

Lampiran Listing Program

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{ *****
*
*   NAMA PROGRAM       :   JARINGAN ANTRIAN JACKSON
*   TANGGAL PEMBUATAN  :   JUNI 2001
*   PEMBUAT PROGRAM    :   HERLINA WIDIASTUTI
*   KETERANGAN         :   PENYELESAIAN JARINGAN ANTRIAN JACKSON
*
***** }
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Uses Crt;

Const
max = 10;

Type
indeks = 1..max;
Data = Array [indeks] of Real;
Matriks = Array [indeks, indeks] of Real;

Var Pilihan : Byte;
Selesai : Boolean;
Tekan, Tekan1 : Char;

at, ct, ap, cp : Matriks ;
bt, nilai1, nilai3 : Real;
bp, hasil2, hasil3, ptp, hpp, jpp, sump, zp : Real;
it, jt, kt, mt, nt, pt, qt, hp, ip, jp, kp : Integer;
mlp, mp, np, pp, qp, rp, yp, jmp, bykp, helpp : integer;
btt, cct, dtt, nilai2, yt, hasil1 : array [1..100] of real;
nrt, nrp : array [1..300] of integer;
btp, ccp, dtp, p2p, y2p, c2p, xp : array [1..300] of real;
mtp : array [0..500, 1..10] of integer;
tanya : char;

Procedure Cover_Depan;
Begin
Clrscr;
Gotoxy(33,7);
Writeln('JUDUL PROGRAM');
Gotoxy(25,11);
Writeln('PENYELESAIAN JARINGAN JACKSON');
Writeln(' ':17, 'DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL');
Gotoxy(37,16);
Write('OLEH :');
Gotoxy(26,16);
Writeln('NAMA : HERLINA WIDIASTUTI');
Writeln(' ':25, 'NIM : J101951200');
Writeln(' ':25, 'JURUSAN : MATEMATIKA');
Gotoxy(17,24);
Writeln('FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM');
Writeln(' ':28, 'UNIVERSITAS DIPONEGORO');
Writeln(' ':35, 'SEMARANG');
Writeln(' ':37, '2001');
End;

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Procedure Beep(noot,dly:Integer);
Begin
  Sound(noot);
  Delay(dly);
  Nosound;
End;

Procedure Judul;
Begin
  Gotoxy(25,11);
  Writeln('PENYELESAIAN JARINGAN JACKSON');
  Writeln(' ':17,'DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL');
End;

Procedure Judul_Input_Matrik_Koefisien;
Begin
  Judul;
  Gotoxy(29,6);0
  Write('INPUT MATRIK KOEFISIEN');
End;

Procedure Judul_Output_Hasil_Matrik;
Begin
  Judul;
  Gotoxy(30,6);
  Write('OUTPUT HASIL MATRIK');
End;

Procedure Judul_Input_Delta_Ro_n;
Begin
  Judul;
  Gotoxy(33,6);
  Write('INPUT ',chr(235),' ',chr(231),' n');
End;

Procedure Judul_Output_Hasil_Jaringan_Jackson_Terbuka;
Begin
  Judul;
  Gotoxy(21,6);
  Write('OUTPUT HASIL JARINGAN JACKSON TERBUKA');
End;

Procedure Judul_Input_Beta_Delta_Ro_Ni_N_M;
Begin
  Judul;
  Gotoxy(28,6);
  Write('INPUT ',chr(225),' ',chr(235),' ',chr(231),' ni, n, m');
End;

Procedure Judul_Output_Hasil_Perkalian;
Begin
  Judul;
  Gotoxy(29,6);
  Write('OUTPUT HASIL PERKALIAN');
End;

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Procedure Judul_Output_Model_C;
Begin
  Judul;
  Gotoxy(21,6);
  Write('OUTPUT MODEL C');
End;

Procedure Judul_Output_Hasil_Jaringan_Jackson_Tertutup;
Begin
  Judul;
  Gotoxy(21,6);
  Write('OUTPUT HASIL JARINGAN JACKSON TERTUTUP');
End;

{***Prosedur Membaca Matrik***}
Procedure Membaca_array_2(baris, kolom : Integer; var at : matriks);
Var
  i,j : Integer;

Begin
  Begin
    For i := 1 to baris do
      Begin
        Writeln ('Baris ke- ', i);
        For j := 1 to kolom do
          Begin
            Write('a [' ,i, ', ',j, ' ] = ');Read (at[i,j]);
          End;
        End;
      End;
    End;
  End;

{***Prosedur Koreksi Kesalahan***}
Procedure Tampil_koreksi(baris, kolom : Integer; var at : matriks);
Var
  i,j : Integer;

Begin
  Clrscr;
  Writeln ('Matriks Koefisien : ');
  Writeln ('Banyaknya nilai : ',baris);
  For i := 1 to baris do
    Begin
      Writeln ('Baris ke- ', i);
      For j := 1 to kolom do
        Begin
          Write('at [' ,i, ', ',j, ' ] = ');
          Writeln (at[i,j]:1:1);
        End;
      End;
    End;
  End;

{***Prosedur Menuliskan Matrik untuk Jaringan Terbuka***}
Procedure Menuliskan_array_2(baris, kolom : Integer; ct : matriks);
Var

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    k,l : Integer;

Begin
  For k := 1 to baris do
    Begin
      For l := 1 to kolom do Write (ct[k,l]:10:5);
      Writeln;
    End;
  End;

  {***Prosedur Pesan Tekan Esc***}
  Procedure Tekan_esc;
  Var
    pesan : string [50];
    m : Integer;

  Begin
    pesan := 'Tekan <Esc>';
    m := 78 - Length(pesan);
    Gotoxy (m,240);
    Write (pesan);
    Repeat Until Readkey = #27;
    Clrscr;
  End;

  {***Procedure Input Matrik Koefisien untuk Jaringan Terbuka***}
  Procedure Input_Matrik_Koefisien;
  Begin
    Clrscr;
    Writeln('INPUT MATRIK KOEFISIEN');
    Writeln('Matriks Koefisien : ');
    Write('Banyaknya nilai : ');Readln (nt);
    Repeat
      Clrscr;
      Writeln('INPUT MATRIK KOEFISIEN');
      Writeln('Matriks Koefisien : ');
      Writeln('Banyaknya nilai : ',nt);
      Membaca_array_2(nt,nt+1,at);
      Write('Data sudah benar ? Y/T ');
      Repeat
        tanya:= readkey
      Until tanya In['Y','y','T','t'];
      Write (Ucase(tanya));
      Clrscr;
      Writeln('INPUT MATRIK KOEFISIEN');
      Writeln('Matriks Koefisien : ');
      Writeln('Banyaknya nilai : ',nt);
      gotoxy (1,3);
    Until Ucase(tanya)='Y';
    Writeln;
  End;

  {***Prosedur Output Hasil Matrik Koefisien untuk Jaringan Terbuka***}
  Procedure Output_Hasil_Matrik;
  Begin
    Clrscr;

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Writeln('OUTPUT HASIL MATRIK');
Writeln;
Writeln (' matrix semula : ');
Menuliskan_array_2(nt,nt+1,at);
Writeln;
For it:=1 to nt do
  Begin
    If at[it,it] = 0 then
      Begin
        For jt:= it+1 to nt do
          Begin
            If at[jt,it] <> 0 then
              Begin
                For kt:= it to nt+1 do
                  Begin
                    bt := at[it,kt];
                    at[it,kt] := at[jt,kt];
                    at[jt,kt] := bt;
                  End;
                End;
              End;
            End;
          End;
        bt := at[it,it];
        For jt := it to nt+1 do
          at[it,jt] := at[it,jt] / bt;
          For jt := 1 to nt do
            Begin
              If jt <> it then
                Begin
                  For kt := it to nt+1 do
                    ct[jt,kt] := at[jt,kt] - at[jt,it] * at[it,kt];
                  For kt := it to nt+1 do
                    at[jt,kt] := ct[jt,kt];
                  End;
                End;
              End;
            End;
          End;
        End;
      End;
    End;
  End;

Writeln(' matrix sekarang : ');
Menuliskan_array_2(nt,nt+1,at);
Writeln;
Writeln(' Matriks hasil : ');
For it := 1 to nt do
  Begin
    Writeln (^g,at[it,nt+1]:10:5);
    btt[it]:=at[it,nt+1];
  End;
Tekan_Esc;
End;

(**Prosedur Input Delta, Rho dan ni untuk Jaringan Terbuka**)
Procedure Input_Delta_Rho_n;
Begin
  Writeln('INPUT ',chr(235),' ',chr(231),' n');
  Writeln;
  Write('Nilai variabel k : ');read(qt);
  For pt:=1 to qt do

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    Begin
        Writeln('Nilai variabel ',chr(225),' ',pt,': ',btt[pt]:5:2);
        Write('Nilai variabel c ',pt,': ');read(cct[pt]);
        Write('Nilai variabel ',chr(235),' ',pt,': ');read(dtt[pt]);
        Write('Nilai variabel n ',pt,': ');read(nrt[pt]);
        Writeln;
    End;
End;

{***Prosedur Input Data untuk Jaringan Terbuka***}
Procedure Tampil_Input_Data;
Begin
    Writeln('          ',chr(225),'          c          ',chr(235));
    Writeln('-----');
    For pt:=1 to qt do
        Begin
            Writeln('^g,pt:2,' | ',btt[pt]:10:2,'|',cct[pt]:10:2,'|',
                dtt[pt]:10:2,'|');
        End;
    Writeln('-----');
    Writeln;
End;

{***Prosedur Rumus Jaringan Jackson Terbuka***}
Procedure Tampil_Rumus_Terbuka;
Begin
    Clrscr;
    Textcolor(LightGreen+blink);Writeln('Jackson Terbuka');
    Normvideo;
    Writeln('          k');
    Write('          P = ',chr(227),' ( 1 - ',chr(231),' ) ');
    Write(chr(231),chr(252));
    Write('          dengan          ',chr(231),' = ',chr(225));
    Writeln(' / c ',chr(235));
    Writeln('          i');
    Writeln;
End;

{***Prosedur Hasil Jaringan Jackson Terbuka***}
Procedure Output_Hasil_Jaringan_Jackson_Terbuka;
Begin
    Writeln('OUTPUT HASIL JARINGAN JACKSON TERBUKA');
    Writeln;
    Tampil_Rumus_Terbuka;
    Tampil_Input_Data;
    For pt:=1 to qt do
        Begin
            yt[pt]:=btt[pt]/(cct[pt]*dtt[pt]);
            Write(' Hasil ',chr(231),' ',it,' = ',yt[pt]:5:2,'');
        End;
    Writeln;Writeln;
    For pt:=1 to qt do
        Begin
            nilail:=1;
            For mt:=1 to nrt[pt] do
                Begin

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        nilai1:=nilai1*yt[pt];
    End;
    Write(' Hasil ',chr(231),' Pangkat ');
    Writeln(nrt[pt],' = ',nilai1:5:2,');
    nilai2[pt]:= (1-yt[pt])*nilai1;
End;
nilai3:=1;
Writeln;
For pt:=1 to qt do
    Begin
        nilai3:=nilai3*nilai2[pt];
        Write(' Hasil P ',pt,' = ',nilai3:5:7,');
    End;
    Writeln;
    Tekan_Esc;
End;

{***Procedure Input Matrik Koefisien untuk Jaringan Tertutup***}
Procedure Input_Matrik_Koefisienp;
Begin
    Writeln ('Matriks Koefisien : ');
    Write ('Banyaknya nilai : ');Readln(np);
    Membaca_array_2(np,np,ap);
    Writeln;
    Clrscr;
    Writeln;
End;

{***Prosedur Output Matrik Koefisien untuk Jaringan Tertutup***}
Procedure Output_Matrik_Koefisienp;
Begin
    Writeln(' Matriks semula : ');
    Menuliskan_array_2(np,np,ap);
    Writeln;
    For ip:=1 to (np-2) do
        Begin
            bp := ap[ip,ip];
            For jp:=ip to np do
                ap[ip,jp] := ap[ip,jp] / bp;
                For jp:=1 to np do
                    Begin
                        If jp <> ip then
                            Begin
                                For kp:=ip to np do
                                    cp[jp,kp] := ap[jp,kp] - ap[jp,ip] * ap[ip,kp];
                                For kp:=ip to np do
                                    ap[jp,kp] := cp[jp,kp];
                                End;
                            End;
                        End;
                    End;
            End;
            Writeln(' Matriks sekarang : ');
            Menuliskan_array_2(np,np,ap);
            If round(ap[np,np-1]/ap[np-1,np-1]) = round(ap[np,np]/ap[np-1,np]) then
                Begin
                    xp[np] := 1;
                    xp[np-1] := -ap[np-1,np] * xp[np] / ap[np-1,np-1];
                End;
        End;
    End;

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For jp:=(np-2) downto 1 do
  Begin
    rp := np;
    sump:= 0;
    While rp > jp do
      Begin
        sump := sump + ap[jp,rp] * xp[rp];
        dec(rp);
      End;
      xp[jp] := -sump;
    End;
  End;
Writeln('Jadi penyelesaian utk persamaannya adalah:');
zp:=0;
For ip:=1 to np do
  Begin
    Write('x[' ,ip,'] = ');
    Writeln(xp[ip]:7:4);
    zp:=zp+xp[ip];
  End;

Tekan_Esc;
For ip := 1 to np do
  Begin
    btp[ip] := xp[ip]/zp;
  End;
End;

{***Prosedur Input C, delta, ni, m dan n untuk Jaringan Tertutup***}
Procedure Input_C_Delta;
Begin
  Write('Nilai variabel k : ');read(qp);
  For pp:=1 to qp do
    Begin
      Writeln('Nilai variabel ',chr(225),' ',pp,': ',btp[pp]:6:5);
      Write('Nilai variabel c ',pp,': ');read(ccp[pp]);
      Write('Nilai variabel ',chr(235),' ',pp,': ');read(dtp[pp]);
      Write('Nilai variabel ni ',pp,': ');read(nrp[pp]);
      Writeln;
    End;
  Clrscr;
  Write('Banyaknya Node : ');read(np);
  Write('Banyaknya Paket : ');read(mp);
End;

Procedure Tampil_Input_Datap;
Begin
  Writeln('          ',chr(225),'          c          ',chr(235));
  Writeln('-----');
  For pp:=1 to qp do
    Begin
      Writeln('^g,pp:2,' | ', ' ':2,btp[pp]:6:5,' ':2,'|', ' ':3,
        ccp[pp]:2:0,' ':3,'|', ' ':3,dtp[pp]:2:0,' ':3,'|');
    End;
  Writeln('-----');
  Writeln;

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End;

Procedure Tampil_Rumus_Tertutup;
Begin
  Clrscr;
  Textcolor(LightGreen+Blink);Writeln('Jackson Tertutup');Normvideo;
  Writeln(' ':67,'k');
  Write('      P = (1 / c) ',chr(227),' ',chr(231),chr(252));
  Write('      dengan ',chr(231),' = ',chr(225),' / c ',chr(235));
  Write('      dan   C = ',chr(228),' [ ',chr(227),' ',chr(231));
  Writeln(chr(252),' ]');
  Write(' ':63,'n   i');
  Writeln;
End;

{**Prosedur Hasil Perkalian untuk Jaringan Tertutup**}
Procedure Output_Hasil_Perkalian;
Begin
  Tampil_Rumus_Tertutup;
  Tampil_Input_Datap;
  For pp:=1 to qp do
  Begin
    y2p[pp]:=btp[pp]/(ccp[pp]*dtp[pp]);
    Writeln(' Hasil ',chr(231),' ',pp,' = ',y2p[pp]:8:7,'');
    xp[pp]:=y2p[pp];
  End;
  Readln;
  Tampil_Rumus_Tertutup;
  hasil2:=1;
  For pp:=1 to qp do
  Begin
    hasil1[pp]:=1;
    For mlp:=1 to nrp[pp] do
    Begin
      hasil1[pp]:=hasil1[pp]*y2p[pp];
    End;
    hasil2:=hasil2*hasil1[pp];
    Writeln(chr(231),' ',pp,' Pangkat ',nrp[pp],' = ',hasil1[pp]:8:7,'');
  End;
  Writeln;
  Writeln(' Hasil Perkalian = ',hasil2,'');
  Tekan_Esc;
End;

{**Prosedur Inisial Model Kemungkinan Keadaan**}
Procedure Inisial;
Begin
  For jp:=0 to 500 do
  For kp:=1 to 10 do
  mtp[jp][kp] := 50;
End;

{**Prosedur Model Kemungkinan Keadaan**}
Procedure Inti;
Begin
  ip:=mp;

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jp:=1;
While mtp[jp][np] <> mp do
Begin
If mtp[jp-1][1] <> ip then
For kp:=1 to np do
If kp=1 then
mtp[jp][kp] := ip
Else
If kp=2 then
mtp[jp][kp] := mp-mtp[jp][1]
Else mtp[jp][kp] := 0
Else
For kp:=1 to np do
If mtp[jp][kp] = 50 then
mtp[jp][kp] := mtp[jp-1][kp];
kp:=np-1;
hp:=0;
While kp>=2 do
Begin
If mtp[jp][kp] = 0 then
Begin
dec(kp);
inc(hp);
End
Else
Begin
mtp[jp+1][kp] := mtp[jp][kp] - 1;
If (mtp[jp][kp+1] = 0) and (kp <> np-1) then
Begin
jmlp:=0;
For yp:=1 to kp do
jmlp := jmlp + mtp[jp][yp];
mtp[jp+1][kp+1] := mp - (jmlp-1);
mtp[jp+1][np] := 0;
End
Else
mtp[jp+1][kp+1] := mtp[jp][kp+1] + 1;
kp:=1;
End;
If (kp=1) and (hp=np-2) then
dec(ip);
End;
inc(jp);
End;
bykp := jp;
mtp[bykp][np] := mp;
For kp:=1 to (np-1) do
mtp[bykp][kp] := 0;
End;

{***Prosedur Hasil Model Kemungkinan Keadaan***}
Procedure Hasil;
Begin
Clrscr;
jp := 1;
While jp <= bykp do

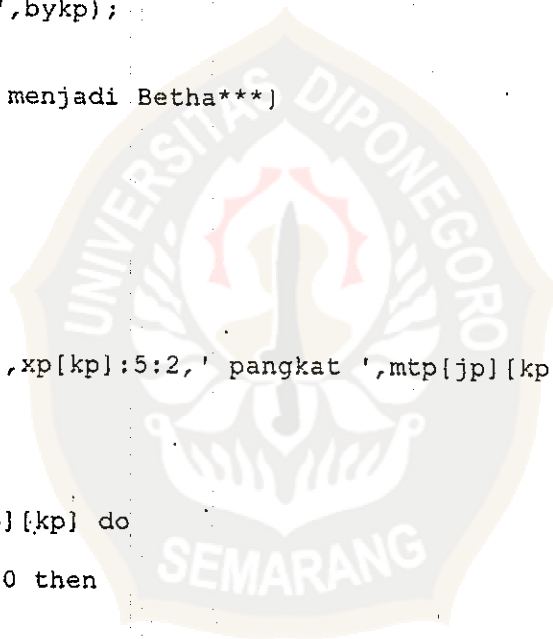
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Begin
  For kp:=1 to np do
    Write(mtp[jp][kp]:5);
    helpp := jp mod 25;
    If helpp <> 0 then
      Writeln
    Else
      Begin
        Readln;
        Clrscr;
      End;
    inc(jp);
  End;
  Writeln;
  Writeln('Jadi banyaknya kemungkinan ',mp,' paket berada dalam ',
  np,' node', ' adalah : ',bykp);
End;

{***Prosedur Perubahan X menjadi Betha***}
Procedure isix;
Begin
  Clrscr;
  jpp:=0;
  jp := 1;
  While jp <= bykp do
    Begin
      For kp:=1 to np do
        Write(chr(231),kp,':',xp[kp]:5:2,' pangkat ',mtp[jp][kp], ' ');
        hpp:=1;
        For kp:=1 to np do
          Begin
            ptp:=1;
            For pp:=1 to mtp[jp][kp] do
              Begin
                If mtp[jp][kp] = 0 then
                  ptp:=1
                Else
                  ptp:=ptp*xp[kp];
              End;
            hpp:=hpp*ptp;
          End;
          jpp:=jpp+hpp;
          helpp := jp mod 25;
          If helpp <> 0 then
            Writeln
          Else
            Begin
              Readln;
              Clrscr;
            End;
          inc(jp);
        End;
      Clrscr;
      Writeln('Hasil : ',jpp);
    End;
  End;

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{***Prosedur Hasil Jaringan Jackson Tertutup***}
Procedure HasilTertutup;
Begin
  Hasil3:=(1/jpp)*hasil2;
  Write('Hasil Tertutup : ',hasil3);
End;

{***Prosedur Output Model Kemungkinan Keadaan***}
Procedure Output_Model_C;
Begin
  inisial;
  inti;
  hasil;
  Readln;
End;

{***Prosedur Output Hasil Jaringan Jackson Tertutup***}
Procedure Output_Hasil_Jaringan_Jackson_Tertutup;
Begin
  Isix;
  HasilTertutup;
  Readln;
End;

{***Prosedur untuk Menu Jaringan Jackson Terbuka***}
Procedure Menu_Jaringan_Jackson_Terbuka;
Begin
  Repeat
  If (Tekan = #13) Then
  Begin
    Clrscr;
    Gotoxy(25,3);
    Writeln('PENYELESAIAN JARINGAN JACKSON');
    Writeln(' ':17,'DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL');
    Gotoxy(25,8);
    Writeln('MENU JARINGAN JACKSON TERBUKA          ');
    Gotoxy(19,10);
    Writeln('[1]. INPUT MATRIK KOEFISIEN          ');
    Gotoxy(19,11);
    Writeln('[2]. OUTPUT HASIL MATRIK          ');
    Gotoxy(19,12);
    Writeln('[3]. INPUT ',chr(235),', ',chr(231),', n', ' ':24);
    Gotoxy(19,13);
    Writeln('[4]. OUTPUT HASIL JARINGAN JACKSON TERBUKA');
    Gotoxy(19,14);
    Writeln('[5]. KEMBALI KE MENU UTAMA          ');
    Pilihan := 15;
    While (pilihan < 0) or (pilihan > 14) do
      Begin
        Gotoxy(28,16);
        Write ('Silahkan Pilih (1..5) : ');
        Readln(Pilihan);
      End;
    Clrscr;
    Case Pilihan of
      1 : Input_Matrik_Koefisien;
    
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    2 : Output_Hasil_Matrik;
    3 : Input_Delta_Rho_n;
    4 : Output_Hasil_Jaringan_Jackson_Terbuka;
    5 : Exit
Else
Begin
  Clrscr;
  Gotoxy(25,15);
  Beep(1000,300);
  Writeln('Pilihan Menu Hanya (1..5) ...!');
  Gotoxy(31,16);
  Write('Tekan Tombol Enter');
  Readln;
End;
End;
End;
Until (Tekan = #27);
End;

{***Prosedur untuk Menu Jaringan Jackson Tertutup***}
Procedure Menu_Jaringan_Jackson_Tertutup;
Begin
  Repeat
  If (Tekan = #13) Then
  Begin
    Clrscr;
    Gotoxy(25,3);
    Writeln('PENYELESAIAN JARINGAN JACKSON');
    Writeln(' ':17,'DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL');
    Gotoxy(25,8);
    Writeln('MENU JARINGAN JACKSON TERTUTUP');
    Gotoxy(19,10);
    Writeln('[1]. INPUT MATRIK KOEFISIEN ');
    Gotoxy(19,11);
    Writeln('[2]. OUTPUT MATRIK KOEFISIEN ');
    Gotoxy(19,12);
    Writeln('[3]. INPUT c, ',chr(235),', ni, n, m, ' ':16);
    Gotoxy(19,13);
    Writeln('[4]. OUTPUT HASIL PERKALIAN ');
    Gotoxy(19,14);
    Writeln('[5]. OUTPUT MODEL C ');
    Gotoxy(19,15);
    Writeln('[6]. OUTPUT HASIL JARINGAN JACKSON TERTUTUP');
    Gotoxy(19,16);
    Writeln('[7]. KEMBALI KE MENU UTAMA ');

    Pilihan := 18;
    While (pilihan < 0) or (pilihan > 17) do
    Begin
      Gotoxy(28,18);
      Write ('Silahkan Pilih (1..7) : ');
      Readln(Pilihan);
    End;
    Clrscr;
    Case Pilihan of
      1 : Input_Matrik_Koefisienp;

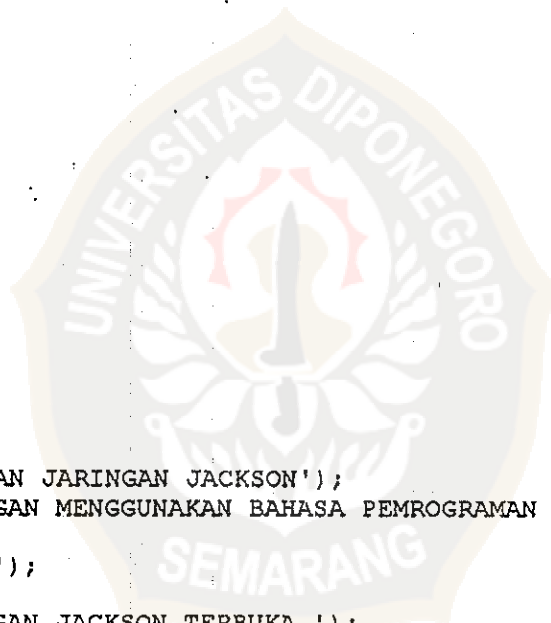
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2 : Output_matrik_Koefisienp;
3 : Input_C_Delta;
4 : Output_Hasil_Perkalian;
5 : Output_Model_C;
6 : Output_Hasil_Jaringan_Jackson_Tertutup;
7 : Exit;
Else
Begin
  Clrscr;
  Gotoxy(25,15);
  Beep(1000,300);
  Writeln('Pilihan Menu Hanya (1..5) ...!');
  Gotoxy(31,16);
  Write('Tekan Tombol Enter');
  Readln;
End;
End;
End;
Until (Tekan = #27);
End;

{Program Utama}
Begin
  Clrscr;
  Cover_depan;
  Tekan:=Readkey;
  Repeat
  If (Tekan = #13) Then
  Begin
    Clrscr;
    Gotoxy(25,3);
    Writeln('PENYELESAIAN JARINGAN JACKSON');
    Writeln(' ':17,'DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL');
    Gotoxy(35,8);
    Writeln('MENU UTAMA');
    Gotoxy(25,10);
    Writeln(' [1]. JARINGAN JACKSON TERBUKA ');
    Gotoxy(25,11);
    Writeln(' [2]. JARINGAN JACKSON TERTUTUP');
    Gotoxy(25,12);
    Writeln(' [3]. SELESAI ');
    Pilihan := 14;
    While (pilihan < 0) or (pilihan > 13) do
    Begin
      Gotoxy(28,15);
      Write ('Silahkan Pilih (1..3) : ');
      Readln(Pilihan);
    End;
    Clrscr;
    Case Pilihan of
      1 : Menu_Jaringan_Jackson_Terbuka;
      2 : Menu_Jaringan_Jackson_Tertutup;
      3 : Exit;
    Else
    Begin
      Clrscr;

```



```
Gotoxy(25,15);  
Beep(1000,300);  
Writeln('Pilihan Menu Hanya (1..3) ...!');  
Gotoxy(31,16);  
Write('Tekan Tombol Enter');  
Readln;  
End;  
End;  
End;  
Until (Tekan = #27);  
End.
```



Lampiran Output Program

JUDUL PROGRAM

PENYELESAIAN JARINGAN JACKSON
DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL

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Gambar 1. Tampilan Cover Program

PENYELESAIAN JARINGAN JACKSON
DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL

MENU UTAMA

- [1]. JARINGAN JACKSON TERBUKA
- [2]. JARINGAN JACKSON TERTUTUP
- [3]. SELESAI

Silahkan Pilih (1..3) :

Gambar 2. Tampilan Menu Utama Program

**PENYELESAIAN JARINGAN JACKSON
DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL**

MENU JARINGAN JACKSON TERBUKA

- [1]. INPUT MATRIK KOEFISIEN
- [2]. OUTPUT HASIL MATRIK
- [3]. INPUT δ , τ , n
- [4]. OUTPUT HASIL JARINGAN JACKSON TERBUKA
- [5]. KEMBALI KE MENU UTAMA

Silahkan Pilih (1..5) :

Gambar 3. Tampilan Menu Jaringan Jackson Terbuka

INPUT MATRIK KOEFISIEN

Matriks Koefisien :

Banyaknya nilai : 3

Baris ke- 1

a [1,1] = 1

a [1,2] = -0.1

a [1,3] = -0.4

a [1,4] = 1

Baris ke- 2

a [2,1] = -0.6

a [2,2] = 1

a [2,3] = -0.4

a [2,4] = 4

Baris ke- 3

a [3,1] = -0.3

a [3,2] = -0.3

a [3,3] = 1

a [3,4] = 3

Gambar 4. Tampilan Input Matrik Koefisien

OUTPUT HASIL MATRIK

matrix semula :
 1.00000 -0.10000 -0.40000 1.00000
 -0.60000 1.00000 -0.40000 4.00000
 -0.30000 -0.30000 1.00000 3.00000

matrix sekarang :
 1.00000 0.00000 0.00000 5.00000
 0.00000 1.00000 0.00000 10.00000
 0.00000 0.00000 1.00000 7.50000

Matriks hasil :
 5.00000
 10.00000
 7.50000
 Tekan <Esc>

Gambar 5. Tampilan Output Hasil Matrik

INPUT δ τ n

Nilai variabel k : 3
 Nilai variabel β 1: 5.00
 Nilai variabel c 1: 1
 Nilai variabel δ 1: 10
 Nilai variabel n 1: 1

Nilai variabel β 2: 10.00
 Nilai variabel c 2: 2
 Nilai variabel δ 2: 10
 Nilai variabel n 2: 1

Nilai variabel β 3: 7.50
 Nilai variabel c 3: 1
 Nilai variabel δ 3: 10
 Nilai variabel n 3: 3

Gambar 6. Tampilan Input delta, rho dan keadaan

Jackson Terbuka

$$P = \prod_{i=1}^k (1 - \tau_i) \tau_i^n \text{ dengan } \tau_i = \beta / c_i \delta$$

	β	c	δ
1	5.00	1.00	10.00
2	10.00	2.00	10.00
3	7.50	1.00	10.00

Hasil $\tau_3 = 0.50$; Hasil $\tau_3 = 0.50$; Hasil $\tau_3 = 0.75$;

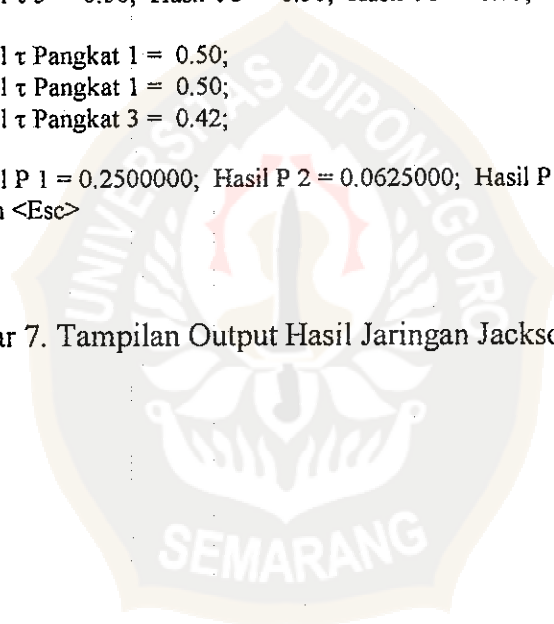
Hasil τ Pangkat 1 = 0.50;

Hasil τ Pangkat 1 = 0.50;

Hasil τ Pangkat 3 = 0.42;

Hasil P 1 = 0.2500000; Hasil P 2 = 0.0625000; Hasil P 3 = 0.0065918;
Tekan <Esc>

Gambar 7. Tampilan Output Hasil Jaringan Jackson terbuka



PENYELESAIAN JARINGAN JACKSON
DENGAN MENGGUNAKAN BAHASA PEMROGRAMAN PASCAL

MENU JARINGAN JACKSON TERTUTUP

- [1]. INPUT MATRIK KOEFISIEN
- [2]. OUTPUT MATRIK KOEFISIEN
- [3]. INPUT c, δ, n_i, n, m
- [4]. OUTPUT HASIL PERKALIAN
- [5]. OUTPUT MODEL C
- [6]. OUTPUT HASIL JARINGAN JACKSON TERTUTUP
- [7]. KEMBALI KE MENU UTAMA

Silahkan Pilih (1..7) :

Gambar 8. Tampilan Menu Jaringan Jackson Tertutup

Matriks Koefisien :
Banyaknya nilai : 5

Baris ke- 1
 $a [1,1] = 0.8$
 $a [1,2] = -0.3$
 $a [1,3] = 0$
 $a [1,4] = 0$
 $a [1,5] = -0.2$

Baris ke- 2
 $a [2,1] = -0.4$
 $a [2,2] = 1$
 $a [2,3] = -0.3$
 $a [2,4] = -0.2$
 $a [2,5] = 0$

Baris ke- 3
 $a [3,1] = 0$
 $a [3,2] = -0.3$
 $a [3,3] = 1$
 $a [3,4] = -0.2$
 $a [3,5] = -0.4$

Baris ke- 4
 $a [4,1] = 0$
 $a [4,2] = -0.4$
 $a [4,3] = -0.4$
 $a [4,4] = 0.6$
 $a [4,5] = -0.4$

Baris ke- 5
 $a [5,1] = -0.4$
 $a [5,2] = 0$
 $a [5,3] = -0.3$
 $a [5,4] = -0.2$
 $a [5,5] = 1$



Gambar 9. Tampilan Input Matrik Koefisien

Matriks semula :

```

0.80000 -0.30000 0.00000 0.00000 -0.20000
-0.40000 1.00000 -0.30000 -0.20000 0.00000
0.00000 -0.30000 1.00000 -0.20000 -0.40000
0.00000 -0.40000 -0.40000 0.60000 -0.40000
-0.40000 0.00000 -0.30000 -0.20000 1.00000

```

Matriks sekarang :

```

1.00000 0.00000 0.00000 -0.12829 -0.35855
0.00000 1.00000 0.00000 -0.34211 -0.28947
0.00000 0.00000 1.00000 -0.30263 -0.48684
0.00000 0.00000 0.00000 0.34211 -0.71053
0.00000 0.00000 0.00000 -0.34211 0.71053

```

Jadi penyelesaian utk persamaannya adalah:

$x[1] = 0.6250$

$x[2] = 1.0000$

$x[3] = 1.1154$

$x[4] = 2.0769$

$x[5] = 1.0000$

Tekan <Esc>

Gambar 10. Tampilan Output Matrik Koefisien

Nilai variabel k : 5

Nilai variabel β 1: 0.10744

Nilai variabel c 1: 1

Nilai variabel δ 1: 1

Nilai variabel ni 1: 1

Nilai variabel β 2: 0.17190

Nilai variabel c 2: 1

Nilai variabel δ 2: 1

Nilai variabel ni 2: 1

Nilai variabel β 3: 0.19174

Nilai variabel c 3: 1

Nilai variabel δ 3: 1

Nilai variabel ni 3: 1

Nilai variabel β 4: 0.35702

Nilai variabel c 4: 1

Nilai variabel δ 4: 1

Nilai variabel ni 4: 2

Nilai variabel β 5: 0.17190

Nilai variabel c 5: 1

Nilai variabel δ 5: 1

Nilai variabel ni 5: 1

Banyaknya Node : 5

Banyaknya Paket : 6

Gambar 11. Tampilan Input c, delta, keadaan, jumlah node dan jumlah paket

Jackson Tertutup

$$P = (1/c) \tau^n \text{ dengan } \tau = \beta/c\delta \text{ dan } C = \sum_{n=1}^k [\tau^n]$$

	β	c	δ
1	0.10744	1	1
2	0.17190	1	1
3	0.19174	1	1
4	0.35702	1	1
5	0.17190	1	1

Hasil $\tau_1 = 0.1074380$;

Hasil $\tau_2 = 0.1719008$;

Hasil $\tau_3 = 0.1917355$;

Hasil $\tau_4 = 0.3570248$;

Hasil $\tau_5 = 0.1719008$;

Jackson Tertutup

$$P = (1/c) \tau^n \text{ dengan } \tau = \beta/c\delta \text{ dan } C = \sum_{n=1}^k [\tau^n]$$

τ_1 Pangkat 1 = 0.1074380;

τ_2 Pangkat 1 = 0.1719008;

τ_3 Pangkat 1 = 0.1917355;

τ_4 Pangkat 2 = 0.1274667;

τ_5 Pangkat 1 = 0.1719008;

Hasil Perkalian = 7.7591344765E-05;

Tekan <Esc>

Gambar 12. Tampilan Output Nilai Parameter

6 0 0 0 0	3 2 0 0 1	2 3 1 0 0
5 1 0 0 0	3 1 2 0 0	2 3 0 1 0
5 0 1 0 0	3 1 1 1 0	2 3 0 0 1
5 0 0 1 0	3 1 1 0 1	2 2 2 0 0
5 0 0 0 1	3 1 0 2 0	2 2 1 1 0
4 2 0 0 0	3 1 0 1 1	2 2 1 0 1
4 1 1 0 0	3 1 0 0 2	2 2 0 2 0
4 1 0 1 0	3 0 3 0 0	2 2 0 1 1
4 1 0 0 1	3 0 2 1 0	2 2 0 0 2
4 0 2 0 0	3 0 2 0 1	2 1 3 0 0
4 0 1 1 0	3 0 1 2 0	2 1 2 1 0
4 0 1 0 1	3 0 1 1 1	2 1 2 0 1
4 0 0 2 0	3 0 1 0 2	2 1 1 2 0
4 0 0 1 1	3 0 0 3 0	2 1 1 1 1
4 0 0 0 2	3 0 0 2 1	2 1 1 0 2
3 3 0 0 0	3 0 0 1 2	2 1 0 3 0
3 2 1 0 0	3 0 0 0 3	2 1 0 2 1
3 2 0 1 0	2 4 0 0 0	2 1 0 1 2

2	1	0	0	3	1	0	4	1	0	0	2	0	2	2
2	0	4	0	0	1	0	4	0	1	0	2	0	1	3
2	0	3	1	0	1	0	3	2	0	0	2	0	0	4
2	0	3	0	1	1	0	3	1	1	0	1	5	0	0
2	0	2	2	0	1	0	3	0	2	0	1	4	1	0
2	0	2	1	1	1	0	2	3	0	0	1	4	0	1
2	0	2	0	2	1	0	2	2	1	0	1	3	2	0
2	0	1	3	0	1	0	2	1	2	0	1	3	1	1
2	0	1	2	1	1	0	2	0	3	0	1	3	0	2
2	0	1	1	2	1	0	1	4	0	0	1	2	3	0
2	0	1	0	3	1	0	1	3	1	0	1	2	2	1
2	0	0	4	0	1	0	1	2	2	0	1	2	1	2
2	0	0	3	1	1	0	1	1	3	0	1	2	0	3
2	0	0	2	2	1	0	1	0	4	0	1	1	4	0
2	0	0	1	3	1	0	0	5	0	0	1	1	3	1
2	0	0	0	4	1	0	0	4	1	0	1	1	2	2
1	5	0	0	0	1	0	0	3	2	0	1	1	1	3
1	4	1	0	0	1	0	0	2	3	0	1	1	0	4
1	4	0	1	0	1	0	0	1	4	0	1	0	5	0
1	4	0	0	1	1	0	0	0	5	0	1	0	4	1
1	3	2	0	0	0	6	0	0	0	0	1	0	3	2
1	3	1	1	0	0	5	1	0	0	0	1	0	2	3
1	3	1	0	1	0	5	0	1	0	0	1	0	1	4
1	3	0	2	0	0	5	0	0	1	0	1	0	0	5
1	3	0	1	1	0	4	2	0	0	0	0	6	0	0
1	3	0	0	2	0	4	1	1	0	0	0	5	1	0
1	2	3	0	0	0	4	1	0	1	0	0	5	0	1
1	2	2	1	0	0	4	0	2	0	0	0	4	2	0
1	2	2	0	1	0	4	0	1	1	0	0	4	1	1
1	2	1	2	0	0	4	0	0	2	0	0	4	0	2
1	2	1	1	1	0	3	3	0	0	0	0	3	3	0
1	2	1	0	2	0	3	2	1	0	0	0	3	2	1
1	2	0	3	0	0	3	2	0	1	0	0	3	1	2
1	2	0	2	1	0	3	1	2	0	0	0	3	0	3
1	2	0	1	2	0	3	1	1	1	0	0	2	4	0
1	2	0	0	3	0	3	1	0	2	0	0	2	3	1
1	1	4	0	0	0	3	0	3	0	0	0	2	2	2
1	1	3	1	0	0	3	0	2	1	0	0	2	1	3
1	1	3	0	1	0	3	0	1	2	0	0	2	0	4
1	1	2	2	0	0	3	0	0	3	0	0	1	5	0
1	1	2	1	1	0	2	4	0	0	0	0	1	4	1
1	1	2	0	2	0	2	3	1	0	0	0	1	3	2
1	1	1	3	0	0	2	3	0	1	0	0	1	2	3
1	1	1	2	1	0	2	2	2	0	0	0	1	1	4
1	1	1	1	2	0	2	2	1	1	0	0	1	0	5
1	1	1	1	0	3	2	2	0	2	0	0	0	6	0
1	1	0	4	0	0	2	1	3	0	0	0	0	5	1
1	1	0	3	1	0	2	1	2	1	0	0	0	4	2
1	1	0	2	2	0	2	1	1	2	0	0	0	3	3
1	1	0	1	3	0	2	1	0	3	0	0	0	2	4
1	1	0	0	4	0	2	0	4	0	0	0	0	1	5
1	0	5	0	0	0	2	0	3	1	0	0	0	0	6

Jadi banyaknya kemungkinan 6 paket dalam 5 node adalah : 210

Gambar 14. Tampilan Output Model Keadaan

Hasil : 2.0927763264E-02
Hasil Tertutup : 3.7075794381E-03

Gambar 15. Tampilan Output Hasil Jaringan Jackson Tertutup

