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Learning Fundamentals of Programming and Innovative Technologies of Program Creation

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Abstract: In this work, recommendations and instructions for learning the basics of programming are given. The basis of the science of programming fundamentals, the stages of software creation, and the situations that should be paid attention to when creating a program are considered.

Keywords. Information, information, program, algorithm, model, database.

INTRODUCTION

Currently, the development of information and information society and the excessive amount of data flow imposes many tasks for processing data on humanity. It is important to create automated systems that are convenient for storing, processing, transferring and managing data flow in the database. To create the above-mentioned systems, of course, the science of programming basics is the basic subject. The science of programming fundamentals can also be considered as the governing science of electronic computers. Because software, which is the basis of electronic computers, is also created by humans in programming languages based on certain rules and commands[1].

In order to learn the fundamentals of programming, two subjects must be well mastered. These are the following subjects:

- Mathematics
- General informatics

A question may arise as to why the science of mathematics is needed for the science of programming basics, because mathematical expressions, mathematical formulas and mathematical laws can certainly be involved in the structure of the program to be created. The dependence of general computer science on the fundamentals of programming is determined by the system environment in which the program is created, what the interface looks like, how the information in the program takes up memory space, and the relationship

with other programs. The fundamentals of programming are automated with the help of problems and problems on electronic computers, mathematics and general computer science.

The programs are divided into two main types.

- System programs;
- Practical programs.

System programs are programs that support the operation of electronic computers, they include operating systems and shell programs.

Application programs are programs designed to perform a specific task that satisfies user requirements [1].

There are software programs that include not only mathematics and computer science, but also other subjects, depending on the problem that such software is designed to solve. For example, programs in the field of medicine, when creating such programs, the programmer also needs specialists in the field of medicine. Circumstances that should be taken into account when creating a program to solve an issue or problem:

- Determining what kind of result will be produced by processing them when given information;
- To solve a given problem, build its mathematical or infological model;
- Creating an algorithm for determining a solution to a problem or problem based on the built model;
- Selection of a programming language based on the created algorithm depending on the situation of the issue or problem;
- Creating software based on the selected programming language and algorithm.

The choice of programming language is of great importance when solving a problem or problem. If an organization creates a database and manages it, MS Access or PHP programming languages for working with the database can be chosen. For mathematical problems, mathematical packages such as Maple, Mathcat can be selected. It is necessary to create interface views within the program for solving some problems, in which programming languages Delphi, C++ and Java can be selected. So, programming languages are selected depending on the situation of the issue or problem.

We will consider the situations that should be paid attention to when creating a program with the help of the following problem.

Example: Given a three-digit integer X(99<X<1000), find how many unique phone numbers that start with that number in a telephone exchange. It's called a great number. If the sum of the last two is equal to the given number.

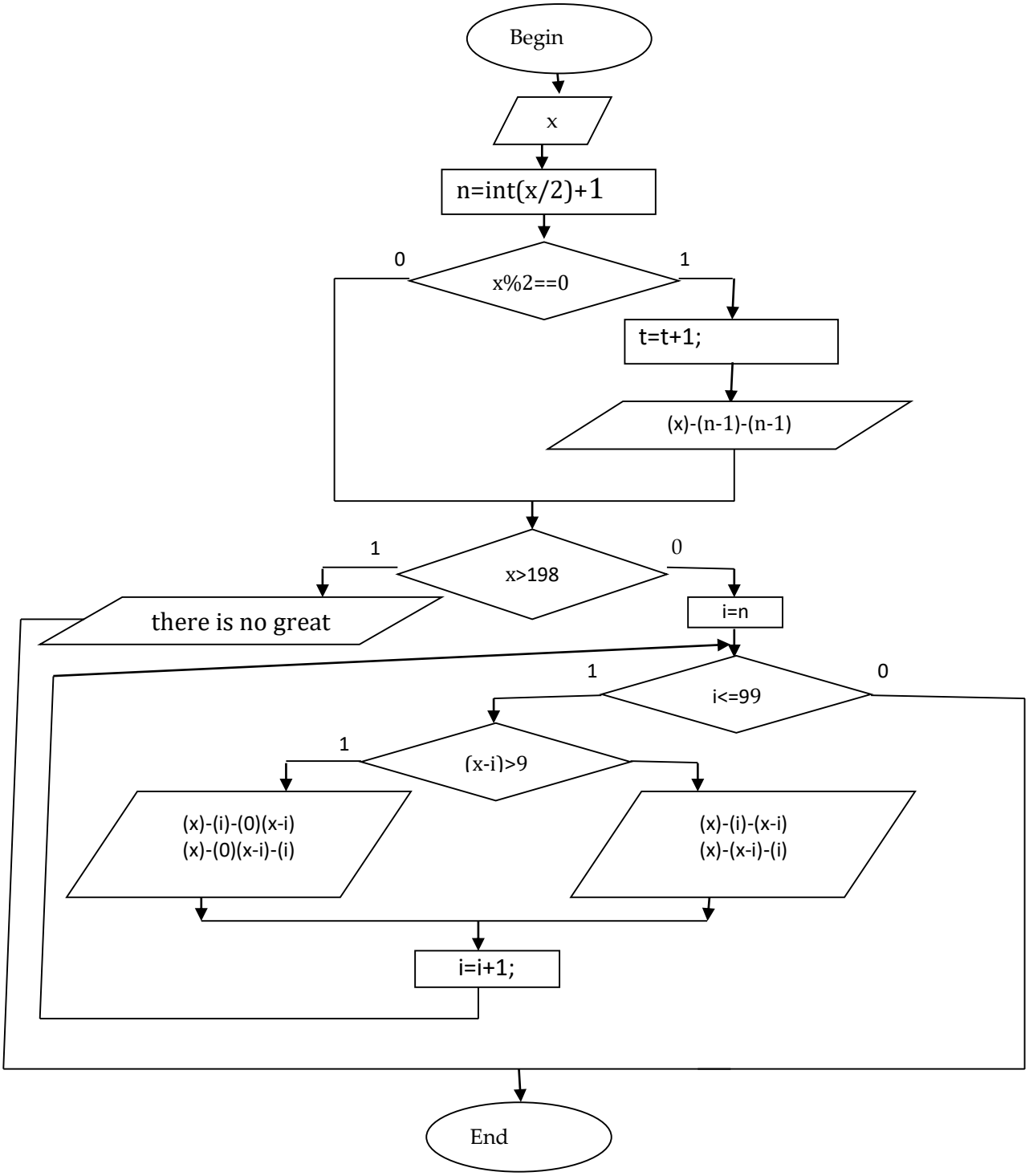
For example: if x=196, there are 3 wonderful numbers 196-98-98, 196-99-97, 196-97-99.

In the first case, enter the first three digits of the phone number. How many cool phone numbers that start with the given number and their number should be displayed.

In the second case, to determine how many unique phone numbers there are that begin with a given number, the given number is divided into two such parts that they form unique numbers. If the given number is greater than 198, it is not possible to create a phone number, because the sum of the largest two-digit numbers is 198. To perform this process, this number is always divided by half, starting from half up to 99.

For example: if 100 is given, the 1st great number is 100-50-50, the 2nd great number is 100-51-49, … , 100-99-01, there are 99 great numbers, because each great number has two great numbers can be formed, i.e. 100-99-01 and 100-01-99, only the last two great numbers are not equal, i.e. 100-50-50. The model of this problem contains the operations of x%2 remainder division and x/2 integer division.

In the third case, an algorithm for solving the problem is created based on the above model.


Begin
x
n=int(x/2)+1
0
x%2==0
1
t=t+1;
(x)-(n-1)-(n-1)
1
x>198
0
there is no great
i=n
1
i<=99
0
1
(x-i)>9
(x)-(i)-(0)(x-i)
(x)-(0)(x-i)-(i)
(x)-(i)-(x-i)
(x)-(x-i)-(i)
i=i+1;
End

C++ language was chosen to create software based on the algorithm created according to the fourth case. According to the fifth case, the following program is created in C++ based on the above algorithm to determine the solution to the given problem.

```
#include <cstdlib>
#include <iostream>
#include <math.h>
using namespace std;
int main(int argc, char *argv[])
{
 int t=0,x,n; cin>>x;
 n=int(x/2)+1;
if(x%2==0){t++; cout<<x<<"-"<<n-1<<"-"<<n-1<<"\n";}
 if (x>198) cout<<" there is no great number;
     else{
      for(int i=n;i<=99;i++){ t=t+2;
        if((x-i)>9)
     {cout<<x<<"-"<<i<<"-"<<x-i<<"\n"; cout<<x<<"-"<< x-i <<"-"<<i<<"\n";}
 else{
     cout<<x<<"-"<<i<<"-0"<<x-i<<"\n";cout<<x<<"-0"<< x-i <<"-"<<i<<"\n";}
        } }
cout<<" Great numbers "<<t<<"ta";
      system("PAUSE");
   return EXIT_SUCCESS;}
```

Input information	Result
198	198-99-99
196	196-98-98 196-99-97 196-97-99

When creating a program to determine the solution to the problem, we must respond to the above five cases. We can refer to the five tasks of software developers as designing the software development process. Because if a project is drawn up on five cases for the solution of each problem, then, of course, such a problem will not remain unsolved.

Conclusion: Mathematics and computer science are considered basic subjects for learning the basics of programming and creating a program. In order to create a program to solve a problem or problem, it is necessary to create a model, algorithm and program, paying attention to the five cases mentioned above.

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