Specification

Postal bar codes. For faster sorting of letters, the United States Postal Service encourages companies that send large volumes of mail to use a bar code denoting the zip code (see Figure 9).

★★★★★★★★★★★★★★★ ECRLOT ★★ CO57

CODE C671RTS2
JOHN DOE   CO57
1009 FRANKLIN BLVD
SUNNYVALE   CA 95014 – 5143

‖I.I..I.I.II......II.I.I.I.I.....II.I.I..II.I..I.I

Figure 9 A Postal Bar Code

The encoding scheme for a five-digit zip code is shown in Figure 10. There are full-height frame bars on each side. The five encoded digits are followed by a check digit, which is computed as follows: Add up all digits, and choose the check digit to make the sum a multiple of 10. For example, the zip code 95014 has a sum of 19, so the check digit is 1 to make the sum equal to 20.
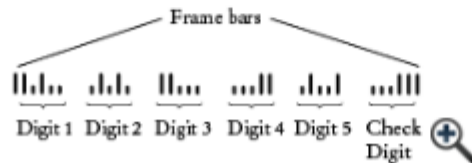
Frame bars

‖I.I.. .I.I. II... ...II .I..I ...‖‖

Digit 1 Digit 2 Digit 3 Digit 4 Digit 5 Check Digit

Figure 10 Encoding for Five-Digit Bar Codes

Each digit of the zip code, and the check digit, is encoded according to the following table where 0 denotes a half bar and 1 a full bar.

Digit	Bar 1 (weight 7)	Bar 2 (weight 4)	Bar 3 (weight 2)	Bar 4 (weight 1)	Bar 5 (weight 0)
1	0	0	0	1	1
2	0	0	1	0	1
3	0	0	1	1	0
4	0	1	0	0	1
5	0	1	0	1	0
6	0	1	1	0	0
7	1	0	0	0	1
8	1	0	0	1	0
9	1	0	1	0	0
0	1	1	0	0	0

The digit can be easily computed from the bar code using the column weights 7, 4, 2, 1, 0. For example, 01100 is 0 $7 + 1 \times 4 + 1 \times 2 + 0 \times 1 + 0 \times 0 = 6$. The only exception is 0, which would yield 11 according to the weight formula.

Write a program that asks the user for a zip code and prints the bar code. Use : for half bars, | for full bars. For example, 95014 becomes

```
||:|:::|:|:||:::::::||:|::|:::|||
```

Analysis

Input zipcode as a string in the `QUERY_STRING` environment variable from the web server.

Preocess Converts the zip code to the bar code.

Output a bar code representing the zip code as a string of characters where | represents the full bar and : represents the half bar.

Design

Functions needed:

- compute check code: expects a zip code as string or integer(My input is a string at first ,but then I translate the string into an integer by using iss function), return either char of integer for the check digit. The check digit is calculated by summing the five digits of the zip code and finding a digit that would bring the total to a number which is a multiple of 10.

- find bar code for zip code: given the zip code string or integer (My input is a string at first ,but then I translate the string into an integer by using iss function)and returns the bar code delimited with full bars.

- find bar code for one digit: given a single digit, returns the corresponding bar code.

Implementation

```cpp
// cs102 lab
// build as lab4.cgi    and copy it to /usr/lib/cgi-bin
// keep lab4.html in the lab4 directory
// receive 2 integers multiply them and display result
#include <iostream>
#include <sstream>

void code(int);
void barcode(int);

int main()
{
        //use environment variable named in QUERY_STRING
        std::string s = getenv("QUERY_STRING");
        // parse the string to get the integers
        //   requires 2 newlines                    1              2
        std::cout << "Content-Type: text/html\n" << std::endl;
        std::cout << "<H3>After entering your zip code </H3>" << std::endl;
        std::cout << "<H2 style = 'color:blue'>here is your bar code!!</H2>"
                  << std::endl;

        std::istringstream iss(s);
        //       z     =      94538
```

```cpp
        int z;   char c;
        iss >> c >> c >> z;
        std::cout << "   Your zip code is: "<< z <<"<br>";
        int r = z;
        std::cout<<"   Your bar code is: |";
        code(z);
        std::cout<<"|";
        return 0;
}

/*
compute check code: expects a zip code as string or integer,
return either char of integer for the check digit.
        The check digit is calculated by summing the five digits of
         the zip code and finding a digit that would bring the
         total to a number which is a multiple of 10.
*/

/**
 compile every digit of the zip code and then output its bar code
 \param cd the zip code
 \return cc the check code
*/
void code(int c)
{
```

```cpp
//every digit of the zip code
int c_d;
c_d=(c-(c%10000))/10000;
barcode(c_d);

int total=0;
total=total+c_d;

c_d=((c-c%1000)/1000)%10;
barcode(c_d);

total=total+c_d;

c_d=((c-(c%100))/100)%10;
barcode(c_d);

total=total+c_d;

c_d=((c%100)-(c%10))/10;
barcode(c_d);

total=total+c_d;

c_d=c%10;
barcode(c_d);
```

```
        total=total+c_d;

        int cc;
        if(total%10!=0)
        {
            cc=10-(total%10);
            barcode(cc);
        }
        else
        {
            cc=0;
            barcode(cc);
        }


        return;

}



/**
 output the bar code of every digit of the zip code
 \param cd is the digit of the zip code
```

```cpp
*/


void barcode(int cd)
{
    if (cd==1)
    {
        std::cout<<" :::||";
    }
    if (cd==2)
    {
        std::cout<<" ::|:|";
    }
    if (cd==3)
    {
        std::cout<<" ::||:";
    }
    if (cd==4)
    {
        std::cout<<" :|::|";
    }
    if (cd==5)
    {
        std::cout<<" :|:|:";
    }
```

```cpp
    if (cd==6)
    {
        std::cout<<" :||::";
    }
    if (cd==7)
    {
        std::cout<<" |:::|";
    }
    if (cd==8)
    {
        std::cout<<" |::|:";
    }
    if (cd==9)
    {
        std::cout<<" |:|::";
    }
    if (cd==0)
    {
        std::cout<<" ||:::";
    }
    return;
}

<html>
        <head>
                <title> cs102 Bar Code </title>
```

```html
        <H1>Welcome to cs102</H1>
        <H2 style = "color:blue">Convert zip code to bar code</H2>
</head>

<body>
        <form action="/cgi-bin/lab4.cgi">
        <label>5-digit Zip Code: <input name="z" size="5"></label>
        <br>

        <input type="submit" value="Convert">
        </form>
</body>
</html>
```

Test

Testcase 1

← → C ⓘ localhost:8080/home/lab4/lab4.html

Welcome to cs102

Convert zip code to bar code

5–digit Zip Code: `95438`
Convert

After entering your zip code

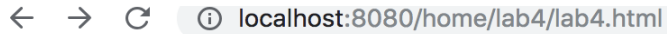## here is your bar code!!

Your zip code is: 95438
Your bar code is: ||:|:::|:|::|::|::||:|::|::::|||

Let's test it now! For example if user types in 95438, then program will display:
||:|:::|:|::|::|::||:|::|::::|||
It proves that my code is correct!!It can exactly output the bar code.

← → C　　ⓘ localhost:8080/home/lab4/lab4.html

Welcome to cs102

Convert zip code to bar code

5–digit Zip Code: 95014

Convert

　　　95014

After entering your zip code

here is your bar code!!

Your zip code is: 95014
Your bar code is: ||:|:::|:|:||:::::||:|::|:::|||

For example if user types in 95014, then program will display:

||:|:::|:|:||:::::||:|::|:::|||

It also proves that my code is correct!!It can exactly output the bar code.