

Рюкзак 0-1 & rosetta code & qbasic qb64 и МЫ

Классическая задача про рюкзак решается многими способами:
оглавление: http://rosetta code.org/wiki/Knapsack_problem

Long read: rosetta code.org/wiki/Knapsack_problem/0-1

Новейшая моя программа синтезирует все шифры 0 и 1
добавляя лишний регистр и 0 остаются слева в шифре

Количество сравнений уменьшается с $N!$ до 2^N
например $N=5$ $N!=120$ >> $2^N=32$

Автоматически присваиваются случайные значения
количества и качества и получается интеграл стоимости
и вообще: интеграл количества и качества
причём возможно и делить только никто не поймёт

Программа пишет в каталог qb64

```

Open "knapsack.txt" For Output As #1
N=7: L=5: a = 2^(N+1): Randomize Timer 'knapsack.bas DANILIN
Dim L(N), C(N), j(N), q(a), q$(a), d(a)

For m=a-1 To (a-1)/2 Step -1: g=m: Do ' sintez shifr
    q$(m)=LTrim$(Str$(g Mod 2))+q$(m)
    g=g\2: Loop Until g=0
    q$(m)=Mid$(q$(m), 2, Len(q$(m)))
Next

For i=1 To N: L(i)=Int(Rnd*3+1) ' lenght & cost
C(i)=10+Int(Rnd*9): Print #1, i, L(i), C(i): Next ' origin

For h=a-1 To (a-1)/2 Step -1
    For k=1 To N: j(k)=Val(Mid$(q$(h), k, 1)) ' from shifr
        q(h)=q(h)+L(k)*j(k)*C(k) ' 0 or 1
        d(h)=d(h)+L(k)*j(k)
    Next
    If d(h) <= L Then Print #1, d(h), q(h), q$(h)
Next

max=0: m=1: For i=1 To a
    If d(i)<=L Then If q(i) > max Then max=q(i): m=i
Next
Print #1,: Print #1, d(m), q(m), q$(m): End

```

Результат сокращён вручную

#	Mass	Cost	Chifer	Mass	Cost
1	2	17	5	73	1101000
2	2	14	2	28	0100000
3	2	17	5	81	0011100 !!!
4	1	11	3	45	0011000
5	2	18	5	76	0010010
6	3	14	2	36	0000100
7	3	10			

Mass	MAX	Chifer
5	81	0011100

Results is reduced manually

Knapsack 0-1 c# Рюкзак

csharpforums.net/threads/knapsack-0-1-c-binary-rosettacode-we.8108

bytes.com/topic/c-sharp/insights/977375-knapsack-0-1-c-binary-rosettacode-we

bytes.com/topic/python/insights/978063-knapsack-0-1-python-binary-rosettacode-we

bytes.com/topic/c/insights/978293-knapsack-0-1-c-binary-we

bytes.com/topic/javascript/insights/978412-knapsack-0-1-javascript-binary-rosettacode-we

Knapsack 0-1 Python Рюкзак

python-forum.io/thread-37333.html

trinket.io/embed/python/dc6398732d

Knapsack Python & qb64

rextester.com/KMDD4803

Knapsack Basic Рюкзак

jdoodle.com/iembed/v0/suj

Knapsack C++ Рюкзак

rextester.com/VCBSQ91995

Knapsack 0-1 & rosettacode & qbasic qb64 & WE

For all people: send yours algorithms to rosettacode
otherwise forum may disappear even in google search

Classic Knapsack problem is solved in many ways

Contents: http://rosettacode.org/wiki/Knapsack_problem

Long read: rosettacode.org/wiki/Knapsack_problem/0-1

Previous topics and long programs: Knapsack

<https://qb64forum.alephc.xyz/index.php?topic=3091>

My newest program synthesizes all ciphers from 0 & 1
adding an extra register and 0 remain on left in cipher

Number of comparisons decreases from $N!$ to 2^N
for example $N=5$ $N!=120$ >> $2^N=32$

Random values origin are automatically assigned
quantity and quality and integral of value is obtained
and in general: integral of quantity and quality
and it is possible to divide only anyone will not understand

Program write results to qb64 director

<https://rextester.com/BCKP19591>

```
n=5; N=n+1; G=5; a=2**N          # N=7: L=5: a = 2^(N+1): 'knapsack.bas DANILIN
L=[];C=[];e=[];j=[];q=[];s=[]    # Dim L(N), C(N), j(N), q(a), q$(a), d(a)
d=[];L=[1]*n;C=[1]*n;e=[1]*a    # KNAPSACK 0-1 DANILIN
j=[1]*n;q=[0]*a;s=[0]*a;d=[0]*a

from random import randint      # Randomize Timer
for i in range(0,n):           # For i=1 To N
    L[i]=randint(1,3)          # L(i)=Int(Rnd*3+1)
    C[i]=10+randint(1,9)       # C(i)=10+Int(Rnd*9)
    print(i+1,L[i],C[i])      # Print i, L(i), C(i): Next
print()

for h in range(a-1,(a-1)//2,-1): # For m=a-1 To (a-1)/2 Step -1: g=m: Do
    b=str(bin(h))              # q$(m)=LTrim$(Str$(g Mod 2))+q$(m): g=g\2: Loop Until g=0
    e[h]=b[3:len(b)]          # q$(m)=Mid$(q$(m), 2, Len(q$(m))): Next

    for k in range (n):        # For k=1 To N:
        j[k]=int(e[h][k])      # j(k)=Val(Mid$(q$(h), k, 1)) ' from chifer
        q[h]=q[h]+L[k]*j[k]*C[k] # q(h)=q(h)+L(k)*j(k)*C(k) ' 0 or 1
        d[h]=d[h]+L[k]*j[k]    # d(h)=d(h)+L(k)*j(k): Next

    if d[h]<= G:                # If d(h) <= L Then
        print(e[h], G, d[h],q[h]) # Print #1, d(h), q(h), q$(h): Next
print()

max=0; m=1                     # max=0: m=1:
for i in range(a):             # For i=1 To a
    if d[i]<=G and q[i]>max:     # If d(i)<=L Then If q(i) > max
        max=q[i]; m=i         # Then max=q(i): m=i: Next
print (d[m], q[m], e[m])      # Print #1,: Print #1, d(m), q(m), q$(m): End
```

Mass Cost

```
1 2 12
2 3 17
3 1 14
4 3 17
5 1 13
```

Chifer Mass Cost

```
11000 5 5 75
10101 5 4 51
01001 5 4 64
00111 5 5 78 !!!
00110 5 4 65
00101 5 2 27
00000 5 0 0
```

Mass MAX Chifer

```
5 78 00111
```

<https://rextester.com/BCKP19591>

```
n=5; N=n+1; G=5; a=2**N # KNAPSACK 0-1 DANILIN
L=[];C=[];e=[];j=[];q=[];s=[] #
rextester.com/BCKP19591
d=[];L=[1]*n;C=[1]*n;e=[1]*a
j=[1]*n;q=[0]*a;s=[0]*a;d=[0]*a

from random import randint
for i in range(0,n):
    L[i]=randint(1,3)
    C[i]=10+randint(1,9)
    print(i+1,L[i],C[i])
print()

for h in range(a-1,(a-1)//2,-1):
    b=str(bin(h))
    e[h]=b[3:len(b)]

    for k in range (n):
        j[k]=int(e[h][k])
        q[h]=q[h]+L[k]*j[k]*C[k]
        d[h]=d[h]+L[k]*j[k]

    if d[h]<= G:
        print(e[h], G, d[h], q[h])
print()

max=0; m=1
for i in range(a):
    if d[i]<=G and q[i]>max:
        max=q[i]; m=i
print (d[m], q[m], e[m])
```

C# KNAPSACK 0-1 рѹкѹах

<https://retester.com/OIALC94208>

```
using System;using System.Text;
namespace Knapsack { class Program
{ static void Main();// KNAPSACK 0-1 DANILIN

{ int n=5; int G=5; int u=n+1;
int a=Convert.ToInt32(Math.Pow(2,u));
int[] L = new int[n]; int[] C = new int[n];
int[] j = new int[n]; int[] q = new int[a];
int[] S = new int[a]; int[] d = new int[a];
int dec; int i; string[] e = new string[a];
int h; int k; int max; int m;
Random rand = new Random();

for (i=0; i<n; i++) // retester.com/OIALC94208
{L[i]=1+rand.Next(3); C[i]=10+rand.Next(9);
Console.Write(i+1); Console.Write(" ");
Console.Write(L[i]); Console.Write(" ");
Console.Write(C[i]);Console.WriteLine();
} Console.WriteLine();
```

```
for (h = a-1; h>(a-1)/2; h--)
{ dec=h; while (dec > 0)
{ e[h] = dec % 2 + e[h]; dec/=2; }
if (e[h] == "") {e[h] = "0";}
e[h]=e[h].Substring(1,e[h].Length-1);

for (k=0; k<n; k++)
{j[k]=Convert.ToInt32(e[h].Substring(k,1));

q[h]=q[h]+L[k]*j[k]*C[k];
d[h]=d[h]+L[k]*j[k];}

if (d[h]<= G)
{ Console.Write(G); Console.Write(" ");
Console.Write(d[h]); Console.Write(" ");
Console.Write(q[h]); Console.Write(" ");
Console.WriteLine(e[h]);}
} Console.WriteLine();

max=0; m=1;
for (i=0; i<a; i++)
{ if (d[i]<=G && q[i]>max)
{ max=q[i]; m=i;}}

Console.Write(d[m]); Console.Write(" ");
Console.Write(q[m]); Console.Write(" ");
Console.WriteLine (e[m]);}
}}
```

```

using System;          // Knapsack C# binary DANILIN
using System.Text;    // https://rextester.com/YRFA61366
namespace Knapsack
{
    class Knapsack
    {
        static void Main()
        {
            int n = 7;
            int Inside = 5;
            int all=Convert.ToInt32(Math.Pow(2,(n+1)));
            int[] mass = new int[n];
            int[] cost = new int[n];
            int[] jack = new int[n];
            int[] quality = new int[all];
            int[] amount = new int[all];
            int i;          // circle
            int k;          // circle
            int dec;
            string[] bin = new string[all];
            int list;
            int max;
            int max_num;
            Random rand = new Random();

            for (i=0; i<n; i++)
            {
                mass[i]=1+rand.Next(3);
                cost[i]=10+rand.Next(9);
                Console.WriteLine("{0} {1} {2}", i+1, mass[i], cost[i]);
            }
            Console.WriteLine();
        }
    }
}

```

```

for (list = all-1; list>(all-1)/2; list--)
{
    dec=list;
    while (dec > 0)
    {
        bin[list] = dec % 2 + bin[list]; // from 10 to 2
        dec/=2;
    }
    if (bin[list] == "")
    {
        bin[list] = "0";
    }
    bin[list]=bin[list].Substring(1,bin[list].Length-1);
    for (k=0; k<n; k++) // inside 01
    {
        jack[k]=Convert.ToInt32(bin[list].Substring(k,1));
        quality[list]=quality[list]+mass[k]*jack[k]*cost[k];
        // integral of costs
        amount[list]=amount[list]+mass[k]*jack[k]; //
    }
    // integral of mass
    if (amount[list]<= Inside) // current mass <
        Knapsack
        {
            Console.WriteLine("{0} {1} {2} {3}", Inside,
                amount[list], quality[list], bin[list]);
        }
    Console.WriteLine();

    max=0;
    max_num=1;
    for (i=0; i < all; i++)
    {
        if (amount[i]<=Inside && quality[i]>max)
        {
            max = quality[i]; max_num = i ;
        }
    }
    Console.WriteLine("{0} {1} {2}",amount[max_num],quality[max_num],bin[max_num]);
}
}
}

```


KNAPSACK JavaScript JS

```
<!DOCTYPE html> <html lang="en"> <head> <meta
charset="UTF-8">
<meta name="viewport" content="width=device-
width, initial-scale=1.0">
<meta http-equiv="X-UA-Compatible"
content="ie=edge">
<title>KNAPSACK JavaScript</title> </head>
<body> <noscript>Vkluch JS</noscript>
jdoodle.com/h/2Uc
```

rextester.com/BQYV50962

```
<script>
var n=12; G=2; a = Math.pow(2,n+1); //
KNAPSACKj.js
var dec, i, h, k, max, m, s;
var L=[n], C=[n], j=[n], q=[a], d=[a]; e=[a];
document.write("<br><br># Kol Cena<br>")
document.write("# Amo Price<br><br>")
for (i=0; i<n; i++)
{ L[i]=1+Math.floor(Math.random()*3)
  C[i]=10+Math.floor(Math.random()*9); j[i]=0;
  document.write( (i+1) +" "+ L[i] +" "+ C[i]
+"<br>")
}
```

```
for (i=0; i<a; i++) { q[i]=0; d[i]=0;}
document.write("<br>")
document.write("Mx Kol St-st Schifr<br>")
document.write("Mx Amo Price Cipher<br>")
for (h = a-1; h>(a-1)/2; h--)
{ dec=h; e[h]=" "
while (dec > 0)
{ s = Math.floor(dec % 2);
  e[h] = s + e[h]; dec = Math.floor(dec/2);
}
if (e[h] == " ") {e[h] = "0";}
e[h]= e[h].substr(1, e[h].length-1);
for (k=0; k<n; k++)
{ j[k] = Number(e[h].substr(k,1));
  q[h]=q[h]+L[k]*j[k]*C[k];
  d[h]=d[h]+L[k]*j[k];
}
if (d[h] <= G)
document.write("<br>"+ G +" "+ d[h] +" "+ q[h]
+" "+ e[h])
} document.write("<br>")
max=0; m=1;
for (i=0; i<a; i++)
{ if (d[i]<=G && q[i]>max){ max=q[i]; m=i;}
}
document.write("<br>"+ d[m] +" "+ q[m] +" "+
e[m] +"<br><br>")
document.write("Mx St-st Schifr<br>")
document.write("Mx Price Cipher<br><br>")
</script>
```

```
</body> </html>
```

C++ Knapsack Рюкзак 0-1 DANILIN

```
#include <iostream> // KNAPSACK 0-1 DANILIN
using namespace std; int main()
{ setlocale (LC_ALL, "RUS");
  srand(time(NULL)); // rextester.com/VCBSQ91995

  { int n=7; int G=5; int a=2;
    int dec, i, h, k, max, m;
    for (i=0; i<n; i++) a=2*a; string e[a]; // 2^n
    int L[n], C[n], j[n], q[a], d[a];
    cout << "# Кол Цена" << endl;
    cout << "# Amo Price" << endl << endl;
    for (i=0; i<n; i++)
    { L[i]=1+(rand() % 3); C[i]=10+(rand() % 9);
      j[i]=0;
      cout << i+1 << " " << L[i] << " " << C[i]
      << endl;
    }
    for (i=0; i<a; i++) { q[i]=0; d[i]=0;}
    cout << endl;
    cout << "Mx Кол Ст-ть Шифр" << endl;
    cout << "Mx Amo Price Cipher" << endl << endl;
    for (h = a-1; h>(a-1)/2; h--)
      { dec=h; while (dec > 0)
        { string s(""); s += '0'+dec%2;
          e[h] = s + e[h]; dec/=2;
        }
      }
    if (e[h] == "") {e[h] = "0";}
    e[h]= e[h].substr(1, e[h].size()-1);
```

```
for (k=0; k<n; k++)
{ j[k] =
  atoi((char*)(e[h].substr(k,1)).c_str());
  q[h]=q[h]+L[k]*j[k]*C[k];
  d[h]=d[h]+L[k]*j[k];
}
if (d[h] <= G)
cout << G << " " << d[h] << " " << q[h] << "
" << e[h] << endl;
} cout << endl;
max=0; m=1;
for (i=0; i<a; i++)
{ if (d[i]<=G && q[i]>max){ max=q[i]; m=i;}
}
cout << "Mx Ст-ть Шифр" << endl;
cout << "Mx Price Cipher" << endl << endl;
cout << d[m] << " " << q[m] << " " << e[m] <<
endl << endl;}
system("pause");
}
```