

### 3.3. MUTAXASSISLIK MASALALARINI DASTURLASHDA TARMOQLANUVCHI ALGORITMDAN FOYDALANISH

Ba'zi hollarda mutaxassislik masalalarida hisoblashlar birorta mantiqiy shartni bajarilishiga bog'lik holda u yoki bu tarmoq bo'yicha amalga oshirilishi mumkin. Bunday tuzilishdagi hisoblash jarayonining algoritmi "tarmoqlanuvchi algoritmi" deb ataladi.

Tarmoqlanuvchi algoritmlarni dasturlashda tanlash operatorlari, ya'ni *goto* shartsiz o'tish operatori, *if* shartli o'tish operatori va *switch* tanlash operatorlari ishlatiladi.

#### 3.3.1. Tanlash operatorlari

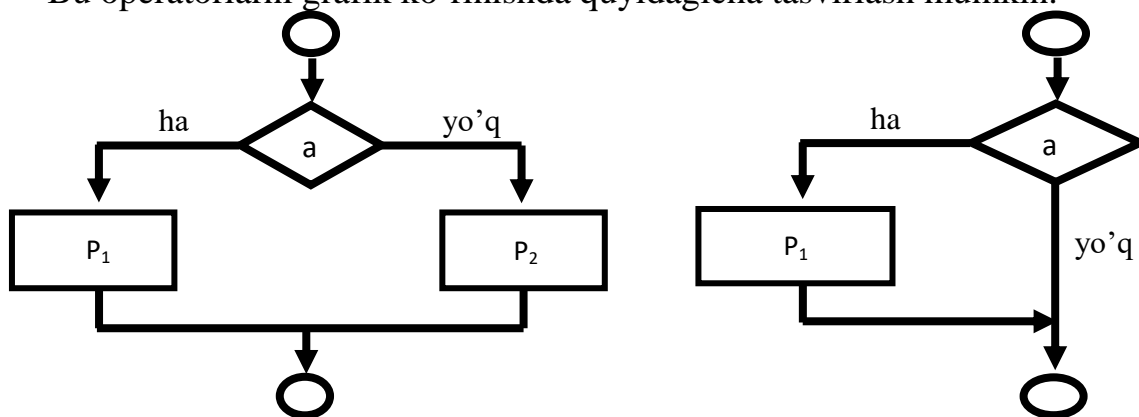
**Shartli operator.** Shartli operator ikki ko'rinishda ishlatilishi mumkin:

if (ifoda) 1- operator else 2- operator

yoki

if (ifoda) 1-operator

Bu operatorlarni grafik ko'rinishda quyidagicha tasvirlash mumkin.



Shartli operator bajarilganda avval ifoda hisoblanadi; agar qiymat rost ya'ni noldan farqli bo'lsa 1- operator bajariladi. Agar qiymat yolg'on ya'ni nol bo'lsa va *else* ishlatilsa 2-operator bajariladi. *Else* qism har doim eng yaqin *if* ga mos qo'yiladi.

if( n>0) if(a>b) z=a; else z=b;

Agar *else* qismni yuqori *if* ga mos quyish lozim bo`lsa, figurali qavslar ishlatish lozim.

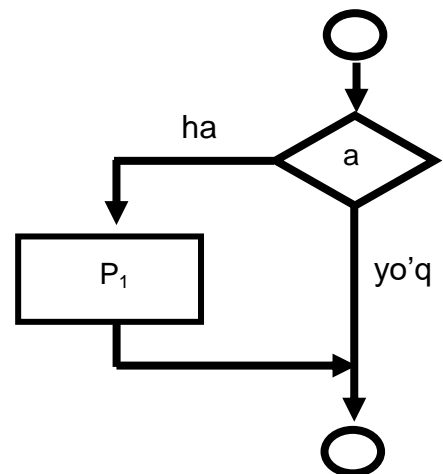
if( n>0) { if(a>b) z=a; } else z=b;

Misol sifatida uchta berilgan sonning eng kattasini aniqlash dasturini ko`ramiz:

```
#include <iostream.h>
void( )
{
float a,b,c,max;
Cout <<"\n a="; Cin>>a;
Cout <<"\n b="; Cin>>b;
Cout <<"\n c="; Cin>>c;
if (a>b)
if (a>c) max=a else max=c;
else
if b>c then max=b else max=c;
Cout <<"\n" <<max;
}
```

Keyingi misolda kiritilgan ball va maksimal ball asosida baho aniqlanadi:

```
#include <iostream.h>
void main( )
{
float ball,max_ball,baho;
Cout<<"\n ball="; Cin>>("%f",&ball);
Cout<<"\n max_ball="; Cin>>max_ball;
d=ball/max_ball;
if (d>0.85) baho=5 else
if (d>0.75) baho=4 else
if (d>0.55) then baho=3 else baho=2;
Cout<<"\n baho;
}
```



Kalit bo`yicha tanlash operatori. Kalit bo`yicha o`tish *switch* operatori umumiy ko`rinishi qo`yidagicha

Switch(<ifoda>)

```

{
Case <l-qiymat>:<l-operator>
...
break;
...
default: <operator>
...
case: <n-operator>;
}

```

Oldin qavs ichidagi butun ifoda hisoblanadi va uning qiymati hamma variantlar bilan solishtiriladi. Biror variantga qiymat mos kelsa shu variantda ko`rsatilgan operator bajariladi. Agar biror variant mos kelmasa *default* orqali ko`rsatilgan operator bajariladi. *Break* operatori ishlatilmasa shartga mos kelgan variantdan tashqari keyingi variantdagi operatorlar ham avtomatik bajariladi. *Default*; *break* va belgilangan variantlar ixtiyoriy tartibda kelishi mumkin. *Default* yoki *break* operatorlarini ishlatish shart emas. Belgilangan operatorlar bo`sh bo`lishi ham mumkin. Misol tariqasida bahoni son miqdoriga qarab aniqlash dasturini ko`ramiz.

```

Include <iostream.h>
Int baho;
Cin>> baho;
Switch(baho)
{
case 2:Cout <<“\n yomon”;break;
case 3:Cout <<“\n o`rta”;break;
case 4:Cout <<“\n yaxshi”;break;
case 5:Cout <<“\n a`lo”;break;
default: Cout <<“\n baho noto`g`ri kiritilgan”;
};
}

```

Keyingi misolimizda kiritilgan simvol unli harf ekanligi aniqlanadi:

```

Include <iostream.h>
Int baho; Char c; Cin >> c;
Switch(c)
{
case 'a':
case 'u':

```

```

case 'o':
case 'i':
Cout << "\n Kiritilgan simvol unli harf";break;
default: Cout << "\n Kiritilgan simvol unli harf emas";
};
}

```

### Tanlash operatoriga misol

**1-misol:** Kiritilgan raqam ko`rinishidagi bahoni so`z ko`rinishida ifidalash dasturi.

```

#include <iostream>
using namespace std;
int main()
{
    int baho;
    cin >> baho;
    switch(baho)
    {
        case 2:cout << "\n yomon";break;
        case 3:cout << "\n o`rta";break;
        case 4:cout << "\n yahshi";break;
        case 5:cout << "\n a'lo";break;
        default: cout << "\n baho noto`g`ri kiritilgan";
    }
}

```

**2-Misol.** Berilgan N ( $1 \leq N \leq 7$ ) butun songa mos hafta kunini chiqaring.

**Yechim.** Bu masalani yechish uchun tanlash operatoridan foydalanish kerak bo'ladi:

<pre> #include &lt;iostream&gt; using namespace std; int main () {     int n;     cout &lt;&lt; "N="; cin &gt;&gt; n;     Switch (n){ Case 1: cout&lt;&lt; "Dushanba"; break; Case 2: cout&lt;&lt; "Seshanba"; break; Case 3: cout&lt;&lt; "Chorshanba"; break; Case 4: cout&lt;&lt; "Payshanba"; break; Case 5: cout&lt;&lt; "Juma"; break; Case 6: cout&lt;&lt; "Shanba"; break; Case 7: cout&lt;&lt; "Yakshanba"; break;     Default: cout &lt;&lt; "Adashdingiz!" ; } Return 0; </pre>	<pre> #include &lt;iostream&gt; Using namespace std; Int main () {     Int n;     Cout &lt;&lt; "N="; cin &gt;&gt; n;     Switch (n){ Case 1: cout&lt;&lt; "Dushanba"; break; Case 2: cout&lt;&lt; "Seshanba"; break; Case 3: cout&lt;&lt; "Chorshanba"; break; Case 4: cout&lt;&lt; "Payshanba"; break; Case 5: cout&lt;&lt; "Juma"; break; Case 6: cout&lt;&lt; "Shanba"; break; Case 7: cout&lt;&lt; "Yakshanba"; break;     Default: cout &lt;&lt; "Adashdingiz!" &lt;&lt;endl ; } Cout &lt;&lt;"Xato bo'ldi!" &lt;&lt;endl; </pre>
--	---

}  har bir <b>case</b> ga mos ko'rsatmalar ketma-ketligi oxirida yozilgan <b>break</b> operatori shu ko'rsatmalar ketma-ketligi bajarilgandan song tanlash operatoridan chiqishni ta'minlaydi.	<b>Return 0;</b> } Agar Break operatori yozilmasa, quyidagi xatolar bo'ladi: N=5 Juma Shanba Yakshanba Adashdingiz! Xato bo'ldi!
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**3-misol.** Berilgan koordinatalar tekisligi choragi nomeri bo'yicha unda yotuvchi nuqta koordinatalari qiymatlari ishorasini aniqlash dasturini tuzing.

*Dastur kodi:*

```
#include <iostream>
using namespace std;
int main()
{ float chorak;
  cout<< "chorak="; cin>>chorak;
  switch(chorak)
  {
    case 1: cout<<"\n koordinatalar qiymatlari: x>0,y>0");break;
    case 2: cout<<"\n koordinatalar qiymatlari: x<0,y>0');break;
    case 3: cout<<"\n koordinatalar qiymatlari: x<0,y<0');break;
    case 4: cout<<"\n koordinatalar qiymatlari: x>0,y<0'); break;
    default: cout <<"\n chorak noto'g'ri kiritilgan";
  }
}
```

**Masala.** Elektr zanjiridagi tok manbai klemmlaridagi kuchlanish  $U=100\text{v}$  bo'lib, qarshiliklari  $R_1=5\text{A}$  va  $R_2=4\text{A}$  bo'lgan iste'molchilar ketma-ket va parallel ulangan holda tok kuchlari qanday bo'lishini aniqlash dasturini tuzing.

$$I=U/R, R=R_1 \cdot R_2 / (R_1 + R_2), R=R_1 + R_2$$

Bu masalani yechish uchun tarmoqlanuvchi algoritim yordamida dasturini tuzing.

**Masala dasturi:**

```
#include <iostream>
#include <string>
using namespace std;
int main()
```

```

{
float R1, R2, R, I, U;
string s;
cout<<"Tok manbai klemmalaridagi kuchlanishni kiriting:"<<endl; cin>>U;
cout<<"Birinchi istemolchi qarshiligini kiriting:"<<endl; cin>>R1;
cout<<"Ikkinchi istemolchi qarshiligini kiriting:"<<endl; cin>>R2;
cout<<"Istemolchilar ulanish turini kiriting:"<<endl; cin>>s;
if(s=="parallel") R=R1*R2/(R1+R2);
if(s=="ketmaket") R=R1+R2;
I=U/R;
cout<<"Istemolchilar " <<s<<" ulanganda " <<"tok kuchi=" <<I<<endl;
return 0;} (Javob: Istemolchilar Parallel ulanganda tok kuchi= I)

```

**4-Misol.** Quyidagi misolni yechish dasturini qaraymiz:

x va q - berilgan son.

$$Y = \begin{cases} \frac{\sin^3 ax^2}{\sqrt{x^2 + 1}} & \text{agar } x < q, \\ \frac{\cos(ax) + e^{-ax^3}}{\sqrt[3]{x^2} \arctg x} & \text{agar } x \geq q, \end{cases}$$

Dastur kodi:

```

#include <iostream>
#include <math.h>
using namespace std;
int main()
{
float a,q,x,y;
a=5.41; b=3;
cout<<"x ning qiymatini kiriting"; cin>>x;
if (x<q) y=pow(sin(a*x*x),3)/sqrt(x*x+1);
else y=(cos(a*x)+exp(-a*pow(x,3)))/(pow(x,2./3) +atan(x));
cout<<"y="<<y; return 0;
}

```

**5-Misol:** 
$$Z = \begin{cases} \frac{a^2+b^2}{c} + \sqrt{a^2+x}, & x \geq 0 \\ \frac{\sin x + b}{a-b}, & x < 0 \end{cases}$$
 funksiya qiymatini

hisoblashga C++ tilida dastur tuzing.

**Dastur matni:**

```
#include <iostream>
#include<iomanip>
#include <math.h>
using namespace std;
int main()
{
    float a,b,x,c,z;
    cin>>a>>b>>c;
    x=(a*a-c*c)/(c*c-b);
    if(x>=0)
        z=(a*a+b*b)/c+sqrt(a*a+x);
    else
        z=(sin(x)+b)/(a-b);
    cout << fixed<<setprecision(3)<<z;
    return 0;
}
```

**Ichma-ich joylashtirilgan operatorlardan foydalanish, ya'ni shartlar ikkitadan ko'p bo'lsa:**

<p>Berilgan <b>x</b> va <b>y</b> sonlaridan quydagi <b>z</b> funksiya qiymatini hisoblang.</p> $z = \begin{cases} \sqrt{y-x}, & \text{agar } x < y \\ x+y, & \text{agar } x = y \\ \sqrt{x-y}, & \text{aks holda} \end{cases}$ <p>Ko'rinib turibdiki, aks holda xolatiga mos keluvchi shart <b>x&gt;y</b> ko'rinishida yoziladi.</p>	<p>Dastur kodi:</p> <pre>#include &lt;iostream&gt; #include &lt;cmath.h&gt; Using namespace std; Int main (){ Float x, y, z; Cout &lt;&lt; "x= " ; cin &gt;&gt; x; Cout &lt;&lt; "y= " cin &gt;&gt; y; Z = (x&lt;y) ? pow(y - x,0.5): (x==y) ? x + y : pow(x - y,0.5); Cout &lt;&lt; "z= " &lt;&lt; z; Return 0 ; }</pre>
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## **Tayanch so'z va iboralar**

Tarmoqlanuvchi algoritmlar, tanlash operatori, shartli o'tish operatori, shartsiz o'tish operatori, sikl, *Switch* operatori, *if* operatori, romb.

## **Mavzuga oid savol va topshiriqlar**

1. Tarmoqlanuvchi algoritmlar deb nimaga aytiladi?
2. Mantiqiy "teng emas" qanday belgi bilan ifodalanadi? (!= )
3. C++ tilida "<" belgi nimani anglatadi ?
4. Blok – sxemadagi romb belgisi nimani anglatadi?
5. *Switch* operatori qachon ishlatiladi?
6. *if* operatori qachon ishlatiladi?
7. Shartsiz o'tish operatori qanday ifodalanadi?
8. Tarmoqlanuvchi algoritmlar chiziqli algoritmdan nima bilan farqlanadi?