .
<b>Input:</b>	The first line of the data set is an integer that represents the number of pairs of lines that follow. The first of each pair of lines contains the cipher alphabet to be used. The second of each pair of lines is the coded message.
<b>data file:</b>	pr26
<b>Output:</b>	Output the decoded message.
<b>Assumptions:</b>	All letters are uppercase. The cipher alphabet contains the 26 letters of the alphabet. Should the encoded message contain non-alphabetic characters, they are not changed.
<b>Sample Input:</b>	2 CDEFGHIJKLMNOPQRSTUVWXYZAB CWUVKP KP OCA CYGUQOG KLMNOPQRSTUVWXYZABCDEFGHIJ NOMOWLOB 25 SC WI PKFYBSDO RYVSNKI
<b>Sample Output:</b>	AUSTIN IN MAY IS AWESOME DECEMBER 25 IS MY FAVORITE HOLIDAY

## pr27 - Pig Latin 1

<b>Problem:</b>	<p>Write a program that converts a sentence to Pig Latin. To convert a sentence to Pig Latin:</p> <p>If the word begins with a consonant, move the first letter of a word to the end of the word and add "AY". For example, <code>PIG</code> becomes <code>IGPAY</code>.</p> <p>If the word begins with a vowel, add "NAY" to the end. For example, <code>IS</code> becomes <code>ISNAY</code>.</p>
<b>Input:</b>	<p>The first line of the data set is an integer that represents the number of lines that follow. Each of the remaining lines contains a sentence of less than 60 characters. Words will be separated by a single space. All words will begin with consonants.</p>
<b>data file:</b>	<code>pr27</code>
<b>Output:</b>	<p>Output each translated sentence on a different line.</p>
<b>Assumptions:</b>	<p>Each sentence will contain only uppercase letters of the alphabet.</p>
<b>Sample Input:</b>	<pre>3 PIG LATIN JAVA IS FUN AUSTIN IS AWESOME IN MAY</pre>
<b>Sample Output:</b>	<pre>IGPAY ATINLAY AVAJAY ISYAY UNFAY AUSTINYAY ISYAY AWESOMEYAY INYAY AYMAY</pre>



## pr28 - Alphabet

<b>Problem:</b>	Write a program that will output a given number of letters of the alphabet.
<b>Input:</b>	The first line of the data set is an integer that represents the number of lines that follow. Each of the remaining lines contains a letter and a number. The letter is where to start in the alphabet. The number is the number of letters to be printed.
<b>data file:</b>	pr28
<b>Output:</b>	Output the set of letters.
<b>Assumptions:</b>	After printing the letter <code>z</code> , the alphabet starts over with <code>A</code> .
<b>Sample Input:</b>	2 G 5 X 10
<b>Sample Output:</b>	GHIJK XYZABCDEFG

## pr29 - Character Remover

<b>Problem:</b>	Write a program that will remove all non-alphabetic and non-space characters from a sentence.
<b>Input:</b>	The first line of the data set is an integer that represents the number of sentences that follow. Each of the remaining lines contains a sentence.
<b>data file:</b>	pr29
<b>Output:</b>	Output each sentence with the alphabetic and space characters that remain.
<b>Assumptions:</b>	All alphabetic characters are uppercase.
<b>Sample Input:</b>	<pre>3 THIS IS PROGRAM 2-9 OF REVIEW #2. I LIVE AT 123 PERIWINKLE DRIVE #125. MY URL IS HTTP://WWW.ANGEL.COM AND MY EMAIL IS ABC@COMPSCI5.COM.</pre>
<b>Sample Output:</b>	(Note spacing) <pre>THIS IS PROGRAM  OF REVIEW I LIVE AT  PERIWINKLE DRIVE MY URL IS HTTPWWWANGELCOM AND MY EMAIL IS ABCCOMPSCICOM</pre>