ESTRUCTURA DE DATOS

Dr. Said Polanco
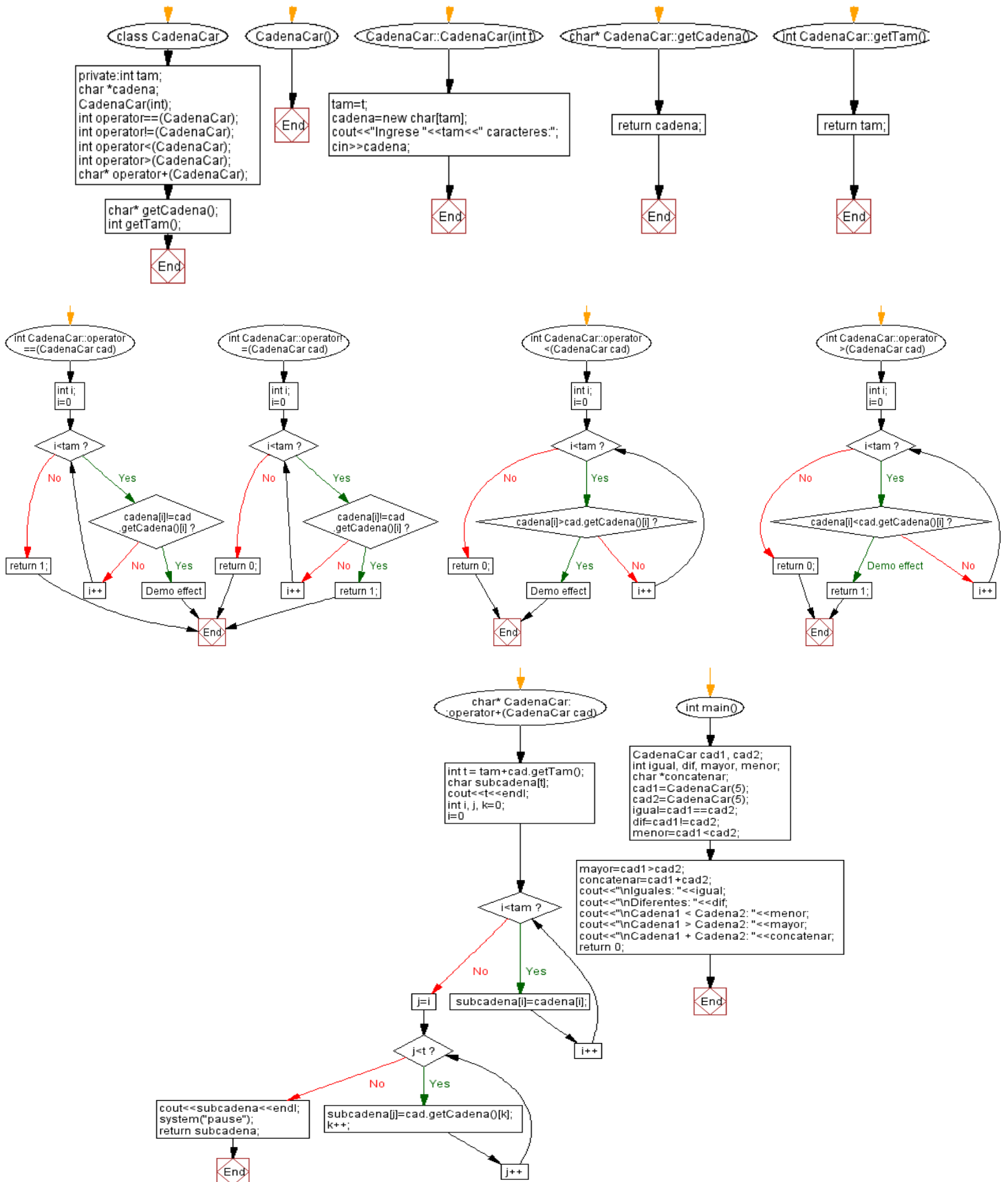
UNIDAD 2

PROGAMARIO 1

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PROGRAMA 1 Y 2

class CadenaCar

```
private:int tam;
char *cadena;
CadenaCar(int);
int operator==(CadenaCar);
int operator!=(CadenaCar);
int operator<(CadenaCar);
int operator>(CadenaCar);
char* operator+(CadenaCar);
```

```
char* getCadena();
int getTam();
```

End

CadenaCar()

End

CadenaCar::CadenaCar(int t)

```
tam=t;
cadena=new char[tam];
cout<<"Ingrese "<<tam<<" caracteres:";
cin>>cadena;
```

End

char* CadenaCar::getCadena()

```
return cadena;
```

End

int CadenaCar::getTam()

```
return tam;
```

End

int CadenaCar::operator==(CadenaCar cad)

```
int i;
i=0
```

i<tam ?
- No → return 1;
- Yes → cadena[i]!=cad.getCadena()[i] ?
  - No → i++
  - Yes → Demo effect

End

int CadenaCar::operator!=(CadenaCar cad)

```
int i;
i=0
```

i<tam ?
- No → return 0;
- Yes → cadena[i]!=cad.getCadena()[i] ?
  - No → i++
  - Yes → return 1;

End

int CadenaCar::operator<(CadenaCar cad)

```
int i;
i=0
```

i<tam ?
- No → return 0;
- Yes → cadena[i]>cad.getCadena()[i] ?
  - Yes → Demo effect
  - No → i++

End

int CadenaCar::operator>(CadenaCar cad)

```
int i;
i=0
```

i<tam ?
- No → return 0;
- Yes → cadena[i]<cad.getCadena()[i] ?
  - Demo effect → return 1;
  - No → i++

End

char* CadenaCar::operator+(CadenaCar cad)

```
int t = tam+cad.getTam();
char subcadena[t];
cout<<t<<endl;
int i, j, k=0;
i=0
```

i<tam ?
- No → j=i
- Yes → subcadena[i]=cadena[i]; → i++

j<t ?
- No → cout<<subcadena<<endl;
      system("pause");
      return subcadena;
- Yes → subcadena[j]=cad.getCadena()[k];
        k++; → j++

End

int main()

```
CadenaCar cad1, cad2;
int igual, dif, mayor, menor;
char *concatenar;
cad1=CadenaCar(5);
cad2=CadenaCar(5);
igual=cad1==cad2;
dif=cad1!=cad2;
menor=cad1<cad2;
```

```
mayor=cad1>cad2;
concatenar=cad1+cad2;
cout<<"\nIguales: "<<igual;
cout<<"\nDiferentes: "<<dif;
cout<<"\nCadena1 < Cadena2 "<<menor;
cout<<"\nCadena1 > Cadena2 "<<mayor;
cout<<"\nCadena1 + Cadena2: "<<concatenar;
return 0;
```

End

```
Ingrese 5 caracteres:hfted
Ingrese 5 caracteres:kjfnr
10
hftedkjfnrH
Presione una tecla para continuar . . .

Iguales: 0
Diferentes: 1
Cadena1 < Cadena2: 1
Cadena1 > Cadena2: 1
Cadena1 + Cadena2: hftedkjfnrH
Process returned 0 (0x0)   execution time : 52.642 s
Press any key to continue.
```
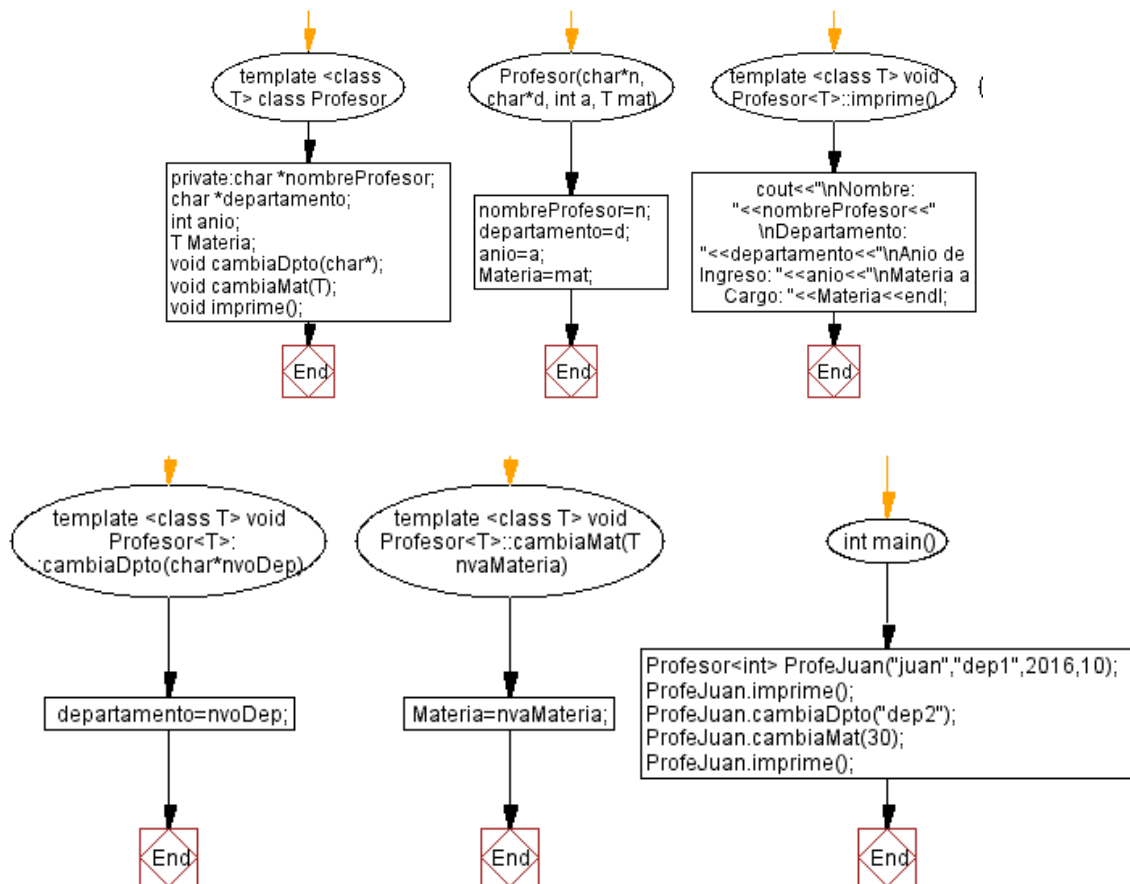
```
Ingrese 5 caracteres:asdfg
Ingrese 5 caracteres:asdfg
10
asdfgasdfgH
Presione una tecla para continuar . . .

Iguales: 1
Diferentes: 0
Cadena1 < Cadena2: 0
Cadena1 > Cadena2: 0
Cadena1 + Cadena2: asdfgasdfgH
Process returned 0 (0x0)   execution time : 5.130 s
Press any key to continue.
```

PROGRAMA 3 Y 4

```
Nombre: juan
Departamento: dep1
Anio de Ingreso: 2016
Materia a Cargo: 10

Nombre: juan
Departamento: dep2
Anio de Ingreso: 2016
Materia a Cargo: 30

Process returned 0 (0x0)   execution time : 5.393 s
Press any key to continue.
```

PROGRAMA 5

template <class T> class Profesor

```
private:char *nombreProfesor;
char *departamento;
int anio;
T *Materia;
void cambiaDpto(char*);
void cambiaMat(T*);
void imprime();
```

End

Profesor(char*n, char*d, int a, T *mat)

```
nombreProfesor=n;
departamento=d;
anio=a;
Materia=mat;
```

End

template <class T> void Profesor<T>::imprime()

```
cout<<"\nNombre: "<<nombreProfesor<<"\nDepartamento: "<<departamento<<"\nAnio de Ingreso: "<<anio<<"\nMateria a Cargo: "<<Materia<<endl;
```

End

template <class T> void Profesor<T>::cambiaDpto(char*nvoDep)

```
departamento=nvoDep;
```

End

template <class T> void Profesor<T>::cambiaMat(T *nvaMateria)

```
Materia=nvaMateria;
```

End

int main()

```
Profesor<char> nuevo("Armando","Oficina",2017,"Materia");
nuevo.imprime();
nuevo.cambiaMat("Matematicas");
nuevo.imprime();
```
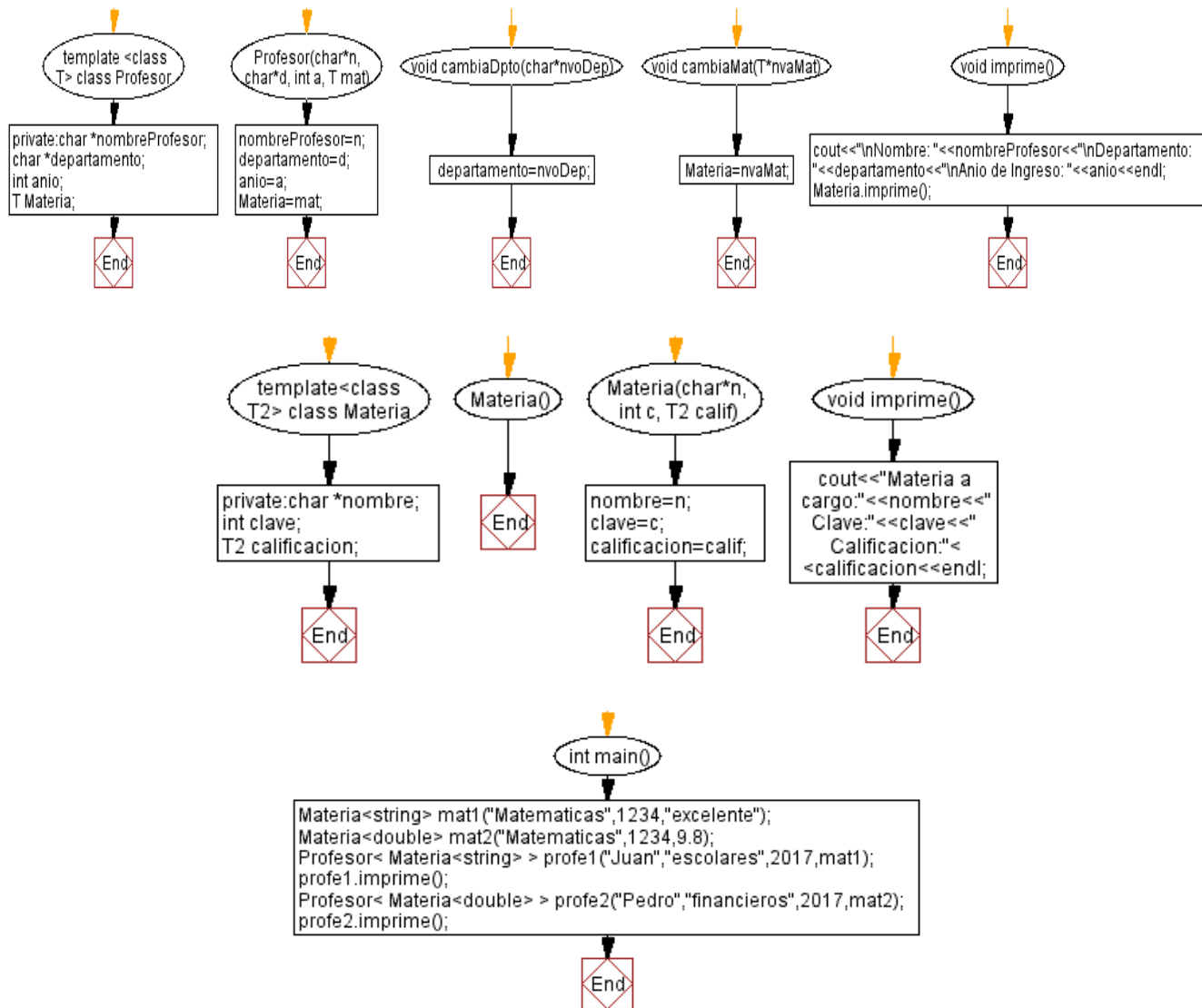
End

```
Nombre: Armando
Departamento: Oficina
Anio de Ingreso: 2017
Materia a Cargo: Materia

Nombre: Armando
Departamento: Oficina
Anio de Ingreso: 2017
Materia a Cargo: Matematicas

Process returned 0 (0x0)   execution time : 4.964 s
Press any key to continue.
```
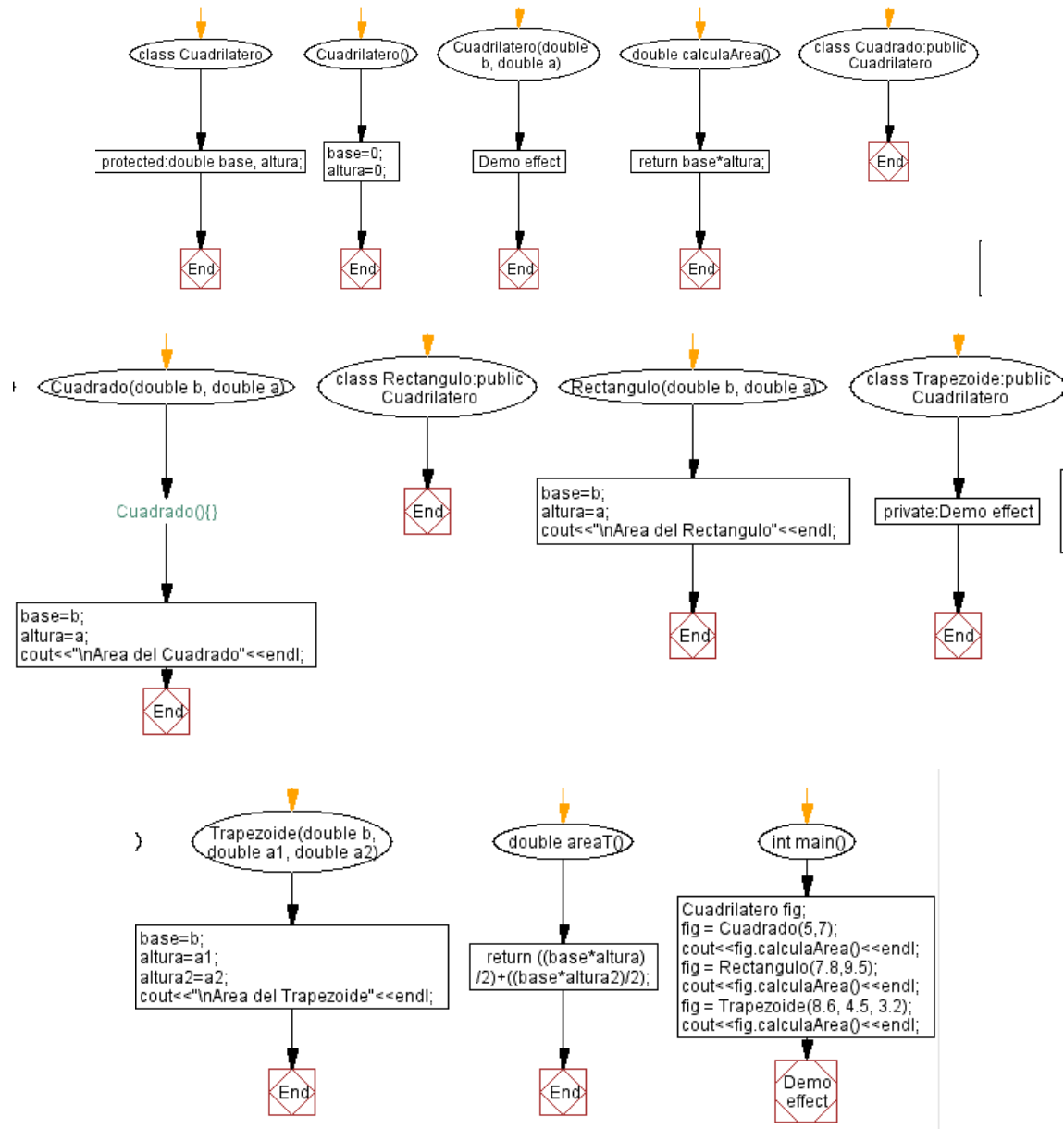
PROGRAMA 6

```
template <class T> class Profesor
```
```
private:char *nombreProfesor;
char *departamento;
int anio;
T Materia;
```
End

```
Profesor(char*n, char*d, int a, T mat)
```
```
nombreProfesor=n;
departamento=d;
anio=a;
Materia=mat;
```
End

```
void cambiaDpto(char*nvoDep)
```
```
departamento=nvoDep;
```
End

```
void cambiaMat(T*nvaMat)
```
```
Materia=nvaMat;
```
End

```
void imprime()
```
```
cout<<"\nNombre: "<<nombreProfesor<<"\nDepartamento: "<<departamento<<"\nAnio de Ingreso: "<<anio<<endl;
Materia.imprime();
```
End

```
template<class T2> class Materia
```
```
private:char *nombre;
int clave;
T2 calificacion;
```
End

```
Materia()
```
End

```
Materia(char*n, int c, T2 calif)
```
```
nombre=n;
clave=c;
calificacion=calif;
```
End

```
void imprime()
```
```
cout<<"Materia a cargo:"<<nombre<<" Clave:"<<clave<<" Calificacion:"<<calificacion<<endl;
```
End

```
int main()
```
```
Materia<string> mat1("Matematicas",1234,"excelente");
Materia<double> mat2("Matematicas",1234,9.8);
Profesor< Materia<string> > profe1("Juan","escolares",2017,mat1);
profe1.imprime();
Profesor< Materia<double> > profe2("Pedro","financieros",2017,mat2);
profe2.imprime();
```
End

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.6\main.exe"

Nombre: Juan
Departamento: escolares
Anio de Ingreso: 2017
Materia a cargo:Matematicas   Clave:1234   Calificacion:excelente

Nombre: Pedro
Departamento: financieros
Anio de Ingreso: 2017
Materia a cargo:Matematicas   Clave:1234   Calificacion:9.8

Process returned 0 (0x0)    execution time : 0.390 s
Press any key to continue.
```
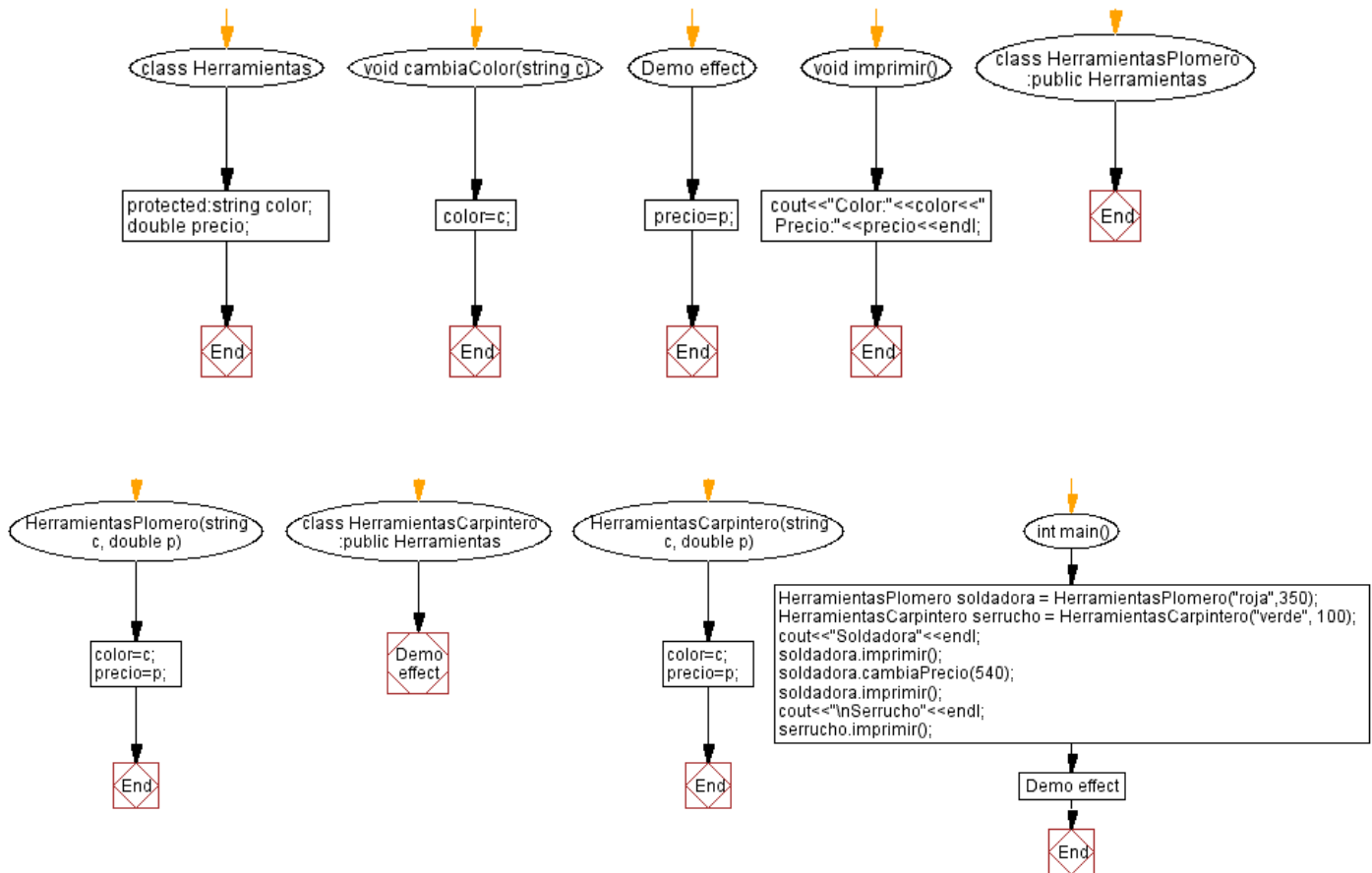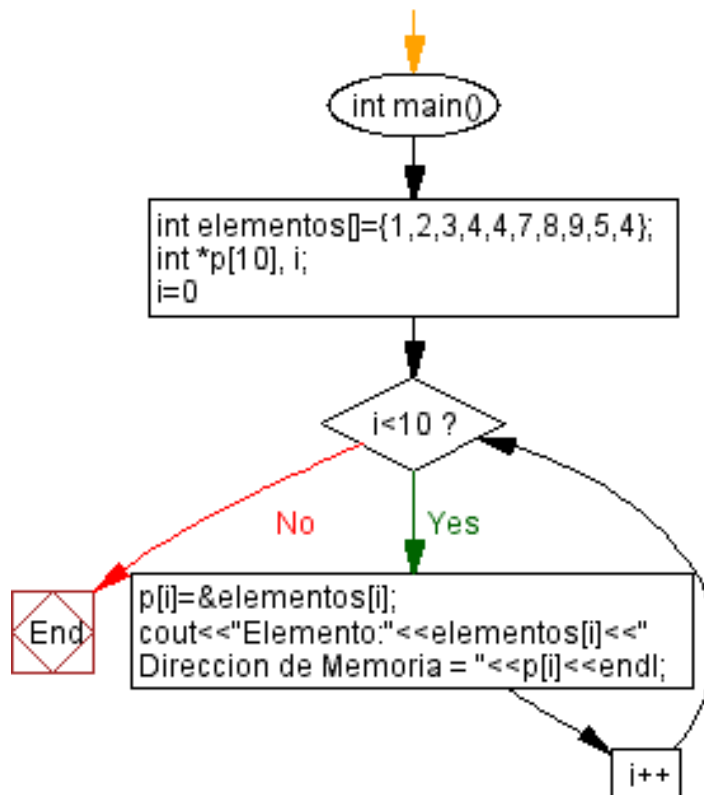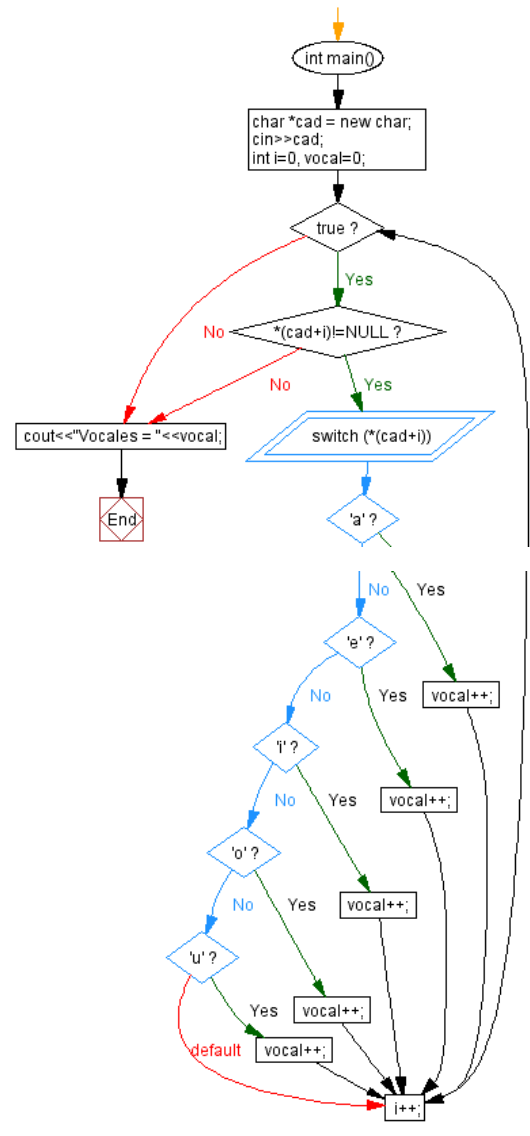
PROGRAMA 7

```
class Cuadrilatero
  → protected:double base, altura;
    → End

Cuadrilatero()
  → base=0;
    altura=0;
    → End

Cuadrilatero(double b, double a)
  → Demo effect
    → End

double calculaArea()
  → return base*altura;
    → End

class Cuadrado:public Cuadrilatero
  → End
```

```
Cuadrado(double b, double a)
  → Cuadrado(){}
    → base=b;
      altura=a;
      cout<<"\nArea del Cuadrado"<<endl;
      → End

class Rectangulo:public Cuadrilatero
  → End

Rectangulo(double b, double a)
  → base=b;
    altura=a;
    cout<<"\nArea del Rectangulo"<<endl;
    → End

class Trapezoide:public Cuadrilatero
  → private:Demo effect
    → End
```

```
Trapezoide(double b, double a1, double a2)
  → base=b;
    altura=a1;
    altura2=a2;
    cout<<"\nArea del Trapezoide"<<endl;
    → End

double areaT()
  → return ((base*altura)/2)+((base*altura2)/2);
    → End

int main()
  → Cuadrilatero fig;
    fig = Cuadrado(5,7);
    cout<<fig.calculaArea()<<endl;
    fig = Rectangulo(7.8,9.5);
    cout<<fig.calculaArea()<<endl;
    fig = Trapezoide(8.6, 4.5, 3.2);
    cout<<fig.calculaArea()<<endl;
    → Demo effect
```
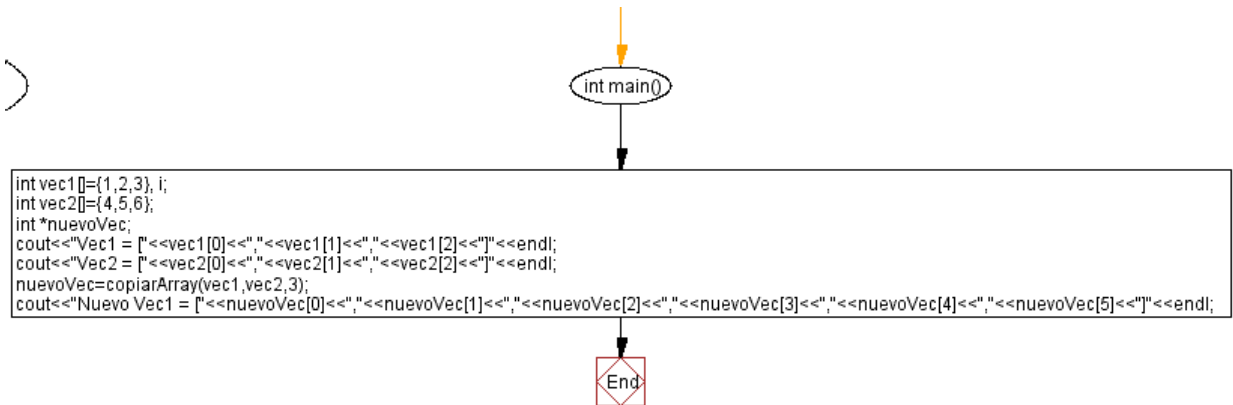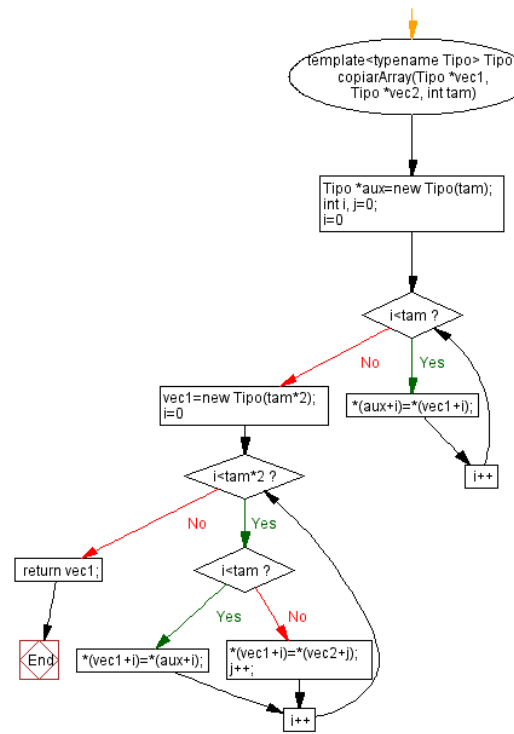
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.7\main.exe"

```
Area del Cuadrado
35

Area del Rectangulo
74.1

Area del Trapezoide
38.7

Process returned 0 (0x0)    execution time : 5.285 s
Press any key to continue.
```

PROGRAMA 8

```
class Herramientas
    |
protected:string color;
double precio;
    |
   End
```

```
void cambiaColor(string c)
    |
  color=c;
    |
   End
```

```
Demo effect
    |
  precio=p;
    |
   End
```

```
void imprimir()
    |
cout<<"Color:"<<color<<"
  Precio:"<<precio<<endl;
    |
   End
```

```
class HerramientasPlomero
    :public Herramientas
    |
   End
```

```
HerramientasPlomero(string
   c, double p)
    |
  color=c;
  precio=p;
    |
   End
```

```
class HerramientasCarpintero
    :public Herramientas
    |
  Demo
  effect
    |
```

```
HerramientasCarpintero(string
   c, double p)
    |
  color=c;
  precio=p;
    |
   End
```

```
int main()
    |
HerramientasPlomero soldadora = HerramientasPlomero("roja",350);
HerramientasCarpintero serrucho = HerramientasCarpintero("verde", 100);
cout<<"Soldadora"<<endl;
soldadora.imprimir();
soldadora.cambiaPrecio(540);
soldadora.imprimir();
cout<<"\nSerrucho"<<endl;
serrucho.imprimir();
    |
  Demo effect
    |
   End
```

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.8\main.exe"

Soldadora
Color:roja Precio:350
Color:roja Precio:540

Serrucho
Color:verde Precio:100
Color:azul Precio:100

Process returned 0 (0x0)     execution time : 3.710 s
Press any key to continue.
```

PROGRAMA 9

```
int main()

int elementos[]={1,2,3,4,4,7,8,9,5,4};
int *p[10], i;
i=0

i<10 ?
   No          Yes

End

p[i]=&elementos[i];
cout<<"Elemento:"<<elementos[i]<<"
Direccion de Memoria = "<<p[i]<<endl;

i++
```

```
Elemento:1  Direccion de Memoria = 0x28feac
Elemento:2  Direccion de Memoria = 0x28feb0
Elemento:3  Direccion de Memoria = 0x28feb4
Elemento:4  Direccion de Memoria = 0x28feb8
Elemento:4  Direccion de Memoria = 0x28febc
Elemento:7  Direccion de Memoria = 0x28fec0
Elemento:8  Direccion de Memoria = 0x28fec4
Elemento:9  Direccion de Memoria = 0x28fec8
Elemento:5  Direccion de Memoria = 0x28fecc
Elemento:4  Direccion de Memoria = 0x28fed0

Process returned 0 (0x0)   execution time : 4.772 s
Press any key to continue.
```

PROGRAMA 10


```
int main()

char *cad = new char;
cin>>cad;
int i=0, vocal=0;

true ?
    No
    Yes
        *(cad+i)!=NULL ?
            No
            Yes
                switch (*(cad+i))
                    'a' ?
                        No      Yes
                        'e' ?           vocal++;
                            No      Yes
                            'i' ?           vocal++;
                                No      Yes
                                'o' ?           vocal++;
                                    No      Yes
                                    'u' ?           vocal++;
                                        Yes     vocal++;
                                        default     vocal++;
                                                        i++;
        cout<<"Vocales = "<<vocal;
        End
```



```
armando
Vocales = 3
Process returned 0 (0x0)   execution time : 35.465 s
Press any key to continue.
```



```
elefante
Vocales = 4
Process returned 0 (0x0)   execution time : 8.705 s
Press any key to continue.
```

PROGRAMA 11

```
template<typename Tipo> Tipo*
copiarArray(Tipo *vec1,
Tipo *vec2, int tam)
```

```
Tipo *aux=new Tipo(tam);
int i, j=0;
i=0
```

i<tam ?

No → Yes

```
vec1=new Tipo(tam*2);
i=0
```

```
*(aux+i)=*(vec1+i);
```

i<tam*2 ?

No → Yes

i++

```
return vec1;
```

i<tam ?

Yes → No

End

```
*(vec1+i)=*(aux+i);
```

```
*(vec1+i)=*(vec2+j);
j++;
```

i++

(int main())

```
int vec1[]={1,2,3}, i;
int vec2[]={4,5,6};
int *nuevoVec;
cout<<"Vec1 = ["<<vec1[0]<<","<<vec1[1]<<","<<vec1[2]<<"]"<<endl;
cout<<"Vec2 = ["<<vec2[0]<<","<<vec2[1]<<","<<vec2[2]<<"]"<<endl;
nuevoVec=copiarArray(vec1,vec2,3);
cout<<"Nuevo Vec1 = ["<<nuevoVec[0]<<","<<nuevoVec[1]<<","<<nuevoVec[2]<<","<<nuevoVec[3]<<","<<nuevoVec[4]<<","<<nuevoVec[5]<<"]"<<endl;
```

End

PROGRAMA 12

```
int main()
```

```
srand(time(NULL));
int numeros[100], i, j=0;
int *aux=new int, par=0, impar=0;
i=0
```

i<100 ?
— Demo effect / Yes

```
cout<<endl;
cout<<endl;
i=0
```

```
numeros[i]=1+rand()%1000;
```

i<100 ?
— No / Yes

numeros[i]%2==0 ?
— Yes / No

```
i=0
```

numeros[i]%2==0 ?
— No / Yes

par++;   impar++;

i<100 ?
— No / Yes

Demo effect

```
cout<<numeros[i]<<",";
```

```
cout<<"\n\nPares="<<par<<"  Impares="<<impar<<endl;
cout<<endl;
```

numeros[i]%2!=0 ?
— No / Yes

i++   i++

```
End
```

Demo effect

i++

"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.12\main.exe"

```
187,360,846,450,278,554,500,257,988,401,824,676,354,528,729,164,881,13,182,349,5
02,998,961,681,98,48,955,125,383,540,496,301,5,819,356,227,291,691,839,62,722,47
4,493,593,398,146,281,368,374,6,803,195,95,580,719,204,676,515,192,691,729,887,9
64,676,63,875,274,559,66,807,682,889,546,562,324,241,223,817,891,214,961,440,11,
775,390,648,401,586,781,482,546,985,578,979,431,201,867,513,303,917,

360,846,450,278,554,500,988,824,676,354,528,164,182,502,998,98,48,540,496,356,62
,722,474,398,146,368,374,6,580,204,676,192,964,676,274,66,682,546,562,324,214,44
0,390,648,586,482,546,578,187,257,401,729,881,13,349,961,681,955,125,383,301,5,8
19,227,291,691,839,493,593,281,803,195,95,719,515,691,729,887,63,875,559,807,889
,241,223,817,891,961,11,775,401,781,985,979,431,201,867,513,303,917,

Pares=48  Impares=52


Process returned 0 (0x0)    execution time : 4.120 s
Press any key to continue.
```

PROGRAMA 13
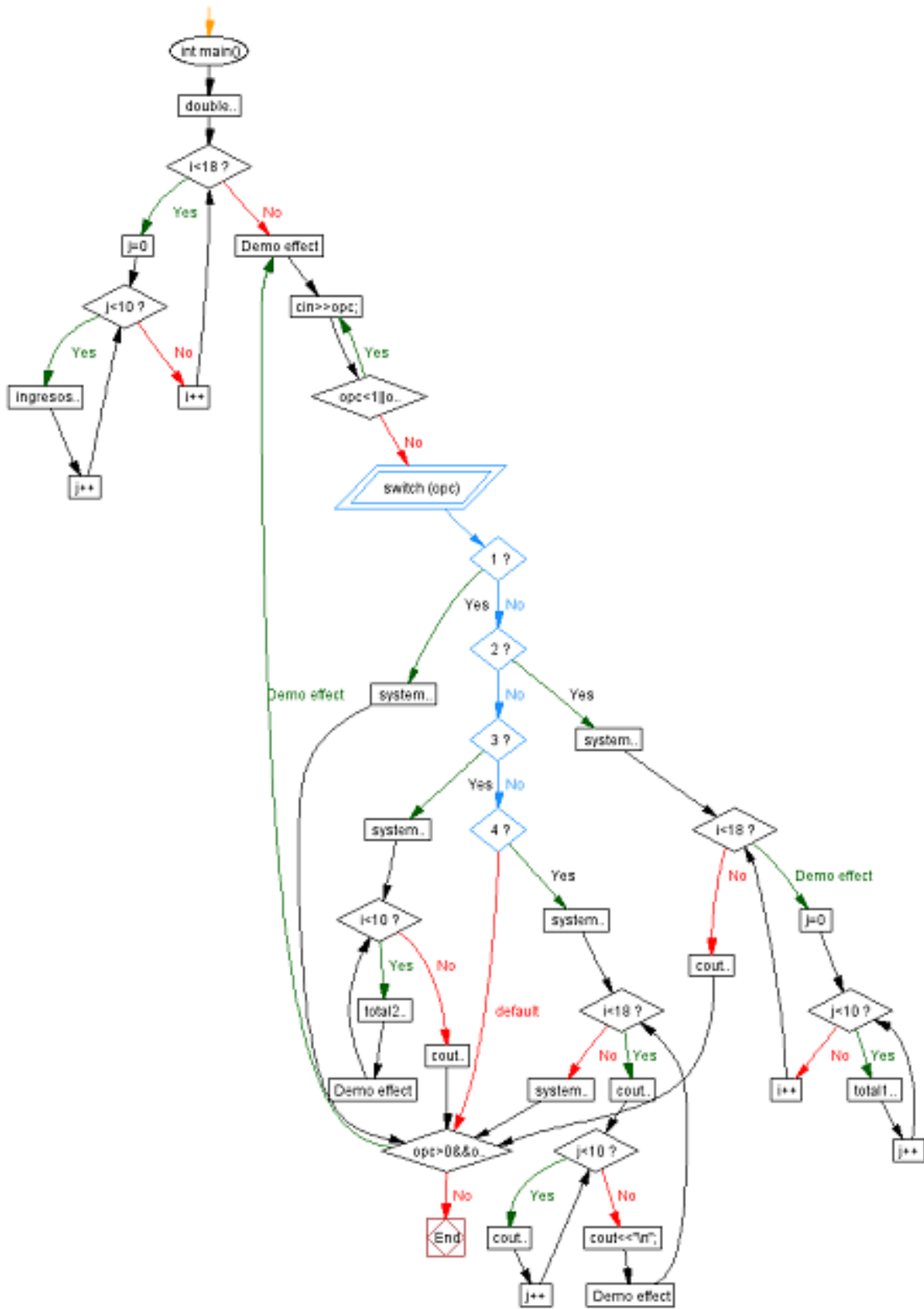
```
1.Agregar Ingresos
2.Ingresos Totales
3.Ingresos por Vendedor
4.Mostrar datos
Opcion: 1_
```

```
No. Vendedor (1-18): 6
No. Producto (1-10): 8
Ingreso Producto: 1200
Presione una tecla para continuar . . .
```

```
1.Agregar Ingresos
2.Ingresos Totales
3.Ingresos por Vendedor
4.Mostrar datos
Opcion: 2
```

```
Total de Ingresos = 1200
Presione una tecla para continuar . . .
```

```
1.Agregar Ingresos
2.Ingresos Totales
3.Ingresos por Vendedor
4.Mostrar datos
Opcion: 3_
```

```
No. Vendedor (1-18): 6
Total de Ingresos = 1200
Presione una tecla para continuar . . .
```

```
1.Agregar Ingresos
2.Ingresos Totales
3.Ingresos por Vendedor
4.Mostrar datos
Opcion: 4
```

```
Vendedor 1: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 2: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 3: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 4: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 5: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 6: [0] [0] [0] [0] [0] [0] [0] [1200] [0] [0]
Vendedor 7: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 8: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 9: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 10: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 11: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 12: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 13: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 14: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 15: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 16: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 17: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Vendedor 18: [0] [0] [0] [0] [0] [0] [0] [0] [0] [0]
Presione una tecla para continuar . . .
```
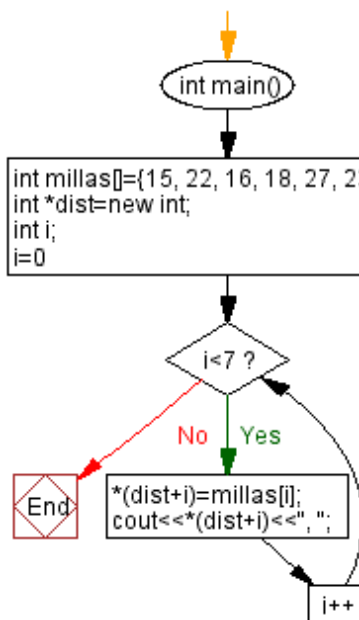
PROGRAMA 14
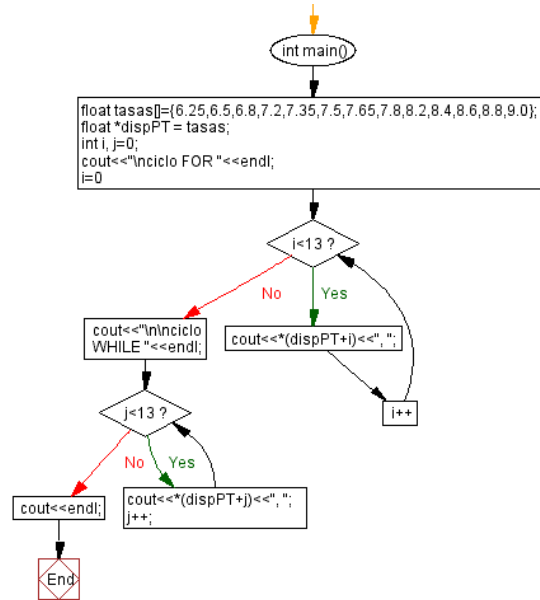

```
ciclo FOR
6.25, 6.5, 6.8, 7.2, 7.35, 7.5, 7.65, 7.8, 8.2, 8.4, 8.6, 8.8, 9,

ciclo WHILE
6.25, 6.5, 6.8, 7.2, 7.35, 7.5, 7.65, 7.8, 8.2, 8.4, 8.6, 8.8, 9,

Process returned 0 (0x0)   execution time : 4.823 s
Press any key to continue.
```
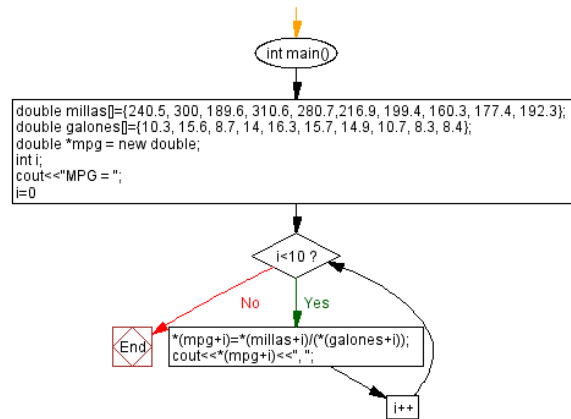
PROGRAMA 15


```
15, 22, 16, 18, 27, 23, 20,

Process returned 0 (0x0)   execution time : 0.546 s
Press any key to continue.
```
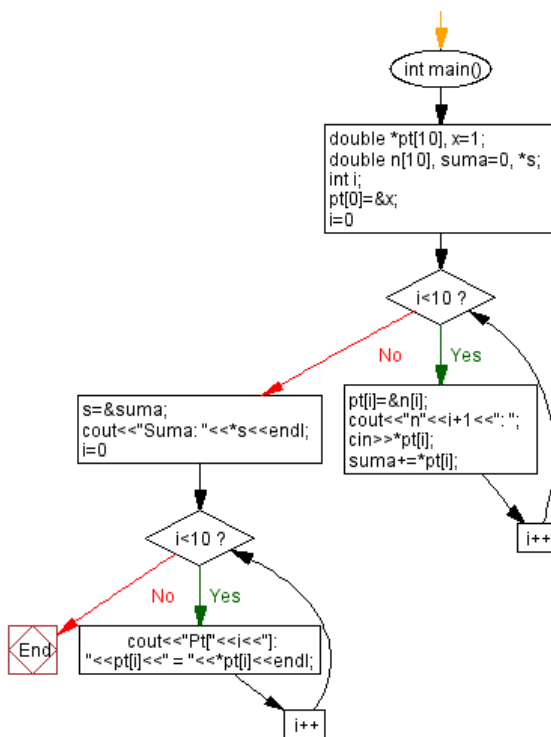
PROGRAMA 16


```
int main()

double millas[]={240.5, 300, 189.6, 310.6, 280.7,216.9, 199.4, 160.3, 177.4, 192.3};
double galones[]={10.3, 15.6, 8.7, 14, 16.3, 15.7, 14.9, 10.7, 8.3, 8.4};
double *mpg = new double;
int i;
cout<<"MPG = ";
i=0

i<10 ?
   No → End
   Yes → *(mpg+i)=*(millas+i)/(*(galones+i));
         cout<<*(mpg+i)<<", ";
         i++
```

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.16\main.exe"
MPG = 23.3495, 19.2308, 21.7931, 22.1857, 17.2209, 13.8153, 13.3826, 14.9813, 21
.3735, 22.8929,

Process returned 0 (0x0)   execution time : 0.733 s
Press any key to continue.
```

PROGRAMA 17


```
int main()

double *pt[10], x=1;
double n[10], suma=0, *s;
int i;
pt[0]=&x;
i=0

i<10 ?
   No → s=&suma;
        cout<<"Suma: "<<*s<<endl;
        i=0
   Yes → pt[i]=&n[i];
         cout<<"n"<<i+1<<": ";
         cin>>*pt[i];
         suma+=*pt[i];
         i++

i<10 ?
   No → End
   Yes → cout<<"Pt["<<i<<"]:
         "<<pt[i]<<" = "<<*pt[i]<<endl;
         i++
```

```
"C:\Users\Armando Isaac\Desktop\Estructura
n1: 8
n2: 5
n3: 9
n4: 6
n5: 8
n6: 6
n7: 4
n8: 1
n9: 2
n10: 9
Suma: 58
Pt[0]: 0x28fea8 = 8
Pt[1]: 0x28feb0 = 5
Pt[2]: 0x28feb8 = 9
Pt[3]: 0x28fec0 = 6
Pt[4]: 0x28fec8 = 8
Pt[5]: 0x28fed0 = 6
Pt[6]: 0x28fed8 = 4
Pt[7]: 0x28fee0 = 1
Pt[8]: 0x28fee8 = 2
Pt[9]: 0x28fef0 = 9

Process returned 0 (0x0)
Press any key to continue.
```

PROGRAMA 18
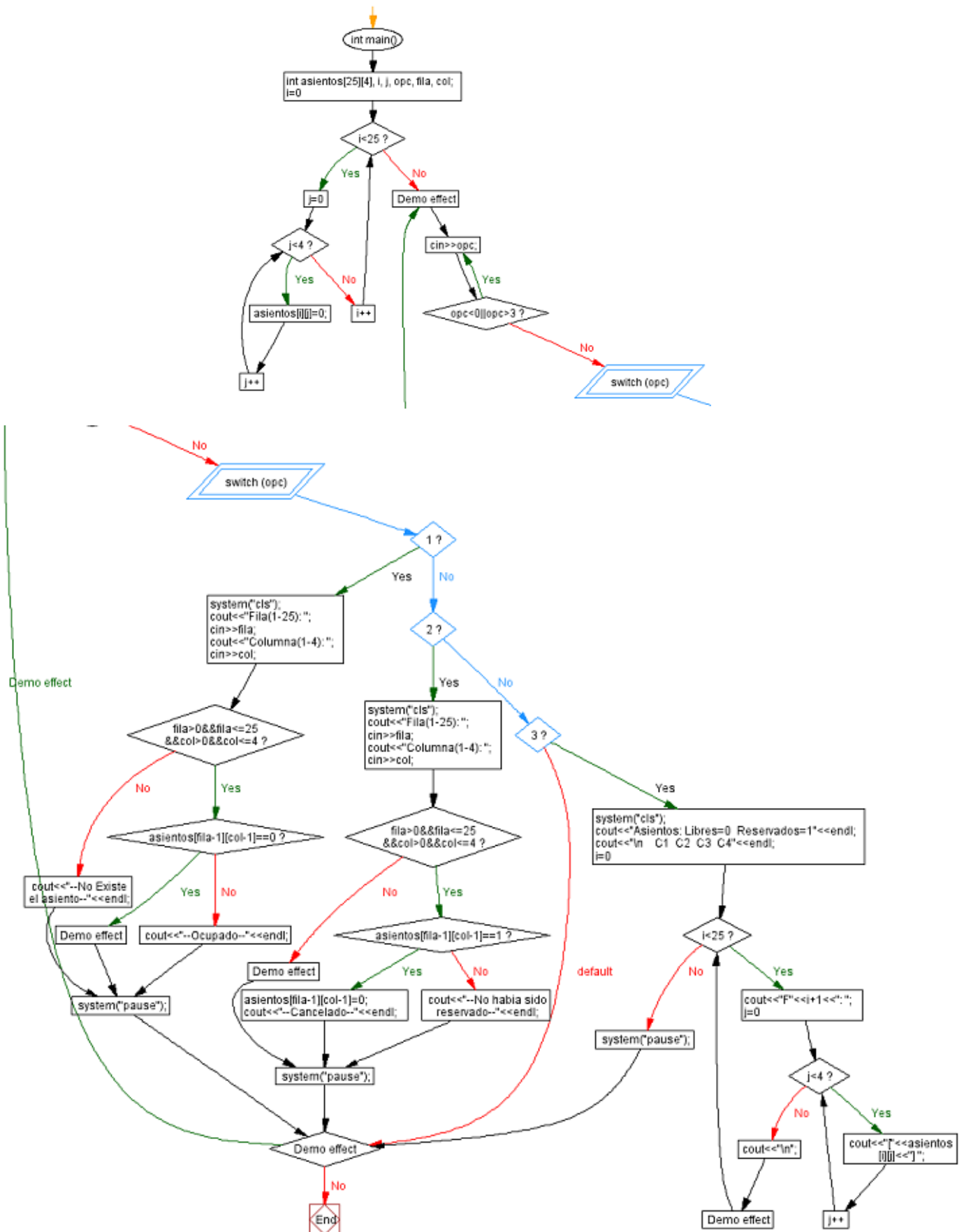
```
"C:\Users\Armando Isaac\Desktop\Estru
1.Reservar
2.Cancelar
3.Mostrar Asientos

1
```

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Prog
Fila(1-25): 15
Columna(1-4): 3
--Reservado--
Presione una tecla para continuar . . .
```

```
"C:\Users\Armando Isaac\Desktop\Estruct
1.Reservar
2.Cancelar
3.Mostrar Asientos

2
```
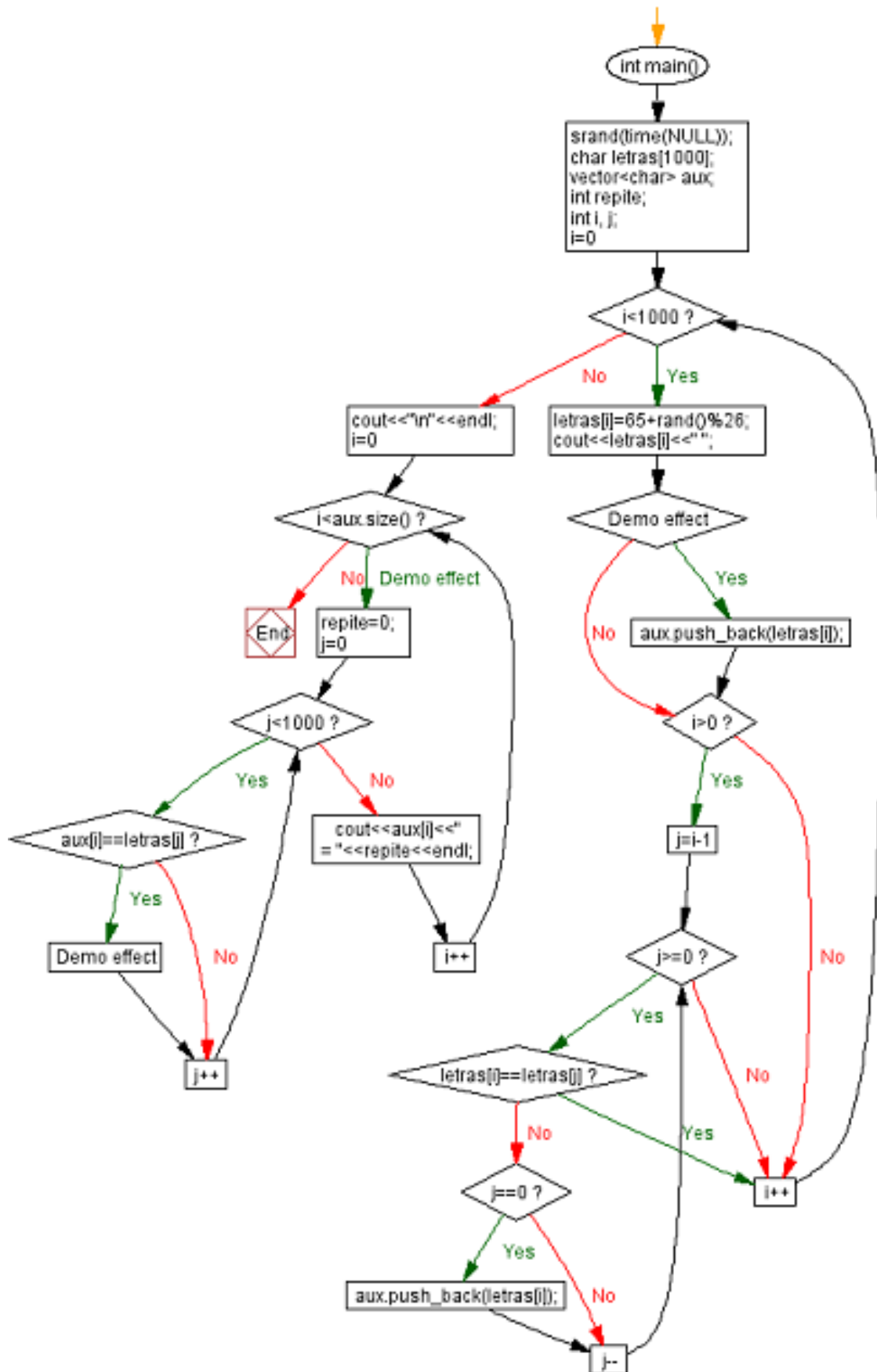
```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progan
Fila(1-25): 4
Columna(1-4): 6
--No Existe el asiento--
Presione una tecla para continuar . . .
```

```
"C:\Users\Armando Isaac\Desktop\Estructu
1.Reservar
2.Cancelar
3.Mostrar Asientos

3
```

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\
Asientos: Libres=0  Reservados=1

     C1  C2  C3  C4
F1: [0] [0] [0] [0]
F2: [0] [0] [0] [0]
F3: [0] [0] [0] [0]
F4: [0] [0] [0] [0]
F5: [0] [0] [0] [0]
F6: [0] [0] [0] [0]
F7: [0] [0] [0] [0]
F8: [0] [0] [0] [0]
F9: [0] [0] [0] [0]
F10: [0] [0] [0] [0]
F11: [0] [0] [0] [0]
F12: [0] [0] [0] [0]
F13: [0] [0] [0] [0]
F14: [0] [0] [0] [0]
F15: [0] [0] [1] [0]
F16: [0] [0] [0] [0]
F17: [0] [0] [0] [0]
F18: [0] [0] [0] [0]
F19: [0] [0] [0] [0]
F20: [0] [0] [0] [0]
F21: [0] [0] [0] [0]
F22: [0] [0] [0] [0]
F23: [0] [0] [0] [0]
F24: [0] [0] [0] [0]
F25: [0] [0] [0] [0]
Presione una tecla para continuar . . .
```

PROGRAMA 19

int main()

```
srand(time(NULL));
char letras[1000];
vector<char> aux;
int repite;
int i, j;
i=0
```

i<1000 ?

No → `cout<<"\n"<<endl;` `i=0`

Yes → `letras[i]=65+rand()%26;` `cout<<letras[i]<<" ";`

i<aux.size() ?

No → End

Demo effect → `repite=0;` `j=0`

j<1000 ?

Yes → aux[i]==letras[j] ?

Yes → Demo effect

No → j++

Demo effect → j++

No → `cout<<aux[i]<<"` `= "<<repite<<endl;`

i++

Demo effect

No → i>0 ?

Yes → `aux.push_back(letras[i]);`

i>0 ?

Yes → j=i-1

No → i++

j>=0 ?

Yes → letras[i]==letras[j] ?

No → j==0 ?

Yes → `aux.push_back(letras[i]);`

No → j--

No → i++

Yes → i++

```
Q U G Q E D H D B P A G B D E A N L E T U X G F S W E R K X D C I B S E B A W A
X X A S Q Y C Z B M N D I Y Z S B Z G Y N H M A J O W J K G T D V Q V A U B J M
C O V Q R D W M N R E Z X D L L I G Z U U V W F Q D V Q G Y D E J L F M H U D Y
E W Q J J R L Y D R Z Y X Q I K V I F T L V Y Y Q O N Z N Z N T Z V H F J N Z B
D K Y E R R R L E M R X K M R X S P H I O R W C Z O A G U N J E X B Q U P L F I
Y O D M I L E J S Y O Q A U C K K G B K V X F M T T Y L W U P G O S U B N B V N
U F E H W O E Z T B U K Q M T O Z Y Y I I W B H G M V V F K I U L C O J T X Y Q
P O O Q M A T I Q D Y E G T T T X R Q E D D W D M E M L F Z O T S L B S V G O C
Z I F G T P T K S I F Y E J B D B G O B R Z H J D N B H S J F R L Y Q T N L A T
F H D A S W P L T Y R M A G O Q H E L W O X Q T Y Z Z K J X N I R P I K A C E U
I T B B I S N X M V X E B I H F G M I N X A M R Z W U J V D W P L D K V O Q K V
H S D U K V P E L Z O D U C R V B M R A T Z E R F E M P S C X N G P I Y G T Q Z
D M B D F C M C V J M S X J X Y Y Y U V X S R C K Q K X V Y Q F U D V Y M E M P
G D W I O M M X D N H K C E K U Y D S K E J W H E E B F Y G Q B H I H B E C P H
T F T W R S O C W Y C C L K K Y H C T N E D U T X M F E B Q E J I I Y Y L G Y J
C H I E V R S I Z I V N E H I U A U O Z K C S Q E X T I I Z Q W R H D L L M J O
Z A M Q G D Q Y A Q H V E O T D P S G B P B X K X S F U D J A Y C F O Z E D P S
F O H V O G X D D L D Q N H B I K I K U K Y N C T P I K U Q N H N W B S F O X L
M M P W Z O E P G N P E C R Q Z C W Q S G I K A C I M T Z R H U Q L Q S P K L Q
C Z D I U C B K P I W G O N N T T O G T L Y V E C D A G M R L M M Y A F X Z Q K L
D X R P K V L K X I H D Z N C U T T W D P V G J X Q X E Y B O W V G J W E M E X
P C H U L A H P E P D K V A R K I C F G L S S I O L C L A T S U H W E W G Q U C
Q P Z C N F V Q Y O P C O K O B U T R K W B M G U V A S N P T K P D O S O K V O
T P L R L S M S T R M K G S O P L N J G D N I X S E Q T B S H R H C S A A H J Q
B P V P F J O S A K V I E O G U K Y F O P D V G Y L K F P B D Q U J X I G W I Z
```

```
Q = 46
U = 37
G = 40
E = 48
D = 50
H = 34
B = 39
P = 38
A = 30
N = 31
L = 39
T = 42
X = 37
F = 31
S = 39
W = 31
R = 33
K = 45
C = 37
I = 45
Y = 43
Z = 35
M = 40
J = 28
O = 44
V = 38

Process returned 0 (0x0)   execution time : 2.046 s
Press any key to continue.
```
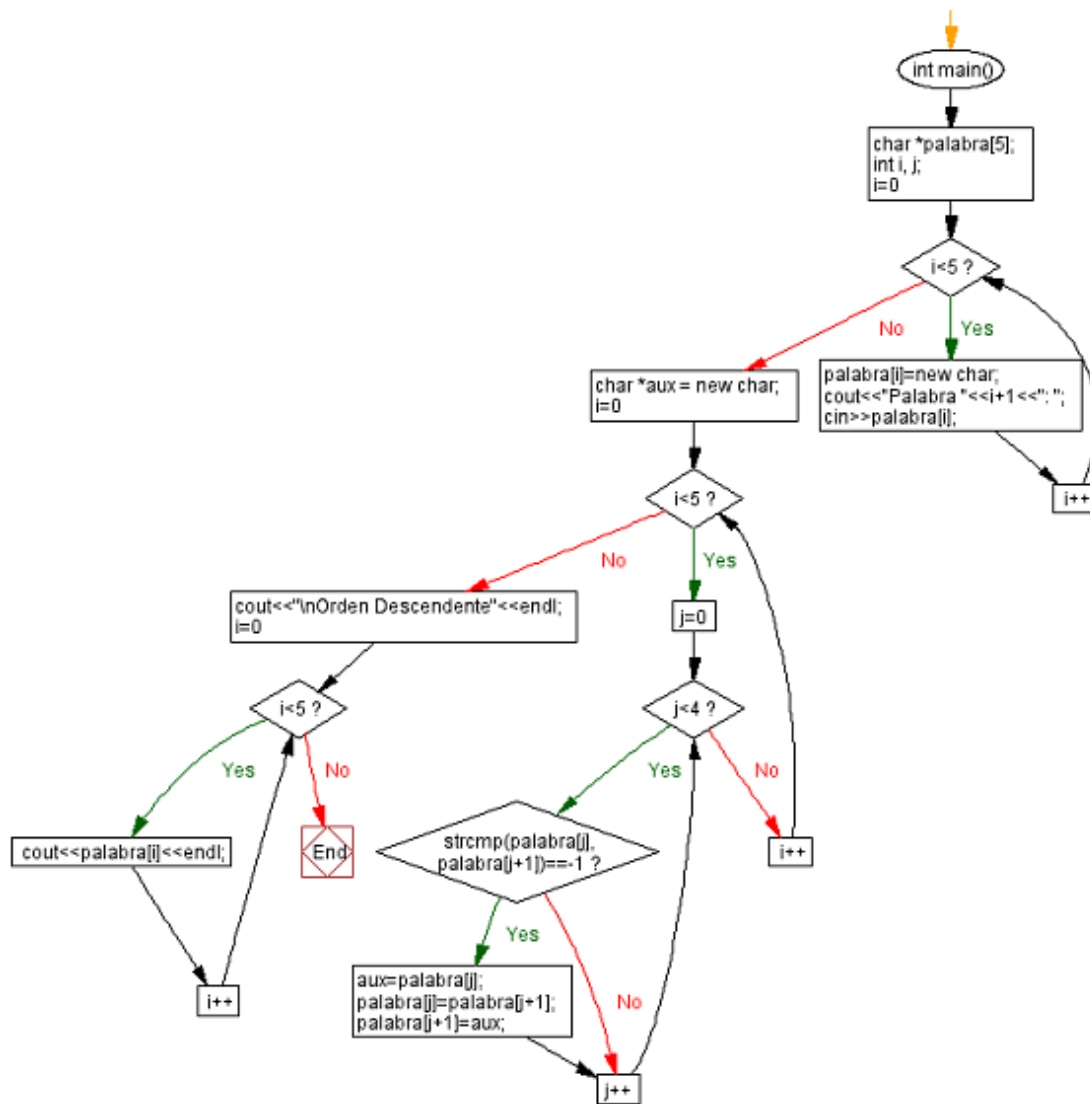
PROGRAMA 20
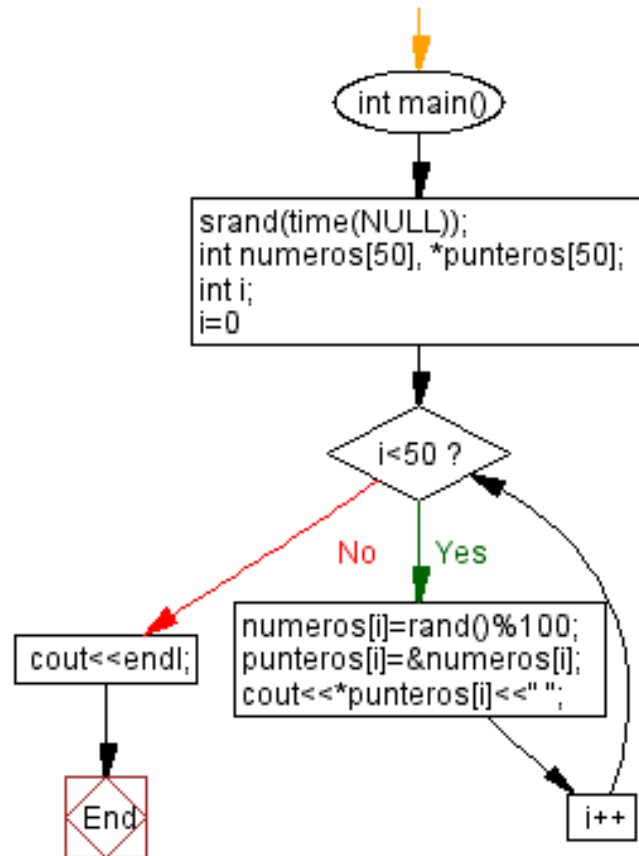
int main()

```
srand(time(NULL));
int numeros[50], *punteros[50];
int i;
i=0
```

i<50 ?

No   Yes

cout<<endl;

```
numeros[i]=rand()%100;
punteros[i]=&numeros[i];
cout<<*punteros[i]<<" ";
```

End

i++

PROGRAMA 21

int main()

char *palabra[5];
int i, j;
i=0

i<5 ?
No
Yes
palabra[i]=new char;
cout<<"Palabra "<<i+1<<": ";
cin>>palabra[i];
i++

char *aux = new char;
i=0

i<5 ?
No
Yes
j=0

cout<<"\nOrden Descendente"<<endl;
i=0

i<5 ?
Yes
No
cout<<palabra[i]<<endl;
End
i++

j<4 ?
Yes
No
i++

strcmp(palabra[j],
palabra[j+1])==-1 ?
Yes
No

aux=palabra[j];
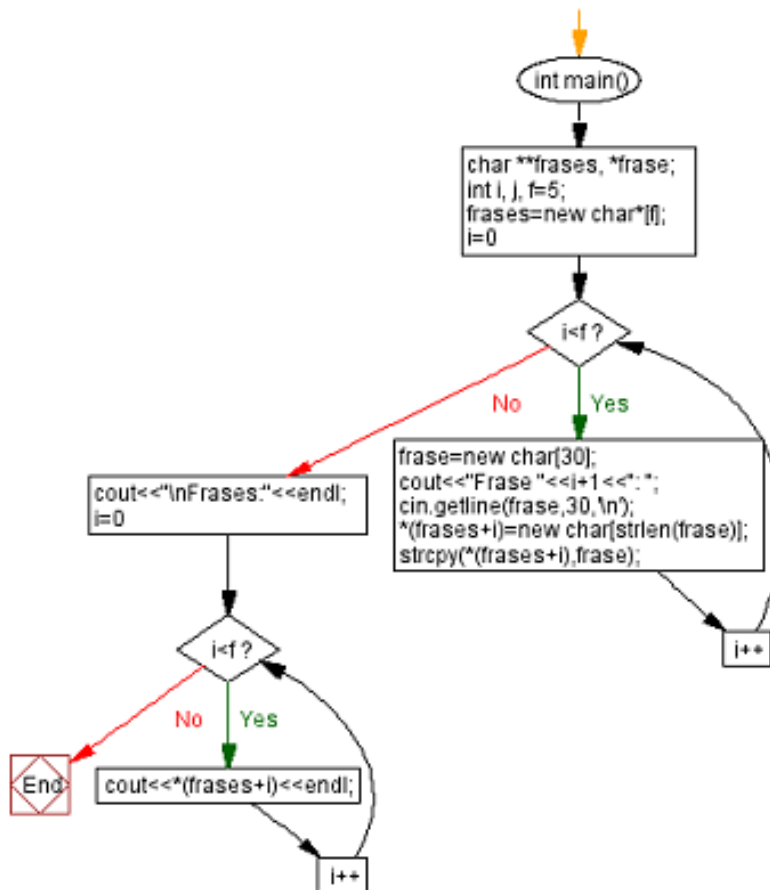palabra[j]=palabra[j+1];
palabra[j+1]=aux;

j++

"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.21\main.exe"

```
Palabra 1: computadora
Palabra 2: libro
Palabra 3: mesa
Palabra 4: television
Palabra 5: lapiz

Orden Descendente
television
mesa
libro
lapiz
computadora

Process returned 0 (0x0)   execution time : 23.563 s
Press any key to continue.
```

PROGRAMA 22

```
int main()

char **frases, *frase;
int i, j, f=5;
frases=new char*[f];
i=0

i<f ?
  No → cout<<"\nFrases:"<<endl;
        i=0
  Yes → frase=new char[30];
        cout<<"Frase "<<i+1<<": ";
        cin.getline(frase,30,'\n');
        *(frases+i)=new char[strlen(frase)];
        strcpy(*(frases+i),frase);
        i++

i<f ?
  No → End
  Yes → cout<<*(frases+i)<<endl;
        i++
```

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.22\main.exe"

Frase 1: leer un libro
Frase 2: aprender ingles
Frase 3: ir a la escuela
Frase 4: estudiar para el examen
Frase 5: ver la tele

Frases:
leer un libro
aprender ingles
ir a la escuela
estudiar para el examen
ver la tele

Process returned 0 (0x0)   execution time : 75.936 s
Press any key to continue.
```
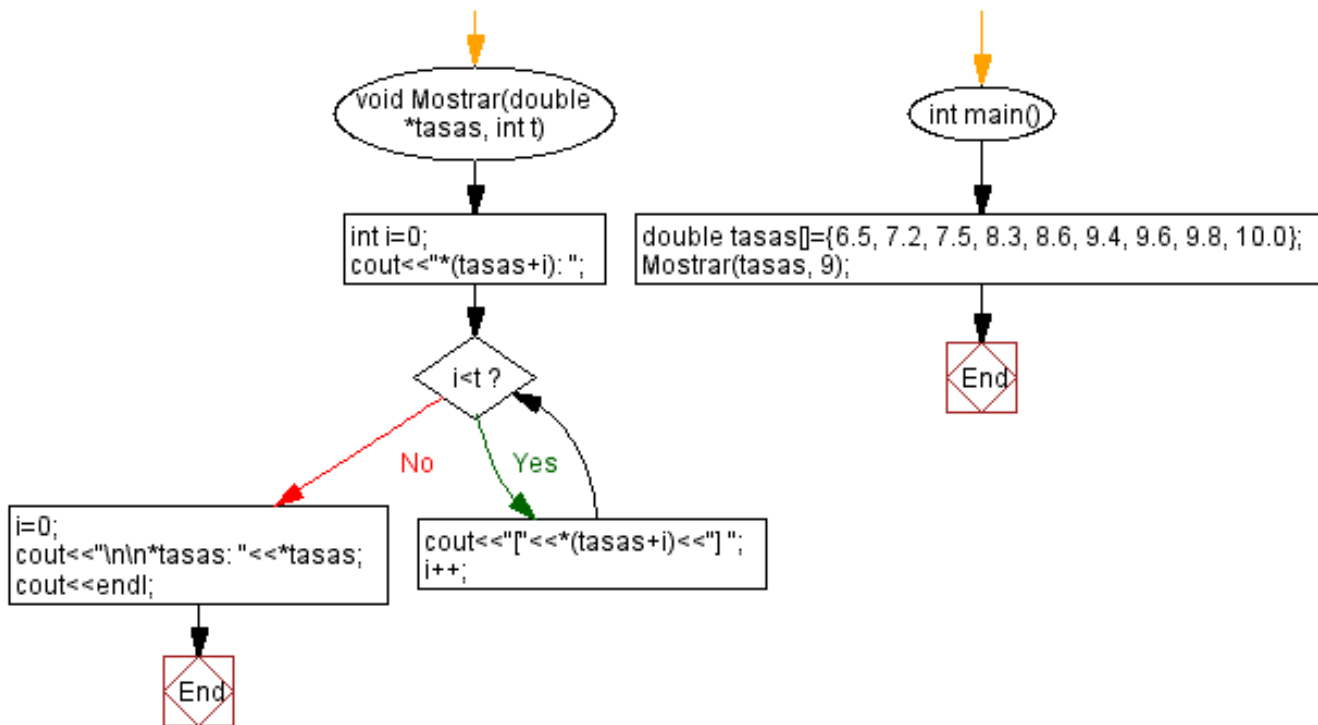
PROGRAMA 23

```
void Mostrar(double
    *tasas, int t)
```

```
int i=0;
cout<<"*(tasas+i): ";
```

```
i<t ?
```

No   Yes

```
i=0;
cout<<"\n\n*tasas: "<<*tasas;
cout<<endl;
```

```
cout<<"["<<*(tasas+i)<<"] ";
i++;
```

End

```
int main()
```

```
double tasas[]={6.5, 7.2, 7.5, 8.3, 8.6, 9.4, 9.6, 9.8, 10.0};
Mostrar(tasas, 9);
```

End

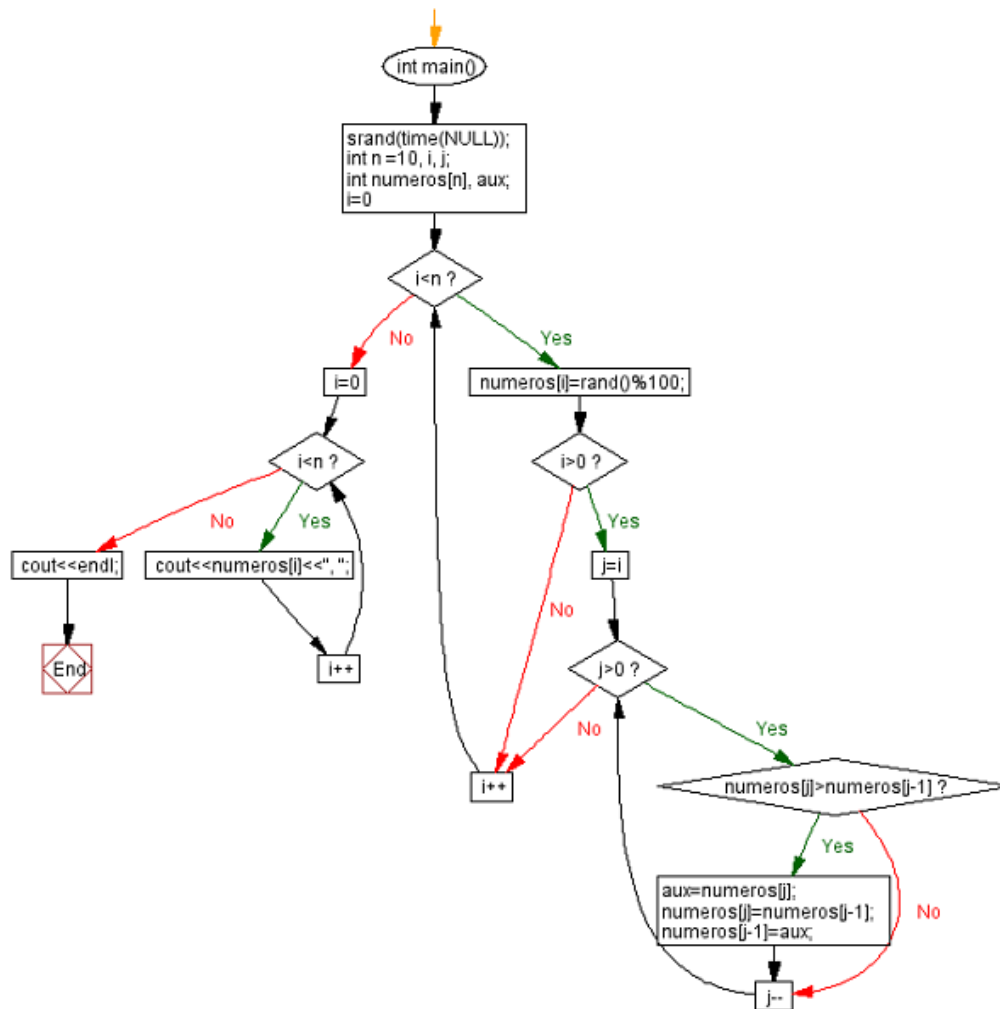
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.23\main.exe"
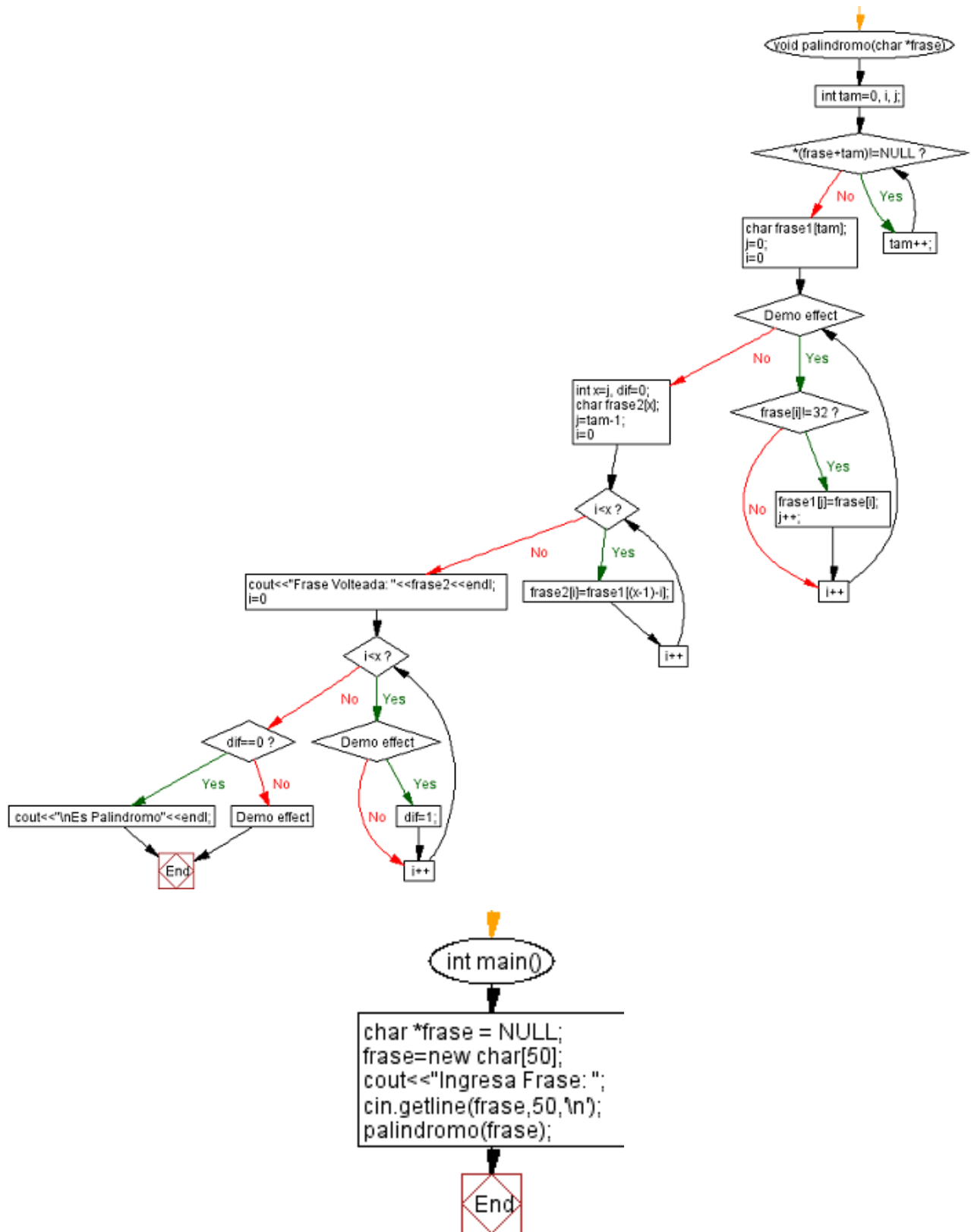
```
*(tasas+i): [6.5] [7.2] [7.5] [8.3] [8.6] [9.4] [9.6] [9.8] [10]

*tasas: 6.5

Process returned 0 (0x0)   execution time : 4.457 s
Press any key to continue.
```

PROGRAMA 24


```
int main()

srand(time(NULL));
int n =10, i, j;
int numeros[n], aux;
i=0

i<n ?
  No → i=0
  Yes → numeros[i]=rand()%100;

i=0
i<n ?
  No → cout<<endl;
  Yes → cout<<numeros[i]<<",";
        i++

cout<<endl;
End

numeros[i]=rand()%100;
i>0 ?
  No → i++
  Yes → j=i
        j>0 ?
          No → i++
          Yes → numeros[j]>numeros[j-1] ?
                  Yes → aux=numeros[j];
                        numeros[j]=numeros[j-1];
                        numeros[j-1]=aux;
                  No → j--
                j--
```

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.24\main.exe"
93, 85, 77, 70, 62, 39, 32, 32, 3, 1,

Process returned 0 (0x0)    execution time : 3.884 s
Press any key to continue.
```

PROGRAMA 25

```
void palindromo(char *frase)
    int tam=0, i, j;

    *(frase+tam)!=NULL ?
        No                          Yes
                                    tam++;

    char frase1[tam];
    j=0;
    i=0

    Demo effect
        No              Yes

    int x=j, dif=0;         frase[i]!=32 ?
    char frase2[x];             No          Yes
    j=tam-1;
    i=0                                 frase1[j]=frase[i];
                                        j++;

    i<x ?
        No          Yes                     i++

    cout<<"Frase Volteada: "<<frase2<<endl;    frase2[i]=frase1[(x-1)-i];
    i=0
                                                    i++
    i<x ?
        No          Yes

    dif==0 ?            Demo effect
                            Yes
        Yes     No      No      dif=1;

    cout<<"\nEs Palindromo"<<endl;  Demo effect     i++

                    End


int main()
    char *frase = NULL;
    frase=new char[50];
    cout<<"Ingresa Frase: ";
    cin.getline(frase,50,'\n');
    palindromo(frase);

                End
```

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.25\main.exe"

Ingresa Frase: ir a la escuela
Frase Volteada: aleucsealari►

No es Palindromo

Process returned 0 (0x0)    execution time : 5.897 s
Press any key to continue.
```

```
"C:\Users\Armando Isaac\Desktop\Estructura de Datos\Unidad 1\Progamarios\Progamario 3\Programa 3.25\main.exe"

Ingresa Frase: anita lava la tina
Frase Volteada: anitalavalatina

Es Palindromo

Process returned 0 (0x0)    execution time : 7.021 s
Press any key to continue.
```