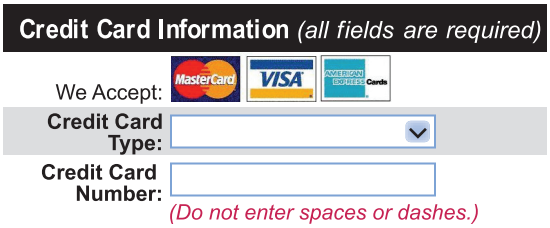
Worked Example 6.1

Credit Card Processing

One of the minor annoyances of online shopping is that many web sites require you to enter a credit card without spaces or dashes, which makes double-checking the number rather tedious. How hard can it be to remove dashes or spaces from a string? Not hard at all, as this worked example shows.



Your task is to remove all spaces or dashes from a string `creditCardNumber`. For example, if `creditCardNumber` is `"4123-5678-9012-3450"`, then you should set it to `"4123567890123450"`

Step 1 Decide what work must be done *inside* the loop.

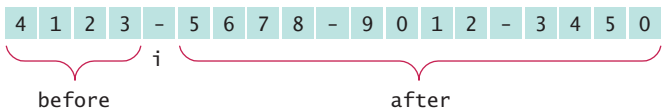
In the loop, we visit each character in turn. You can get the `i`th character as

```
char ch = creditCardNumber.charAt(i);
```

If it is not a dash or space, we move on to the next character. If it is a dash or space, we remove the offending character.

```
Loop
   ch = the ith character of creditCardNumber
   If ch is a space or dash
      Remove the character from creditCardNumber.
   Else
      Increment i.
```

You may wonder how to remove a character from a string in Java. Here is the procedure for removing the character at position `i`: Take the substrings that end before `i` and start after `i`, and concatenate them.




```
string before = creditCardNumber.substring(0, i);
string after = creditCardNumber.substring(i + 1);
creditCardNumber = before + after;
```

Note that we do *not* increment `i` after removing a character. For example, in the figure above, i was 4, and we removed the dash at position 4. The next time we enter the loop, we want to reexamine position 4 which now contains the character `5`.

Step 2 Specify the loop condition.

We stay in the loop while the index i is a valid position. That is,

```
i < creditCardNumber.length()
```

Step 3 Choose the loop type.

We don't know at the outset how many times the loop is repeated. It depends on the number of dashes and spaces that we find. Therefore, we will choose a `while` loop. Why not a `do` loop?

If we are given an empty string (because the user has not provided any credit card number at all), we do not want to enter the loop at all.

Step 4 Process the result after the loop has finished.

In this case, the result is simply the string.

Step 5 Trace the loop with typical examples.

The complete loop is

```
i = 0
While i < creditCardNumber.length()
   ch = the ith character of creditCardNumber.
   If ch is a space or dash
      Remove the character from creditCardNumber.
   Else
      Increment i.
```

It is a bit tedious to trace a string with 20 characters, so we will use a shorter example:

creditCardNumber	i	ch
4-56-7	0	4
4-56-7	1	-
456-7	1	5
456-7	2	6
456-7	3	-
4567	3	7

Step 6 Implement the loop in Java.

Here's the complete program, ch06/creditcard/CCNumber.java.

```
public class CCNumber
{
   public static void main(String[] args)
   {
      String creditCardNumber = "4123-5678-9012-3450";

      int i = 0;
      while (i < creditCardNumber.length())
      {
         char ch = creditCardNumber.charAt(i);
         if (ch == ' ' || ch == "-")
         {
            String before = creditCardNumber.substring(0, i);
            String after = creditCardNumber.substring(i + 1);
            creditCardNumber = before + after;
         }
         else
         {
            i++;
         }
      }

      System.out.println(creditCardNumber);
   }
}
```