LAMPIRAN 1

Kode ASCII

Kode	Karakter	Kode	Karakter	Kode	Karakter
01	blank	33	@	65	`
02	!	34	A	66	a
03	"	35	B	67	b
04	#	36	C	68	c
05	$	37	D	69	d
06	%	38	E	70	e
07	&	39	F	71	f
08	'	40	G	72	g
09	(	41	H	73	h
10	)	42	I	74	i
11	*	43	J	75	j
12	+	44	K	76	k
13	,	45	L	77	l
14	-	46	M	78	m
15	.	47	N	79	n
16	/	48	O	80	o
17	0	49	P	81	p
18	1	50	Q	82	q
19	2	51	R	83	r
20	3	52	S	84	s
21	4	53	T	85	t
22	5	54	U	86	u
23	6	55	V	87	v
24	7	56	W	88	w
25	8	57	X	89	x
26	9	58	Y	90	y
27	:	59	Z	91	z
28	;	60	[	92	{
29	<	61	\	93	|
30	=	62	]	94	}
31	>	63	^		
32	?	64	_		

LAMPIRAN 2

LISTING PROGRAM

```
Program Huffman;
Uses crt;
const Gr ='-------------------------';
    maxbits = 50;
    maxbitpos = 51;
    maxsymbs = 50;
    maxnodes = 99;

type Node = ^Simpul;
   Simpul = record
            Info      : char;
            Frekuensi : integer;
            Kiri,Kanan,
            Next : Node;
          end;

   Teks = array[char] of integer;
   stype = (lson,rson);
   nodeptr = 0..maxnodes;
   bit = '0'..'1';
   codetype = record
              bits: array[1..maxbits] of bit;
              startpos: 1..maxbitpos
            end;

   nodetype = record
              freq: integer;
              father: nodeptr;
              sontype: stype
            end;

   arraychar  = array [1..maxsymbs] of char;
   arraycode  = array [1..maxsymbs] of codetype;
   arraynodes = array [1..maxnodes] of nodetype;
   larik      = string;

var pil : char;
   Kepala : node;
   jmlkar        : word;
   kode          : arraycode;
   alphabet      : arraychar;
```

```
 titik        : arraynodes;
 nf           : larik;

Procedure Kotak1;
var p:word;

begin
   TextBackGround(red);
   TextColor(cyan);
   gotoxy(7,1);write('┌');
   p:=1;
   repeat
     gotoxy(8+p,1);write('–');
     p:=p+1;
   until p=63;
   gotoxy(71,1);write('┐');
   p:=1;
   repeat
     gotoxy(7,1+p);write('│');
     gotoxy(71,1+p);write('│');
     gotoxy(9,1+p);write(":62);
     p:=p+1;
   until p=24;
   gotoxy(7,25);write('└');
   p:=1;
   repeat
     gotoxy(8+p,25);write('–');
     p:=p+1;
   until p=63;
   gotoxy(71,25);write('┘');
end;

Procedure Kotak2;
var p:word;
begin
   TextBackGround(blue);
   TextColor(yellow);
   gotoxy(10,2);write('┌');
   p:=1;
   repeat
     gotoxy(10+p,2);write('–');
     p:=p+1;
   until p=59;
   gotoxy(69,2);write('┐');
   p:=1;
   repeat
```

```
    gotoxy(10,2+p);write(' | ');
    gotoxy(69,2+p);write(' | ');
    gotoxy(11,2+p);write(":58);
    p:=p+1;
  until p=7;
  gotoxy(10,8);write(' └ ');
  p:=1;
  repeat
    gotoxy(10+p,8);write(' — ');
    p:=p+1;
  until p=59;
  gotoxy(69,8);write(' ┘ ');
end;

Procedure Kotak3;
var p:word;
begin
  TextBackGround(blue);
  TextColor(yellow);
  gotoxy(10,10);write(' ┌ ');
  p:=1;
  repeat
    gotoxy(10+p,10);write(' — ');
    p:=p+1;
  until p=59;
  gotoxy(69,10);write(' ┐ ');
  p:=1;
  repeat
    gotoxy(10,10+p);write(' | ');
    gotoxy(69,10+p);write(' |');
    gotoxy(11,10+p);write(":58);
    p:=p+1;
  until p=15;
  gotoxy(10,24);write(' └ ');
  p:=1;
  repeat
    gotoxy(10+p,24);write(' — ');
    p:=p+1;
  until p=59;
  gotoxy(69,24);write(' ┘ ');
end;

Procedure Kotak4;
var p:word;
begin
  TextColor(white);
```

```
  gotoxy(20,11);write('┌');
  p:=1;
  repeat
    gotoxy(20+p,11);write('─');
    p:=p+1;
  until p=40;
  gotoxy(60,11);write('┐');
  p:=1;
  repeat
      gotoxy(20,11+p);write('│');
      gotoxy(60,11+p);write('│');
      gotoxy(21,11+p);write(':39);
      p:=p+1;
  until p=10;
  gotoxy(20,20);write('└');
  p:=1;
  repeat
      gotoxy(20+p,20);write('─');
      p:=p+1;
  until p=40;
  gotoxy(60,20);write('┘');
end;

Procedure Kotak5;
var p:word;
begin
  TextBackground(blue);
  TextColor(white);
  gotoxy(1,1);write('┌');
  p:=1;
  repeat
    gotoxy(1+p,1);write('─');
    p:=p+1;
  until p=79;
  gotoxy(80,1);write('┐');
  p:=1;
  repeat
      gotoxy(1,1+p);write('│');
      gotoxy(2,1+p);write(':79);
      gotoxy(80,1+p);write('│');
      p:=p+1;
  until p=20;
  gotoxy(1,21);write('└');
  p:=1;
  repeat
      gotoxy(1+p,21);write('─');
```

```
      p:=p+1;
    until p=79;
    gotoxy(80,21);write('┘');
end;

Procedure JendelaMenuUtama;
var Jdl1,jdl2,jdl3,jdl4,jdl5,jdlMenu,GrBwh : string;

begin
    ClrScr;
    Kotak1;
    Kotak2;
    Jdl1 := 'IMPLEMENTASI ALGORITMA POHON HUFFMAN';
    jdl2 := 'UNTUK MENENTUKAN KODE BINER';
    jdl3 := '═══════════════════════════════════════════' ;
    Jdl4 := 'JUMADI';
    Jdl5 := 'J2A 098 026';
    TextColor(yellow);
    gotoxy((80-length(jdl1)) div 2,3);write(Jdl1);
    gotoxy((80-length(jdl2)) div 2,4);write(Jdl2);
    gotoxy((80-length(jdl3)) div 2,5);write(Jdl3);
    gotoxy((80-length(jdl4)) div 2,6);write(Jdl4);
    gotoxy((80-length(jdl5)) div 2,7);write(jdl5);
    Kotak3;
    JdlMenu:='MENU UTAMA';
    Grbwh  :='═══════════';
    TextColor(white);
    gotoxy((80-length(JdlMenu)) div 2,11);write(JdlMenu);
    gotoxy((80-length(GrBwh)) div 2,12);write(GrBwh);
    gotoxy(25,14);write('1. Informasi Menu Utama');
    gotoxy(25,15);write('2. Masukan');
    gotoxy(25,16);write('3. Tabel Frekuensi');
    gotoxy(25,17);write('4. Hasil Pengkodean');
    gotoxy(25,18);write('5. Keluar');
    gotoxy(25,22);write('Pilih salah satu Menu : ');
    TextBackground(black);

  end; { End of JendelaMenuUtama }


procedure InformasiMenuUtama;
var i : integer;
begin
  clrscr;
  textbackground(7);
```

```
 textcolor(4);gotoxy(1,2);
 write('INFORMASI MENU');
 textcolor(1);  gotoxy(15,2);
 write('═══════════════════════════════════════════════');
 gotoxy(1,4);write( ' Masukan ');
 gotoxy(1,9);write(' Tabel Frekuensi');
 gotoxy(1,14);write(' Hasil Pengkodean');
 gotoxy(1,19);write(' Keluar');
 textcolor(8);
 gotoxy(3,6);write('Memberikan masukan berupa kalimat dari papan ketik atau
open file');
 gotoxy(3,11);write('Melihat tabel frekuensi tiap karakter hasil dari program
Huffman ');
 gotoxy(3,16);write('Melihat kode biner tiap karakter hasil dari program
huffman');
 gotoxy(3,21);write('Keluar dari program ');
 gotoxy(1,24);textcolor(1);
 write('═══════════════════════════════════════════════');
 gotoxy(10,25);textcolor(4);write('Tekan <enter>');
readln;
end;

procedure AWALAN(var H : Node);
 begin
  new(H);
  with H^ do
   begin
    Kiri  := nil;
    Kanan := nil;
    Next  := nil;
    Info  := chr(32);
    Frekuensi := 0;
   end
 end;

procedure BUAT_LIST_FREKUENSI(H:Node;Kal:Teks);
 var Bantu : Node;
    I    : integer;

 begin
  Bantu := H;
  for I:= 0 to 255 do
  if Kal[chr(I)] <> 0 then
    {* karakter yang frekuensi <> 0 *}
    begin
      AWALAN(Bantu^.Next);
```

```
        with Bantu^.Next^ do
          begin
            Info := chr(I);
            Frekuensi := Kal[chr(I)]
        end;

        {* simpul berikutnya *}
        Bantu := Bantu^.Next
      end
  end;      {* prosedur BUAT_LIST_FREKUENSI *}

procedure tulis_pilih_file(var pil:char);

begin
clrscr;
  gotoxy(20,8);writeln('Pilihan File');
  gotoxy(6,9);writeln('----------------------------------------');
  gotoxy(20,11);write('1. contoh.dat');
  gotoxy(20,12);write('2. judul.dat');
  gotoxy(20,13);write('3. abstrak.dat');
  gotoxy(20,14);write('4. kesimpulan.dat');
end;

procedure pilihan_file(var nf:larik);
var pilih:char;

begin
clrscr;
  tulis_pilih_file(pilih);
  gotoxy(20,18);write('Silahkan Pilih : ');
  readln(pilih);
  case pilih of
    '1' : begin
          nf:='contoh.dat';
          end;
    '2' : begin
          nf:='judul.dat';
          end;
    '3' : begin
          nf:='abstrak.dat';
          end;
    '4' : begin
          nf:='kesimpulan.dat';
          end;
  end;
end;
```

```
procedure PilihSatu(var H: Node);
var i,j,k,l,n : integer;
   pilihan : char;
   Dt,jdlsubmenu,Grbwh : string;
   Bantu : node;
   T: Teks;
   Bks : text;

begin
  for i:=1 to 255 do
     T[chr(i)]:=0;
  TextBackground(red);
  Kotak4;
  jdlsubmenu := 'MASUKAN KALIMAT';
  Grbwh      := '═══════════════════════════';
  gotoxy(20+(40-length(jdlsubmenu)) div 2,12);write(jdlSubmenu);
  gotoxy(20+(40-length(grbwh)) div 2,13);write(grbwh);
  gotoxy(27,15);write('1. Dari File');
  gotoxy(27,16);write('2. Dari Keyboard');
  gotoxy(24,18);write('Pilih salah satu menu di atas : ');
  TextBackground(7);
  TextColor(yellow);
  gotoxy(56,18);readln(pilihan);
  case pilihan of
     '1': begin
            pilihan_file(nf);
            assign (Bks,nf);
            reset(Bks);
            ClrScr;
            Kotak5;
            JdlSubMenu:='KALIMAT YANG DIMASUKKAN DARI FILE';
            Grbwh :='═══════════════════════════════════';
            gotoxy((80-length(JdlSubMenu)) div 2,2);write(JdlSubMenu);
            gotoxy((80-length(Grbwh)) div 2,3);writeln(Grbwh);
            writeln;
            j:=0;
            k:=1;
            while not eof (Bks) do
            begin
              readln(Bks,Dt);
              inc(j);
              gotoxy(3,4+k);write(j:2,'.');
              if length(dt) <= 70 then
```

```
            begin
              gotoxy(7,4+k);write(Dt);
              inc(k);
            end
            else
              for i:=1 to length(dt) do
              begin
                if i+6 <= 78 then
                begin
                  gotoxy(6+i,4+k);write(Dt[i]);
                  if i+6 = 78 then
                    inc(k)
                end
                else
                begin
                  gotoxy(6+(i-78),4+k);write(Dt[i]);
                end;
              end;


          for i:=1 to length (Dt) do
          if Dt [i] <> ' ' then
            T[Dt[i]] := T[Dt[i]] + 1;
        end;
        gotoxy(20,20);write('Tekan <enter> untuk ke menu utama..');
        readkey;
        close(Bks);
      end;
  '2': begin
        ClrScr;
        TextColor(yellow);
        write ('Banyaknya Kalimat : ');
        readln(n);
        for j:=1 to n do
        begin
          writeln('Kalimat ke-',j,' : ');readln(Dt);
          for i:=1 to length(Dt) do
          if Dt[i] <> ' ' then
            T[Dt[i]] :=T[Dt[i]]+1
        end;
      end;
end;

Bantu := H;
for i:=1 to 255 do
if T[chr(i)] <> 0 then
```

```
  begin
    AWALAN(Bantu^.next);
    with Bantu^.next^ do
    begin
      info :=chr(i);
      frekuensi:=T[chr(i)];
    end;
    Bantu:=Bantu^.next;
  end;
end;{end of pilihsatu}

procedure PilihDua(H:node;var jumkar : word; var alph : arraychar; var nodes :
arraynodes);
var i,j : integer;

begin
  textbackground(7);clrscr;
  textcolor(4);
  writeln( ' ':5,' TABEL FREKUENSI ');
  writeln(Gr,'-');
  writeln(' no      kar       frek ');
  writeln(Gr,'-');

  for j:= 1 to maxnodes do
  begin
      nodes[j].freq:=0;
      nodes[j].father:=0
  end; {for...do begin}

  for i:= 1 to maxsymbs do
      alph[i]:=' ';

  i:=0;
  while H <> nil do
    begin
      inc(I);
      writeln(i:2,":3,H^.Info : 5,H^.Frekuensi : 12,");
      alph[i]:=H^.info;
      nodes[i].freq:=H^.frekuensi;
      H:= H^.Next;
      if I mod 10 = 0 then
      readkey;
    end;
  jumkar:=i;
  writeln; writeln(Gr,'-');
  writeln; writeln('Jumlah karakter beda : ',jumkar:3);
```

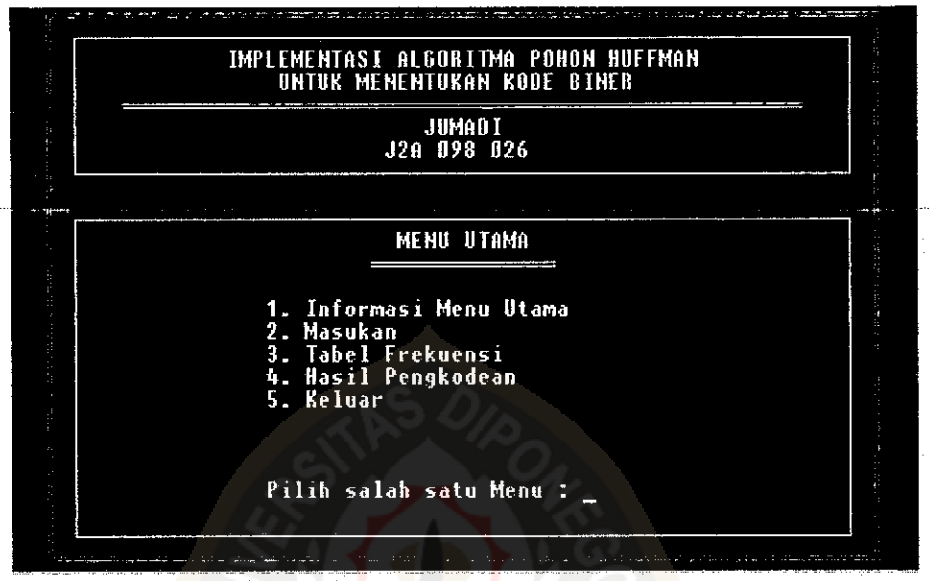
```
  writeln;
  gotoxy(20,24);write('Tekan <enter> untuk ke menu utama..');
  readkey;
end;    {* prosedur CETAK_FREKUENSI *}


Procedure Decode(jumkar : word; alph : arraychar; nodes : arraynodes);
var   code: arraycode;
      i : 0..maxsymbs;
      n1,n2,j,m: nodeptr;
      cd: codetype;
      k: 1..maxbits;
      symb: char;
      small1,small2:integer;

begin
   ClrScr;
    for m:= jumkar+1 to 2*jumkar-1 do
     begin
      n1:= 0;
      n2:= 0;
      small1:= maxint;
      small2:= maxint;
      for j:= 1 to m-1  do
         if nodes[j].father=0 then
           if nodes[j].freq<small1 then
           begin
             small2:=small1;
             small1:=nodes[j].freq;
             n2:=n1;
             n1:=j
           end
           else if nodes[j].freq<small2 then
               begin
                 small2:=nodes[j].freq;
                 n2:=j
               end;

      nodes[n1].father:=m;
      nodes[n1].sontype:=lson;
      nodes[n2].father:=m;
      nodes[n2].sontype:=rson;
      nodes[m].freq:=nodes[n1].freq + nodes[n2].freq
    end;
```

```
for i:=1 to jumkar do
begin

  cd.startpos:= maxbitpos;
  j:=i;
  while nodes[j].father<>0 do
  begin
    if nodes[j].sontype=lson then
     begin
       cd.startpos:=cd.startpos-1;
       cd.bits[cd.startpos]:='0'
    end

    else
    begin
      cd.startpos:=cd.startpos-1;
      cd.bits[cd.startpos]:='1'
    end;
    j:=nodes[j].father
  end;
  code[i]:=cd
end;


textbackground(7);
clrscr;
textcolor(4);
writeln(':10,'TABEL KODE');
writeln('------------------------');
writeln('karakter   kode ');
writeln('------------------------');
for i:=1 to jumkar do
begin
   write(':3,alph[i], ' ':8);
   for k:= code[i].startpos to maxbits do
      write(code[i].bits[k]);
   writeln;
end;
writeln('------------------------');
gotoxy(20,24);write('Tekan <enter> untuk ke menu utama..');
readkey;
end;
```

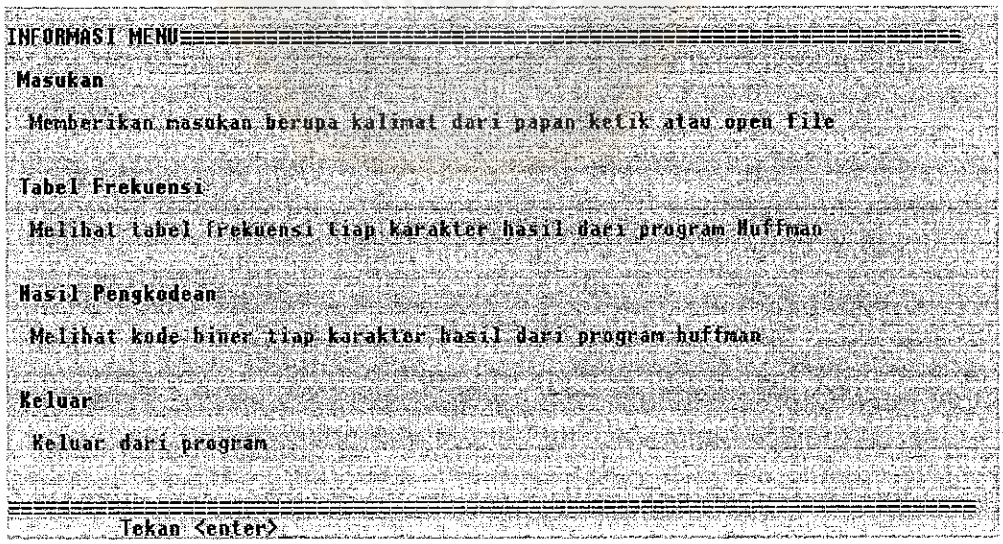
```
procedure selesai;

begin
clrscr;
   window(1,1,80,25);textbackground(7);
   clrscr;textcolor(4);gotoxy(20,10);
   writeln('----  TERIMA KASIH  ----');
   gotoxy(20,21);
   writeln (' silahkan tekan sembarang tombol');gotoxy(52,21);
  repeat
 until keypressed;
end;

program Utama;

begin
  AWALAN(Kepala);
  repeat
  JendelaMenuUtama;
  TextBackground(red);
  TextColor(yellow);
  gotoxy(49,22);write(":1);
  gotoxy(49,22);readln(pil);
  Textbackground(black);
   case pil of
      '1' : begin
              InformasiMenuUtama;
            end;
      '2' : begin
              PilihSatu(Kepala);
            end;
      '3' : begin
              PilihDua(Kepala^.Next,jmlkar,alphabet,titik);
            end;
      '4' : begin
              Decode(jmlkar,alphabet,titik);
            end;
      '5' : begin
              selesai;
            end;
   end;

   TextBackground(black);
  until pil = '6';
 end.
```

LAMPIRAN 3

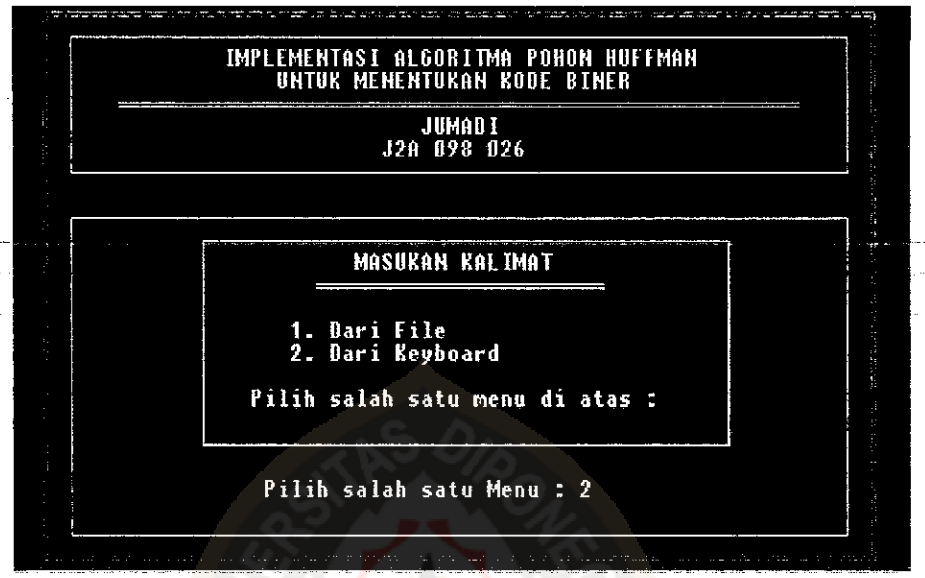
OUT PUT PROGRAM



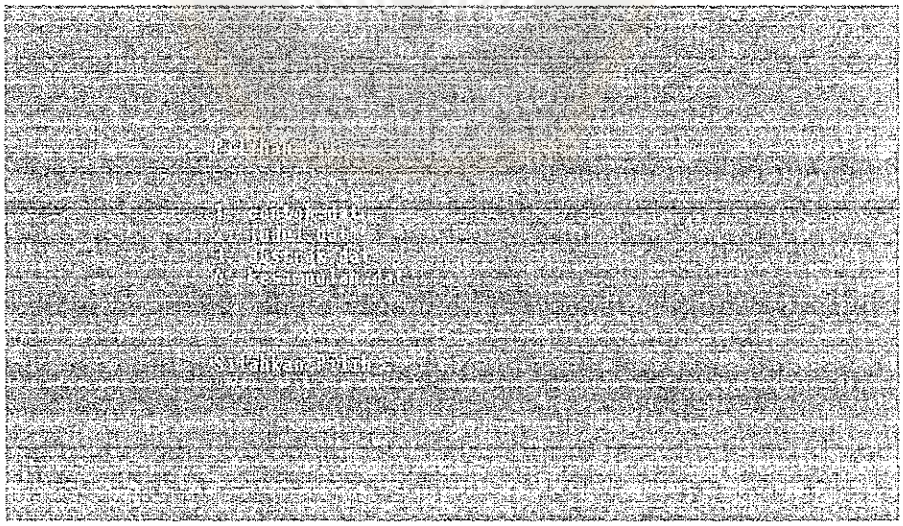
Tampilan Menu Utama



Tampilan Informasi Menu

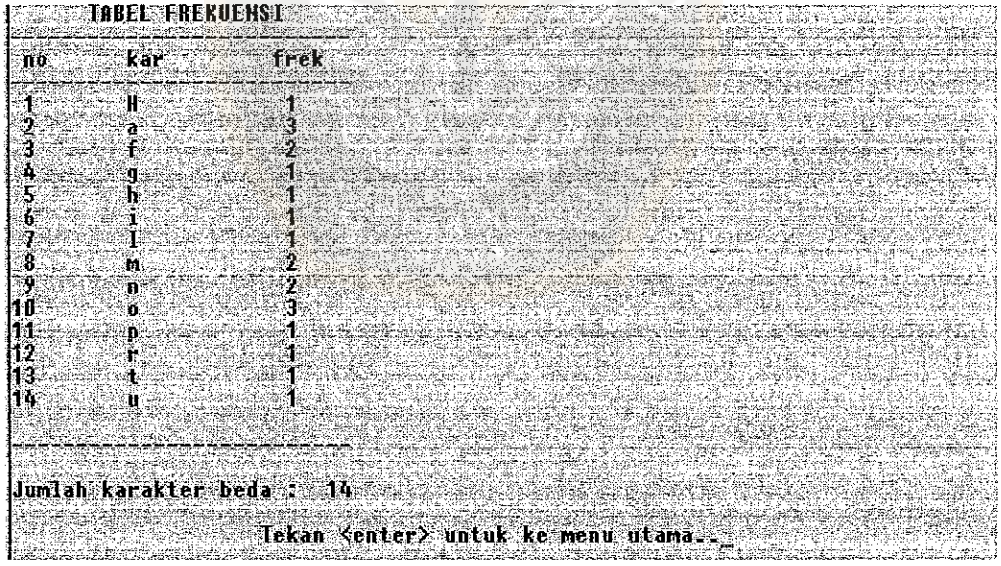


Tampilan Menu Masukan



Tampilan pilihan file

Tampilan Masukan



TABEL FREKUENSI

no	Kar	frek
1	H	1
2	a	3
3	f	2
4	g	1
5	h	1
6	i	1
7	l	1
8	m	2
9	n	2
10	o	3
11	p	1
12	r	1
13	t	1
14	u	1

Jumlah karakter beda : 14

Tekan <enter> untuk ke menu utama...

Tampilan Tabel Frekuensi Hasil Program Huffman

```
TABEL KODE
karakter    kode
H           0000
a           100
f           1101
g           0001
h           0010
i           0011
i           0100
m           1110
n           1111
o           101
p           0101
r           0110
t           0111
u           1100

Tekan <enter> untuk ke menu utama...
```

Tampilan Kode Biner Hasil Program Huffman

```
---- TERIMA KASIH ----

silahkan tekan sembarang tombol_
```

Tampilan Akhir Program