Software Development Process

1. Problem statement:

For task 1,

1) Read a full name with spaces
2) Change the character into numbers
3) Use a loop to add all of the numbers together and output the value.

For task 2,

1) Read a telephone number with 11 digits and print it on the screen.
2) Separate the first 6 digits from the last 5 digits and store them in variables.
3) Divide the first 6 digits with the last 5 digits and print it on the screen.

For task 3,

1) Input a three-digit positive integer number and print it on the screen.
2) Change this three-digit number from decimal to binary.
3) Output the binary value.

For task 4,

1) Users should do a choice: Transfer rectangular to polar or polar to rectangular.
2) Then, users should input the values according to their choice.
3) Do the calculation according to user's choice.
4) Output should contain two values.

2. Analysis:

For task 1,

On an input:

We should first tell users they should input a name with space and check whether they input the wrong thing.

On an output:

The output is a positive number.

Structure:

First, store the input value in a variable. Then, count the length of the name, so that we can change the value according to ASCII. After that, the program will judge whether you input the right thing. Finally, use loop and function to transfer and add all things together (Use judgement statement to ignore the spaces, so that they will not be add in the final result).

Algorithm:

Transfer the character to number according to ASCII.

For task 2,

On an input:

First of all, we should tell users to input an eleven-digit positive number. If they input the wrong eleven-digit value, the program should let them input the value again. But we should notice that "int" could only contain 10 digits. Thus, we should

use “float” to define a 11-digit number.

On an output:

The output should be a positive number. Due to the fact that different people may input different values, thus, the output may not an integer. We should use decimal fraction. What is more, if the last five digits are all 0, users should input the value again. Because a number can not be divided by 0

Structure:

There is only one variable in this program, no complex program.

Algorithm:

Only do the basic calculation, no complex algorithm.

For task 3,

On an input:

We should tell users to input a three-digit positive integer number and check whether they input the wrong thing.

On an output:

The output should be a binary base. Thus, we should transfer the decimal to binary.

Structure:

We should use a loop to transfer the decimal base to binary base and store the number in an array. Then, use another loop to reverse the order.

Algorithm:

The integer is divided by 2 continuously and obtain the remainder.

For task4,

On inputs:

First of all, we should let users choose what kind of operation they want. Then, they should input two numbers which are relevant to the requirements. if users make the wrong choice or input the irrelevant values, they should do the choice or input the values again. What is more, the angle θ_A should be rad value.

On outputs:

If they want to transfer polar to rectangular, the output should be two numbers. If they want to transfer rectangular to polar, the output are also two numbers. But one is the magnitude of the A, another one is the rad value of θ_A.

Structure:

In order to make a choice, we should use flow control statements. Moreover, there are some mathematic function are used to calculate the value. We should use “math.h”. What is more, we also should use loops to check whether they input the right values.

Algorithm:

In order to obtain the values, we should use square function, square root function and trigonometric function.

3. Design:

For task 1,

1). Define 4 "int" type variables j, length, z, l and two characters name and u.
   j – Count the number of the character.
   Length – Record the total characters of the name.
   L – The sum of all numbers.
   Name – store the input name.
   U – a pointer to store the name.
2). Print a message to ask input their name with spaces
3). Count the length of the name and check whether user's input is correct.
4). Store the name in U.
5). Use "toascii" function to transfer the character to number according to ASCII.
6). Use a "while" loop to add all the transformed numbers together. Use "if" statement to ignore the effect of the spaces.
7). Output the final value.

For task 2,

1). Define four "float" type variables: a,c,n,p,s,q and one "int" type variable m.
   a – input an eleven-digit positive telephone number.
   m – first 6 digits.
   n – change the range of the value.
   c – the other 5 digits.
   p – the output value after do the division.
   s – The maximum value of the number.
   q – The minimum value of the number.
2). Print a message to ask users to input a value.
3). Use a while loop to check and tell users input the value again if they input the wrong value and another loop to check whether the last five digits are all zero.
4). Read the input number and store it in variable "a"
5). Compute the first 6 digit by diving 100000 and store it in variable "m".
6). Change the range of variable "m" to "n", that is because the maximum calculation "int" could do is only ten digits. Thus, we should change "int" to "float" and make the calculation continuous.
7). Compute the other five digits and store in variable "c". The formula shows below: c = a - n*100000.
8). Compute the final output and store it in variable "p" and display it on the screen.

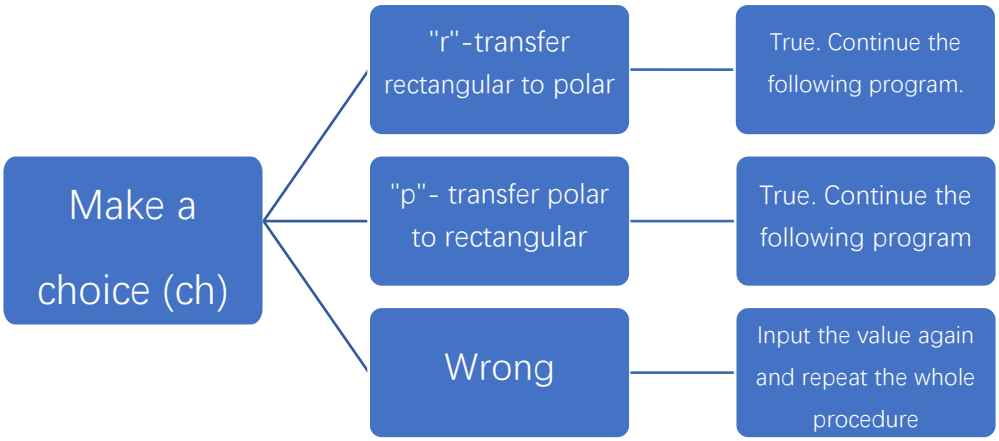
For task 3,

1). Define three "int" type variables x,k[20],i.
   x – input value of three-digit positive number.
   k[20] – an array to store every number which is divided by 2.
   i – count the number.
2). Print a message to ask users to input a value.
3). Use a "while" loop to check whether they input the wrong thing.

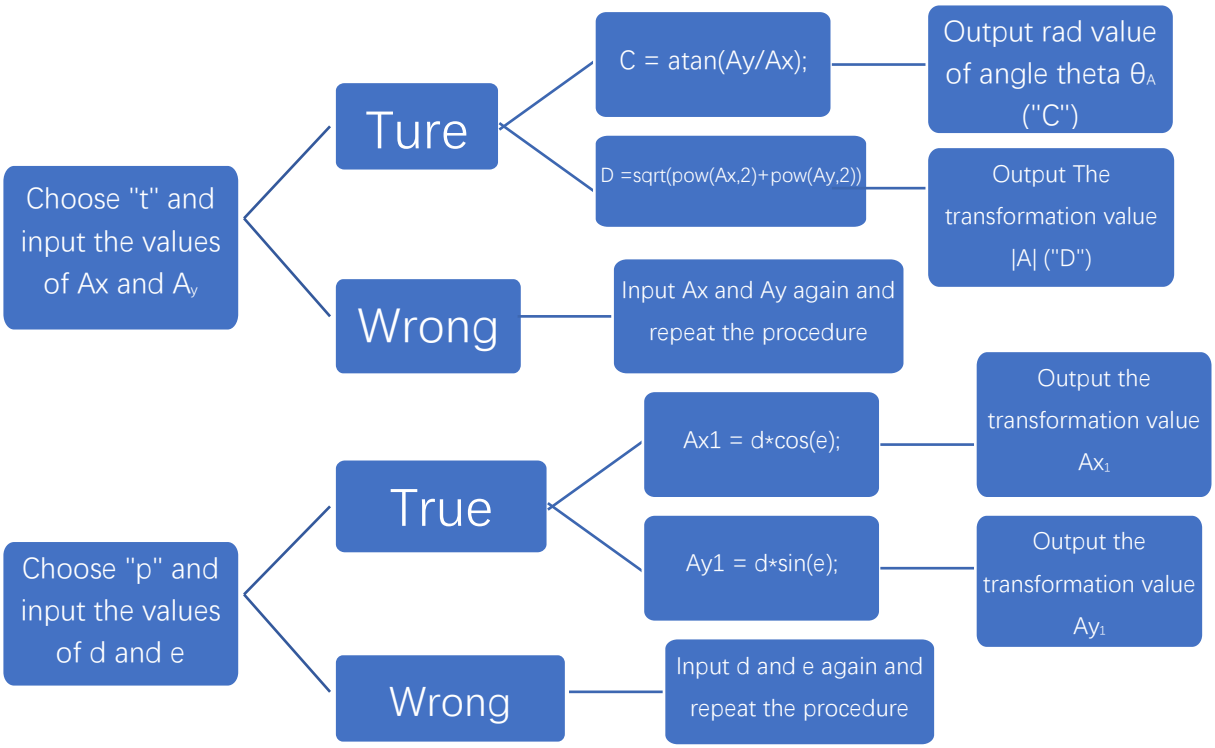
4). Compute the binary base by using a "while" loop. And store of the value in the array k;
5). Use a "for" loop to reverse the order of the number and obtain the correct output.
6). Output the correct value in binary base.

For task 4,

1). Define 8 "float" variables A_X A_y C D d e A_{X1} A_{y1} and a character ch.
2). Use a "whlie" loop to make a choice and check the value.



3). Do the calculation according to their choice by using the "switch" flow control and use formula from "math.h". If they input the wrong value, use a "while" loop to let



them input the values again.
4) . Show the output values on the screen.

4. Implementation

See the C code 1928748_1.c with comments.

5. Testing

For task 1,

Test 1:

Please input your name with spaces: Jet Li.

Your name

Jet Li

The sum is 472.

Test 2:

Please input your name with spaces: Mark Paul Leach.

Your name

Mark Paul Leach

The sum is 1274.

Test 3:

Please input your name with spaces

1333

You input the wrong name

Please input your name with spaces:

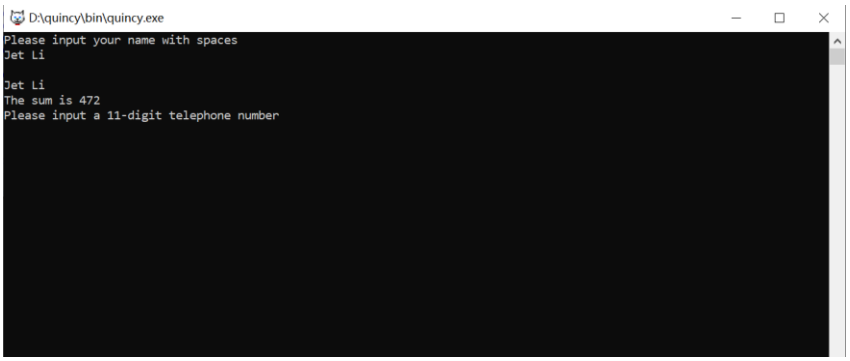
Test 4:

Please input your name with spaces

j12

You input the wrong name

Please input your name with spaces:



For task 2,

Test 1:

Please input a 11-digit telephone number: 12345678900

The value is 1.564715.

Test 2:
Please input a 11-digit telephone number: 123456789000
The value you entered is wrong please try again.
Please input a 11-digit telephone number:

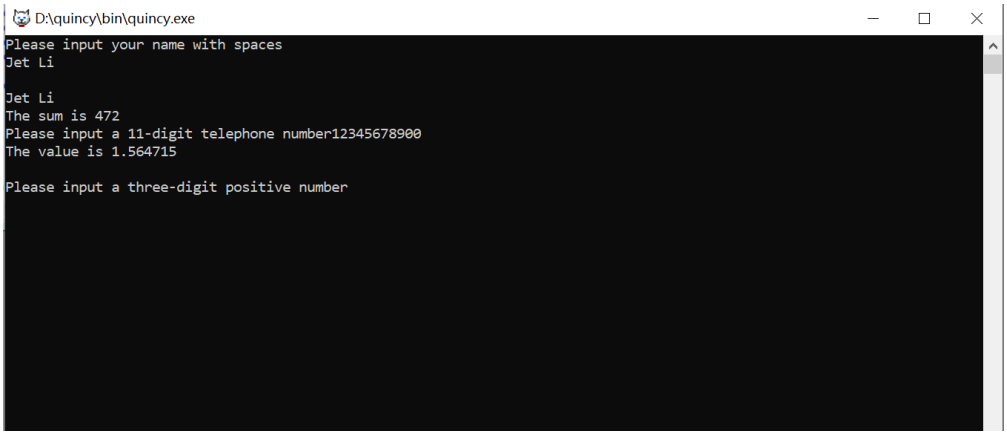
Test 3:
Please input a 11-digit telephone number: 1234567890
The value you entered is wrong please try again.
Please input a 11-digit telephone number:

Test 4,
Please input a 11-digit telephone number1234567$&00
The value you entered is wrong please try again
Please input a 11-digit telephone number

Test 5,
Please input a 11-digit telephone number: asxdccrrf
The value you entered is wrong please try again
Please input a 11-digit telephone number

Test 6,
Please input a 11-digit telephone number12345600000

The value you entered is wrong because a number can not be divided by 0 please try again
Please input a 11-digit telephone number



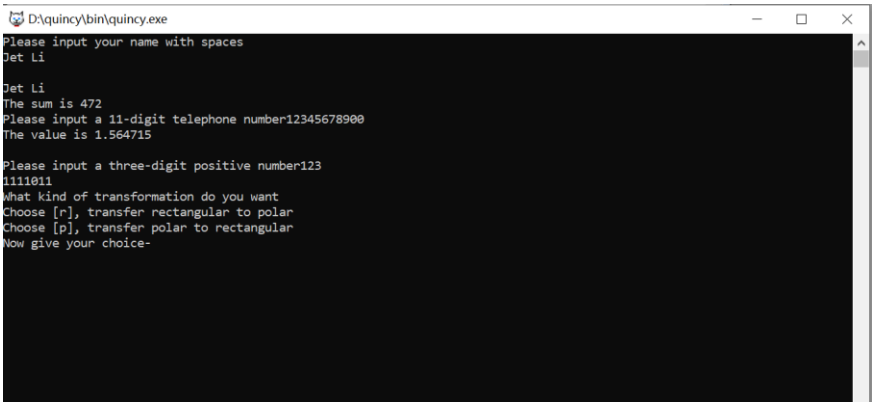
For task 3,
Test 1:
Please input a three-digit positive integer number: 123
1111011

Test 2:
Please input a three-digit positive integer number: 12
The value you entered is wrong please try again
Please input a three-digit positive integer number

Test 3:
Please input a three-digit positive integer number: 1234
The value you entered is wrong please try again
Please input a three-digit positive integer number

Test 4:
Please input a three-digit positive integer number: asd
The value you entered is wrong please try again
Please input a three-digit positive integer number

Test 5:
Please input a three-digit positive integer number1q2
The value you entered is wrong please try again
Please input a three-digit positive integer number



For task 4:
Test 1:
What kind of transformation do you want?
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice- r
The vector is A = A_{xi} + A_{yj}
The values of the Ax and Ay are
(values separated by spaces)-2 3
The transformation value |A| is 3.605551 and rad value of angle theta is 0.982794

Test 2:

What kind of transformation do you want
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice- p
The value of |A| and rad value of angle theta are
(values separated by spaces)- 1 2
The transformation values A_{x1} and A_{y1} are -0.416147 0.909297

Test 3:
What kind of transformation do you want?
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice- a
The character you entered is not defined
please try again
What kind of transformation do you want?
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice-

Test 4:
What kind of transformation do you want
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice- r
The vector is $A = A_{xi} + A_{yj}$
The values of the Ax and Ay are
(values separated by spaces)- a d

The values you entered are wrong please try again

The vector is $A = A_{xi} + A_{yj}$
The values of the Ax and Ay are
(values separated by spaces)-

Test 5:
What kind of transformation do you want?
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice- p
The value of |A| and rad value of angle theta are
(values separated by spaces)- s d

The values you entered are wrong please try again

The value of |A| and rad value of angle theta are
(values separated by spaces)-

Test 6:
What kind of transformation do you want
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice- r
The vector is $A = A_{xi} + A_{yj}$
The values of the Ax and Ay are
(values separated by spaces)-2 %

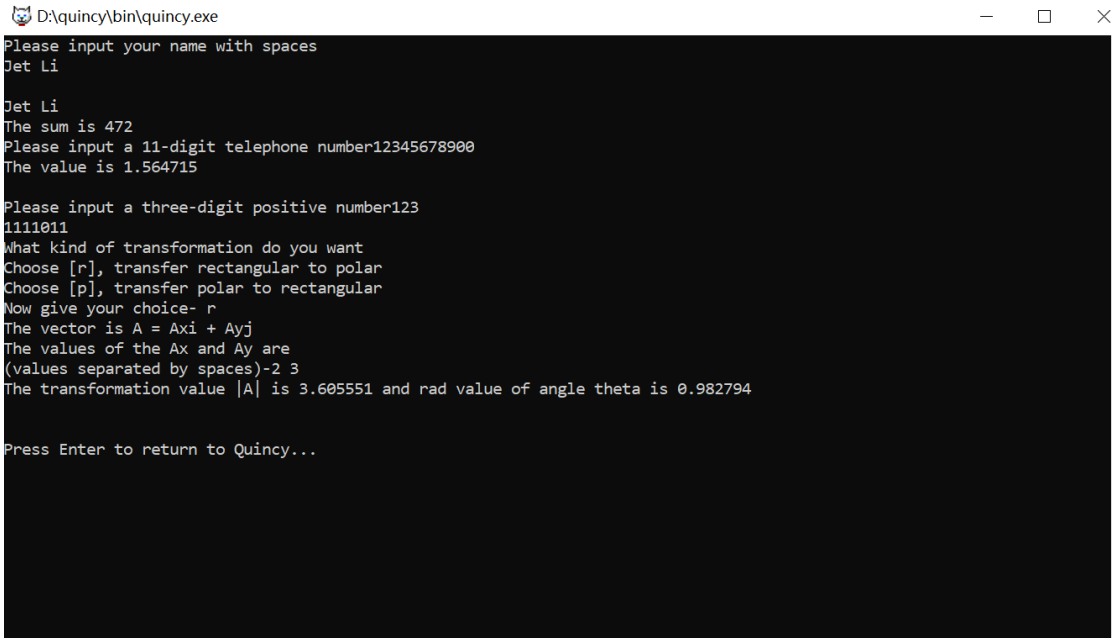
The values you entered are wrong please try again

The vector is $A = A_{xi} + A_{yj}$
The values of the Ax and Ay are
(values separated by spaces)-

Test 7:
What kind of transformation do you want
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice- p
The value of |A| and rad value of angle theta are
(values separated by spaces)-3 #

The values you entered are wrong please try again

The value of |A| and rad value of angle theta are
(values separated by spaces)-


D:\quincy\bin\quincy.exe
Please input your name with spaces
Jet Li
Jet Li
The sum is 472
Please input a 11-digit telephone number12345678900
The value is 1.564715
Please input a three-digit positive number123
1111011
What kind of transformation do you want
Choose [r], transfer rectangular to polar
Choose [p], transfer polar to rectangular
Now give your choice- r
The vector is A = Axi + Ayj
The values of the Ax and Ay are
(values separated by spaces)-2 3
The transformation value |A| is 3.605551 and rad value of angle theta is 0.982794
Press Enter to return to Quincy...