Lampiran 1
Program Menu Utama

```
package physics;
import java.awt.Dimension;
import java.awt.Toolkit;
import physics.koneksi.KoneksiAstronomi;
/**
@author arif
 */
public class Tampilan extends javax.swing.JFrame {

    public Tampilan() {
        initComponents();

    }

    @SuppressWarnings("unchecked")
    // <editor-fold defaultstate="collapsed" desc="Generated Code">
    private void initComponents() {

        desktop = new javax.swing.JDesktopPane();
        jImageDesktopPane1 = new physics.JImageDesktopPane();
        jMenuBar1 = new javax.swing.JMenuBar();
        jMenu1 = new javax.swing.JMenu();
        Exit = new javax.swing.JMenuItem();
        jMenu2 = new javax.swing.JMenu();
        FB = new javax.swing.JMenuItem();
        PB = new javax.swing.JMenuItem();
        KK = new javax.swing.JMenuItem();

setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON
_CLOSE);
        setTitle("Aplikasi Visibilitas Bulan"); // NOI18N
        addWindowListener(new java.awt.event.WindowAdapter() {
            public void windowActivated(java.awt.event.WindowEvent
evt) {
                formWindowActivated(evt);
            }
```

```
        });

desktop.setDragMode(javax.swing.JDesktopPane.OUTLINE_DRAG
_MODE);
        desktop.setName("desktop"); // NOI18N

        jImageDesktopPane1.setName("jImageDesktopPane1"); //
NOI18N
        jImageDesktopPane1.setBounds(0, 0, 520, 410);
        desktop.add(jImageDesktopPane1,
javax.swing.JLayeredPane.DEFAULT_LAYER);

        jMenuBar1.setName("jMenuBar1"); // NOI18N
        jMenu1.setText("File");
        jMenu1.setName("jMenu1"); // NOI18N


Exit.setAccelerator(javax.swing.KeyStroke.getKeyStroke(java.awt.e
vent.KeyEvent.VK_K, java.awt.event.InputEvent.CTRL_MASK));
        Exit.setText("Exit");
        Exit.setName("Exit"); // NOI18N
        Exit.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                ExitActionPerformed(evt);
            }
        });
        jMenu1.add(Exit);
        jMenuBar1.add(jMenu1);
        jMenu2.setText("Hisab");
        jMenu2.setName("jMenu2"); // NOI18N


FB.setAccelerator(javax.swing.KeyStroke.getKeyStroke(java.awt.ev
ent.KeyEvent.VK_A, java.awt.event.InputEvent.CTRL_MASK));
        FB.setText("Fase Bulan");
        FB.setName("FB"); // NOI18N
        FB.addActionListener(new java.awt.event.ActionListener() {
```

```
        public void actionPerformed(java.awt.event.ActionEvent evt)
{
            FBActionPerformed(evt);
        }
    });
    jMenu2.add(FB);

PB.setAccelerator(javax.swing.KeyStroke.getKeyStroke(java.awt.ev
ent.KeyEvent.VK_B, java.awt.event.InputEvent.CTRL_MASK));
    PB.setText("Posisi Bulan");
    PB.setName("PB"); // NOI18N
    PB.addActionListener(new java.awt.event.ActionListener() {
        public void actionPerformed(java.awt.event.ActionEvent evt)
{
            PBActionPerformed(evt);
        }
    });
    jMenu2.add(PB);

KK.setAccelerator(javax.swing.KeyStroke.getKeyStroke(java.awt.ev
ent.KeyEvent.VK_C, java.awt.event.InputEvent.CTRL_MASK));
    KK.setText("Konversi Kalender");
    KK.setName("KK"); // NOI18N
    KK.addActionListener(new java.awt.event.ActionListener() {
        public void actionPerformed(java.awt.event.ActionEvent evt)
{
            KKActionPerformed(evt);
        }
    });
    jMenu2.add(KK);
    jMenuBar1.add(jMenu2);
    setJMenuBar(jMenuBar1);

    javax.swing.GroupLayout layout = new
javax.swing.GroupLayout(getContentPane());
    getContentPane().setLayout(layout);
    layout.setHorizontalGroup(
```

```
layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LE
ADING)
            .addComponent(desktop,
javax.swing.GroupLayout.Alignment.TRAILING,
javax.swing.GroupLayout.DEFAULT_SIZE, 514,
Short.MAX_VALUE)
        );
        layout.setVerticalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LE
ADING)
            .addComponent(desktop,
javax.swing.GroupLayout.Alignment.TRAILING,
javax.swing.GroupLayout.DEFAULT_SIZE, 411,
Short.MAX_VALUE)
        );

        pack();
    }// </editor-fold>

    private void FBActionPerformed(java.awt.event.ActionEvent evt)
{
        new FaseBulan().setVisible(true);
    }

    private void PBActionPerformed(java.awt.event.ActionEvent evt)
{
        new PosisiBulan().setVisible(true);
    }

    private void KKActionPerformed(java.awt.event.ActionEvent evt)
{
        new Konversi().setVisible(true);
    }

    private void ExitActionPerformed(java.awt.event.ActionEvent
evt) {
        dispose();
```

```
    }

    private void formWindowActivated(java.awt.event.WindowEvent
evt) {
        Dimension posisi =
Toolkit.getDefaultToolkit().getScreenSize();
        int x = (posisi.width - this.getWidth())/2;
        int y = (posisi.height -this.getHeight())/2;
        this.setLocation(x,y);
        this.setVisible(true);
    }

    public static void main(String args[]) {

        //<editor-fold defaultstate="collapsed" desc=" Look and feel
setting code (optional) ">
        /* If Nimbus (introduced in Java SE 6) is not available, stay
with the default look and feel.
         * For details see
http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.
html
         */
        try {
            for (javax.swing.UIManager.LookAndFeelInfo info :
javax.swing.UIManager.getInstalledLookAndFeels()) {
                if ("Nimbus".equals(info.getName())) {

javax.swing.UIManager.setLookAndFeel(info.getClassName());
                    break;
                }
            }
        } catch (ClassNotFoundException ex) {

java.util.logging.Logger.getLogger(Tampilan.class.getName()).log(j
ava.util.logging.Level.SEVERE, null, ex);
        } catch (InstantiationException ex) {

java.util.logging.Logger.getLogger(Tampilan.class.getName()).log(j
ava.util.logging.Level.SEVERE, null, ex);
```

```
        } catch (IllegalAccessException ex) {

java.util.logging.Logger.getLogger(Tampilan.class.getName()).log(j
ava.util.logging.Level.SEVERE, null, ex);
        } catch (javax.swing.UnsupportedLookAndFeelException ex) {

java.util.logging.Logger.getLogger(Tampilan.class.getName()).log(j
ava.util.logging.Level.SEVERE, null, ex);
        }
        //</editor-fold>

        /* Create and display the form */
        java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
                new Tampilan().setVisible(true);
            }
        });
        KoneksiAstronomi koneksi = new KoneksiAstronomi();
        koneksi.panggilDriver();
        koneksi.hubungDBastronomi();
    }
    // Variables declaration - do not modify
    private javax.swing.JMenuItem Exit;
    private javax.swing.JMenuItem FB;
    private javax.swing.JMenuItem KK;
    private javax.swing.JMenuItem PB;
    private javax.swing.JDesktopPane desktop;
    private physics.JImageDesktopPane jImageDesktopPane1;
    private javax.swing.JMenu jMenu1;
    private javax.swing.JMenu jMenu2;
    private javax.swing.JMenuBar jMenuBar1;
    // End of variables declaration
}
```

Lampiran 2
Program Fase Bulan

```
package physics;
import java.text.DecimalFormat;
/**
@author arif
 */
public class FaseBulan extends javax.swing.JFrame {


    static int NilaiTahun;
    static double TDetik;
    static double THari;
    static int nilaiBulan;
    DecimalFormat ft0= new DecimalFormat("#.##");
    DecimalFormat ft= new DecimalFormat("#.####");
    DecimalFormat ft1= new DecimalFormat("#.#####");
    DecimalFormat ft2= new DecimalFormat("#.#######");
    DecimalFormat ft3= new DecimalFormat("#.######");

    static String[] bulanMasehi = { "Desember","Januari", "Februari",
"Maret", "April", "Mei", "Juni", "Juli", "Agustus", "September",
"Oktober", "November","Desember"};
    private int A;
    String Bulan1;
    String nilaiTahun;

        public FaseBulan() {
        initComponents();
    }

    void newMoon()
    {
      NilaiTahun = Integer.parseInt(InputThn.getText());
      int K = (int)Math.round((NilaiTahun-2000)*12.3685);
      double T1,T2,T3,T4;
      jta.append("Date                                    Time(UT)\n");
      jta.append("-----------------------------------------------\n");
```

```
int j;

        for(j=0;j<13;j++)
        {
         int month = j+1;
double y = (NilaiTahun+(month-0.5)/12);
double T = Double.valueOf(ft1.format(K/1236.85));
T1 = T; T2= T*T; T3 = T*T*T; T4 = T*T*T*T;

         //Eksentritas bumi
        double Ek = 1-0.002516*T1-0.0000074*T2;

         //---Anomali Rata-rata Matahari (M)
 double M1 =Double.valueOf(ft.format(2.5534 +29.1053567*K -
0.0000014*T2 -0.00000011*T3));
          double M =
Math.toRadians(Double.valueOf(ft.format(360+(M1%360))));

        //---Anomali Rata-rata Bulan (M')
        double MBulan1 = Double.valueOf(ft.format(201.5643
+385.81693528*K +0.0107582*T2 +0.00001238*T3 -
0.000000058*T4));
        double MBulan=
Math.toRadians(Double.valueOf(ft.format(360+(MBulan1%360))));

         //---Argumen Lintang Bulan
         double F1 = Double.valueOf(ft.format(160.7108
+390.67050284*K -0.0016118*T2 -
0.00000227*T3+0.000000011*T4));
         double F=
Math.toRadians(Double.valueOf(ft.format(360+(F1%360))));

          //---Argumen Bujur Bulan
          double Omega1 = Double.valueOf(ft.format(124.7746 -
1.56375588*K +0.0020672*T2 +0.00000215*T3));
          double Omega=
Math.toRadians(Double.valueOf(ft.format(Omega1-360)));

      //---Argumen Planet
```

```
      double A1= (299.77 +0.107408*K -
0.009173*T*T)*Math.PI/180;//radian
      double A2= (251.88 +0.016321*K)*Math.PI/180;//----radian
      double A3= ((251.83
+26.651886*K)%360+360)*Math.PI/180;//---radian
      double A4= ((349.42
+36.412478*K)%360+360)*Math.PI/180;//---radian
      double A5= ((84.66 +18.206239*K)%360+360)*Math.PI/180;//-
---radian
      double A6= ((141.74
+53.303771*K)%360+360)*Math.PI/180;//---radian
      double A7= ((207.14 +2.453732*K)%360+360)*Math.PI/180;//-
---radian
      double A8= ((154.84 +7.30686*K)%360+360)*Math.PI/180;//--
---radian
      double A9= ((34.52 +27.261239*K)%360+360)*Math.PI/180;//-
---radian
      double A10= (207.19 +0.121824*K)*Math.PI/180;//---radian
      double A11= (291.34 +1.844379*K)*Math.PI/180;//---radian
      double A12= ((161.72
+24.198154*K)%360+360)*Math.PI/180;//--radian
      double A13= ((239.56
+25.513099*K)%360+360)*Math.PI/180;//--radian
      double A14= ((331.55
+3.592518*K)%360+360)*Math.PI/180;//---radian

        //=====JDE belum terkoreksi
     double JDE1= 2451550.09766 + 29.530588861*K
         + 0.00015437*T2 - 0.00000015*T3 + 0.00000000073*T4;
     double JDE=Double.valueOf(ft1.format(JDE1));

      double KoreksiArgumenPlanet1 =(325*Math.sin(A1) +
165*Math.sin(A2) + 164*Math.sin(A3)
         + 126*Math.sin(A4) + 110*Math.sin(A5) + 62*Math.sin(A6)
+ 60*Math.sin(A7)
         + 56*Math.sin(A8)+ 47*Math.sin(A9) + 42*Math.sin(A10) +
40*Math.sin(A11) + 37*Math.sin(A12)
         + 35*Math.sin(A13) + 23*Math.sin(A14))/1000000;
```

```
    double KoreksiArgumenPlanet
=Double.valueOf(ft3.format(KoreksiArgumenPlanet1));

    double KoreksiFase1=(-40720*Math.sin(MBulan) +
17241*Ek*Math.sin(M)
        +  1608*Math.sin(2*MBulan) + 1039*Math.sin(2*F) +
739*Ek*Math.sin(MBulan-M)- 514*Ek*Math.sin(MBulan+M) +
208*Ek*Ek*Math.sin(2*M)
        - 111*Math.sin(MBulan-2*F) - 57*Math.sin(MBulan+2*F) +
56*Ek*Math.sin(2*MBulan+M)- 42*Math.sin(3*MBulan) +
42*Ek*Math.sin(M+2*F)
        + 38*Ek*Math.sin(M-2*F)- 24*Ek*Math.sin(2*MBulan-M)
- 17*Math.sin(Omega) - 7*Math.sin(MBulan+2*M)
        + 4*Math.sin(2*(MBulan-F)) + 4*Math.sin(3*M) +
3*Math.sin(MBulan+M-2*F) +3*Math.sin(2*(MBulan+F))
        - 3*Math.sin(MBulan+M+2*F) + 3*Math.sin(MBulan-
M+2*F) - 2*Math.sin(MBulan-M-2*F) -
2*Math.sin(3*MBulan+M)+ 2*Math.sin(4*MBulan))/100000;//hari
        double KoreksiFase
=Double.valueOf(ft1.format(KoreksiFase1));

     //==JDE terkoreksi (TD)
   double JD1 =JDE+KoreksiFase+KoreksiArgumenPlanet;
   double JD =Double.valueOf(ft1.format(JD1));

    //=========Menghitung Delta T=======
//================================================
    //SEBELUM TAHUN -500
      if (y <= -500) {
         TDetik = -20 + 32 * (y/100 - 18.2) * (y/100 - 18.2);
         THari= TDetik / 86400;

      } //==ANTARA -500 DAN 500
      else if ((y > -500) && (y <= 500)) {
          TDetik = 10583.6 - 1014.41*(y/100) +
33.78311*(y/100)*(y/100) - 5.952053*(y/100)*(y/100)*(y/100)
              - 0.1798452*(y/100)*(y/100)*(y/100)*(y/100) +
0.022174192*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)
```

```
            +
0.0090316521*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)*(y/100);
        THari = TDetik / 86400;

    } //==ANTARA 500 SD 1600
    else if ((y > 500) && (y <= 1600)) {
      TDetik = 1574.2 - 556.01*(y/100 - 10) + 71.23472*(y/100 -
10)*(y/100 - 10) + 0.319781*(y/100 - 10)*(y/100 - 10)*(y/100 - 10)
            - 0.8503463*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)
            - 0.005050998*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)
            + 0.0083572073*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)*(y/100 - 10);
        THari = TDetik / 86400;

    } //=====ANTARA 1600 SD 1700
    else if ((y > 1600) && (y <= 1700)) {
        TDetik = 120 - 0.9808*(y - 1600) - 0.01532*(y - 1600)*(y -
1600)
            + ((y - 1600)*(y - 1600)*(y - 1600)/7129);
        THari = TDetik  / 86400;

    } //===antara 1700 SD 1800
    else if ((y > 1700) && (y <= 1800)) {
        TDetik = 8.83 + 0.1603*(y - 1700) - 0.0059285*(y -
1700)*(y- 1700)
            + 0.00013336*(y - 1700)*(y - 1700)*(y - 1700)
            - ((y - 1700)*(y - 1700)*(y - 1700)*(y - 1700)/1174000);
        THari = TDetik / 86400;

    } //===antara 1800 SD 1860
    else if ((y > 1800) && (y <= 1860)) {
        TDetik = 13.72 - 0.332447*(y - 1800) + 0.0068612*(y -
1800)*(y - 1800)+ 0.0041116*(y - 1800)*(y - 1800)*(y - 1800)
            - 0.00037436*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)
            + 0.0000121272*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)
```

```
            - 0.0000001699*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)*(y - 1800)
            + 0.000000000875*(y - 1800)*(y - 1800)*(y - 1800)*(y
- 1800)*(y - 1800)*(y - 1800)*(y - 1800);
        THari = TDetik / 86400;

    } //==antara 1860 sd 1900
    else if ((y > 1860) && (y <= 1900)) {
        TDetik = 7.62 + 0.5737*(y - 1860) - 0.251754*(y - 1860)*(y
- 1860)
            + 0.01680668*(y - 1860)*(y - 1860)*(y - 1860)
            - 0.0004473624*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)
            + ((y - 1860)*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)/233174);
        THari = TDetik / 86400;
    }

    //==antara 1900 sd 1920
    if ((y > 1900) && (y <= 1920)) {
        TDetik = -2.79 + 1.494119*(y- 1900) - 0.0598939*(y-
1900)*(y- 1900)
            + 0.0061966*(y- 1900)*(y- 1900)*(y- 1900)
            - 0.000197*(y- 1900)*(y- 1900)*(y- 1900)*(y- 1900);
        THari = TDetik / 86400;

    } //==antara 1920 sd 1941
    else if ((y > 1900) && (y <= 1920)) {
        TDetik = 21.2 + 0.84493*(y - 1920) - 0.0761*(y - 1920)*(y -
1920)
            + 0.0020936*(y - 1920)*(y - 1920)*(y - 1920);
        THari = TDetik / 86400;

} //==antara 1941 sd 1961
    else if ((y > 1941) && (y <= 1961)) {
        TDetik = 29.07 + 0.407*(y - 1950) - (y - 1950)*(y -
1950)/233
            + ((y - 1950)*(y - 1950)*(y - 1950)/2547);
        THari = TDetik / 86400;
```

```
    }
    //==antara 1961 sd 1986
    else if ((y > 1961) && (y <= 1986)) {
       TDetik = 45.45 + 1.067*(y - 1975) - (y - 1975)*(y -
1975)/260
            - ((y - 1975)*(y - 1975)*(y - 1975)/718);
       THari = TDetik / 86400;

    } //==antara 1986 sd 2005
    else if ((y > 1986) && (y <= 2005)) {
        TDetik = 63.86 + 0.3345*(y - 2000) - 0.060374*(y -
2000)*(y - 2000)
            + 0.0017275*(y - 2000)*(y - 2000)*(y - 2000)
            + 0.000651814*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)
            + 0.00002373599*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)*(y - 2000);
       THari = TDetik / 86400;

    } //==antara 2005 sd 2050
    else if ((y > 2005) && (y <= 2050)) {
       TDetik = 62.92 + 0.32217*(y - 2000) + 0.005589*(y -
2000)*(y - 2000);
       THari = TDetik / 86400;

    } //==antara 2050 sd 2150
    else if ((y > 2050) && (y <= 2150)) {
       TDetik = -20 + 32*(y/100 - 18.20)*(y/100 - 18.2) -
0.5628*(2150 - y);
      THari = TDetik / 86400;

    } //==diatas 2150
    else if (y > 2150) {
       TDetik = -20 + 32*(y/100 - 18.2)*(y/100 - 18.2);
        THari = TDetik / 86400;

    } else {
       TDetik  = 0;
        THari = TDetik / 86400;
```

```
    }

   //========JD terkoreksi (UT)
   double JDTerkoreksiUT=Double.valueOf(ft2.format(JD-THari));

   //===JD + 0.5 =
   double JDTambahan=JDTerkoreksiUT+0.5;
   int Z=(int)JDTambahan;
   double F2=Double.valueOf(ft2.format(JDTambahan-Z));

   //Menghitung nilai A
      if(Z<2299161)
      {
         A=Z;
      }
     else if (Z>=2299161)
      {
        int Alpha=(int)((Z- 1867216.25)/36524.25);
        A=Z+1+Alpha-(int)(Alpha/4);
      }

   //nilai B
   int B= A+1524;
   int C=(int)((B - 122.1)/365.25);
   int D=(int)(365.25*C);
   int E=(int)((B - D)/30.6001);

   //==Menghitung tanggal
   double day= B - D - (int) (30.6001*E) + F2;
   int day2= (int)day;                    //------> variabel u/ mengambil
tanggal
   String tanggal=Integer.toString(day2);
   double day3= day - day2;

   //==Menghitung Bulan
   if(E<14)
    {
      nilaiBulan= E-1;
      int Bulan = nilaiBulan;
```

```
      Bulan1=bulanMasehi[Bulan];
    }

   else if(E==14 || E==15)
   {
      nilaiBulan= E-13;
     int  Bulan = nilaiBulan;
     Bulan1=bulanMasehi[Bulan];
   }

   //==Menghitung Tahun Awal Bulan
   if(nilaiBulan>2)
   {
      int Tahun = C-4716;
      nilaiTahun = Integer.toString(Tahun);
   }
   else if (nilaiBulan==1 || nilaiBulan==2)
   {
      int Tahun = C-4715;
      nilaiTahun = Integer.toString(Tahun);
   }

   //==Menghitung hari ke Jam:Menit:Detik (UT)
   double Jam = day3*24;
   int JamAkhir = (int)Jam;          //-------> variabel u/ mengambil
nilai jam
   String nilaiJam = Integer.toString(JamAkhir);
   double menit = (Jam-JamAkhir)*60;
   int menitAkhir = (int)menit;       // -------> variabel u/ mengambil
nilai menit
   String nilaiMenit = Integer.toString(menitAkhir);
   double detik = (menit-menitAkhir)*60; //-------> variabel u/
mengambil nilai detik
   String nilaiDetik =
Double.toString(Double.valueOf(ft0.format(detik)));

  jta.append(""+tanggal+" "+Bulan1+" "+nilaiTahun);
  jta.append("           "+nilaiJam +" : "+nilaiMenit +" :
"+nilaiDetik+"\n");
```

```
  System.out.println("\n");

   //NB : untuk mengambil nilai :
   //---> tanggal= day2            ----> jam = nilaiJam
   //---> bulan= Bulan             ----> menit = nilaiMenit
   //---> tahun = nilaiTahun       ----> detik = nilaiDetik
K++;
        }
  }

   void firstQuarter(){
     NilaiTahun = Integer.parseInt(InputThn.getText());
     int K1 = (int)Math.round((NilaiTahun-2000)*12.3685);
     double K = K1+0.25;
     double T1,T2,T3,T4;
     jta.append("Date                                    Time(UT)\n");
     jta.append("-----------------------------------------------\n");
     int j;
        for(j=0;j<13;j++)
        {
         int month = j+1;
         double y = (NilaiTahun+(month-0.5)/12);
         double T = Double.valueOf(ft1.format(K/1236.85));
         T1 = T; T2= T*T; T3 = T*T*T; T4 = T*T*T*T;

         //Eksentritas bumi
        double Ek = 1-0.002516*T1-0.0000074*T2;

         //---Anomali Rata-rata Matahari (M)
        double M1 =Double.valueOf(ft.format(2.5534
+29.1053567*K -0.0000014*T2 -0.00000011*T3));
        double M =
Math.toRadians(Double.valueOf(ft.format(360+(M1%360))));

        //---Anomali Rata-rata Bulan (M')
        double MBulan1 = Double.valueOf(ft.format(201.5643
+385.81693528*K +0.0107582*T2 +0.00001238*T3 -
0.000000058*T4));
```

```
        double MBulan=
Math.toRadians(Double.valueOf(ft.format(360+(MBulan1%360))));

        //---Argumen Lintang Bulan
        double F1 = Double.valueOf(ft.format(160.7108
+390.67050284*K -0.0016118*T2 -
0.00000227*T3+0.000000011*T4));          double F=
Math.toRadians(Double.valueOf(ft.format(360+(F1%360))));

         //---Argumen Bujur Bulan
         double Omega1 = Double.valueOf(ft.format(124.7746 -
1.56375588*K +0.0020672*T2 +0.00000215*T3));
         double Omega=
Math.toRadians(Double.valueOf(ft.format(Omega1-360)));

       //---Argumen Planet
     double A1= (299.77 +0.107408*K -
0.009173*T*T)*Math.PI/180;//radian
     double A2= (251.88 +0.016321*K)*Math.PI/180;//----radian
     double A3= ((251.83
+26.651886*K)%360+360)*Math.PI/180;//---radian
     double A4= ((349.42
+36.412478*K)%360+360)*Math.PI/180;//---radian
     double A5= ((84.66 +18.206239*K)%360+360)*Math.PI/180;//-
---radian
     double A6= ((141.74
+53.303771*K)%360+360)*Math.PI/180;//---radian
     double A7= ((207.14 +2.453732*K)%360+360)*Math.PI/180;//-
---radian
     double A8= ((154.84 +7.30686*K)%360+360)*Math.PI/180;//--
---radian
     double A9= ((34.52 +27.261239*K)%360+360)*Math.PI/180;//-
---radian
     double A10= (207.19 +0.121824*K)*Math.PI/180;//---radian
     double A11= (291.34 +1.844379*K)*Math.PI/180;//---radian
     double A12= ((161.72
+24.198154*K)%360+360)*Math.PI/180;//--radian
     double A13= ((239.56
+25.513099*K)%360+360)*Math.PI/180;//--radian
```

```
      double A14= ((331.55
+3.592518*K)%360+360)*Math.PI/180;//---radian

        //=====JDE belum terkoreksi
     double JDE1= 2451550.09766 + 29.530588861*K
          + 0.00015437*T2 - 0.00000015*T3 + 0.00000000073*T4;
     double JDE=Double.valueOf(ft1.format(JDE1));

      double KoreksiArgumenPlanet1 =(325*Math.sin(A1) +
165*Math.sin(A2) + 164*Math.sin(A3)
          + 126*Math.sin(A4) + 110*Math.sin(A5) + 62*Math.sin(A6)
+ 60*Math.sin(A7)
          + 56*Math.sin(A8)+ 47*Math.sin(A9) + 42*Math.sin(A10) +
40*Math.sin(A11) + 37*Math.sin(A12)
          + 35*Math.sin(A13) + 23*Math.sin(A14))/1000000;
     double KoreksiArgumenPlanet
=Double.valueOf(ft3.format(KoreksiArgumenPlanet1));

     double KoreksiFase2 = (- 62801*Math.sin(MBulan) +
17172*Ek*Math.sin(M) - 1183*Ek*Math.sin(MBulan+M) +
862*Math.sin(2*MBulan)
                + 804*Math.sin(2*F) + 454*Ek*Math.sin(MBulan-M)
+ 204*Ek*Ek*Math.sin(2*M) - 180*Math.sin(MBulan-2*F) -
70*Math.sin(MBulan+2*F)
                - 40*Math.sin(3*MBulan) -
34*Ek*Math.sin(2*MBulan-M) + 32*Ek*Math.sin(M+2*F) -
32*Ek*Math.sin(M-2*F) -28*Ek*Ek*Math.sin(MBulan+2*M)
                + 27*Ek*Math.sin(2*MBulan+M) -
17*Math.sin(Omega) - 5*Math.sin(MBulan-M-2*F) +
4*Math.sin(2*MBulan+2*F) - 4*Math.sin(MBulan+M+2*F)
                + 4*Math.sin(MBulan-2*M) +
3*Math.sin(MBulan+M-2*F) + 3*Math.sin(3*M) +
2*Math.sin(2*MBulan-2*F) + 2*Math.sin(MBulan-M+2*F) -
2*Math.sin(3*MBulan+M)
                + (306 - 38*Ek*Math.cos(M) + 26*Math.cos(MBulan)
- 2*Math.cos(MBulan-M) + 2*Math.cos(MBulan+M) +
2*Math.cos(2*F)))/100000;//hari
```

```
    double KoreksiFase
=Double.valueOf(ft1.format(KoreksiFase2));

    //==JDE terkoreksi (TD)
   double JD1 =JDE+KoreksiFase+KoreksiArgumenPlanet;
   double JD =Double.valueOf(ft1.format(JD1));

    //=========Menghitung Delta T=======
 //==========================================
    //SEBELUM TAHUN -500
      if (y <= -500) {
         TDetik = -20 + 32 * (y/100 - 18.2) * (y/100 - 18.2);
         THari= TDetik / 86400;

      } //==ANTARA -500 DAN 500
      else if ((y > -500) && (y <= 500)) {
          TDetik = 10583.6 - 1014.41*(y/100) +
33.78311*(y/100)*(y/100) - 5.952053*(y/100)*(y/100)*(y/100)
              - 0.1798452*(y/100)*(y/100)*(y/100)*(y/100) +
0.022174192*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)
              +
0.0090316521*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)*(y/100);
         THari = TDetik / 86400;

      } //==ANTARA 500 SD 1600
      else if ((y > 500) && (y <= 1600)) {
        TDetik = 1574.2 - 556.01*(y/100 - 10) + 71.23472*(y/100 -
10)*(y/100 - 10) + 0.319781*(y/100 - 10)*(y/100 - 10)*(y/100 - 10)
              - 0.8503463*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)
              - 0.005050998*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)
              + 0.0083572073*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)*(y/100 - 10);
         THari = TDetik / 86400;

      } //=====ANTARA 1600 SD 1700
      else if ((y > 1600) && (y <= 1700)) {
```

```
        TDetik = 120 - 0.9808*(y - 1600) - 0.01532*(y - 1600)*(y -
1600)
                + ((y - 1600)*(y - 1600)*(y - 1600)/7129);
        THari = TDetik  / 86400;

    } //===antara 1700 SD 1800
    else if ((y > 1700) && (y <= 1800)) {
        TDetik = 8.83 + 0.1603*(y - 1700) - 0.0059285*(y -
1700)*(y- 1700)
                + 0.00013336*(y - 1700)*(y - 1700)*(y - 1700)
                - ((y - 1700)*(y - 1700)*(y - 1700)*(y - 1700)/1174000);
        THari = TDetik / 86400;

    } //===antara 1800 SD 1860
    else if ((y > 1800) && (y <= 1860)) {
        TDetik = 13.72 - 0.332447*(y - 1800) + 0.0068612*(y -
1800)*(y - 1800)+ 0.0041116*(y - 1800)*(y - 1800)*(y - 1800)
                - 0.00037436*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)
                + 0.0000121272*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)
                - 0.0000001699*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)*(y - 1800)
                + 0.000000000875*(y - 1800)*(y - 1800)*(y - 1800)*(y
- 1800)*(y - 1800)*(y - 1800)*(y - 1800);
        THari = TDetik / 86400;

    } //==antara 1860 sd 1900
    else if ((y > 1860) && (y <= 1900)) {
        TDetik = 7.62 + 0.5737*(y - 1860) - 0.251754*(y - 1860)*(y
- 1860)
                + 0.01680668*(y - 1860)*(y - 1860)*(y - 1860)
                - 0.0004473624*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)
                + ((y - 1860)*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)/233174);
        THari = TDetik / 86400;
    }
```

```
      //==antara 1900 sd 1920
      if ((y > 1900) && (y <= 1920)) {
         TDetik = -2.79 + 1.494119*(y- 1900) - 0.0598939*(y-
1900)*(y- 1900)
                + 0.0061966*(y- 1900)*(y- 1900)*(y- 1900)
                - 0.000197*(y- 1900)*(y- 1900)*(y- 1900)*(y- 1900);
         THari = TDetik / 86400;

      } //==antara 1920 sd 1941
      else if ((y > 1900) && (y <= 1920)) {
         TDetik = 21.2 + 0.84493*(y - 1920) - 0.0761*(y - 1920)*(y -
1920)
                + 0.0020936*(y - 1920)*(y - 1920)*(y - 1920);
          THari = TDetik / 86400;

      } //==antara 1941 sd 1961
      else if ((y > 1941) && (y <= 1961)) {
         TDetik = 29.07 + 0.407*(y - 1950) - (y - 1950)*(y -
1950)/233
                + ((y - 1950)*(y - 1950)*(y - 1950)/2547);
         THari = TDetik / 86400;

      }
      //==antara 1961 sd 1986
      else if ((y > 1961) && (y <= 1986)) {
         TDetik = 45.45 + 1.067*(y - 1975) - (y - 1975)*(y -
1975)/260
                - ((y - 1975)*(y - 1975)*(y - 1975)/718);
         THari = TDetik / 86400;

      } //==antara 1986 sd 2005
      else if ((y > 1986) && (y <= 2005)) {
          TDetik = 63.86 + 0.3345*(y - 2000) - 0.060374*(y -
2000)*(y - 2000)
                + 0.0017275*(y - 2000)*(y - 2000)*(y - 2000)
                + 0.000651814*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)
                + 0.00002373599*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)*(y - 2000);
```

```
        THari = TDetik / 86400;

      } //==antara 2005 sd 2050
      else if ((y > 2005) && (y <= 2050)) {
         TDetik = 62.92 + 0.32217*(y - 2000) + 0.005589*(y -
2000)*(y - 2000);
         THari = TDetik / 86400;

      } //==antara 2050 sd 2150
      else if ((y > 2050) && (y <= 2150)) {
         TDetik = -20 + 32*(y/100 - 18.20)*(y/100 - 18.2) -
0.5628*(2150 - y);
        THari = TDetik / 86400;

      } //==diatas 2150
      else if (y > 2150) {
         TDetik = -20 + 32*(y/100 - 18.2)*(y/100 - 18.2);
          THari = TDetik / 86400;

      } else {
         TDetik  = 0;
          THari = TDetik / 86400;
      }

   //========JD terkoreksi (UT)
   double JDTerkoreksiUT=Double.valueOf(ft2.format(JD-THari));

   //===JD + 0.5 =
   double JDTambahan=JDTerkoreksiUT+0.5;
   int Z=(int)JDTambahan;
   double F2=Double.valueOf(ft2.format(JDTambahan-Z));

   //Menghitung nilai A
     if(Z<2299161)
     {
        A=(int)Z;
     }
    else if (Z>=2299161)
     {
```

```
            int Alpha=(int)((Z- 1867216.25)/36524.25);
            A=Z+1+Alpha-(int)(Alpha/4);
          }

    //nilai B
    int B= A+1524;
    int C=(int)((B - 122.1)/365.25);
    int D=(int)(365.25*C);
    int E=(int)((B - D)/30.6001);
    //==Menghitung tanggal
    double day= B - D - (int) (30.6001*E) + F2;
    int day2= (int)day;                    //------> variabel u/ mengambil
tanggal
    String tanggal=Integer.toString(day2);
    double day3= day - day2;

    //==Menghitung Bulan
    if(E<14)
     {
        nilaiBulan= E-1;
        int Bulan = nilaiBulan;
        Bulan1=bulanMasehi[Bulan];
     }

    else if(E==14 || E==15)
    {
        nilaiBulan= E-13;
        int Bulan = nilaiBulan;
        Bulan1=bulanMasehi[Bulan];
    }

    //==Menghitung Tahun Awal Bulan
    if(nilaiBulan>2)
    {
        int Tahun = C-4716;
        nilaiTahun = Integer.toString(Tahun);
    }
    else if (nilaiBulan==1 || nilaiBulan==2)
    {
```

```
      int Tahun = C-4715;
      nilaiTahun = Integer.toString(Tahun);
    }

    //==Menghitung hari ke Jam:Menit:Detik (UT)
    double Jam = day3*24;
    int JamAkhir = (int)Jam;            //-------> variabel u/ mengambil
nilai jam
    String nilaiJam = Integer.toString(JamAkhir);
    double menit = (Jam-JamAkhir)*60;
    int menitAkhir = (int)menit;        // -------> variabel u/ mengambil
nilai menit
    String nilaiMenit = Integer.toString(menitAkhir);
    double detik = (menit-menitAkhir)*60; //-------> variabel u/
mengambil nilai detik
    String nilaiDetik =
Double.toString(Double.valueOf(ft0.format(detik)));
   jta.append(""+tanggal+" "+Bulan1+" "+nilaiTahun);
   jta.append("             "+nilaiJam +" : "+nilaiMenit +" :
"+nilaiDetik+"\n");
   System.out.println("\n");

    //NB : untuk mengambil nilai :
    //---> tanggal= day2            ----> jam = nilaiJam
    //---> bulan= Bulan             ----> menit = nilaiMenit
    //---> tahun = nilaiTahun       -----> detik = nilaiDetik
K++;
        }
    }


  void fullMoon(){
     NilaiTahun = Integer.parseInt(InputThn.getText());
     int K2 = (int)Math.round((NilaiTahun-2000)*12.3685);
     double K = K2+0.50;
       double T1,T2,T3,T4;
       jta.append("Date                                    Time(UT)\n");
       jta.append("-----------------------------------------------------\n");
       int j;
```

```
        for(j=0;j<13;j++)
        {
         int month = j+1;
         double y = (NilaiTahun+(month-0.5)/12);
         double T = Double.valueOf(ft1.format(K/1236.85));
         T1 = T; T2= T*T; T3 = T*T*T; T4 = T*T*T*T;

         //Eksentritas bumi
        double Ek = 1-0.002516*T1-0.0000074*T2;

         //---Anomali Rata-rata Matahari (M)
        double M1 =Double.valueOf(ft.format(2.5534
+29.1053567*K -0.0000014*T2 -0.00000011*T3));
        double M =
Math.toRadians(Double.valueOf(ft.format(360+(M1%360))));

        //---Anomali Rata-rata Bulan (M')
        double MBulan1 = Double.valueOf(ft.format(201.5643
+385.81693528*K +0.0107582*T2 +0.00001238*T3 -
0.000000058*T4));
        double MBulan=
Math.toRadians(Double.valueOf(ft.format(360+(MBulan1%360))));

         //---Argumen Lintang Bulan
         double F1 = Double.valueOf(ft.format(160.7108
+390.67050284*K -0.0016118*T2 -
0.00000227*T3+0.000000011*T4));          double F=
Math.toRadians(Double.valueOf(ft.format(360+(F1%360))));

          //---Argumen Bujur Bulan
          double Omega1 = Double.valueOf(ft.format(124.7746 -
1.56375588*K +0.0020672*T2 +0.00000215*T3));
          double Omega=
Math.toRadians(Double.valueOf(ft.format(Omega1-360)));

      //---Argumen Planet
     double A1= (299.77 +0.107408*K -
0.009173*T*T)*Math.PI/180;//radian
```

```
      double A2= (251.88 +0.016321*K)*Math.PI/180;//----radian
      double A3= ((251.83
+26.651886*K)%360+360)*Math.PI/180;//---radian
      double A4= ((349.42
+36.412478*K)%360+360)*Math.PI/180;//---radian
      double A5= ((84.66 +18.206239*K)%360+360)*Math.PI/180;//-
---radian
      double A6= ((141.74
+53.303771*K)%360+360)*Math.PI/180;//---radian
      double A7= ((207.14 +2.453732*K)%360+360)*Math.PI/180;//-
---radian
      double A8= ((154.84 +7.30686*K)%360+360)*Math.PI/180;//--
---radian
      double A9= ((34.52 +27.261239*K)%360+360)*Math.PI/180;//-
---radian
      double A10= (207.19 +0.121824*K)*Math.PI/180;//---radian
      double A11= (291.34 +1.844379*K)*Math.PI/180;//---radian
      double A12= ((161.72
+24.198154*K)%360+360)*Math.PI/180;//--radian
      double A13= ((239.56
+25.513099*K)%360+360)*Math.PI/180;//--radian
      double A14= ((331.55
+3.592518*K)%360+360)*Math.PI/180;//---radian

         //=====JDE belum terkoreksi
     double JDE1= 2451550.09766 + 29.530588861*K
          + 0.00015437*T2 - 0.00000015*T3 + 0.00000000073*T4;
     double JDE=Double.valueOf(ft1.format(JDE1));

      double KoreksiArgumenPlanet1 =(325*Math.sin(A1) +
165*Math.sin(A2) + 164*Math.sin(A3)
          + 126*Math.sin(A4) + 110*Math.sin(A5) + 62*Math.sin(A6)
+ 60*Math.sin(A7)
          + 56*Math.sin(A8)+ 47*Math.sin(A9) + 42*Math.sin(A10) +
40*Math.sin(A11) + 37*Math.sin(A12)
          + 35*Math.sin(A13) + 23*Math.sin(A14))/1000000;
     double KoreksiArgumenPlanet
=Double.valueOf(ft3.format(KoreksiArgumenPlanet1));
```

```
    double KoreksiFase3=(-40614*Math.sin(MBulan) +
17302*Ek*Math.sin(M) + 1614*Math.sin(2*MBulan) +
1043*Math.sin(2*F) + 734*Ek*Math.sin(MBulan-M)
        - 515*Ek*Math.sin(MBulan+M) +
209*Ek*Ek*Math.sin(2*M) - 111*Math.sin(MBulan-2*F) -
57*Math.sin(MBulan+2*F) + 56*Ek*Math.sin(2*MBulan+M)
        - 42*Math.sin(3*MBulan) + 42*Ek*Math.sin(M+2*F) +
38*Ek*Math.sin(M-2*F)- 24*Ek*Math.sin(2*MBulan-M) -
17*Math.sin(Omega) - 7*Math.sin(MBulan+2*M)
        + 4*Math.sin(2*(MBulan-F)) + 4*Math.sin(3*M) +
3*Math.sin(MBulan+M-2*F) +3*Math.sin(2*(MBulan+F)) -
3*Math.sin(MBulan+M+2*F) + 3*Math.sin(MBulan-M+2*F)
        - 2*Math.sin(MBulan-M-2*F) - 2*Math.sin(3*MBulan+M)+
2*Math.sin(4*MBulan))/100000;//hari

    double KoreksiFase
=Double.valueOf(ft1.format(KoreksiFase3));

     //==JDE terkoreksi (TD)
   double JD1 =JDE+KoreksiFase+KoreksiArgumenPlanet;
   double JD =Double.valueOf(ft1.format(JD1));

    //=========Menghitung Delta T=======
  //==============================================
    //SEBELUM TAHUN -500
      if (y <= -500) {
         TDetik = -20 + 32 * (y/100 - 18.2) * (y/100 - 18.2);
         THari= TDetik / 86400;

      } //==ANTARA -500 DAN 500
      else if ((y > -500) && (y <= 500)) {
          TDetik = 10583.6 - 1014.41*(y/100) +
33.78311*(y/100)*(y/100) - 5.952053*(y/100)*(y/100)*(y/100)
             - 0.1798452*(y/100)*(y/100)*(y/100)*(y/100) +
0.022174192*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)
             +
0.0090316521*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)*(y/100);
         THari = TDetik / 86400;
```

```
    } //==ANTARA 500 SD 1600
    else if ((y > 500) && (y <= 1600)) {
      TDetik = 1574.2 - 556.01*(y/100 - 10) + 71.23472*(y/100 -
10)*(y/100 - 10) + 0.319781*(y/100 - 10)*(y/100 - 10)*(y/100 - 10)
            - 0.8503463*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)
            - 0.005050998*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)
            + 0.0083572073*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)*(y/100 - 10);
      THari = TDetik / 86400;

    } //=====ANTARA 1600 SD 1700
    else if ((y > 1600) && (y <= 1700)) {
      TDetik = 120 - 0.9808*(y - 1600) - 0.01532*(y - 1600)*(y -
1600)
            + ((y - 1600)*(y - 1600)*(y - 1600)/7129);
      THari = TDetik  / 86400;

    } //===antara 1700 SD 1800
    else if ((y > 1700) && (y <= 1800)) {
      TDetik = 8.83 + 0.1603*(y - 1700) - 0.0059285*(y -
1700)*(y- 1700)
            + 0.00013336*(y - 1700)*(y - 1700)*(y - 1700)
            - ((y - 1700)*(y - 1700)*(y - 1700)*(y - 1700)/1174000);
      THari = TDetik / 86400;

    } //===antara 1800 SD 1860
    else if ((y > 1800) && (y <= 1860)) {
      TDetik = 13.72 - 0.332447*(y - 1800) + 0.0068612*(y -
1800)*(y - 1800)+ 0.0041116*(y - 1800)*(y - 1800)*(y - 1800)
            - 0.00037436*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)
            + 0.0000121272*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)
            - 0.0000001699*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)*(y - 1800)
            + 0.000000000875*(y - 1800)*(y - 1800)*(y - 1800)*(y
- 1800)*(y - 1800)*(y - 1800)*(y - 1800);
```

```
        THari = TDetik / 86400;

    } //==antara 1860 sd 1900
    else if ((y > 1860) && (y <= 1900)) {
        TDetik = 7.62 + 0.5737*(y - 1860) - 0.251754*(y - 1860)*(y
- 1860)
                + 0.01680668*(y - 1860)*(y - 1860)*(y - 1860)
                - 0.0004473624*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)
                + ((y - 1860)*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)/233174);
        THari = TDetik / 86400;
    }

    //==antara 1900 sd 1920
    if ((y > 1900) && (y <= 1920)) {
        TDetik = -2.79 + 1.494119*(y- 1900) - 0.0598939*(y-
1900)*(y- 1900)
                + 0.0061966*(y- 1900)*(y- 1900)*(y- 1900)
                - 0.000197*(y- 1900)*(y- 1900)*(y- 1900)*(y- 1900);
        THari = TDetik / 86400;

    } //==antara 1920 sd 1941
    else if ((y > 1900) && (y <= 1920)) {
        TDetik = 21.2 + 0.84493*(y - 1920) - 0.0761*(y - 1920)*(y -
1920)
                + 0.0020936*(y - 1920)*(y - 1920)*(y - 1920);
         THari = TDetik / 86400;

    } //==antara 1941 sd 1961
    else if ((y > 1941) && (y <= 1961)) {
        TDetik = 29.07 + 0.407*(y - 1950) - (y - 1950)*(y -
1950)/233
                + ((y - 1950)*(y - 1950)*(y - 1950)/2547);
        THari = TDetik / 86400;

    }
    //==antara 1961 sd 1986
    else if ((y > 1961) && (y <= 1986)) {
```

```
        TDetik = 45.45 + 1.067*(y - 1975) - (y - 1975)*(y -
1975)/260
                - ((y - 1975)*(y - 1975)*(y - 1975)/718);
        THari = TDetik / 86400;

      } //==antara 1986 sd 2005
      else if ((y > 1986) && (y <= 2005)) {
         TDetik = 63.86 + 0.3345*(y - 2000) - 0.060374*(y -
2000)*(y - 2000)
                + 0.0017275*(y - 2000)*(y - 2000)*(y - 2000)
                + 0.000651814*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)
                + 0.00002373599*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)*(y - 2000);
        THari = TDetik / 86400;

      } //==antara 2005 sd 2050
      else if ((y > 2005) && (y <= 2050)) {
        TDetik = 62.92 + 0.32217*(y - 2000) + 0.005589*(y -
2000)*(y - 2000);
        THari = TDetik / 86400;

      } //==antara 2050 sd 2150
      else if ((y > 2050) && (y <= 2150)) {
        TDetik = -20 + 32*(y/100 - 18.20)*(y/100 - 18.2) -
0.5628*(2150 - y);
       THari = TDetik / 86400;
      } //==diatas 2150
      else if (y > 2150) {
        TDetik = -20 + 32*(y/100 - 18.2)*(y/100 - 18.2);
         THari = TDetik / 86400;

      } else {
        TDetik  = 0;
         THari = TDetik / 86400;
      }

   //========JD terkoreksi (UT)
   double JDTerkoreksiUT=Double.valueOf(ft2.format(JD-THari));
```

```
    //===JD + 0.5 =
    double JDTambahan=JDTerkoreksiUT+0.5;
    int Z=(int)JDTambahan;
    double F2=Double.valueOf(ft2.format(JDTambahan-Z));

    //Menghitung nilai A
      if(Z<2299161)
      {
         A=(int)Z;
      }
     else if (Z>=2299161)
      {
        int Alpha=(int)((Z- 1867216.25)/36524.25);
        A=Z+1+Alpha-(int)(Alpha/4);
      }

    //nilai B
    int B= A+1524;
    int C=(int)((B - 122.1)/365.25);
    int D=(int)(365.25*C);
    int E=(int)((B - D)/30.6001);

    //==Menghitung tanggal
    double day= B - D - (int) (30.6001*E) + F2;
    int day2= (int)day;                    //------> variabel u/ mengambil
tanggal
    String tanggal=Integer.toString(day2);
    double day3= day - day2;

    //==Menghitung Bulan
    if(E<14)
     {
       nilaiBulan= E-1;
       int Bulan = nilaiBulan;
       Bulan1=bulanMasehi[Bulan];
     }

    else if(E==14 || E==15)
```

```
    {
       nilaiBulan= E-13;
       int Bulan = nilaiBulan;
       Bulan1=bulanMasehi[Bulan];
    }

    //==Menghitung Tahun Awal Bulan
    if(nilaiBulan>2)
    {
       int Tahun = C-4716;
       nilaiTahun = Integer.toString(Tahun);
    }
    else if (nilaiBulan==1 || nilaiBulan==2)
    {
       int Tahun = C-4715;
       nilaiTahun = Integer.toString(Tahun);
    }

    //==Menghitung hari ke Jam:Menit:Detik (UT)
    double Jam = day3*24;
    int JamAkhir = (int)Jam;          //-------> variabel u/ mengambil
nilai jam
    String nilaiJam = Integer.toString(JamAkhir);
    double menit = (Jam-JamAkhir)*60;
    int menitAkhir = (int)menit;       // -------> variabel u/ mengambil
nilai menit
    String nilaiMenit = Integer.toString(menitAkhir);
    double detik = (menit-menitAkhir)*60; //-------> variabel u/
mengambil nilai detik
    String nilaiDetik =
Double.toString(Double.valueOf(ft0.format(detik)));

  jta.append(""+tanggal+" "+Bulan1+" "+nilaiTahun);
  jta.append("            "+nilaiJam +" : "+nilaiMenit +" :
"+nilaiDetik+"\n");
  System.out.println("\n");

    //NB : untuk mengambil nilai :
    //---> tanggal= day2          ----> jam = nilaiJam
```

```
   //---> bulan= Bulan            ----> menit = nilaiMenit
   //---> tahun = nilaiTahun      ----> detik = nilaiDetik

K++;
        }
  }

  void lastQuarter(){
      NilaiTahun = Integer.parseInt(InputThn.getText());
      int K3 = (int)Math.round((NilaiTahun-2000)*12.3685);
      double K = K3+0.75;
      double T1,T2,T3,T4;
      jta.append("Date                                    Time(UT)\n");
      jta.append("-------------------------------------------------\n");
      int j;

         for(j=0;j<13;j++)
         {
          int month = j+1;
          double y = (NilaiTahun+(month-0.5)/12);
          double T = Double.valueOf(ft1.format(K/1236.85));
          T1 = T; T2= T*T; T3 = T*T*T; T4 = T*T*T*T;

          //Eksentritas bumi
         double Ek = 1-0.002516*T1-0.0000074*T2;


          //---Anomali Rata-rata Matahari (M)
         double M1 =Double.valueOf(ft.format(2.5534
+29.1053567*K -0.0000014*T2 -0.00000011*T3));
         double M =
Math.toRadians(Double.valueOf(ft.format(360+(M1%360))));


         //---Anomali Rata-rata Bulan (M')
         double MBulan1 = Double.valueOf(ft.format(201.5643
+385.81693528*K +0.0107582*T2 +0.00001238*T3 -
0.000000058*T4));
```

```
double MBulan=
Math.toRadians(Double.valueOf(ft.format(360+(MBulan1%360))));

        //---Argumen Lintang Bulan
        double F1 = Double.valueOf(ft.format(160.7108
+390.67050284*K -0.0016118*T2 -
0.00000227*T3+0.000000011*T4));
        double F=
Math.toRadians(Double.valueOf(ft.format(360+(F1%360))));

         //---Argumen Bujur Bulan
         double Omega1 = Double.valueOf(ft.format(124.7746 -
1.56375588*K +0.0020672*T2 +0.00000215*T3));
         double Omega=
Math.toRadians(Double.valueOf(ft.format(Omega1-360)));

      //---Argumen Planet
     double A1= (299.77 +0.107408*K -
0.009173*T*T)*Math.PI/180;//radian
     double A2= (251.88 +0.016321*K)*Math.PI/180;//----radian
     double A3= ((251.83
+26.651886*K)%360+360)*Math.PI/180;//---radian
     double A4= ((349.42
+36.412478*K)%360+360)*Math.PI/180;//---radian
     double A5= ((84.66 +18.206239*K)%360+360)*Math.PI/180;//-
---radian
     double A6= ((141.74
+53.303771*K)%360+360)*Math.PI/180;//---radian
     double A7= ((207.14 +2.453732*K)%360+360)*Math.PI/180;//-
---radian
     double A8= ((154.84 +7.30686*K)%360+360)*Math.PI/180;//--
---radian
     double A9= ((34.52 +27.261239*K)%360+360)*Math.PI/180;//-
---radian
     double A10= (207.19 +0.121824*K)*Math.PI/180;//---radian
     double A11= (291.34 +1.844379*K)*Math.PI/180;//---radian
     double A12= ((161.72
+24.198154*K)%360+360)*Math.PI/180;//--radian
```

```
      double A13= ((239.56
+25.513099*K)%360+360)*Math.PI/180;//--radian
      double A14= ((331.55
+3.592518*K)%360+360)*Math.PI/180;//---radian

        //=====JDE belum terkoreksi
     double JDE1= 2451550.09766 + 29.530588861*K
          + 0.00015437*T2 - 0.00000015*T3 + 0.00000000073*T4;
double JDE=Double.valueOf(ft1.format(JDE1));

      double KoreksiArgumenPlanet1 =(325*Math.sin(A1) +
165*Math.sin(A2) + 164*Math.sin(A3)
          + 126*Math.sin(A4) + 110*Math.sin(A5) + 62*Math.sin(A6)
+ 60*Math.sin(A7)
          + 56*Math.sin(A8)+ 47*Math.sin(A9) + 42*Math.sin(A10) +
40*Math.sin(A11) + 37*Math.sin(A12)
          + 35*Math.sin(A13) + 23*Math.sin(A14))/1000000;
     double KoreksiArgumenPlanet
=Double.valueOf(ft3.format(KoreksiArgumenPlanet1));

     double KoreksiFase4 = (- 62801*Math.sin(MBulan) +
17172*Ek*Math.sin(M) - 1183*Ek*Math.sin(MBulan+M) +
862*Math.sin(2*MBulan)
                + 804*Math.sin(2*F) + 454*Ek*Math.sin(MBulan-M)
+ 204*Ek*Ek*Math.sin(2*M) - 180*Math.sin(MBulan-2*F) -
70*Math.sin(MBulan+2*F)
                - 40*Math.sin(3*MBulan) -
34*Ek*Math.sin(2*MBulan-M) + 32*Ek*Math.sin(M+2*F) -
32*Ek*Math.sin(M-2*F) -28*Ek*Ek*Math.sin(MBulan+2*M)
                + 27*Ek*Math.sin(2*MBulan+M) -
17*Math.sin(Omega) - 5*Math.sin(MBulan-M-2*F) +
4*Math.sin(2*MBulan+2*F) - 4*Math.sin(MBulan+M+2*F)
                + 4*Math.sin(MBulan-2*M) +
3*Math.sin(MBulan+M-2*F) + 3*Math.sin(3*M) +
2*Math.sin(2*MBulan-2*F) + 2*Math.sin(MBulan-M+2*F) -
2*Math.sin(3*MBulan+M)
                - (306 - 38*Ek*Math.cos(M) + 26*Math.cos(MBulan)
- 2*Math.cos(MBulan-M) + 2*Math.cos(MBulan+M) +
2*Math.cos(2*F)))/100000;//hari
```

```
    double KoreksiFase
=Double.valueOf(ft1.format(KoreksiFase4));

    //==JDE terkoreksi (TD)
   double JD1 =JDE+KoreksiFase+KoreksiArgumenPlanet;
   double JD =Double.valueOf(ft1.format(JD1));

   //=========Menghitung Delta T=======
//================================================
   //SEBELUM TAHUN -500
     if (y <= -500) {
        TDetik = -20 + 32 * (y/100 - 18.2) * (y/100 - 18.2);
        THari= TDetik / 86400;

     } //==ANTARA -500 DAN 500
     else if ((y > -500) && (y <= 500)) {
         TDetik = 10583.6 - 1014.41*(y/100) +
33.78311*(y/100)*(y/100) - 5.952053*(y/100)*(y/100)*(y/100)
              - 0.1798452*(y/100)*(y/100)*(y/100)*(y/100) +
0.022174192*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)
              +
0.0090316521*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)*(y/100);
        THari = TDetik / 86400;

     } //==ANTARA 500 SD 1600
     else if ((y > 500) && (y <= 1600)) {
       TDetik = 1574.2 - 556.01*(y/100 - 10) + 71.23472*(y/100 -
10)*(y/100 - 10) + 0.319781*(y/100 - 10)*(y/100 - 10)*(y/100 - 10)
              - 0.8503463*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)
              - 0.005050998*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)
              + 0.0083572073*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)*(y/100 - 10);
        THari = TDetik / 86400;

     } //=====ANTARA 1600 SD 1700
     else if ((y > 1600) && (y <= 1700)) {
```

```
        TDetik = 120 - 0.9808*(y - 1600) - 0.01532*(y - 1600)*(y -
1600)
                + ((y - 1600)*(y - 1600)*(y - 1600)/7129);
        THari = TDetik  / 86400;

      } //===antara 1700 SD 1800
      else if ((y > 1700) && (y <= 1800)) {
        TDetik = 8.83 + 0.1603*(y - 1700) - 0.0059285*(y -
1700)*(y- 1700)
                + 0.00013336*(y - 1700)*(y - 1700)*(y - 1700)
                - ((y - 1700)*(y - 1700)*(y - 1700)*(y - 1700)/1174000);
        THari = TDetik / 86400;

      } //===antara 1800 SD 1860
      else if ((y > 1800) && (y <= 1860)) {
        TDetik = 13.72 - 0.332447*(y - 1800) + 0.0068612*(y -
1800)*(y - 1800)+ 0.0041116*(y - 1800)*(y - 1800)*(y - 1800)
                 - 0.00037436*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)
                + 0.0000121272*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)
                - 0.0000001699*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)*(y - 1800)
                + 0.000000000875*(y - 1800)*(y - 1800)*(y - 1800)*(y
- 1800)*(y - 1800)*(y - 1800)*(y - 1800);
        THari = TDetik / 86400;

      } //==antara 1860 sd 1900
      else if ((y > 1860) && (y <= 1900)) {
        TDetik = 7.62 + 0.5737*(y - 1860) - 0.251754*(y - 1860)*(y
- 1860)
                + 0.01680668*(y - 1860)*(y - 1860)*(y - 1860)
                - 0.0004473624*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)
                + ((y - 1860)*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)/233174);
        THari = TDetik / 86400;
      }
```

```
    //==antara 1900 sd 1920
    if ((y > 1900) && (y <= 1920)) {
       TDetik = -2.79 + 1.494119*(y- 1900) - 0.0598939*(y-
1900)*(y- 1900)
              + 0.0061966*(y- 1900)*(y- 1900)*(y- 1900)
              - 0.000197*(y- 1900)*(y- 1900)*(y- 1900)*(y- 1900);
       THari = TDetik / 86400;

    } //==antara 1920 sd 1941
    else if ((y > 1900) && (y <= 1920)) {
       TDetik = 21.2 + 0.84493*(y - 1920) - 0.0761*(y - 1920)*(y -
1920)
              + 0.0020936*(y - 1920)*(y - 1920)*(y - 1920);
        THari = TDetik / 86400;

    } //==antara 1941 sd 1961
    else if ((y > 1941) && (y <= 1961)) {
       TDetik = 29.07 + 0.407*(y - 1950) - (y - 1950)*(y -
1950)/233
              + ((y - 1950)*(y - 1950)*(y - 1950)/2547);
       THari = TDetik / 86400;

    }
    //==antara 1961 sd 1986
    else if ((y > 1961) && (y <= 1986)) {
       TDetik = 45.45 + 1.067*(y - 1975) - (y - 1975)*(y -
1975)/260
              - ((y - 1975)*(y - 1975)*(y - 1975)/718);
       THari = TDetik / 86400;

    } //==antara 1986 sd 2005
    else if ((y > 1986) && (y <= 2005)) {
        TDetik = 63.86 + 0.3345*(y - 2000) - 0.060374*(y -
2000)*(y - 2000)
              + 0.0017275*(y - 2000)*(y - 2000)*(y - 2000)
              + 0.000651814*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)
              + 0.00002373599*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)*(y - 2000);
```

```
            THari = TDetik / 86400;

        } //==antara 2005 sd 2050
        else if ((y > 2005) && (y <= 2050)) {
            TDetik = 62.92 + 0.32217*(y - 2000) + 0.005589*(y -
2000)*(y - 2000);
            THari = TDetik / 86400;

        } //==antara 2050 sd 2150
        else if ((y > 2050) && (y <= 2150)) {
            TDetik = -20 + 32*(y/100 - 18.20)*(y/100 - 18.2) -
0.5628*(2150 - y);
            THari = TDetik / 86400;

        } //==diatas 2150
        else if (y > 2150) {
            TDetik = -20 + 32*(y/100 - 18.2)*(y/100 - 18.2);
             THari = TDetik / 86400;

        } else {
            TDetik  = 0;
             THari = TDetik / 86400;
        }

    //========JD terkoreksi (UT)
    double JDTerkoreksiUT=Double.valueOf(ft2.format(JD-THari));

    //===JD + 0.5 =
    double JDTambahan=JDTerkoreksiUT+0.5;
    int Z=(int)JDTambahan;
    double F2=Double.valueOf(ft2.format(JDTambahan-Z));

    //Menghitung nilai A
       if(Z<2299161)
       {
          A=(int)Z;
       }
     else if (Z>=2299161)
       {
```

```
        int Alpha=(int)((Z- 1867216.25)/36524.25);
        A=Z+1+Alpha-(int)(Alpha/4);
      }

   //nilai B
   int B= A+1524;
   int C=(int)((B - 122.1)/365.25);
   int D=(int)(365.25*C);
   int E=(int)((B - D)/30.6001);
   //==Menghitung tanggal
   double day= B - D - (int) (30.6001*E) + F2;
   int day2= (int)day;                    //------> variabel u/ mengambil
tanggal
   String tanggal=Integer.toString(day2);
   double day3= day - day2;

   //==Menghitung Bulan
   if(E<14)
    {
      nilaiBulan= E-1;
      int Bulan = nilaiBulan;
      Bulan1=bulanMasehi[Bulan];
    }

   else if(E==14 || E==15)
   {
      nilaiBulan= E-13;
      int Bulan = nilaiBulan;
      Bulan1=bulanMasehi[Bulan];
   }

   //==Menghitung Tahun Awal Bulan
   if(nilaiBulan>2)
   {
      int Tahun = C-4716;
      nilaiTahun = Integer.toString(Tahun);
   }
   else if (nilaiBulan==1 || nilaiBulan==2)
   {
```

```
        int Tahun = C-4715;
        nilaiTahun = Integer.toString(Tahun);
    }

    //==Menghitung hari ke Jam:Menit:Detik (UT)
    double Jam = day3*24;
    int JamAkhir = (int)Jam;            //-------> variabel u/ mengambil
nilai jam
    String nilaiJam = Integer.toString(JamAkhir);
    double menit = (Jam-JamAkhir)*60;
    int menitAkhir = (int)menit;        // -------> variabel u/ mengambil
nilai menit
    String nilaiMenit = Integer.toString(menitAkhir);
    double detik = (menit-menitAkhir)*60; //-------> variabel u/
mengambil nilai detik
    String nilaiDetik =
Double.toString(Double.valueOf(ft0.format(detik)));

  jta.append(""+tanggal+" "+Bulan1+" "+nilaiTahun);
  jta.append("            "+nilaiJam +" : "+nilaiMenit +" :
"+nilaiDetik+"\n");  System.out.println("\n");

    //NB : untuk mengambil nilai :
    //---> tanggal= day2            ----> jam = nilaiJam
    //---> bulan= Bulan             ----> menit = nilaiMenit
    //---> tahun = nilaiTahun       ----> detik = nilaiDetik

K++;
          }
  }

    @SuppressWarnings("unchecked")
    // <editor-fold defaultstate="collapsed" desc="Generated Code">
    private void initComponents() {

        Group = new javax.swing.ButtonGroup();
        buttonGroup2 = new javax.swing.ButtonGroup();
        jPanel1 = new javax.swing.JPanel();
        jLabel1 = new javax.swing.JLabel();
```

```
        InputThn = new javax.swing.JTextField();
        rb_baru = new javax.swing.JRadioButton();
        rb_spertama = new javax.swing.JRadioButton();
        rb_purnama = new javax.swing.JRadioButton();
        rb_sakhir = new javax.swing.JRadioButton();
        bt_hitung = new javax.swing.JButton();
        bt_reset = new javax.swing.JButton();
        jLabel2 = new javax.swing.JLabel();
        jScrollPane1 = new javax.swing.JScrollPane();
        jta = new javax.swing.JTextArea();
        bt_exit = new javax.swing.JButton();

setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON
_CLOSE);
        setTitle("FASE BULAN"); // NOI18N

jPanel1.setBorder(javax.swing.BorderFactory.createTitledBorder(jav
ax.swing.BorderFactory.createLineBorder(new java.awt.Color(0, 0,
0)), "Lunar Phase",
javax.swing.border.TitledBorder.DEFAULT_JUSTIFICATION,
javax.swing.border.TitledBorder.DEFAULT_POSITION, new
java.awt.Font("Tahoma", 0, 11), new java.awt.Color(0, 0, 0))); //
NOI18N
        jLabel1.setText("Insert Year");
        Group.add(rb_baru);
        rb_baru.setText("New Moon");
        Group.add(rb_spertama);
        rb_spertama.setText("First Quarter");
        Group.add(rb_purnama);
        rb_purnama.setText("Full Moon");
        Group.add(rb_sakhir);
        rb_sakhir.setText("Last Quarter");
        bt_hitung.setText("Run");
        bt_hitung.addActionListener(new
java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                bt_hitungActionPerformed(evt);
            }
```

```
        });

        bt_reset.setText("Reset");
        bt_reset.addActionListener(new java.awt.event.ActionListener()
{
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                bt_resetActionPerformed(evt);
            }
        });

        jLabel2.setFont(new java.awt.Font("Tahoma", 0, 14));
        jLabel2.setText("Calculation of Lunar Phase");

        jta.setColumns(20);
        jta.setRows(5);
        jScrollPane1.setViewportView(jta);

        bt_exit.setText("Exit");
        bt_exit.addActionListener(new java.awt.event.ActionListener()
{
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                bt_exitActionPerformed(evt);
            }
        });

        javax.swing.GroupLayout jPanel1Layout = new
javax.swing.GroupLayout(jPanel1);
        jPanel1.setLayout(jPanel1Layout);
        jPanel1Layout.setHorizontalGroup(

jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel1Layout.createSequentialGroup()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                    .addGroup(jPanel1Layout.createSequentialGroup()
```

```
                .addGap(81, 81, 81)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
                    .addComponent(rb_spertama,
javax.swing.GroupLayout.Alignment.LEADING)
                    .addComponent(rb_purnama,
javax.swing.GroupLayout.Alignment.LEADING)
                    .addComponent(rb_sakhir,
javax.swing.GroupLayout.Alignment.LEADING)
                    .addComponent(rb_baru,
javax.swing.GroupLayout.Alignment.LEADING)))
                .addGroup(jPanel1Layout.createSequentialGroup()
                    .addGap(24, 24, 24)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                    .addGroup(jPanel1Layout.createSequentialGroup()
                        .addComponent(jLabel1)
                        .addGap(18, 18, 18)
                        .addComponent(InputThn,
javax.swing.GroupLayout.PREFERRED_SIZE, 103,
javax.swing.GroupLayout.PREFERRED_SIZE))
                    .addGroup(jPanel1Layout.createSequentialGroup()
                        .addComponent(bt_hitung,
javax.swing.GroupLayout.PREFERRED_SIZE, 75,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
                        .addComponent(bt_reset,
javax.swing.GroupLayout.PREFERRED_SIZE, 78,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
                        .addComponent(bt_exit,
javax.swing.GroupLayout.PREFERRED_SIZE, 74,
javax.swing.GroupLayout.PREFERRED_SIZE)))))
```

```
.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED, javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                .addComponent(jLabel2)
                .addComponent(jScrollPane1,
javax.swing.GroupLayout.PREFERRED_SIZE, 291,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addContainerGap())
        );
        jPanel1Layout.setVerticalGroup(

jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel1Layout.createSequentialGroup()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                .addGroup(jPanel1Layout.createSequentialGroup()
                    .addContainerGap()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                        .addComponent(jLabel1)
                        .addComponent(InputThn,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE))
                    .addGap(15, 15, 15)
                    .addComponent(rb_baru)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)
                .addComponent(rb_spertama)
```

```
.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)
                .addComponent(rb_purnama)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
                .addComponent(rb_sakhir)
                .addGap(18, 18, 18)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(bt_hitung)
                    .addComponent(bt_reset)
                    .addComponent(bt_exit)))
            .addGroup(jPanel1Layout.createSequentialGroup()
                .addGap(15, 15, 15)
                .addComponent(jLabel2)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
                .addComponent(jScrollPane1,
javax.swing.GroupLayout.PREFERRED_SIZE, 248,
javax.swing.GroupLayout.PREFERRED_SIZE)))

.addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE))
        );

        javax.swing.GroupLayout layout = new
javax.swing.GroupLayout(getContentPane());
        getContentPane().setLayout(layout);
        layout.setHorizontalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LE
ADING)
            .addGroup(layout.createSequentialGroup()
                .addContainerGap()
```

```
            .addComponent(jPanel1,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addContainerGap(16, Short.MAX_VALUE))
        );
        layout.setVerticalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LE
ADING)
            .addGroup(layout.createSequentialGroup()
            .addComponent(jPanel1,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE))
        );
        pack();
    }// </editor-fold>

    private void
bt_hitungActionPerformed(java.awt.event.ActionEvent evt) {
        // TODO add your handling code here:
        if(rb_baru.isSelected()){
            newMoon();
        }
        else if(rb_spertama.isSelected()){
            firstQuarter();
        }
        else if(rb_purnama.isSelected()){
            fullMoon();
        }
        else if(rb_sakhir.isSelected()){
            lastQuarter();
        }
    }
```

```
    private void bt_resetActionPerformed(java.awt.event.ActionEvent
evt) {
        // TODO add your handling code here:
        Group.clearSelection();
        InputThn.setText("");
        jta.setText("");
    }

    private void bt_exitActionPerformed(java.awt.event.ActionEvent
evt) {
        // TODO add your handling code here:
       dispose();
    }


    public static void main(String args[]) {

    }

    // Variables declaration - do not modify
    private javax.swing.ButtonGroup Group;
    private javax.swing.JTextField InputThn;
    private javax.swing.JButton bt_exit;
    private javax.swing.JButton bt_hitung;
    private javax.swing.JButton bt_reset;
    private javax.swing.ButtonGroup buttonGroup2;
    private javax.swing.JLabel jLabel1;
    private javax.swing.JLabel jLabel2;
    private javax.swing.JPanel jPanel1;
    private javax.swing.JScrollPane jScrollPane1;
    private javax.swing.JTextArea jta;
    private javax.swing.JRadioButton rb_baru;
    private javax.swing.JRadioButton rb_purnama;
    private javax.swing.JRadioButton rb_sakhir;
    private javax.swing.JRadioButton rb_spertama;
    // End of variables declaration
}
```

Lampiran 3
Program Konversi

```
package physics;

/**
@author arif
 */
public class Konversi extends javax.swing.JFrame {

    static String[] bulanHij = {"Dzul-Hijjah","Muharram", "Shafar",
"Rabiu'l Awwal", "Rabi'ul Akhir",
        "Jumadil Awwal", "Jumadil Akhir", "Rajab", "Sya'ban",
"Ramadhan", "Syawal", "Dzul-Qa'dah", "Dzul-Hijjah"};
    static String[] bulanMasehi = {"Desember" ,"Januari", "Februari",
"Maret", "April", "Mei", "Juni", "Juli", "Agustus",
        "September", "Oktober", "November", "Desember" };

    public Konversi() {
        initComponents();
    }

    void MasehiHijriyah()
    {
        int tgl1 = Integer.parseInt(tf_tanggal.getText());
        int bln = Integer.parseInt(tf_bulan.getText());
        int thn = Integer.parseInt(tf_tahun.getText());
        int tgl = tgl1; // ------> bisa +1 atau -1 tergantung hasil rukyah
        int JD;

        if((thn > 1582)||((thn == 1582) && (bln > 10))||((thn == 1582)
&& (bln == 10) && (tgl>14)))
        {
            JD =((1461*(thn+4800+((bln-14)/12)))/4)+((367*(bln-2-
12*(((bln-14)/12))))/12)
                -((3*(((thn+4900+((bln-14)/12))/100)))/4)+tgl-32075;
        }

        else
```

```
        {
            JD = 367*thn-((7*(thn+5001+((bln-
9)/7)))/4)+((275*bln)/9)+tgl+1729777;
        }
      int L1 = JD - 1948440 + 10632;
      int N = ((L1-1)/10631);
      int L2 = L1-10631*N+354;
      int J = ((10985-
L2)/5316)*(50*L2)/17719+(L2/5670)*(43*L2)/15238;
      int L = L2 -((30-J)/15)*(17719*J)/50-(J/16)*((15238*J)/43)+29;
     int Rm = (24*L)/709;
     String Rm1 = bulanHij[Rm];
     int Rd = L-(709*Rm)/24;
     int Ry = 30*N+J-30;

     lb_hasilMasehiHijriyah.setText(tgl1+" "+bulanMasehi[bln]+"
"+thn+"    M"+"    =  "+Rd + "  "+Rm1 + "   " +Ry +"  H");
   }


   void HijriyahMasehi()
   {
     int tgl1 = Integer.parseInt(tf_tanggal.getText());
     int bln = Integer.parseInt(tf_bulan.getText());
     int thn = Integer.parseInt(tf_tahun.getText());
     int tgl = tgl1; // ------> bisa +1 atau -1 tergantung hasil rukyah
     int Rd;
     int Ry;
     String Rm1;

     int JD = ((11*thn+3)/30)+354*thn+30*bln-((bln-
1)/2)+tgl+1948440-385;
     if(JD > 2299160)
     {
      int L1 = JD+68569;
      int N = ((4*L1)/146097);
      int L2 = L1-(int)((146097*N+3)/4);
      int i = ((4000*(L2+1))/1461001);
      int L3 = L2-((1461*i)/4)+31;
```

```
        int J = ((80*L3)/2447);
        Rd = L3-((2447*J)/80);
        int L = (int)(J/11);
        int Rm = J+2-12*L;
        Rm1 = bulanMasehi[Rm];
        Ry = 100*(N-49)+i+L;
       }
       else
       {
        int J1 = JD+1402;
        int K = ((J1-1)/1461);
        int L1 = J1-1461*K;
        int N = ((L1-1)/365)-(L1/1461);
        int i1 = L1-365*N+30;
        int J = ((80*i1)/2447);
        Rd= i1-((2447*J)/80);
        int i = (J/11);
        int Rm= J+2-12*i;
        Rm1 = bulanMasehi[Rm];
        Ry= 4*K+N+i-4716;
       }

     lb_hasilMasehiHijriyah.setText(tgl1+" "+bulanHij[bln]+"
"+thn+"    H"+"    =  "+Rd + "  "+Rm1 + "   " +Ry +"  M");

    }


    @SuppressWarnings("unchecked")
    // <editor-fold defaultstate="collapsed" desc="Generated Code">
    private void initComponents() {

        Group = new javax.swing.ButtonGroup();
        jPanel1 = new javax.swing.JPanel();
        rb_MH = new javax.swing.JRadioButton();
        rb_HM = new javax.swing.JRadioButton();
        jPanel2 = new javax.swing.JPanel();
        jLabel1 = new javax.swing.JLabel();
        jLabel2 = new javax.swing.JLabel();
```

```
        jLabel3 = new javax.swing.JLabel();
        tf_tanggal = new javax.swing.JTextField();
        tf_bulan = new javax.swing.JTextField();
        tf_tahun = new javax.swing.JTextField();
        convert = new javax.swing.JButton();
        lb_hasilMasehiHijriyah = new javax.swing.JLabel();
        reset = new javax.swing.JButton();
        bt_exit = new javax.swing.JButton();


setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON
_CLOSE);
        setTitle("KONVERSI KALENDER"); // NOI18N

jPanel1.setBorder(javax.swing.BorderFactory.createTitledBorder(jav
ax.swing.BorderFactory.createTitledBorder("Conversion")));
        jPanel1.setName("jPanel1"); // NOI18N
        Group.add(rb_MH);
        rb_MH.setText("Masehi to Hijriyah");
        rb_MH.setName("rb_MH"); // NOI18N
        Group.add(rb_HM);
        rb_HM.setText("Hijriyah to Masehi");
        rb_HM.setName("rb_HM"); // NOI18N


jPanel2.setBorder(javax.swing.BorderFactory.createTitledBorder("")
);
        jPanel2.setName("jPanel2"); // NOI18N
        jLabel1.setText("Date");
        jLabel1.setName("jLabel1"); // NOI18N
        jLabel2.setText("Month");
        jLabel2.setName("jLabel2"); // NOI18N
        jLabel3.setText("Year");
        jLabel3.setName("jLabel3"); // NOI18N
        tf_tanggal.setName("tf_tanggal"); // NOI18N
        tf_bulan.setName("tf_bulan"); // NOI18N
        tf_tahun.setName("tf_tahun"); // NOI18N
        convert.setText("Convert");
        convert.setName("convert"); // NOI18N
```

```
        convert.addActionListener(new java.awt.event.ActionListener()
{
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                convertActionPerformed(evt);
            }
        });

        lb_hasilMasehiHijriyah.setName("lb_hasilMasehiHijriyah"); //
NOI18N

        reset.setText("Reset");
        reset.setName("reset"); // NOI18N
        reset.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                resetActionPerformed(evt);
            }
        });

        bt_exit.setText("Exit");
        bt_exit.setName("bt_exit"); // NOI18N
        bt_exit.addActionListener(new java.awt.event.ActionListener()
{
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                bt_exitActionPerformed(evt);
            }
        });

        javax.swing.GroupLayout jPanel2Layout = new
javax.swing.GroupLayout(jPanel2);
        jPanel2.setLayout(jPanel2Layout);
        jPanel2Layout.setHorizontalGroup(

jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel2Layout.createSequentialGroup()
                .addContainerGap()
```

```
.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                .addComponent(lb_hasilMasehiHijriyah,
javax.swing.GroupLayout.DEFAULT_SIZE, 319,
Short.MAX_VALUE)
                .addGroup(jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING, false)
                    .addComponent(convert,
javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)

.addGroup(javax.swing.GroupLayout.Alignment.LEADING,
jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                        .addComponent(jLabel1)
                        .addComponent(tf_tanggal,
javax.swing.GroupLayout.PREFERRED_SIZE, 56,
javax.swing.GroupLayout.PREFERRED_SIZE))

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)

.addGroup(jPanel2Layout.createSequentialGroup()
                            .addGap(24, 24, 24)
                            .addComponent(jLabel2))

.addGroup(jPanel2Layout.createSequentialGroup()
                            .addGap(18, 18, 18)
                            .addComponent(tf_bulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 58,
javax.swing.GroupLayout.PREFERRED_SIZE)))
                    .addGap(27, 27, 27)
```

```
.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                        .addComponent(jLabel3)
                        .addComponent(tf_tahun,
javax.swing.GroupLayout.PREFERRED_SIZE, 81,
javax.swing.GroupLayout.PREFERRED_SIZE))))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING, false)
                    .addComponent(bt_exit, 0, 0,
Short.MAX_VALUE)
                    .addComponent(reset,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
                .addGap(12, 12, 12)))
            .addContainerGap())
        );
        jPanel2Layout.setVerticalGroup(

jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel2Layout.createSequentialGroup()
                .addGap(20, 20, 20)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(jLabel1)
                .addComponent(jLabel2)
                .addComponent(jLabel3))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
```

```
                .addComponent(tf_tanggal,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_tahun,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_bulan,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(reset))
            .addGap(18, 18, 18)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(convert)
                .addComponent(bt_exit))
            .addGap(18, 18, 18)
            .addComponent(lb_hasilMasehiHijriyah,
javax.swing.GroupLayout.PREFERRED_SIZE, 24,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addContainerGap(20, Short.MAX_VALUE))
        );

        javax.swing.GroupLayout jPanel1Layout = new
javax.swing.GroupLayout(jPanel1);
        jPanel1.setLayout(jPanel1Layout);
        jPanel1Layout.setHorizontalGroup(

jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel1Layout.createSequentialGroup()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                .addGroup(jPanel1Layout.createSequentialGroup()
                    .addGap(20, 20, 20)
```

```
                .addComponent(rb_MH)
                .addGap(73, 73, 73)
                .addComponent(rb_HM))
            .addGroup(jPanel1Layout.createSequentialGroup()
                .addContainerGap()
                .addComponent(jPanel2,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE)))
            .addContainerGap())
        );
        jPanel1Layout.setVerticalGroup(

jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel1Layout.createSequentialGroup()
                .addGap(35, 35, 35)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
                .addComponent(rb_HM)
                .addComponent(rb_MH))
            .addGap(18, 18, 18)
            .addComponent(jPanel2,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
            .addContainerGap())
        );

        javax.swing.GroupLayout layout = new
javax.swing.GroupLayout(getContentPane());
        getContentPane().setLayout(layout);
        layout.setHorizontalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LE
ADING)
            .addGroup(layout.createSequentialGroup()
                .addContainerGap()
```

```
            .addComponent(jPanel1,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
            .addContainerGap())
        );
        layout.setVerticalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LE
ADING)
            .addGroup(layout.createSequentialGroup()
                .addContainerGap()
                .addComponent(jPanel1,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                .addContainerGap())
        );

        pack();
    }// </editor-fold>

    private void convertActionPerformed(java.awt.event.ActionEvent
evt) {
        if(rb_MH.isSelected()){
            MasehiHijriyah();
        }
        else if(rb_HM.isSelected()){
          HijriyahMasehi();
        }
    }

    private void resetActionPerformed(java.awt.event.ActionEvent
evt) {
        Group.clearSelection();
        tf_tanggal.setText("");
        tf_bulan.setText("");
        tf_tahun.setText("");
        lb_hasilMasehiHijriyah.setText("");
    }
```

```
    private void bt_exitActionPerformed(java.awt.event.ActionEvent
evt) {
        dispose();
    }

    public static void main(String args[]) {

    }

    // Variables declaration - do not modify
    private javax.swing.ButtonGroup Group;
    private javax.swing.JButton bt_exit;
    private javax.swing.JButton convert;
    private javax.swing.JLabel jLabel1;
    private javax.swing.JLabel jLabel2;
    private javax.swing.JLabel jLabel3;
    private javax.swing.JPanel jPanel1;
    private javax.swing.JPanel jPanel2;
    private javax.swing.JLabel lb_hasilMasehiHijriyah;
    private javax.swing.JRadioButton rb_HM;
    private javax.swing.JRadioButton rb_MH;
    private javax.swing.JButton reset;
    private javax.swing.JTextField tf_bulan;
    private javax.swing.JTextField tf_tahun;
    private javax.swing.JTextField tf_tanggal;
    // End of variables declaration
}
```

Lampiran 4
Program Posisi Bulan

```
package physics;

/**
@author arif
 */
import java.awt.Component;
import physics.koneksi.KoneksiAstronomi;
import java.text.DecimalFormat;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.util.logging.Level;
import java.util.logging.Logger;
import javax.swing.JOptionPane;
import javax.swing.JTextField;
import org.apache.derby.client.am.Statement;

public final class PosisiBulan extends javax.swing.JFrame {

   static String[] zone = {"-12","-11","-10","-9","-8","-7","-6","-5","-
4","-3", "-2","-
1","0","1","2","3","4","5","6","7","8","9","10","11","12"};
   static String[] tanggal = {"1", "2", "3", "4", "5", "6", "7", "8", "9",
"10",
       "11", "12", "13", "14", "15", "16", "17", "18", "19", "20", "21",
"22", "23", "24",
       "25", "26", "27", "28", "29", "30", "31"};
   static String[] tanggal1 = {"1", "2", "3", "4", "5", "6", "7", "8", "9",
"10",
       "11", "12", "13", "14", "15", "16", "17", "18", "19", "20", "21",
"22", "23", "24",
       "25", "26", "27", "28", "29", "30"};
   static String[] tanggal2 = {"1", "2", "3", "4", "5", "6", "7", "8", "9",
"10",
```

```
        "11", "12", "13", "14", "15", "16", "17", "18", "19", "20", "21",
"22", "23", "24",
        "25", "26", "27", "28", "29"};
     static String[] tanggal3 = {"1", "2", "3", "4", "5", "6", "7", "8",
"9", "10",
        "11", "12", "13", "14", "15", "16", "17", "18", "19", "20", "21",
"22", "23", "24",
        "25", "26", "27", "28"};
    static String[] bulan
={"Januari","Februari","Maret","April","Mei","Juni","Juli","Agustus
",
        "September","Oktober","November","Desember"};
static String[] Lintang ={"LU","LS"};
    static String[] lin ={"0","1"};
    static String[] Bujur = {"BT","BB"};
    static String[] buj = {"0","1"};    double derajatLintang,
derajatBujur;
    int  nilaiBulan, nilaiTahun;
    double jam, menit, detik;
    static double derajat1, menit1, detik1;
    static double derajat2, menit2, detik2;
    double Th;
    private int Mn, Y;
    private String D1;
    private String D2;
    private String D3;
    private String D4;
    private String D5;
    private int MenitAltitude1;
    private int DetikAltitude1;
    static double THari, TDetik;
    static double koreksibujurTotal;
    static double koreksilintangTotal;
    static double koreksiBBTotal;
    static double TotalhasilNutasi;
    static double TotalhasilEpsilon;
    static double Alpha;
    static double AlphaMatahari;
    private double derajatLintang2;
```

```
    static double TotalhasilL0;
    static double TotalhasilL1;
    static double TotalhasilL2;
    static double TotalhasilL3;
    static double TotalhasilL4;
    static double TotalhasilL5;
    static double TotalhasilR0;
    static double TotalhasilR1;
    static double TotalhasilR2;
    static double TotalhasilR3;
    static double TotalhasilR4;
    static double TotalhasilB0;
    static double TotalhasilB1;
    static double IluminasiBulan;
    DecimalFormat ft= new DecimalFormat("#.######");
    DecimalFormat ft1= new DecimalFormat("#.##");
    DecimalFormat("#.############");
    private String LS;
    private String BT;
    private int tgl1;

KoneksiAstronomi koneksiAstronomi =new KoneksiAstronomi();
    public PosisiBulan() {
        initComponents();
        Lokasi();
    }

    public void Lokasi() {
        ResultSet rs=null;
        try {
            Connection koneksiLokasi =
koneksiAstronomi.hubungDBastronomi();
            Statement st = (Statement)koneksiLokasi.createStatement();
            String sql = "select NM_KOTA from
APP.KOTA,APP.BUJUR,APP.LINTANG,APP.ZONA where
ID_KOTA=ID_BUJUR and ID_KOTA=ID_LINTANG and
ID_KOTA=ID_ZONA" ;
            rs = st.executeQuery(sql);
            System.out.println("Tampil lokasi berhasil");
```

```
        } catch (SQLException ex) {
          System.err.println("Error(1):"+ex);
          System.exit(1);
        }
        try{
          while(rs.next()){
          String namaKota = rs.getString("NM_KOTA");
          cb3.addItem(namaKota);
          }
          rs.close();
        }catch(SQLException ex){
          System.err.println("Error(2):"+ex);
          System.exit(1);
        }
    }

    public void itemKoordinat(){
        String text = (String)cb3.getSelectedItem();
            if( "".equals(text)){
                return;
            }
        ResultSet rs=null;
        try{
            Connection koneksiLokasi =
koneksiAstronomi.hubungDBastronomi();
            Statement st = (Statement)koneksiLokasi.createStatement();
            String sql = "select * from
APP.KOTA,APP.BUJUR,APP.LINTANG,APP.ZONA where
ID_KOTA=ID_BUJUR and ID_KOTA=ID_LINTANG and
ID_KOTA=ID_ZONA and NM_KOTA = "'+ text+"'" ;
            rs = st.executeQuery(sql);
        }catch(SQLException ex){
            System.err.println("Error(3):"+ex);
            System.exit(1);
        }
          try{
            while(rs.next()){
            tf_dj1.setText(rs.getString("DERAJAT_LINTANG"));
```

```
            tf_min1.setText(rs.getString("MENIT_LINTANG"));
            tf_det1.setText(rs.getString("DETIK_LINTANG"));
            tf_pos1.setText(rs.getString("POSISI_LINTANG"));
            tf_dj2.setText(rs.getString("DERAJAT_BUJUR"));
            tf_min2.setText(rs.getString("MENIT_BUJUR"));
            tf_det2.setText(rs.getString("DETIK_BUJUR"));
            tf_pos2.setText(rs.getString("POSISI_BUJUR"));
            tf_zona.setText(rs.getString("ZONA_WAKTU"));
            }
            rs.close();
        }catch(SQLException ex){
            System.err.println("Error(4):"+ex);
            System.exit(1);
        }
    }

    void Posisi()
    {
        nilaiTahun = Integer.parseInt(tf_tahun.getText());
        double nilaiTahun1 =
Double.parseDouble(Integer.toString(nilaiTahun));
        nilaiBulan = cb2.getSelectedIndex() +1;
        double nilaiBulan1 =
Double.parseDouble(Integer.toString(nilaiBulan));
        String tgl =cb1.getSelectedItem().toString();
        tgl1 = Integer.parseInt(tgl);
        double nilaiTanggal1 =
Double.parseDouble(Integer.toString(tgl1));

      derajat1 = Double.parseDouble(tf_dj1.getText());
      menit1 = Double.parseDouble(tf_min1.getText());
      detik1 = Double.parseDouble(tf_det1.getText());

      derajat2 = Double.parseDouble(tf_dj2.getText());
      menit2 = Double.parseDouble(tf_min2.getText());
      detik2 = Double.parseDouble(tf_det2.getText());

       jam = Double.parseDouble(tf_jam.getText());
       menit = Double.parseDouble(tf_menit.getText());
```

```
detik = Double.parseDouble(tf_detik.getText());


// ============== Lintang Geografis
if(tf_pos1.getText().equals(Lintang[0])) {
    double derajatLintang1 = derajat1 + menit1/60 +
detik1/3600; // dalam derajat
    derajatLintang = Double.valueOf(ft.format(derajatLintang1));
    derajatLintang2 = Math.toRadians(derajatLintang);
  }
  else{
   double derajatLintang1 = -1*(derajat1 + menit1/60 +
detik1/3600);
    derajatLintang = Double.valueOf(ft.format(derajatLintang1));
    derajatLintang2 = Math.toRadians(derajatLintang);      }

  //============== Bujur Geografis
  if(tf_pos2.getText().equals(Bujur[0])){
   double derajatBujur1 = (derajat2 + menit2/60 + detik2/3600);
   derajatBujur = Double.valueOf(ft.format(derajatBujur1));
   double derajatBujur2 = Math.toRadians(derajatBujur);

  }
  else{
   double derajatBujur1 = -1*(derajat2 + menit2/60 +
detik2/3600);
   derajatBujur = Double.valueOf(ft.format(derajatBujur1));
   double derajatBujur2 = Math.toRadians(derajatBujur);

  }

  //Mengecek tanggal,bulan dan tahun
  if( nilaiBulan < 3){
    Mn = nilaiBulan + 12;
    Y = nilaiTahun - 1 ;
  }
  else{
    Mn = nilaiBulan;
    Y = nilaiTahun;
```

```
        }

        int B = 2- (int)(Y/100) + (int)((int)(Y/100)/4);
        double JD = 1720994.5 +(int)(365.25*Y) +(int)(30.60001*(Mn
+ 1)) +B +tgl1
                +(jam +menit/60 +detik/3600)/24 -
Double.parseDouble(tf_zona.getText())/24 ;
        double UT = (JD -2451545)/36525;
        double Th1 =(nilaiTahun1 +(nilaiBulan1 -1)/12 +
nilaiTanggal1/365);
        Th =Double.valueOf(ft1.format(Th1));


         //========= PERHITUNGAN DELTA T =====
        double y = Th;

      //SEBELUM TAHUN -500
        if (y <= -500) {
           TDetik = -20 + 32 * (y/100 - 18.2) * (y/100 - 18.2);
           THari= TDetik / 86400;

        } //==ANTARA -500 DAN 500
        else if ((y > -500) && (y <= 500)) {
            TDetik = 10583.6 - 1014.41*(y/100) +
33.78311*(y/100)*(y/100) - 5.952053*(y/100)*(y/100)*(y/100)
                - 0.1798452*(y/100)*(y/100)*(y/100)*(y/100) +
0.022174192*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)
                +
0.0090316521*(y/100)*(y/100)*(y/100)*(y/100)*(y/100)*(y/100);
           THari = TDetik / 86400;

        } //==ANTARA 500 SD 1600
        else if ((y > 500) && (y <= 1600)) {
          TDetik = 1574.2 - 556.01*(y/100 - 10) + 71.23472*(y/100 -
10)*(y/100 - 10) + 0.319781*(y/100 - 10)*(y/100 - 10)*(y/100 - 10)
                - 0.8503463*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)
                - 0.005050998*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)
```

```
            + 0.0083572073*(y/100 - 10)*(y/100 - 10)*(y/100 -
10)*(y/100 - 10)*(y/100 - 10)*(y/100 - 10);
        THari = TDetik / 86400;

    } //=====ANTARA 1600 SD 1700
    else if ((y > 1600) && (y <= 1700)) {
        TDetik = 120 - 0.9808*(y - 1600) - 0.01532*(y - 1600)*(y -
1600)
            + ((y - 1600)*(y - 1600)*(y - 1600)/7129);
        THari = TDetik  / 86400;

    } //===antara 1700 SD 1800
    else if ((y > 1700) && (y <= 1800)) {
        TDetik = 8.83 + 0.1603*(y - 1700) - 0.0059285*(y -
1700)*(y- 1700)
            + 0.00013336*(y - 1700)*(y - 1700)*(y - 1700)
            - ((y - 1700)*(y - 1700)*(y - 1700)*(y - 1700)/1174000);
        THari = TDetik / 86400;

    } //===antara 1800 SD 1860
    else if ((y > 1800) && (y <= 1860)) {
        TDetik = 13.72 - 0.332447*(y - 1800) + 0.0068612*(y -
1800)*(y - 1800)+ 0.0041116*(y - 1800)*(y - 1800)*(y - 1800)
            - 0.00037436*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)
            + 0.0000121272*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)
            - 0.0000001699*(y - 1800)*(y - 1800)*(y - 1800)*(y -
1800)*(y - 1800)*(y - 1800)
            + 0.000000000875*(y - 1800)*(y - 1800)*(y - 1800)*(y
- 1800)*(y - 1800)*(y - 1800)*(y - 1800);
        THari = TDetik / 86400;

    } //==antara 1860 sd 1900
    else if ((y > 1860) && (y <= 1900)) {
        TDetik = 7.62 + 0.5737*(y - 1860) - 0.251754*(y - 1860)*(y
- 1860)
            + 0.01680668*(y - 1860)*(y - 1860)*(y - 1860)
```

```
            - 0.0004473624*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)
            + ((y - 1860)*(y - 1860)*(y - 1860)*(y - 1860)*(y -
1860)/233174);
        THari = TDetik / 86400;
    }

    //==antara 1900 sd 1920
    if ((y > 1900) && (y <= 1920)) {
        TDetik = -2.79 + 1.494119*(y- 1900) - 0.0598939*(y-
1900)*(y- 1900)
            + 0.0061966*(y- 1900)*(y- 1900)*(y- 1900)
            - 0.000197*(y- 1900)*(y- 1900)*(y- 1900)*(y- 1900);
        THari = TDetik / 86400;

    } //==antara 1920 sd 1941
    else if ((y > 1900) && (y <= 1920)) {
        TDetik = 21.2 + 0.84493*(y - 1920) - 0.0761*(y - 1920)*(y -
1920)
            + 0.0020936*(y - 1920)*(y - 1920)*(y - 1920);
         THari = TDetik / 86400;

    } //==antara 1941 sd 1961
    else if ((y > 1941) && (y <= 1961)) {
        TDetik = 29.07 + 0.407*(y - 1950) - (y - 1950)*(y -
1950)/233
            + ((y - 1950)*(y - 1950)*(y - 1950)/2547);
        THari = TDetik / 86400;

    }
    //==antara 1961 sd 1986
    else if ((y > 1961) && (y <= 1986)) {
        TDetik = 45.45 + 1.067*(y - 1975) - (y - 1975)*(y -
1975)/260
            - ((y - 1975)*(y - 1975)*(y - 1975)/718);
        THari = TDetik / 86400;

    } //==antara 1986 sd 2005
    else if ((y > 1986) && (y <= 2005)) {
```

```
        TDetik = 63.86 + 0.3345*(y - 2000) - 0.060374*(y -
2000)*(y - 2000)
                + 0.0017275*(y - 2000)*(y - 2000)*(y - 2000)
                + 0.000651814*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)
                + 0.00002373599*(y - 2000)*(y - 2000)*(y - 2000)*(y -
2000)*(y - 2000);
        THari = TDetik / 86400;

      } //==antara 2005 sd 2050
      else if ((y > 2005) && (y <= 2050)) {
        TDetik = 62.92 + 0.32217*(y - 2000) + 0.005589*(y -
2000)*(y - 2000);
        THari = TDetik / 86400;
      } //==antara 2050 sd 2150
      else if ((y > 2050) && (y <= 2150)) {
        TDetik = -20 + 32*(y/100 - 18.20)*(y/100 - 18.2) -
0.5628*(2150 - y);
       THari = TDetik / 86400;
      } //==diatas 2150
      else if (y > 2150) {
        TDetik = -20 + 32*(y/100 - 18.2)*(y/100 - 18.2);
         THari = TDetik / 86400;

      } else {
        TDetik  = 0;
         THari = TDetik / 86400;
      }

      double JDE = Double.valueOf(ft.format(JD + THari));
      double TD =(JDE -2451545)/36525;
      double tau = TD/10;
      double U = TD/100;
      double GST1 = ((280.46061837 +360.98564736629*(JD -
2451545)+0.000387933*UT*UT -UT*UT*UT/3871000)%360)/15;
      double GST = Double.valueOf(ft.format(GST1));

      //Rata-rata pemanjangan bulan dari matahari
```

```
        double D = Math.toRadians((297.85036 +445267.111480*TD -
0.0019142*TD*TD +TD*TD*TD/189474)%360); // radian

        //Anomali rata-rata matahari
        double M = Math.toRadians((357.52772 +35999.050340*TD -
0.0001603*TD*TD -TD*TD*TD/300000)%360);

        //Anomali rata-rata bulan
        double Mb = Math.toRadians((134.96298 +477198.867398*TD
+0.0086972*TD*TD +TD*TD*TD/56250)%360);

        //Argumen lintang bulan
        double F = Math.toRadians((93.27191 +483202.017538*TD -
0.0036825*TD*TD -TD*TD*TD/327270)%360);

        //Argumen bujur bulan
        double Omega = Math.toRadians(360 +((125.04452 -
1934.136261*TD +0.0020708*TD*TD
+TD*TD*TD/450000)%360));

      //=======DELTA PSI/NUTASI============
        double DNutasi[] = {0.0, -2.0, 0.0, 0.0, 0.0, 0.0, -2.0, 0.0, -2.0, -
2.0, 0.0, 0.0, 0.0, -2.0, 0.0, -2.0, 0.0, 2.0, 2.0, 0.0, -2.0, 0.0, 2.0, 0.0,
0.0, -2.0, 0.0, -2.0, 0.0, 2.0, 0.0, -2.0, 0.0, 0.0, 2.0, 2.0, 0.0, -2.0, 0.0,
2.0, 2.0, -2.0, -2.0, 2.0, 2.0, 0.0, -2.0, -2.0, 0.0, -2.0, -2.0, 0.0, -1.0, -
2.0, 1.0, 0.0, 0.0, -1.0, 0.0, 0.0, 2.0, 0.0, 2.0};
        double AMatahariNutasi[] = {0.0, 0.0, 0.0, 0.0, 1.0, 0.0, 1.0,
0.0, -1.0, 0.0, 0.0, 0.0, 2.0, 2.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, 0.0, -1.0, 0.0, 0.0, 0.0, 1.0,
1.0, -1.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, -1.0, -1.0, 0.0, 0.0, 0.0, 1.0, 0.0,
0.0, 1.0, 0.0, 0.0, 0.0, -1.0, 1.0, -1.0, -1.0, 0.0, -1.0};
        double ABulanNutasi[] = {0.0, 0.0, 0.0, 0.0, 0.0, 1.0, 0.0, 0.0,
0.0, 0.0, 1.0, -1.0, 0.0, 0.0, 1.0, 1.0, -1.0, 0.0, -1.0, 1.0, 2.0, -2.0, 0.0,
2.0, 2.0, 1.0, 0.0, 0.0, -1.0, -1.0, 0.0, 1.0, 0.0, 2.0, -1.0, 1.0, 0.0, 1.0,
0.0, 0.0, 1.0, 2.0, 1.0, -2.0, 0.0, 1.0, 0.0, 0.0, 2.0, 2.0, 0.0, 1.0, 1.0,
0.0, 0.0, 1.0, -2.0, 1.0, 1.0, 1.0, -1.0, 3.0, 0.0};
        double FNutasi[] = {0.0, 2.0, 2.0, 0.0, 0.0, 0.0, 2.0, 2.0, 2.0, 2.0,
0.0, 0.0, 0.0, 2.0, 2.0, 0.0, 2.0, 0.0, 2.0, 2.0, 0.0, 2.0, 2.0, 2.0, 0.0, 2.0,
2.0, 2.0, 2.0, 0.0, 0.0, 0.0, 0.0, -2.0, 2.0, 2.0, 2.0, 0.0, 2.0, 2.0, 0.0,
```

```
2.0, 2.0, 0.0, 0.0, 0.0, 2.0, 0.0, 2.0, 0.0, 2.0, -2.0, 0.0, 0.0, 0.0, 2.0,
2.0, 0.0, 0.0, 2.0, 2.0, 2.0, 2.0};
        double OmegaNutasi[] = {1.0, 2.0, 2.0, 2.0, 0.0, 0.0, 2.0, 1.0,
2.0, 1.0, 1.0, 1.0, 0.0, 2.0, 2.0, 0.0, 2.0, 0.0, 2.0, 1.0, 0.0, 1.0, 2.0, 2.0,
0.0, 2.0, 0.0, 0.0, 1.0, 1.0, 1.0, 1.0, 1.0, 0.0, 1.0, 2.0, 2.0, 0.0, 2.0, 1.0,
0.0, 2.0, 1.0, 1.0, 1.0, 0.0, 1.0, 1.0, 1.0, 1.0, 1.0, 0.0, 0.0, 0.0, 0.0, 0.0,
2.0, 0.0, 0.0, 2.0, 2.0, 2.0, 2.0};
        double KoefesienDelta1[] = {-171996.0, -13187.0, -2274.0,
2062.0, 1426.0, 712.0, -517.0, -386.0, 217.0, 129.0, 63.0, -58.0, 17.0,
-16.0, -301.0, -158.0, 123.0, 63.0, -59.0, -51.0, 48.0, 46.0, -38.0, -
31.0, 29.0, 29.0, 26.0, -22.0, 21.0, 16.0, -15.0, -13.0, -12.0, 11.0, -
10.0, -8.0, 7.0, -7.0, -7.0, -7.0, 6.0, 6.0, 6.0, -6.0, -6.0, 5.0, -5.0, -5.0,
-5.0, 4.0, 4.0, 4.0, -4.0, -4.0, -4.0, 3.0, -3.0, -3.0,
            -3.0, -3.0, -3.0, -3.0, -3.0};
        double KoefesienDelta2[] = {-174.2, -1.6, -0.2, 0.2, -3.4, 0.1,
1.2, -0.4, -0.5, 0.1, 0.1, -0.1, -0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0};

        int l;
TotalhasilNutasi=0.0;
        for (l = 0; l <= 62; l++) {

            double hasilNutasiDelta = (KoefesienDelta1[l] +
KoefesienDelta2[l] * TD) * Math.sin(DNutasi[l] * D
                    + AMatahariNutasi[l] * M + ABulanNutasi[l] * Mb +
FNutasi[l] * F + OmegaNutasi[l] * Omega);
            TotalhasilNutasi += hasilNutasiDelta;
        }

        //==========nilai notasi total/koreksi delta psi
        double Psi = TotalhasilNutasi / 10000.0;//detik busur
        double PsiDeg = Psi / 3600.0;//derajat

//======Delta Epsilon (Kemiringan sumbu rotasi bumi)=====
        double DDelta[] = {0.0, -2.0, 0.0, 0.0, 0.0, -2.0, 0.0, -2.0, 0.0,
0.0, -2.0, 0.0, 0.0, 2.0, 0.0, 0.0, 0.0, 2.0, 0.0, -2.0, 0.0, 2.0, -2.0, 0.0, -
2.0, 0.0, 2.0, 2.0, 0.0, 0.0, 2.0, -2.0, -2.0, 2.0, 2.0, -2.0, -2.0, 0.0};
```

```
        double AMatahariDelta[] = {0.0, 0.0, 0.0, 0.0, 1.0, 1.0, 0.0, -1.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 2.0, 1.0,
0.0, -1.0, 0.0, 0.0, 1.0, -1.0, 0.0, 0.0, 0.0, 0.0, 0.0, -1.0, 0.0, 0.0};
        double ABulanDelta[] = {0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, 0.0,
1.0, 0.0, 0.0, -1.0, 1.0, -1.0, -1.0, 1.0, -2.0, 0.0, 2.0, 1.0, -1.0, -1.0,
0.0, 0.0, 1.0, 0.0, -1.0, 1.0, 0.0, 0.0, 0.0, 2.0, 1.0, -2.0, 0.0, 0.0, 0.0,
2.0};
        double FDelta[] = {0.0, 2.0, 2.0, 0.0, 0.0, 2.0, 2.0, 2.0, 0.0, 2.0,
2.0, 2.0, 0.0, 2.0, 0.0, 2.0, 2.0, 2.0, 2.0, 2.0, 2.0, 0.0, 2.0, 0.0, 0.0, 0.0,
2.0, 2.0, 2.0, 2.0, 2.0, 2.0, 2.0, 0.0, 0.0, 2.0, 0.0, 2.0};
        double OmegaDelta[] = {1.0, 2.0, 2.0, 2.0, 0.0, 2.0, 2.0, 2.0, 0.0,
1.0, 1.0, 2.0, 1.0, 2.0, 1.0, 1.0, 1.0, 2.0, 2.0, 2.0, 1.0, 1.0, 2.0, 1.0, 1.0,
1.0, 1.0, 2.0, 2.0, 2.0, 1.0, 2.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0};
        double Koefesien1Delta[] = {92025.0, 5736.0, 977.0, -895.0,
54.0, 224.0, 129.0, -95.0, -7.0, 200.0, -70.0, -53.0, -33.0, 26.0, 32.0,
27.0, -24.0, 16.0, 13.0, -12.0, -10.0, -8.0, 7.0, 9.0, 7.0, 6.0, 5.0, 3.0, -
3.0, 3.0, 3.0, -3.0, -3.0, 3.0, 3.0, 3.0, 3.0, 3.0};
        double Koefesien2Delta[] = {8.9, -3.1, -0.5, 0.5, -0.1, -0.6, -0.1,
0.3, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0};


        int a;
TotalhasilEpsilon=0.0;
        for (a = 0; a <= 37; a++) {

            double hasilDeltaEpsilon = (Koefesien1Delta[a] +
Koefesien2Delta[a] * TD) * Math.cos(DDelta[a] * D
                    + AMatahariDelta[a] * M + ABulanDelta[a] * M +
FDelta[a] * F + OmegaDelta[a] * Omega);
            TotalhasilEpsilon += hasilDeltaEpsilon;
        }

         //========== nilai delta epsilon total========
        double EpsilonTotal = TotalhasilEpsilon / 10000;//detik busur
        double EpsDeg = EpsilonTotal / 3600;//derajat

        double EpsZero = 23.0 + 26.0 / 60.0 + 21.448 / 3600.0 + (-
4680.93 * U - 1.55 * U * U + 1999.25 * U * U * U - 51.38 * U * U *
U * U
```

```
            - 249.67 * U * U * U * U * U - 39.05 * U * U * U * U * U
* U + 7.12 * U * U * U * U * U * U * U + 27.87 * U * U * U * U *
U * U * U * U
            + 5.79 * U * U * U * U * U * U * U * U + 2.45 * U *
U * U * U * U * U * U * U * U * U) / 3600.0;//DERAJAT

        //=======Epsilon (kemiringan sumbu rotasi bumi)=====
        double Epsilon = EpsZero + EpsDeg;//derajat
        double EpsilonRad = Math.toRadians(Epsilon);//radians

        int JamEpsilon = (int)Epsilon; // =====> ambil nilai jam
        double sisaEpsilon = Epsilon - JamEpsilon;
        int MenitEpsilon = (int) (60 * sisaEpsilon); // ====> ambil nilai
menit
        double sisaMenitEpsilon = (60.0 * sisaEpsilon) - MenitEpsilon;
        int DetikEpsilon = (int) Math.round(60.0 * sisaMenitEpsilon); //
=======> ambil nilai detik

// GST NAMPAK =PUKUL = Ngaruh KOREKSI DELTA NUTASI
        double GSTnampak1 = GST
+PsiDeg*Math.cos(EpsilonRad)/15;
        double GSTnampak =
Double.valueOf(ft.format(GSTnampak1));

// LST nampak = pukul
        double LST = (GSTnampak +derajatBujur/15)%24;

        //================ PERHITUNGAN BULAN
        //Bujur rata-rata bulan (L')
        double Lb = (218.3164591 + 481267.88134236*TD -
0.0013268*TD*TD + TD*TD*TD/538841 -
TD*TD*TD*TD/65194000)%360;
       double LbRad = Math.toRadians(Lb);

        //Elongasi rata-rata bulan (D)
        double d = Math.toRadians((297.8502042 +
445267.1115168*TD - 0.00163*TD*TD + TD*TD*TD/545868 -
TD*TD*TD*TD/113065000)%360);
```

```
        //Anomali rata-rata matahari (M)
        double m = Math.toRadians((357.5291092 +
35999.0502909*TD - 0.0001536*TD*TD +
TD*TD*TD/24490000)%360);

        //Anomali rata-rata bulan (M')
        double mB = Math.toRadians((134.9634114 +
477198.8676313*TD + 0.008997*TD*TD + TD*TD*TD/69699 -
TD*TD*TD*TD/14712000)%360);

        //Argumen bujur bulan (F)
        double f = Math.toRadians((93.2720993 + 483202.0175273*TD
- 0.0034029*TD*TD - TD*TD*TD/3526000 +
TD*TD*TD*TD/863310000)%360);

        //Eksentrisitas orbit (E)
        double E = 1 - 0.002516*TD - 0.0000074*TD*TD;

         //=============== Argumen A1,A2,A3
        double A1 = Math.toRadians((119.75 + 131.849*TD)%360.0);
        double A2 = Math.toRadians((53.09 + 479264.29*TD)%360.0);
        double A3 = Math.toRadians((313.45 +
481266.484*TD)%360.0);

        //============= Koreksi untuk bujur ekliptika bulan

         //Rumusnya==koefesien*(Math.pow(
Eksentrisitasorbit,Math.ABS(d)))*SIN(A14*F3+B14*F4+C14*F5+
D14*F6)

        double DBulanB[] = {0.0, 2.0, 2.0, 0.0, 0.0, 0.0, 2.0, 2.0, 2.0,
2.0, 0.0, 1.0, 0.0, 2.0, 0.0, 0.0, 4.0, 0.0, 4.0, 2.0, 2.0, 1.0, 1.0, 2.0, 2.0,
4.0, 2.0, 0.0, 2.0, 2.0, 1.0, 2.0, 0.0, 0.0, 2.0, 2.0, 2.0, 4.0, 0.0, 3.0, 2.0,
4.0, 0.0, 2.0, 2.0, 2.0, 4.0, 0.0, 4.0, 1.0, 2.0, 0.0, 1.0, 3.0, 4.0, 2.0, 0.0,
1.0, 2.0};
        double AMatahariB[] = {0.0, 0.0, 0.0, 0.0, 1.0, 0.0, 0.0, -1.0,
0.0, -1.0, 1.0, 0.0, 1.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, 1.0, 0.0, 1.0, -
1.0, 0.0, 0.0, 0.0, 1.0, 0.0, -1.0, 0.0, -2.0, 1.0, 2.0, -2.0, 0.0, 0.0, -1.0,
```

```
0.0, 0.0, 1.0, -1.0, 2.0, 2.0, 1.0, -1.0, 0.0, 0.0, -1.0, 0.0, 1.0, 0.0, 1.0,
0.0, 0.0, -1.0, 2.0, 1.0, 0.0};
      double ABulanB[] = {1.0, -1.0, 0.0, 2.0, 0.0, 0.0, -2.0, -1.0, 1.0,
0.0, -1.0, 0.0, 1.0, 0.0, 1.0, 1.0, -1.0, 3.0, -2.0, -1.0, 0.0, -1.0, 0.0, 1.0,
2.0, 0.0, -3.0, -2.0, -1.0, -2.0, 1.0, 0.0, 2.0, 0.0, -1.0, 1.0, 0.0, -1.0,
2.0, -1.0, 1.0, -2.0, -1.0, -1.0, -2.0, 0.0, 1.0, 4.0, 0.0, -2.0, 0.0, 2.0,
1.0, -2.0, -3.0, 2.0, 1.0, -1.0, 3.0};
      double FB[] = {0.0, 0.0, 0.0, 0.0, 0.0, 2.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, -2.0, 2.0, -2.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, 2.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, -2.0, 2.0, 0.0, 2.0, 0.0, 0.0,
0.0, 0.0, 0.0, 0.0, -2.0, 0.0, 0.0, 0.0, 0.0, -2.0, -2.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, 0.0};
      double KoefesienB[] = {6288774.0, 1274027.0, 658314.0,
213618.0, -185116.0, -114332.0, 58793.0, 57066.0, 53322.0,
45758.0, -40923.0, -34720.0, -30383.0, 15327.0, -12528.0,
          10980.0, 10675.0, 10034.0, 8548.0, -7888.0, -6766.0, -
5163.0, 4987.0, 4036.0, 3994.0, 3861.0, 3665.0, -2689.0, -2602.0,
2390.0, -2348.0, 2236.0, -2120.0, -2069.0, 2048.0, -1773.0,
          -1595.0, 1215.0, -1110.0, -892.0, -810.0, 759.0, -713.0, -
700.0, 691.0, 596.0, 549.0, 537.0, 520.0, -487.0, -399.0, -381.0,
351.0, -340.0, 330.0, 327.0, -323.0, 299.0, 294.0};


      int i;
koreksibujurTotal=0.0;
      for (i = 0; i <= 58; i++) {

          double hasilkoreksibujur = KoefesienB[i] * (Math.pow(E,
Math.abs(AMatahariB[i])))
                  * Math.sin(DBulanB[i] * d + AMatahariB[i] * m +
ABulanB[i] * mB + FB[i] * f);
          koreksibujurTotal += hasilkoreksibujur;
      }
     double koreksiBJ = (koreksibujurTotal +3958*Math.sin(A1)
+1962*Math.sin(LbRad-f) +318*Math.sin(A2))/1000000;

      // ==========Koreksi untuk lintang ekliptika bulan

      double DBulanL[] = {0.0, 0.0, 0.0, 2.0, 2.0, 2.0, 2.0, 0.0, 2.0,
0.0, 2.0, 2.0, 2.0, 2.0, 2.0, 2.0, 2.0, 0.0, 4.0, 0.0, 0.0, 0.0, 1.0, 0.0, 0.0,
```

```
0.0, 1.0, 0.0, 4.0, 4.0, 0.0, 4.0, 2.0, 2.0, 2.0, 2.0, 0.0, 2.0, 2.0, 2.0, 2.0,
4.0, 2.0, 2.0, 0.0, 2.0, 1.0, 1.0, 0.0, 2.0, 1.0, 2.0, 0.0, 4.0, 4.0, 1.0, 4.0,
1.0, 4.0, 2.0};
      double AMatahariL[] = {0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, -1.0, 0.0, 0.0, 1.0, -1.0, -1.0, -1.0, 1.0, 0.0, 1.0, 0.0, 1.0, 0.0, 1.0,
1.0, 1.0, 0.0, 0.0, 0.0, 0.0,
         0.0, 0.0, 0.0, 0.0, -1.0, 0.0, 0.0, 0.0, 0.0, 1.0, 1.0, 0.0, -1.0, -
2.0, 0.0, 1.0, 1.0, 1.0, 1.0, 1.0, 0.0, -1.0, 1.0, 0.0, -1.0, 0.0, 0.0, 0.0, -
1.0, -2.0};
      double ABulanL[] = {0.0, 1.0, 1.0, 0.0, -1.0, -1.0, 0.0, 2.0, 1.0,
2.0, 0.0, -2.0, 1.0, 0.0, -1.0, 0.0, -1.0, -1.0, -1.0, 0.0, 0.0, -1.0, 0.0,
1.0, 1.0, 0.0, 0.0, 3.0, 0.0, -1.0,
         1.0, -2.0, 0.0, 2.0, 1.0, -2.0, 3.0, 2.0, -3.0, -1.0, 0.0, 0.0, 1.0,
0.0, 1.0, 1.0, 0.0, 0.0, -2.0, -1.0, 1.0, -2.0, 2.0, -2.0, -1.0, 1.0, 1.0, -
1.0, 0.0, 0.0};
      double FL[] = {1.0, 1.0, -1.0, -1.0, 1.0, -1.0, 1.0, 1.0, -1.0, -1.0,
-1.0, -1.0, 1.0, -1.0, 1.0, 1.0, -1.0, -1.0, -1.0, 1.0, 3.0, 1.0, 1.0, 1.0, -
1.0, -1.0, -1.0, 1.0, -1.0, 1.0,
         -3.0, 1.0, -3.0, -1.0, -1.0, 1.0, -1.0, 1.0, -1.0, 1.0, 1.0, 1.0, 1.0,
-1.0, 3.0, -1.0, -1.0, 1.0, -1.0, -1.0, 1.0, -1.0, 1.0, -1.0, -1.0, -1.0, -1.0,
-1.0, -1.0, 1.0};
      double KoefesienL[] = {5128122.0, 280602.0, 277693.0,
173237.0, 55413.0, 46271.0, 32573.0, 17198.0, 9266.0, 8822.0,
8216.0, 4324.0, 4200.0,
         -3359.0, 2463.0, 2211.0, 2065.0, -1870.0, 1828.0, -1794.0, -
1749.0, -1565.0, -1491.0, -1475.0, -1410.0, -1344.0, -1335.0, 1107.0,
1021.0, 833.0, 777.0, 671.0, 607.0, 596.0, 491.0, -451.0, 439.0,
422.0, 421.0, -366.0, -351.0, 331.0, 315.0, 302.0, -283.0, -229.0,
223.0, 223.0, -220.0,
         -220.0, -185.0, 181.0, -177.0, 176.0, 166.0, -164.0, 132.0, -
119.0, 115.0, 107.0};


      int j;
koreksilintangTotal=0.0;
      for (j = 0; j <= 59; j++) {
         double hasilkoreksilintang = KoefesienL[j] * (Math.pow(E,
Math.abs(AMatahariL[j])))
               * Math.sin(DBulanL[j] * d + AMatahariL[j] * m +
ABulanL[j] * mB + FL[j] * f);
```

```
            koreksilintangTotal += hasilkoreksilintang;
        }

        //==============Koreksi lintang bulan ========
        double koreksiBB = (koreksilintangTotal - 2235.0 *
Math.sin(LbRad) + 382.0 * Math.sin(A3)
                + 175.0 * Math.sin(A1 - f) + 175.0 * Math.sin(A1 + f)
                + 127.0 * Math.sin(LbRad - mB) - 115.0 *
Math.sin(LbRad + mB)) / 1000000.0;//derajat

        // ==============Koreksi untuk jarak bumi-bulan

        double DBulanBB[] = {0.0, 2.0, 2.0, 0.0, 2.0, 2.0, 2.0, 2.0, 0.0,
1.0, 0.0, 0.0, 0.0, 4.0, 2.0, 2.0, 0.0, 4.0, 1.0, 2.0, 2.0, 4.0, 2.0, 2.0, 2.0,
2.0, 2.0, 1.0, 0.0, 1.0, 0.0, 2.0, 0.0, 2.0, 4.0, 3.0, 0.0, 2.0, 2.0, 0.0, 4.0,
1.0, 4.0, 4.0, 0.0, 0.0};
        double AMatahariBB[] = {0.0, 0.0, 0.0, 0.0, 0.0, -1.0, 0.0, -1.0,
1.0, 0.0, 1.0, 0.0, 0.0, 1.0, 0.0, 1.0, 1.0, 0.0, 0.0, 1.0, 0.0, -1.0, 0.0, 0.0,
0.0, -1.0, -2.0, 0.0, 0.0, 1.0, 0.0, 1.0, -2.0, 0.0, 0.0, -1.0, 0.0, 0.0, 1.0,
2.0, 2.0, -1.0, 0.0, -1.0, 0.0, 2.0, 0.0};
        double ABulanBB[] = {1.0, -1.0, 0.0, 2.0, -2.0, 0.0, 1.0, -1.0, -
1.0, 0.0, 1.0, 1.0, 0.0, -1.0, 0.0, -1.0, 3.0, -2.0, 0.0, -3.0, 1.0, 0.0, 2.0,
0.0, -2.0, 0.0, -1.0, -1.0, -2.0, 1.0, 2.0, -1.0, 2.0, 1.0, -1.0, -1.0, 0.0,
1.0, -1.0, -1.0, -2.0, -2.0, 0.0, 1.0, 1.0, 4.0};
        double FBB[] = {0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, -2.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, -2.0, 0.0,
0.0, -2.0, 0.0, 0.0, 0.0, 0.0, 0.0, -2.0, -2.0, 0.0, 0.0, 2.0, 0.0, 0.0, 0.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0};
        double KoefesienBB[] = {-20905355.0, -3699111.0, -
2955968.0, -569925.0, 246158.0, -204586.0, -170733.0, -152138.0,
            -129620.0, 108743.0, 104755.0, 79661.0, 48888.0, -34782.0,
30824.0, 24208.0, -23210.0, -21636.0, -16675.0, 14403.0, -12831.0,
            -11650.0, -10445.0, 10321.0, 10056.0, -9884.0, 8752.0, -
8379.0, -7003.0, 6322.0, 5751.0, -4950.0, -4421.0, 4130.0, -3958.0,
3258.0, -3149.0, 2616.0, 2354.0, -2117.0, -1897.0, -1739.0, -1571.0,
-1423.0, 1165.0, -1117.0};

        int k;
koreksiBBTotal=0.0;
```

```
        for (k = 0; k <= 45; k++) {
            double hasilkoreksijarakBB = KoefesienBB[k] *
(Math.pow(E, Math.abs(AMatahariBB[k])))
                    * Math.cos(DBulanBB[k] * d + AMatahariBB[k] * m +
ABulanBB[k] * mB + FBB[k] * f);
            koreksiBBTotal += hasilkoreksijarakBB;
        }

       // =========Koreksi jarak bumi-bulan============
        double koreksijarakBB = koreksiBBTotal / 1000.0;//km


 //==================== POSISI BULAN

 //==== Bujur Bulan
      double bujurBulan =(Lb+koreksiBJ)%360;

//===== Bujur Bulan nampak (Lamda)
      double Lamda = (EpsDeg+bujurBulan)%360;
      double LamdaRad = Math.toRadians(Lamda);
      // DMS dari Bujur Bulan
       int derajatLamda = (int)Lamda; // ==> ambil nilai derajat
       double sisaLamda = Lamda - derajatLamda;
       int MenitLamda = (int) (60 * sisaLamda); // ==> ambil nilai
menit
       double sisaMenitLamda = (60.0 * sisaLamda) - MenitLamda;
       int DetikLamda = (int) Math.round(60.0 * sisaMenitLamda); //
====> ambil nilai detik

//===== Lintang Bulan (Beta)
      double lintangBulan = Math.abs(koreksiBB);
      double LintangRad = Math.toRadians(koreksiBB);

      if (koreksiBB < 0){
         D1 ="NEGATIF";
      }
      else{

         D1 = "POSITIF";
```

```
        }
        // DMS dari Lintang Bulan
        int derajatlintangBulan = (int)lintangBulan; // ===> ambil nilai
derajat
        double sisalintangBulan = lintangBulan - derajatlintangBulan;
        int MenitlintangBulan = (int) (60 * sisalintangBulan); // ==>
ambil nilai menit
        double sisaMenitlintangBulan = (60.0 * sisalintangBulan) -
MenitlintangBulan;
        int DetiklintangBulan = (int) Math.round(60.0 *
sisaMenitlintangBulan); // ==> ambil nilai detik

//===== Jarak Bumi-Bulan
        double jarakBB = Double.valueOf(ft1.format(385000.56
+koreksijarakBB));
        String jarakbb = Double.toString(jarakBB);

//===== Sudut Paralaks
        double paralaks =
Math.toDegrees(Math.asin(6378.14/jarakBB));
        // DMS dari Sudut Paralaks
        int Derajatparalaks = (int)paralaks; // =====> ambil nilai
derajat
        double sisaparalaks = paralaks - Derajatparalaks;
        int Menitparalaks = (int) (60 * sisaparalaks); // ===> ambil nilai
menit
        double sisaMenitparalaks = (60.0 * sisaparalaks) -
Menitparalaks;
        int Detikparalaks = (int) Math.round(60.0 * sisaMenitparalaks);
// =======> ambil nilai detik

//===== Sudut jari-jari bulan
        double jariBulan = 358473400/(jarakBB*3600);
        // DMS dari jar-jari bulan
        int DerajatjariBulan = (int)jariBulan; // ==> ambil nilai derajat
        double sisajariBulan = jariBulan - DerajatjariBulan ;
        int MenitjariBulan = (int) (60 * sisajariBulan); // ===> ambil
nilai menit
```

```
        double sisaMenitjariBulan = (60.0 * sisajariBulan) -
MenitjariBulan;
        int DetikjariBulan = (int) Math.round(60.0 *
sisaMenitjariBulan); // ====> ambil nilai detik

//===== Alpha (Ketinggian dari horizon)
        double alp =
Math.atan2(Math.sin(LamdaRad)*Math.cos(EpsilonRad)-
Math.tan(LintangRad)*Math.sin(EpsilonRad),Math.cos(LamdaRad))
;
        if(alp < 0.0){
            Alpha = 360+(Math.toDegrees(alp)%360);
        }
        else{
            Alpha = (Math.toDegrees(alp)%360);
        }

        double AlphaRad = Math.toRadians(Alpha);

        // HMS dari Alpha
        double JamAlpha1 = Alpha /360.0 * 24;
        int JamAlpha = (int)JamAlpha1; // ====> ambil nilai jam
        double sisaJamAlpha1 = JamAlpha1 - JamAlpha;
        int MenitAlpha  = (int)(60 * sisaJamAlpha1); // ====> ambil
nilai menit
        double sisaMenitAlpha = (60 * sisaJamAlpha1) - MenitAlpha;
        int DetikAlpha = (int)(60 * sisaMenitAlpha); // ===> ambil nilai
detik


//==== Delta (Deklinasi)
        double Delta =
Math.toDegrees(Math.asin(Math.sin(LintangRad)*Math.cos(Epsilon
Rad)

+Math.cos(LintangRad)*Math.sin(EpsilonRad)*Math.sin(LamdaRad
)));
        double Delta1 = Math.abs(Delta);
        double DeltaRad = Math.toRadians(Delta);
```

```
    // ======= Deklinasi Bulan ========
    if(Delta < 0){
        D2 = "NEGATIF";
    }
    else{
            D2 = "POSITIF";
    }
    // DMS dari Delta
    int DerajatDelta = (int)Delta1; // ====> ambil nilai derajat
    double sisaDelta = Delta1 - DerajatDelta;
    int MenitDelta = (int)(60 * sisaDelta); // ====> ambil nilai
menit
    double sisaMenitDelta = (60 * sisaDelta)- MenitDelta;
    int DetikDelta = (int)(60 * sisaMenitDelta); // ====> ambil nilai
detik

//===== Hour Angle
    double HourAngle = LST * 15 - Alpha;
    double HourAngleRad = Math.toRadians(HourAngle);

// ===== Azimuth Bulan
    // Azimuth dari selatan
    double Azimuth1 =
Math.toDegrees(Math.atan2(Math.sin(HourAngleRad),Math.cos(Ho
urAngleRad)*Math.sin(derajatLintang2)
        -Math.tan(DeltaRad)*Math.cos(derajatLintang2)));
       // Azimuth
    double Azimuth = (Azimuth1 +180)%360;
    double AzimuthRad = Math.toRadians(Azimuth);
     // DMS dari Azimuth
     int derajatAzimuth = (int)Azimuth; // =====> ambil nilai
derajat
     double sisaAzimuth = Azimuth - derajatAzimuth;
     int MenitAzimuth = (int) (60 * sisaAzimuth); // =========>
ambil nilai menit
     double sisaMenitAzimuth = (60.0 * sisaAzimuth) -
MenitAzimuth;
```

```
      int DetikAzimuth = (int) Math.round(60.0 *
sisaMenitAzimuth); // =======> ambil nilai detik

// ======= Altitude Bulan
     double Altitude =
Math.toDegrees(Math.asin(Math.sin(derajatLintang2)*Math.sin(Delt
aRad)

+Math.cos(derajatLintang2)*Math.cos(DeltaRad)*Math.cos(HourAn
gleRad)));
     double AltitudeRad = Math.toRadians(Altitude);

     if(Altitude < 0){

         D3 = "NEGATIF";
     }
     else{

         D3 = "POSITIF";
     }
     // DMS dari Altitude
      int derajatAltitude = (int)Math.abs(Altitude); // =====> ambil
nilai derajat
      double sisaAltitude = Altitude - derajatAltitude;
      int MenitAltitude = (int) Math.abs(60 * sisaAltitude); // ===>
ambil nilai menit

      if(MenitAltitude > 360){
        MenitAltitude1 = MenitAltitude % 360;
      }
      else{
        MenitAltitude1 = MenitAltitude;
      }
      double sisaMenitAltitude = (60.0 * sisaAltitude) -
MenitAltitude1;
      int DetikAltitude = (int) Math.abs(Math.round(60.0 *
sisaMenitAltitude)); // ====> ambil nilai detik

       if(DetikAltitude > 360){
```

```
        DetikAltitude1 = MenitAltitude % 360;
      }
      else{
        DetikAltitude1 = MenitAltitude;
      }
// ------------------------------------------------------------> LANJUTAN
HITUNGAN BULAN DIBAWAH

    // ============== PERHITUNGAN MATAHARI
==========================================
//===========Bujur ekliptika (L0)
      double AL0[] = {175347046.0, 3341656.0, 34894.0, 3497.0,
3418.0, 3136.0, 2676.0, 2343.0, 1324.0, 1273.0, 1199.0, 990.0,
902.0, 857.0, 780.0, 753.0,
        505.0, 492.0, 357.0, 317.0, 284.0, 271.0, 243.0, 206.0, 205.0,
202.0, 156.0, 132.0, 126.0, 115.0, 103.0, 102.0, 102.0, 99.0, 98.0,
86.0, 85.0, 85.0,
        80.0, 79.0, 75.0, 74.0, 74.0, 70.0, 62.0, 61.0, 57.0, 56.0, 56.0,
52.0, 52.0, 51.0, 49.0, 41.0, 41.0, 39.0, 37.0, 37.0, 36.0, 36.0, 33.0,
30.0, 30.0, 25.0};
      double BL0[] = {0.0, 4.6692568, 4.6261, 2.7441, 2.8289,
3.6277, 4.4181, 6.1352, 0.7425, 2.0371, 1.1096, 5.233,
        2.045, 3.508, 1.179, 2.533, 4.583, 4.205, 2.92, 5.849, 1.899,
0.315, 0.345, 4.806, 1.869, 2.458,
        0.833, 3.411, 1.083, 0.645, 0.636, 0.976, 4.267, 6.21, 0.68,
5.98, 1.3, 3.67, 1.81, 3.04, 1.76,
        3.5, 4.68, 0.83, 3.98, 1.82, 2.78, 4.39, 3.47, 0.19, 1.33, 0.28,
0.49, 5.37, 2.4, 6.17, 6.04, 2.57,
        1.71, 1.78, 0.59, 0.44, 2.74, 3.16};
      double CL0[] = {0.0, 6283.07585, 12566.1517, 5753.3849,
3.5231, 77713.7715, 7860.4194, 3930.2097, 11506.7698,
        529.691, 1577.3435, 5884.927, 26.298, 398.149, 5223.694,
5507.553, 18849.228, 775.523, 0.067,
        11790.629, 796.298, 10977.079, 5486.778, 2544.314,
5573.143, 6069.777, 213.299, 2942.463, 20.775,
        0.98, 4694.003, 15720.839, 7.114, 2146.17, 155.42,
161000.69, 6275.96, 71430.7, 17260.15, 12036.46,
        5088.63, 3154.69, 801.82, 9437.76, 8827.39, 7084.9, 6286.6,
14143.5, 6279.55, 12139.55, 1748.02,
```

```
        5856.48, 1194.45, 8429.24, 19651.05, 10447.39, 10213.29,
1059.38, 2352.87, 6812.77, 17789.85,
        83996.85, 1349.87, 4690.48};

    int n;
TotalhasilL0=0.0;
    for (n = 0; n <= 63; n++) {
        double hasilL0 = AL0[n] * Math.cos(BL0[n] + CL0[n] *
tau);
        TotalhasilL0 += hasilL0;
    }

 //==================Bujur ekliptika (L1)
    double AL1[] = {628331966747.0, 206059.0, 4303.0, 425.0,
119.0, 109.0, 93.0, 72.0, 68.0, 67.0, 59.0, 56.0, 45.0, 36.0, 29.0,
        21.0, 19.0, 19.0, 17.0, 16.0, 16.0, 15.0, 12.0, 12.0, 12.0, 12.0,
11.0, 10.0, 10.0, 9.0, 9.0, 8.0, 6.0, 6.0};
    double BL1[] = {0.0, 2.678235, 2.6351, 1.59, 5.796, 2.966,
2.59, 1.14, 1.87, 4.41, 2.89, 2.17,
        0.4, 0.47, 2.65, 5.34, 1.85, 4.97, 2.99, 0.03, 1.43, 1.21, 2.83,
3.26, 5.27, 2.08,
        0.77, 1.3, 4.24, 2.7, 5.64, 5.3, 2.65, 4.67};
    double CL1[] = {0.0, 6283.07585, 12566.1517, 3.523, 26.298,
1577.344, 18849.23, 529.69, 398.15,
        5507.55, 5223.69, 155.42, 796.3, 775.52, 7.11, 0.98, 5486.78,
213.3, 6275.96, 2544.31,
        2146.17, 10977.08, 1748.02, 5088.63, 1194.45, 4694, 553.57,
6286.6, 1349.87, 242.73,
        951.72, 2352.87, 9437.76, 4690.48};


    int p;
TotalhasilL1=0.0;
    for (p = 0; p <= 33; p++) {
        double hasilL1 = AL1[p] * Math.cos(BL1[p] + CL1[p] *
tau);
        TotalhasilL1 += hasilL1;
    }

 //=============Bujur ekliptika (L2)
```

```
        double AL2[] = {52919.0, 8720.0, 309.0, 27.0, 16.0, 16.0, 10.0,
9.0, 7.0, 5.0, 4.0, 4.0, 3.0, 3.0, 3.0, 3.0, 3.0, 3.0, 2.0, 2.0};
        double BL2[] = {0.0, 1.0721, 0.867, 0.05, 5.19, 3.68, 0.76, 2.06,
0.83, 4.66, 1.03, 3.44,
            5.14, 6.05, 1.19, 6.12, 0.31, 2.28, 4.38, 3.75};
        double CL2[] = {0.0, 6283.0758, 12566.152, 3.52, 26.3, 155.42,
18849.23, 77713.77, 775.52, 1577.34, 7.11, 5573.14, 796.3, 5507.55,
242.73, 529.69, 398.15, 553.57,
            5223.69, 0.98};

        int q;
TotalhasilL2=0.0;
        for (q = 0; q <= 19; q++) {
            double hasilL2 = AL2[q] * Math.cos(BL2[q] + CL2[q] *
tau);
            TotalhasilL2 += hasilL2;
        }

//============Bujur ekliptika (L3)
        double AL3[] = {289.0, 35.0, 17.0, 3.0, 1.0, 1.0, 1.0};
        double BL3[] = {5.844, 0.0, 5.49, 5.2, 4.72, 5.3, 5.97};
        double CL3[] = {6283.076, 0.0, 12566.15, 155.42, 3.52,
18849.23, 242.73};

        int r;
TotalhasilL3=0.0;
        for (r = 0; r <= 6; r++) {
            double hasilL3 = AL3[r] * Math.cos(BL3[r] + CL3[r] * tau);
            TotalhasilL3 += hasilL3;
        }

//==============Bujur Ekliptika (L4)
        double AL4[] = {114.0, 8.0, 1.0};
        double BL4[] = {3.142, 4.13, 3.84};
        double CL4[] = {0.0, 6283.08, 12566.15};

        int s;
TotalhasilL4=0.0;
        for (s = 0; s <= 2; s++) {
```

```
            double hasilL4 = AL4[s] * Math.cos(BL4[s] + CL4[s] * tau);
            TotalhasilL4 += hasilL4;
        }

//============Bujur Ekliptika (L5)
        double AL5 = 1.0;
        double BL5 = 3.14;
        double CL5 = 0.0;
        double hasilL5 = AL5 * Math.cos(BL5 + CL5 * tau);
        TotalhasilL5 = hasilL5;

 //============= HASIL L ==============
        double L0Total = TotalhasilL0;
        double L1Total = TotalhasilL1 *tau;
        double L2Total = TotalhasilL2 *tau*tau;
        double L3Total = TotalhasilL3 *tau*tau*tau;
        double L4Total = TotalhasilL4 *tau*tau*tau*tau;
        double L5Total = TotalhasilL5 *tau*tau*tau*tau*tau;
        double LTotal = (L0Total + L1Total + L2Total + L3Total +
L4Total + L5Total)/100000000; // radian

        double LTotalDeg = Math.toDegrees(LTotal);
        double LTotalMod = LTotalDeg % 360;

// ============= THETA
        double Theta = (LTotalMod + 180) % 360;
        double Lambda = (Theta - 1.397*koreksiBJ -
0.00031*koreksiBJ*koreksiBJ) % 360;
        double LambdaRad = Math.toRadians(Lambda);
        double DeltaTheta = -0.09033 / 3600.0;//derajat
        double ThetaTerkoreksi = (Theta + DeltaTheta) % 360;//derajat

//==================JARAK BUMI MATAHARI(R0)
//================ R0
        double AR0[] = {100013989.0, 1670700.0, 13956.0, 3084.0,
1628.0, 1576.0, 925.0, 542.0, 472.0, 346.0, 329.0, 307.0, 243.0,
            212.0, 186.0, 175.0, 110.0, 98.0, 86.0, 86.0, 65.0, 63.0, 57.0,
56.0, 49.0, 47.0, 45.0, 43.0, 39.0, 38.0, 37.0, 37.0, 36.0, 35.0,
            33.0, 32.0, 32.0, 28.0, 28.0, 26.0};
```

```
        double BR0[] = {0.0, 3.0984635, 3.05525, 5.1985, 1.1739,
2.8469, 5.453, 4.564, 3.661, 0.964,
            5.9, 0.299, 4.273, 5.847, 5.022, 3.012, 5.055, 0.89, 5.69, 1.27,
0.27, 0.92, 2.01,
            5.24, 3.25, 2.58, 5.54, 6.01, 5.36, 2.39, 0.83, 4.9, 1.67, 1.84,
0.24, 0.18, 1.78,
            1.21, 1.9, 4.59};
        double CR0[] = {0.0, 6283.07585, 12566.1517, 77713.7715,
5753.3849, 7860.4194, 11506.77, 3930.21,
            5884.927, 5507.553, 5223.694, 5573.143, 11790.629,
1577.344, 10977.079, 18849.228,
            5486.778, 6069.78, 15720.84, 161000.69, 17260.15, 529.69,
83996.85, 71430.7, 2544.31,
            775.52, 9437.76, 6275.96, 4694, 8827.39, 19651.05,
12139.55, 12036.46, 2942.46, 7084.9,
            5088.63, 398.15, 6286.6, 6279.55, 10447.39};

        int e;
TotalhasilR0=0.0;
        for (e = 0; e <= 39; e++) {
            double hasilR0 = AR0[e] * Math.cos(BR0[e] + CR0[e] *
tau);
            TotalhasilR0 += hasilR0;
        }
//========== R1
        double AR1[] = {103019.0, 1721.0, 702.0, 32.0, 31.0, 25.0,
18.0, 10.0, 9.0, 9.0};
        double BR1[] = {1.10749, 1.0644, 3.142, 1.02, 2.84, 1.32, 1.42,
5.91, 1.42, 0.27};
        double CR1[] = {6283.07585, 12566.1517, 0, 18849.23,
5507.55, 5223.69, 1577.34,
            10977.08, 6275.96, 5486.78};

        int u;
TotalhasilR1=0.0;
        for (u = 0; u <= 9; u++) {
            double hasilR1 = AR1[u] * Math.cos(BR1[u] + CR1[u] *
tau);
            TotalhasilR1 += hasilR1;
```

```
        }
//================ R2
        double AR2[] = {4359.0, 124.0, 12.0, 9.0, 6.0, 3.0};
        double BR2[] = {5.7846, 5.579, 3.14, 3.63, 1.87, 5.47};
        double CR2[] = {6283.0758, 12566.152, 0, 77713.77, 5573.14,
18849.23};

        int v;
TotalhasilR2=0.0;
        for (v = 0; v <= 5; v++) {
            double hasilR2 = AR2[v] * Math.cos(BR2[v] + CR2[v] *
tau);
            TotalhasilR2 += hasilR2;
        }
//================ R3
        double AR3[] = {145.0, 7.0};
        double BR3[] = {4.273, 3.92};
        double CR3[] = {6283.076, 12566.15};

        int g;
TotalhasilR3=0.0;
        for (g = 0; g <= 1; g++) {
            double hasilR3 = AR3[g] * Math.cos(BR3[g] + CR3[g] *
tau);
            TotalhasilR3 += hasilR3;
        }
//================ R4
        double AR4 = 4.0;
        double BR4 = 2.56;
        double CR4 = 6283.08;
        double hasilR4 = AR4 * Math.cos(BR4 + CR4 * tau);
        TotalhasilR4 = hasilR4;

 //============= HASIL R ==============
        double R0Total = TotalhasilR0;
        double R1Total = TotalhasilR1 *tau;
        double R2Total = TotalhasilR2 *tau*tau;
        double R3Total = TotalhasilR3 *tau*tau*tau;
        double R4Total = TotalhasilR4 *tau*tau*tau*tau;
```

```
        double RTotal = (R0Total + R1Total + R2Total + R3Total +
R4Total)/100000000; // AU

 //===============Lintang Ekliptika/B=======
 //========== B0
        double AB0[] = {280, 102, 80, 44, 32};
        double BB0[] = {3.199, 5.422, 3.88, 3.7, 4};
        double CB0[] = {84334.662, 5507.553, 5223.69, 2352.87,
1577.34};
        int b;
TotalhasilB0=0.0;
        for (b = 0; b <= 4; b++) {
           double hasilB0 = AB0[b] * Math.cos(BB0[b] + CB0[b] *
tau);
           TotalhasilB0 += hasilB0;
        }
 //============ B1
        double AB1[] = {9, 6};
        double BB1[] = {3.9, 1.73};
        double CB1[] = {5507.55, 5223.69};

        int c;
TotalhasilB1=0.0;
        for (c = 0; c <= 1; c++) {
           double hasilB1 = AB1[c] * Math.cos(BB1[c] + CB1[c] *
tau);
           TotalhasilB1 += hasilB1;
        }
 //============== HASIL B ============
        double B0Total = TotalhasilB0;
        double B1Total = TotalhasilB1 *tau;
        double BTotal = (B0Total + B1Total)/100000000; // RADIAN
        double BTotalDeg = Math.toDegrees(BTotal);
        double BTotalDetik = BTotalDeg * 3600;
//==========POSISI MATAHARI========

        double koreksiAberasi = -20.4898/(3600 * RTotal);

// ========= Bujur Matahari nampak (Lambda)
```

```
        double LamdaMatahari = (Theta + PsiDeg +koreksiAberasi);
        double LamdaMatahariRad = Math.toRadians(LamdaMatahari);

         // DMS dari Bujur Bulan
        int derajatLamdaMatahari = (int)LamdaMatahari; // ===> ambil
nilai derajat
        double sisaLamdaMatahari = LamdaMatahari -
derajatLamdaMatahari;
        int MenitLamdaMatahari = (int) (60 * sisaLamdaMatahari); //
====> ambil nilai menit
        double sisaMenitLamdaMatahari = (60.0 * sisaLamdaMatahari)
- MenitLamdaMatahari;
        int DetikLamdaMatahari = (int) Math.round(60.0 *
sisaMenitLamdaMatahari); // ===> ambil nilai detik

// ========== Lintang Matahari nampak (Beta)
        double Beta = -BTotalDetik;
        double deltaBeta = 0.03916 * (Math.cos(LambdaRad) -
Math.sin(LambdaRad));
        String lintangMatahari =
Double.toString(Double.valueOf(ft1.format(BetaTerkoreksi)));

        double BetaTerkoreksiRad = Math.toRadians((BetaTerkoreksi)/
3600);//rad


// ========== Jarak Bumi - Matahari
        double jarakBM = Math.round(149598000 * RTotal); // Km
        String jarakbm = Double.toString(jarakBM);

// ========== Sudut jari-jari matahari
        double sudutMatahari = (959.63/3600)/ RTotal;
        // DMS dari sudut Matahari
       int derajatSudut = (int)sudutMatahari; // ==> ambil nilai derajat
       double sisaSudut = sudutMatahari - derajatSudut;
       int MenitSudut = (int)(60 * sisaSudut); // ===> ambil nilai menit
       double sisaMenitSudut = (60 * sisaSudut)- MenitSudut;
       int DetikSudut = (int)(60 * sisaMenitSudut); // ==> ambil nilai
detik
```

```
// ========= Alpha Matahari
      double alpha =
Math.atan2(Math.sin(LamdaMatahariRad)*Math.cos(EpsilonRad)
            -
Math.tan(BetaTerkoreksiRad)*Math.sin(EpsilonRad),Math.cos(Lam
daMatahariRad));
   if(alpha < 0.0){
         AlphaMatahari = 360+(Math.toDegrees(alpha)%360);
      }
      else{
         AlphaMatahari = (Math.toDegrees(alpha)%360);
      }
      double AlphaMatahariRad = Math.toRadians(AlphaMatahari);

      // HMS dari Alpha
      double JamAlpha2 = AlphaMatahari /360.0 * 24;
      int JamAlpha3 = (int)JamAlpha2; //===> ambil nilai jam
      double sisaJamAlpha2 = JamAlpha2 - JamAlpha3;
      int MenitAlpha2  = (int)(60 * sisaJamAlpha2); // ==> ambil nilai
menit
      double sisaMenitAlpha2 = (60 * sisaJamAlpha2) - MenitAlpha2;
      int DetikAlpha2 = (int)(60 * sisaMenitAlpha2); // ===> ambil
nilai detik

//==== Delta
      double DeltaMatahari =
Math.toDegrees(Math.asin(Math.sin(BetaTerkoreksiRad)*Math.cos(
EpsilonRad)

+Math.cos(BetaTerkoreksiRad)*Math.sin(EpsilonRad)*Math.sin(La
mdaMatahariRad)));
      double Delta2 = (DeltaMatahari);
      double DeltaMatahariRad = Math.toRadians(Delta2);

       // ======= Deklinasi Matahari ========
      if(Delta2 < 0){
            D4="NEGATIF";
```

```
        }
        else{
            D4="POSITIF";
        }
        // DMS dari Delta
        int derajatDeltaMatahari = (int)Delta2; // =======> ambil nilai
derajat
        double sisaDeltaMatahari = Delta2 - derajatDeltaMatahari;
        int menitDeltaMatahari = (int)(60 * sisaDeltaMatahari); // ==>
ambil nilai menit
        double sisaMenitDeltaMatahari = (60 * sisaDeltaMatahari)-
menitDeltaMatahari;
        int detikDeltaMatahari = (int)(60 * sisaMenitDeltaMatahari); //
==> ambil nilai detik

    //====Hour Angle
        double HourAngleMatahari = LST *15.0- AlphaMatahari;
        double HourAngleMataharіRad =
Math.toRadians(HourAngleMatahari);

// ===== Azimuth Matahari
        // Azimuth dari selatan
        double Azimuth2 =
Math.toDegrees(Math.atan2(Math.sin(HourAngleMataharіRad),Mat
h.cos(HourAngleMataharіRad)*Math.sin(derajatLintang2)
                -
Math.tan(DeltaMataharіRad)*Math.cos(derajatLintang2)));

        // Azimuth
        double AzimuthMatahari = (Azimuth2 +180)%360;
        double AzimuthMataharіRad =
Math.toRadians(AzimuthMatahari);
         // DMS dari Azimuth
         int derajatAzimuthMatahari = (int)AzimuthMatahari; // ==>
ambil nilai derajat
         double sisaAzimuthMatahari = AzimuthMatahari -
derajatAzimuthMatahari;
         int menitAzimuthMatahari = (int) (60 * sisaAzimuthMatahari);
// ==> ambil nilai menit
```

```
        double sisaMenitAzimuthMatahari = (60.0 *
sisaAzimuthMatahari) - menitAzimuthMatahari;
        int detikAzimuthMatahari = (int) Math.round(60.0 *
sisaMenitAzimuthMatahari); // ===> ambil nilai detik

// ======= Altitude Matahari
      double AltitudeMatahari =
Math.toDegrees(Math.asin(Math.sin(derajatLintang2)*Math.sin(Delt
aMatahariRad)

+Math.cos(derajatLintang2)*Math.cos(DeltaMatahariRad)*Math.cos
(HourAngleMatahariRad)));

      double AltitudeMatahariRad =
Math.toRadians(AltitudeMatahari);
      if(AltitudeMatahari < 0){
            D5="NEGATIF";
      }
      else{
            D5="POSITIF";
      }
      // DMS dari Altitude
       int derajatAltitudeMatahari = (int)Math.abs(AltitudeMatahari);
// =====> ambil nilai derajat
       double sisaAltitudeMatahari = Math.abs(AltitudeMatahari) -
derajatAltitudeMatahari;
       int menitAltitudeMatahari = (int)(60 * sisaAltitudeMatahari); //
====> ambil nilai menit
       double sisaMenitAltitudeMatahari = (60.0 *
sisaAltitudeMatahari) - menitAltitudeMatahari;
       int detikAltitudeMatahari = (int) Math.round(60.0 *
sisaMenitAltitudeMatahari); // ===> ambil nilai detik

//===== Sudut Paralaks Matahari
      double paralaksMatahari =
Math.toDegrees(Math.asin(6378.14/jarakBM));
      // DMS dari Sudut Paralaks
       int derajatParalaksMatahari = (int)paralaksMatahari; // ==>
ambil nilai derajat
```

```
        double sisaparalaksMatahari = paralaksMatahari -
derajatParalaksMatahari;
        int MenitparalaksMatahari = (int) (60 * sisaparalaksMatahari);
// ==> ambil nilai menit
        double sisaMenitparalaksMatahari = (60.0 *
sisaparalaksMatahari) - MenitparalaksMatahari;
        int DetikparalaksMatahari = (int) Math.round(60.0 *
sisaMenitparalaksMatahari); // =======> ambil nilai detik


//---------------> LANJUTAN PERHITUNGAN BULAN
//=====Sudut fai ====
        double SudutFaiRad = Math.acos(Math.sin(DeltaRad) *
Math.sin(DeltaMatahariRad) + Math.cos(DeltaRad) *
Math.cos(DeltaMatahariRad)
                * Math.cos(AlphaRad - AlphaMatahariRad));//radian
        double SudutFaiDerajat = Math.toDegrees(SudutFaiRad);

 //======Sudut fase (i)=====
       double sudutFase = Math.atan2(jarakBM *
Math.sin(SudutFaiRad), jarakBB - jarakBM *
Math.cos(SudutFaiRad)); // radian
       double sudutFaseDerajat = Math.toDegrees(sudutFase);//derajat

        //======DMS
        double DerajatSudutFase = sudutFaseDerajat;
        int DerajatSudutFase2 = (int) DerajatSudutFase; // ===> ambil
nilai derajat
        double SisaDerajatSudutFase = DerajatSudutFase -
DerajatSudutFase2;
        int MenitSudutFase = (int) (60 * SisaDerajatSudutFase); //
===> ambil nilai menit
        double SisaMenitSudutFase = (60 * SisaDerajatSudutFase) -
MenitSudutFase;
        int DetikSudutFase = (int)Math.round(60 *
SisaMenitSudutFase); // ===> ambil nilai detik


//============= Iluminasi Bulan (% visibilitas)
```

```
        double Iluminasi = 100 * (1 + Math.cos(sudutFase)) /
2.0;//persen
        IluminasiBulan = Double.valueOf(ft1.format(Iluminasi));
        String Iluminasi1 = Double.toString(IluminasiBulan);


// ============ LAIN-LAIN
         //Bujur ekliptika bulan - bujur eklpitika matahari
         double eBeM = (Lamda - LamdaMatahari) % 360;
         // COS (Elongasi bulan matahari)
         double COSElong =
Math.sin(AltitudeRad)*Math.sin(AltitudeMatahariRad)

+Math.cos(AltitudeRad)*Math.cos(AltitudeMatahariRad)*Math.cos(
AzimuthRad - AzimuthMatahariRad);

         // Sudut elongasi bulan matahari
         double sudutElongasi =
Math.toDegrees(Math.acos(COSElong));
         //======DMS
        int SudutElongasi = (int) sudutElongasi; // => ambil nilai
derajat
        double SisasudutElongasi = sudutElongasi - SudutElongasi;
        int MenitsudutElongasi = (int) (60 * SisasudutElongasi); // ==>
ambil nilai menit
        double SisaMenitsudutElongasi = (60 * SisasudutElongasi) -
MenitsudutElongasi;
        int DetiksudutElongasi = (int)Math.round(60 *
SisaMenitsudutElongasi); // ==> ambil nilai detik

//POSISI BULAN
        tf_bujurEklip.setText(derajatLamda +" : "+MenitLamda +" :
"+DetikLamda);
        tf_posNeg1.setText(D1);
        tf_lintangEklip.setText(derajatlintangBulan +" :
"+MenitlintangBulan +" : "+DetiklintangBulan);
        tf_BB.setText(jarakbb);
        tf_right.setText(JamAlpha +" : "+MenitAlpha +" :
"+DetikAlpha);
```

```
        tf_posNeg2.setText(D2);
        tf_deklinasi.setText(DerajatDelta +" : "+MenitDelta +" :
"+DetikDelta);
        tf_azimuth.setText(derajatAzimuth +" : "+MenitAzimuth +" :
"+DetikAzimuth);
        tf_posNeg3.setText(D3);
        tf_altitude.setText(derajatAltitude +" : "+MenitAltitude1 +" :
"+DetikAltitude1);
        tf_paralaks.setText(Derajatparalaks +" : "+Menitparalaks +" :
"+Detikparalaks);
        tf_sudut.setText(DerajatjariBulan +" : "+MenitjariBulan +" :
"+DetikjariBulan);
        tf_iluminasi.setText(Iluminasi1);

//POSISI MATAHARI
        tx_bujurEklip.setText(derajatLamdaMatahari +" :
"+MenitLamdaMatahari +" : "+DetikLamdaMatahari);
        tx_posNeg1.setText(D4);
        tx_lintangEklip.setText(lintangMatahari);
        tx_BM.setText(jarakbm);
        tx_right.setText(JamAlpha3 +" : "+MenitAlpha2 +" :
"+DetikAlpha2);
        tx_posNeg2.setText(D5);
        tx_deklinasi.setText(derajatDeltaMatahari +" :
"+menitDeltaMatahari +" : "+detikDeltaMatahari);
        tx_azimuth.setText(derajatAzimuthMatahari +" :
"+menitAzimuthMatahari +" : "+detikAzimuthMatahari);
        tx_altitude.setText(derajatAltitudeMatahari +" :
"+menitAltitudeMatahari +" : "+detikAltitudeMatahari);
        tx_paralaks.setText(derajatParalaksMatahari +" :
"+MenitparalaksMatahari +" : "+DetikparalaksMatahari);
        tx_sudut.setText(derajatSudut+" : "+MenitSudut +" :
"+DetikSudut);
        tx_miringBumi.setText(JamEpsilon+" : "+MenitEpsilon +" :
"+DetikEpsilon);
    }

    @SuppressWarnings("unchecked")
    // <editor-fold defaultstate="collapsed" desc="Generated Code">
```

```
private void initComponents() {

    jPanel1 = new javax.swing.JPanel();
    jLabel1 = new javax.swing.JLabel();
    jLabel2 = new javax.swing.JLabel();
    jLabel3 = new javax.swing.JLabel();
    tf_tahun = new javax.swing.JTextField();
    jLabel4 = new javax.swing.JLabel();
    jLabel5 = new javax.swing.JLabel();
    cb3 = new javax.swing.JComboBox();
    tf_dj1 = new javax.swing.JTextField();
    tf_dj2 = new javax.swing.JTextField();
    jLabel9 = new javax.swing.JLabel();
    jLabel10 = new javax.swing.JLabel();
    jLabel11 = new javax.swing.JLabel();
    tf_menit = new javax.swing.JTextField();
    tf_jam = new javax.swing.JTextField();
    tf_detik = new javax.swing.JTextField();
    jLabel12 = new javax.swing.JLabel();
    bt_run = new javax.swing.JButton();
    bt_reset = new javax.swing.JButton();
    jPanel2 = new javax.swing.JPanel();
    lb_posisiBulan = new javax.swing.JLabel();
    lb_lamdaBulan = new javax.swing.JLabel();
    lb_betaBulan = new javax.swing.JLabel();
    lb_jarakBB = new javax.swing.JLabel();
    lb_deltaBulan = new javax.swing.JLabel();
    lb_alphaBulan = new javax.swing.JLabel();
    lb_azimuthBulan = new javax.swing.JLabel();
    lb_altitudeBulan = new javax.swing.JLabel();
    lb_paralaksBulan = new javax.swing.JLabel();
    lb_sudutBulan = new javax.swing.JLabel();
    lb_iluminasi = new javax.swing.JLabel();
    tf_bujurEklip = new javax.swing.JTextField();
    tf_lintangEklip = new javax.swing.JTextField();
    tf_BB = new javax.swing.JTextField();
    tf_right = new javax.swing.JTextField();
    tf_deklinasi = new javax.swing.JTextField();
    tf_azimuth = new javax.swing.JTextField();
```

```
tf_altitude = new javax.swing.JTextField();
tf_paralaks = new javax.swing.JTextField();
tf_sudut = new javax.swing.JTextField();
tf_iluminasi = new javax.swing.JTextField();
jLabel14 = new javax.swing.JLabel();
jLabel15 = new javax.swing.JLabel();
jLabel16 = new javax.swing.JLabel();
jLabel17 = new javax.swing.JLabel();
jLabel18 = new javax.swing.JLabel();
jLabel19 = new javax.swing.JLabel();
jLabel20 = new javax.swing.JLabel();
jLabel21 = new javax.swing.JLabel();
jLabel22 = new javax.swing.JLabel();
jLabel23 = new javax.swing.JLabel();
tf_posNeg1 = new javax.swing.JTextField();
tf_posNeg2 = new javax.swing.JTextField();
tf_posNeg3 = new javax.swing.JTextField();
jLabel24 = new javax.swing.JLabel();
jLabel25 = new javax.swing.JLabel();
jLabel26 = new javax.swing.JLabel();
jLabel27 = new javax.swing.JLabel();
jLabel28 = new javax.swing.JLabel();
jLabel29 = new javax.swing.JLabel();
jLabel30 = new javax.swing.JLabel();
jLabel31 = new javax.swing.JLabel();
jLabel32 = new javax.swing.JLabel();
jLabel33 = new javax.swing.JLabel();
jLabel34 = new javax.swing.JLabel();
tx_posNeg1 = new javax.swing.JTextField();
tx_posNeg2 = new javax.swing.JTextField();
tx_deklinasi = new javax.swing.JTextField();
tx_azimuth = new javax.swing.JTextField();
tx_altitude = new javax.swing.JTextField();
tx_bujurEklip = new javax.swing.JTextField();
tx_lintangEklip = new javax.swing.JTextField();
tx_BM = new javax.swing.JTextField();
tx_right = new javax.swing.JTextField();
tx_paralaks = new javax.swing.JTextField();
tx_sudut = new javax.swing.JTextField();
```

```
        tx_miringBumi = new javax.swing.JTextField();
        jLabel35 = new javax.swing.JLabel();
        jLabel36 = new javax.swing.JLabel();
        jLabel37 = new javax.swing.JLabel();
        jLabel38 = new javax.swing.JLabel();
        jLabel39 = new javax.swing.JLabel();
        jLabel40 = new javax.swing.JLabel();
        jLabel41 = new javax.swing.JLabel();
        jLabel42 = new javax.swing.JLabel();
        jLabel43 = new javax.swing.JLabel();
        jLabel44 = new javax.swing.JLabel();
        jLabel13 = new javax.swing.JLabel();
        cb1 = new javax.swing.JComboBox();
        cb2 = new javax.swing.JComboBox();
        jLabel45 = new javax.swing.JLabel();
        tf_min1 = new javax.swing.JTextField();
        tf_min2 = new javax.swing.JTextField();
        tf_zona = new javax.swing.JTextField();
        tf_det1 = new javax.swing.JTextField();
        tf_det2 = new javax.swing.JTextField();
        tf_pos1 = new javax.swing.JTextField();
        tf_pos2 = new javax.swing.JTextField();
        bt_exit = new javax.swing.JButton();


setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON
_CLOSE);
        setTitle("POSISI BULAN"); // NOI18N

jPanel1.setBorder(javax.swing.BorderFactory.createTitledBorder(jav
ax.swing.BorderFactory.createLineBorder(new java.awt.Color(0, 0,
0)), "Position of Moon",
javax.swing.border.TitledBorder.DEFAULT_JUSTIFICATION,
javax.swing.border.TitledBorder.DEFAULT_POSITION, new
java.awt.Font("Tahoma", 0, 12), new java.awt.Color(0, 0, 0))); //
NOI18N
        jPanel1.setName("jPanel1"); // NOI18N
        jPanel1.setPreferredSize(new java.awt.Dimension(800, 756));
```

```
        jLabel1.setText("Date");
        jLabel1.setName("jLabel1"); // NOI18N
        jLabel2.setText("Month");
        jLabel2.setName("jLabel2"); // NOI18N
        jLabel3.setText("Year");
        jLabel3.setName("jLabel3"); // NOI18N
        tf_tahun.setName("tf_tahun"); // NOI18N
        jLabel4.setText("Latitude");
        jLabel4.setName("jLabel4"); // NOI18N
        jLabel5.setText("Longitude");
        jLabel5.setName("jLabel5"); // NOI18N
        cb3.setName("cb3"); // NOI18N
        cb3.addActionListener(new java.awt.event.ActionListener() {
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                cb3ActionPerformed(evt);
            }
        });

        tf_dj1.setName("tf_dj1"); // NOI18N
        tf_dj2.setName("tf_dj2"); // NOI18N
        jLabel9.setText("Hour");
        jLabel9.setName("jLabel9"); // NOI18N
        jLabel10.setText("Minutes");
        jLabel10.setName("jLabel10"); // NOI18N
        jLabel11.setText("Second");
        jLabel11.setName("jLabel11"); // NOI18N
        tf_menit.setName("tf_menit"); // NOI18N
        tf_jam.setName("tf_jam"); // NOI18N
        tf_detik.setName("tf_detik"); // NOI18N
        jLabel12.setText("Zone Time");
        jLabel12.setName("jLabel12"); // NOI18N
        bt_run.setText("RUN");
        bt_run.setName("bt_run"); // NOI18N
        bt_run.addActionListener(new java.awt.event.ActionListener()
{
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                bt_runActionPerformed(evt);
```

```
        }
    });

    bt_reset.setText("RESET");
    bt_reset.setName("bt_reset"); // NOI18N
    bt_reset.addActionListener(new java.awt.event.ActionListener()
{
        public void actionPerformed(java.awt.event.ActionEvent evt)
{
            bt_resetActionPerformed(evt);
        }
    });

jPanel2.setBorder(javax.swing.BorderFactory.createEtchedBorder());
    jPanel2.setName("jPanel2"); // NOI18N
    lb_posisiBulan.setText("POSISI BULAN");
    lb_posisiBulan.setName("lb_posisiBulan"); // NOI18N
    lb_lamdaBulan.setText("Bujur ekliptika bulan ");
    lb_lamdaBulan.setName("lb_lamdaBulan"); // NOI18N
    lb_betaBulan.setText("Lintang ekliptika bulan");
    lb_betaBulan.setName("lb_betaBulan"); // NOI18N
    lb_jarakBB.setText("Jarak Bumi-Bulan");
    lb_jarakBB.setName("lb_jarakBB"); // NOI18N
    lb_deltaBulan.setText("Deklinasi bulan");
    lb_deltaBulan.setName("lb_deltaBulan"); // NOI18N
    lb_alphaBulan.setText("Right ascension bulan");
    lb_alphaBulan.setName("lb_alphaBulan"); // NOI18N
    lb_azimuthBulan.setText("Azimuth bulan");
    lb_azimuthBulan.setName("lb_azimuthBulan"); // NOI18N
    lb_altitudeBulan.setText("True altitude bulan ");
    lb_altitudeBulan.setName("lb_altitudeBulan"); // NOI18N
    lb_paralaksBulan.setText("Sudut paralaks");
    lb_paralaksBulan.setName("lb_paralaksBulan"); // NOI18N
    lb_sudutBulan.setText("Sudut jari-jari bulan");
    lb_sudutBulan.setName("lb_sudutBulan"); // NOI18N
    lb_iluminasi.setText("Iluminasi bulan");
    lb_iluminasi.setName("lb_iluminasi"); // NOI18N
    tf_bujurEklip.setBackground(new java.awt.Color(204, 204,
204));
```

```
        tf_bujurEklip.setName("tf_bujurEklip"); // NOI18N
        tf_lintangEklip.setBackground(new java.awt.Color(204, 204,
204));
        tf_lintangEklip.setName("tf_lintangEklip"); // NOI18N
        tf_BB.setBackground(new java.awt.Color(204, 204, 204));
        tf_BB.setName("tf_BB"); // NOI18N
        tf_right.setBackground(new java.awt.Color(204, 204, 204));
        tf_right.setName("tf_right"); // NOI18N
        tf_deklinasi.setBackground(new java.awt.Color(204, 204,
204));
        tf_deklinasi.setName("tf_deklinasi"); // NOI18N
        tf_azimuth.setBackground(new java.awt.Color(204, 204, 204));
        tf_azimuth.setName("tf_azimuth"); // NOI18N
        tf_altitude.setBackground(new java.awt.Color(204, 204, 204));
        tf_altitude.setName("tf_altitude"); // NOI18N
        tf_paralaks.setBackground(new java.awt.Color(204, 204, 204));
        tf_paralaks.setName("tf_paralaks"); // NOI18N
        tf_sudut.setBackground(new java.awt.Color(204, 204, 204));
        tf_sudut.setName("tf_sudut"); // NOI18N
        tf_iluminasi.setBackground(new java.awt.Color(204, 204,
204));
        tf_iluminasi.setName("tf_iluminasi"); // NOI18N
        jLabel14.setText("DMS");
        jLabel14.setName("jLabel14"); // NOI18N
        jLabel15.setText("DMS");
        jLabel15.setName("jLabel15"); // NOI18N
        jLabel16.setText("Km");
        jLabel16.setName("jLabel16"); // NOI18N
        jLabel17.setText("HMS");
        jLabel17.setName("jLabel17"); // NOI18N
        jLabel18.setText("DMS");
        jLabel18.setName("jLabel18"); // NOI18N
        jLabel19.setText("DMS");
        jLabel19.setName("jLabel19"); // NOI18N
        jLabel20.setText("DMS");
        jLabel20.setName("jLabel20"); // NOI18N
        jLabel21.setText("DMS");
        jLabel21.setName("jLabel21"); // NOI18N
        jLabel22.setText("DMS");
```

```
        jLabel22.setName("jLabel22"); // NOI18N
        jLabel23.setText("%");
        jLabel23.setName("jLabel23"); // NOI18N
        tf_posNeg1.setBackground(new java.awt.Color(204, 204,
204));
        tf_posNeg1.setName("tf_posNeg1"); // NOI18N
        tf_posNeg2.setBackground(new java.awt.Color(204, 204,
204));
        tf_posNeg2.setName("tf_posNeg2"); // NOI18N

        tf_posNeg3.setBackground(new java.awt.Color(204, 204,
204));
        tf_posNeg3.setName("tf_posNeg3"); // NOI18N
        jLabel24.setText("POSISI MATAHARI");
        jLabel24.setName("jLabel24"); // NOI18N
        jLabel25.setText("Lintang ekliptika matahari");
        jLabel25.setName("jLabel25"); // NOI18N
        jLabel26.setText("Bujur ekliptika matahari");
        jLabel26.setName("jLabel26"); // NOI18N
        jLabel27.setText("Jarak Bumi-Matahari");
        jLabel27.setName("jLabel27"); // NOI18N
        jLabel28.setText("Right ascension matahari");
        jLabel28.setName("jLabel28"); // NOI18N
        jLabel29.setText("Deklinasi matahari");
        jLabel29.setName("jLabel29"); // NOI18N
        jLabel30.setText("Azimuth matahari");
        jLabel30.setName("jLabel30"); // NOI18N
        jLabel31.setText("True altitude matahari");
        jLabel31.setName("jLabel31"); // NOI18N
        jLabel32.setText("Sudut paralaks");
        jLabel32.setName("jLabel32"); // NOI18N
        jLabel33.setText("Sudut jari-jari matahari");
        jLabel33.setName("jLabel33"); // NOI18N
        jLabel34.setText("Sudut kemiringan Bumi");
        jLabel34.setName("jLabel34"); // NOI18N
        tx_posNeg1.setBackground(new java.awt.Color(204, 204,
204));
        tx_posNeg1.setName("tx_posNeg1"); // NOI18N
```

```
        tx_posNeg2.setBackground(new java.awt.Color(204, 204,
204));
        tx_posNeg2.setName("tx_posNeg2"); // NOI18N
        tx_deklinasi.setBackground(new java.awt.Color(204, 204,
204));
        tx_deklinasi.setName("tx_deklinasi"); // NOI18N
        tx_azimuth.setBackground(new java.awt.Color(204, 204, 204));
        tx_azimuth.setName("tx_azimuth"); // NOI18N

        tx_altitude.setBackground(new java.awt.Color(204, 204, 204));
        tx_altitude.setName("tx_altitude"); // NOI18N
        tx_bujurEklip.setBackground(new java.awt.Color(204, 204,
204));
        tx_bujurEklip.setName("tx_bujurEklip"); // NOI18N
        tx_lintangEklip.setBackground(new java.awt.Color(204, 204,
204));
        tx_lintangEklip.setName("tx_lintangEklip"); // NOI18N
        tx_BM.setBackground(new java.awt.Color(204, 204, 204));
        tx_BM.setName("tx_BM"); // NOI18N
        tx_right.setBackground(new java.awt.Color(204, 204, 204));
        tx_right.setName("tx_right"); // NOI18N
        tx_paralaks.setBackground(new java.awt.Color(204, 204, 204));
        tx_paralaks.setName("tx_paralaks"); // NOI18N
        tx_sudut.setBackground(new java.awt.Color(204, 204, 204));
        tx_sudut.setName("tx_sudut"); // NOI18N
        tx_miringBumi.setBackground(new java.awt.Color(204, 204,
204));
        tx_miringBumi.setName("tx_miringBumi"); // NOI18N
        jLabel35.setText("DMS");
        jLabel35.setName("jLabel35"); // NOI18N
        jLabel36.setText("DMS");
        jLabel36.setName("jLabel36"); // NOI18N
        jLabel37.setText("Km");
        jLabel37.setName("jLabel37"); // NOI18N
        jLabel38.setText("HMS");
        jLabel38.setName("jLabel38"); // NOI18N
        jLabel39.setText("DMS");
        jLabel39.setName("jLabel39"); // NOI18N
        jLabel40.setText("DMS");
```

```
        jLabel40.setName("jLabel40"); // NOI18N
        jLabel41.setText("DMS");
        jLabel41.setName("jLabel41"); // NOI18N
        jLabel42.setText("DMS");
        jLabel42.setName("jLabel42"); // NOI18N
        jLabel43.setText("DMS");
        jLabel43.setName("jLabel43"); // NOI18N
        jLabel44.setText("DMS");
        jLabel44.setName("jLabel44"); // NOI18N
        javax.swing.GroupLayout jPanel2Layout = new
javax.swing.GroupLayout(jPanel2);
        jPanel2.setLayout(jPanel2Layout);
        jPanel2Layout.setHorizontalGroup(

jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel2Layout.createSequentialGroup()
                .addContainerGap()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                    .addGroup(jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING, false)
                        .addComponent(lb_azimuthBulan,
javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                        .addComponent(lb_deltaBulan,
javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.DEFAULT_SIZE, 86,
Short.MAX_VALUE))
                    .addGap(58, 58, 58))
                .addGroup(jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
```

```
                .addComponent(lb_paralaksBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 108,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(lb_altitudeBulan,
javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.PREFERRED_SIZE, 108,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addGap(36, 36, 36))

.addGroup(javax.swing.GroupLayout.Alignment.TRAILING,
jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
                .addComponent(lb_sudutBulan,
javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.DEFAULT_SIZE, 123,
Short.MAX_VALUE)
                .addComponent(lb_posisiBulan,
javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.DEFAULT_SIZE, 123,
Short.MAX_VALUE)
                .addComponent(lb_alphaBulan,
javax.swing.GroupLayout.DEFAULT_SIZE, 123,
Short.MAX_VALUE))
            .addGap(21, 21, 21))

.addGroup(javax.swing.GroupLayout.Alignment.TRAILING,
jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
                .addComponent(lb_jarakBB,
javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.DEFAULT_SIZE, 113,
Short.MAX_VALUE)
                .addComponent(lb_lamdaBulan,
javax.swing.GroupLayout.Alignment.LEADING,
```

```
javax.swing.GroupLayout.DEFAULT_SIZE, 113,
Short.MAX_VALUE)
                    .addComponent(lb_betaBulan,
javax.swing.GroupLayout.Alignment.LEADING,
javax.swing.GroupLayout.DEFAULT_SIZE, 113,
Short.MAX_VALUE))
                .addGap(31, 31, 31))
            .addComponent(lb_iluminasi,
javax.swing.GroupLayout.PREFERRED_SIZE, 110,
javax.swing.GroupLayout.PREFERRED_SIZE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING, false)
            .addComponent(tf_posNeg1,
javax.swing.GroupLayout.DEFAULT_SIZE, 100,
Short.MAX_VALUE)
            .addComponent(tf_posNeg2)
            .addComponent(tf_posNeg3))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)

.addGroup(javax.swing.GroupLayout.Alignment.TRAILING,
jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.TRAILING, false)
                .addComponent(tf_iluminasi)
                .addComponent(tf_sudut)
                .addComponent(tf_paralaks)
                .addComponent(tf_altitude)
                .addComponent(tf_azimuth)
                .addComponent(tf_deklinasi)
                .addComponent(tf_right)
                .addComponent(tf_BB)
```

```
                .addComponent(tf_bujurEklip,
javax.swing.GroupLayout.DEFAULT_SIZE, 155,
Short.MAX_VALUE))
            .addComponent(tf_lintangEklip,
javax.swing.GroupLayout.DEFAULT_SIZE, 155,
Short.MAX_VALUE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
            .addComponent(jLabel16)
            .addComponent(jLabel23)
            .addComponent(jLabel22)
            .addComponent(jLabel21)
            .addComponent(jLabel20)
            .addComponent(jLabel19)
            .addComponent(jLabel18)
            .addComponent(jLabel17)
            .addComponent(jLabel14)
            .addComponent(jLabel15))
        .addGap(36, 36, 36)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
            .addComponent(jLabel24)
            .addGroup(jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                .addComponent(jLabel26)
                .addGroup(jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                    .addComponent(jLabel29)
                    .addComponent(jLabel31))
                .addGap(47, 47, 47)
```

```
.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING, false)

.addGroup(jPanel2Layout.createSequentialGroup()
                        .addComponent(tx_posNeg1,
javax.swing.GroupLayout.PREFERRED_SIZE, 100,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING, false)
                        .addComponent(tx_azimuth,
javax.swing.GroupLayout.Alignment.TRAILING)
                        .addComponent(tx_deklinasi,
javax.swing.GroupLayout.Alignment.TRAILING,
javax.swing.GroupLayout.DEFAULT_SIZE, 155,
Short.MAX_VALUE)
                        .addComponent(tx_right,
javax.swing.GroupLayout.Alignment.TRAILING)
                        .addComponent(tx_BM,
javax.swing.GroupLayout.Alignment.TRAILING)
                        .addComponent(tx_lintangEklip,
javax.swing.GroupLayout.Alignment.TRAILING)
                        .addComponent(tx_bujurEklip,
javax.swing.GroupLayout.Alignment.TRAILING)))

.addGroup(jPanel2Layout.createSequentialGroup()
                        .addComponent(tx_posNeg2,
javax.swing.GroupLayout.PREFERRED_SIZE, 100,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
```

```
                                .addComponent(tx_paralaks,
javax.swing.GroupLayout.Alignment.TRAILING,
javax.swing.GroupLayout.DEFAULT_SIZE, 155,
Short.MAX_VALUE)
                                .addComponent(tx_altitude)
                                .addComponent(tx_sudut,
javax.swing.GroupLayout.Alignment.TRAILING,
javax.swing.GroupLayout.DEFAULT_SIZE, 155,
Short.MAX_VALUE)
                                .addComponent(tx_miringBumi,
javax.swing.GroupLayout.Alignment.TRAILING,
javax.swing.GroupLayout.DEFAULT_SIZE, 155,
Short.MAX_VALUE)))))
                        .addComponent(jLabel25)
                        .addComponent(jLabel27)
                        .addComponent(jLabel28)
                        .addComponent(jLabel30)
                        .addComponent(jLabel32)
                        .addComponent(jLabel33)
                        .addComponent(jLabel34))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                        .addComponent(jLabel40)
                        .addComponent(jLabel44)
                        .addComponent(jLabel43)
                        .addComponent(jLabel42)
                        .addComponent(jLabel41)
                        .addComponent(jLabel39)
                        .addComponent(jLabel38)
                        .addComponent(jLabel37)
                        .addComponent(jLabel36)
                        .addComponent(jLabel35))))
                .addGap(19, 19, 19))
        );
        jPanel2Layout.setVerticalGroup(
```

```
jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
        .addGroup(jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(lb_posisiBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel24))
            .addGap(5, 5, 5)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(lb_lamdaBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_bujurEklip,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel14)
                .addComponent(jLabel26)
                .addComponent(tx_bujurEklip,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel35))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(lb_betaBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
```

```
                .addComponent(tf_posNeg1,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel15)
                .addComponent(tf_lintangEklip,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel25)
                .addComponent(tx_lintangEklip,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel36))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(lb_jarakBB,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel16)
                .addComponent(tf_BB,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel27)
                .addComponent(tx_BM,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel37))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
```

```
.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
                .addGroup(jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(lb_alphaBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel17)
                    .addComponent(tf_right,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel28)
                    .addComponent(tx_right,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel38))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(lb_deltaBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel18)
                    .addComponent(tf_deklinasi,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(tf_posNeg2,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
```

```
                    .addComponent(jLabel29)
                    .addComponent(tx_posNeg1)
                    .addComponent(tx_deklinasi)
                    .addComponent(jLabel39))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(lb_azimuthBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel19)
                    .addComponent(tf_azimuth,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel30)
                    .addComponent(tx_azimuth,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel40))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                        .addComponent(lb_altitudeBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addComponent(tf_posNeg3,
javax.swing.GroupLayout.PREFERRED_SIZE,
```

```
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE))

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                        .addComponent(jLabel31)
                        .addComponent(tx_posNeg2)
                        .addComponent(tx_altitude,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addComponent(jLabel41))))

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(jLabel20)
                    .addComponent(tf_altitude,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                .addGroup(jPanel2Layout.createSequentialGroup()

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                        .addComponent(lb_paralaksBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addComponent(jLabel21)
                        .addComponent(tf_paralaks,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addComponent(jLabel32))
```

```
.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(lb_sudutBulan,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel22)
                    .addComponent(tf_sudut,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel33))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(lb_iluminasi,
javax.swing.GroupLayout.PREFERRED_SIZE, 19,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel23)
                    .addComponent(tf_iluminasi,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel34)))
                .addGroup(jPanel2Layout.createSequentialGroup()
                    .addComponent(tx_paralaks,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
```

```
.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(tx_sudut,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel43))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(tx_miringBumi,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(jLabel44)))
                .addComponent(jLabel42))
            .addContainerGap(32, Short.MAX_VALUE))
        );

        jLabel13.setText("Output Value");
        jLabel13.setName("jLabel13"); // NOI18N
        cb12 = new javax.swing.JComboBox();
        cb13 = new javax.swing.JComboBox();
        cb14 = new javax.swing.JComboBox();
        cb1.setModel(new
javax.swing.DefaultComboBoxModel(tanggal));
        cb12.setModel(new
javax.swing.DefaultComboBoxModel(tanggal1));
        cb13.setModel(new
javax.swing.DefaultComboBoxModel(tanggal2));
        cb14.setModel(new
javax.swing.DefaultComboBoxModel(tanggal3));
        cb1.setName("cb1"); // NOI18N
        cb12.setName("cb12");
        cb13.setName("cb13");
```

```
        cb14.setName("cb14");
        cb2.setModel(new
javax.swing.DefaultComboBoxModel(bulan));
        cb2.setName("cb2"); // NOI18N
        jLabel45.setText("Location");
        jLabel45.setName("jLabel45"); // NOI18N
        tf_min1.setName("tf_min1"); // NOI18N
        tf_min2.setName("tf_min2"); // NOI18N
        tf_zona.setName("tf_zona"); // NOI18N
        tf_det1.setName("tf_det1"); // NOI18N
        tf_det2.setName("tf_det2"); // NOI18N
        tf_pos1.setName("tf_pos1"); // NOI18N
        tf_pos2.setName("tf_pos2"); // NOI18N
        bt_exit.setText("EXIT");
        bt_exit.setName("bt_exit"); // NOI18N
        bt_exit.addActionListener(new java.awt.event.ActionListener()
{
            public void actionPerformed(java.awt.event.ActionEvent evt)
{
                bt_exitActionPerformed(evt);
            }
        });

        javax.swing.GroupLayout jPanel1Layout = new
javax.swing.GroupLayout(jPanel1);
        jPanel1.setLayout(jPanel1Layout);
        jPanel1Layout.setHorizontalGroup(

jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel1Layout.createSequentialGroup()
                .addGap(91, 91, 91)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                    .addGroup(jPanel1Layout.createSequentialGroup()
                        .addComponent(jLabel1)
                        .addGap(39, 39, 39)
                        .addComponent(jLabel2)
```

```
                .addGap(120, 120, 120)
                .addComponent(jLabel3))
            .addGroup(jPanel1Layout.createSequentialGroup()
                .addComponent(jLabel45)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)
                .addComponent(cb3,
javax.swing.GroupLayout.PREFERRED_SIZE, 136,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addGroup(jPanel1Layout.createSequentialGroup()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                .addComponent(jLabel4)
                .addComponent(jLabel5))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING, false)
                .addComponent(tf_dj2)
                .addComponent(tf_dj1,
javax.swing.GroupLayout.DEFAULT_SIZE, 60,
Short.MAX_VALUE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING, false)
                .addComponent(tf_min2)
                .addComponent(tf_min1,
javax.swing.GroupLayout.DEFAULT_SIZE, 60,
Short.MAX_VALUE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
```

```
.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING, false)
                    .addComponent(tf_det2)
                    .addComponent(tf_det1,
javax.swing.GroupLayout.DEFAULT_SIZE, 60,
Short.MAX_VALUE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING, false)
                    .addComponent(tf_pos2)
                    .addComponent(tf_pos1,
javax.swing.GroupLayout.DEFAULT_SIZE, 50,
Short.MAX_VALUE)))
                .addGroup(jPanel1Layout.createSequentialGroup()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)

.addGroup(javax.swing.GroupLayout.Alignment.LEADING,
jPanel1Layout.createSequentialGroup()
                        .addComponent(cb1,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)
                        .addComponent(cb2,
javax.swing.GroupLayout.PREFERRED_SIZE, 148,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)
```

```
                    .addComponent(tf_tahun,
javax.swing.GroupLayout.PREFERRED_SIZE, 71,
javax.swing.GroupLayout.PREFERRED_SIZE))
                .addGroup(jPanel1Layout.createSequentialGroup()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)

.addGroup(javax.swing.GroupLayout.Alignment.LEADING,
jPanel1Layout.createSequentialGroup()
                        .addComponent(bt_run,
javax.swing.GroupLayout.PREFERRED_SIZE, 94,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)
                        .addComponent(bt_reset,
javax.swing.GroupLayout.PREFERRED_SIZE, 88,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)
                        .addComponent(bt_exit,
javax.swing.GroupLayout.DEFAULT_SIZE, 66,
Short.MAX_VALUE))

.addGroup(jPanel1Layout.createSequentialGroup()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
                            .addComponent(jLabel12,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                            .addComponent(tf_zona,
javax.swing.GroupLayout.DEFAULT_SIZE, 49,
Short.MAX_VALUE))
                        .addGap(18, 18, 18)
```

```
.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                        .addComponent(tf_jam,
javax.swing.GroupLayout.PREFERRED_SIZE, 61,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addComponent(jLabel9))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
                        .addComponent(tf_menit,
javax.swing.GroupLayout.PREFERRED_SIZE, 61,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addComponent(jLabel10,
javax.swing.GroupLayout.DEFAULT_SIZE, 61,
Short.MAX_VALUE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                        .addComponent(jLabel11)
                        .addComponent(tf_detik,
javax.swing.GroupLayout.PREFERRED_SIZE, 67,
javax.swing.GroupLayout.PREFERRED_SIZE))))
                    .addGap(4, 4, 4)))
                .addGap(576, 576, 576)))
            .addGap(114, 114, 114))
        .addGroup(jPanel1Layout.createSequentialGroup()
            .addGap(27, 27, 27)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.LEADING)
                .addComponent(jPanel2,
javax.swing.GroupLayout.PREFERRED_SIZE,
```

```
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(jLabel13))
            .addGap(38, 38, 38))
        );
        jPanel1Layout.setVerticalGroup(

jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Align
ment.LEADING)
            .addGroup(jPanel1Layout.createSequentialGroup()
                .addContainerGap()

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(jLabel1)
                .addComponent(jLabel2)
                .addComponent(jLabel3))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(cb1,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(cb2,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_tahun,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
```

```
.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(jLabel45)
                .addComponent(cb3,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.TRAILING)
                .addComponent(jLabel4)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                    .addComponent(tf_dj1,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(tf_min1)
                    .addComponent(tf_det1,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(tf_pos1,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)))
            .addGap(6, 6, 6)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(tf_dj2,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
```

```
                .addComponent(jLabel5)
                .addComponent(tf_min2,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_det2,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_pos2,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addGap(10, 10, 10)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(jLabel12)
                .addComponent(jLabel11)
                .addComponent(jLabel9)
                .addComponent(jLabel10,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(tf_zona,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_jam,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_menit,
javax.swing.GroupLayout.PREFERRED_SIZE,
```

```
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(tf_detik,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.U
NRELATED)

.addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLa
yout.Alignment.BASELINE)
                .addComponent(bt_run)
                .addComponent(bt_reset)
                .addComponent(bt_exit))
            .addGap(5, 5, 5)
            .addComponent(jLabel13)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.R
ELATED)
            .addComponent(jPanel2,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addContainerGap())
        );

        javax.swing.GroupLayout layout = new
javax.swing.GroupLayout(getContentPane());
        getContentPane().setLayout(layout);
        layout.setHorizontalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LE
ADING)
            .addGroup(layout.createSequentialGroup()
                .addContainerGap()
                .addComponent(jPanel1,
javax.swing.GroupLayout.PREFERRED_SIZE, 1013,
javax.swing.GroupLayout.PREFERRED_SIZE)
```

```
.addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE))
        );
        layout.setVerticalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LE
ADING)
            .addGroup(layout.createSequentialGroup()
                .addComponent(jPanel1,
javax.swing.GroupLayout.DEFAULT_SIZE, 596,
Short.MAX_VALUE)
                .addContainerGap())
        );

        pack();
    }// </editor-fold>

    private void bt_runActionPerformed(java.awt.event.ActionEvent
evt) {

        Posisi();
    }

    private void bt_resetActionPerformed(java.awt.event.ActionEvent
evt) {

        for (Component component : jPanel1.getComponents()){
                    if
(component.getClass().getSimpleName().equalsIgnoreCase("JTextFi
eld")){
                        JTextField field = (JTextField) component;
                        field.setText("");
                    }
                }
        for (Component component : jPanel2.getComponents()){
                    if
(component.getClass().getSimpleName().equalsIgnoreCase("JTextFi
eld")){
```

```
                JTextField field = (JTextField) component;
                field.setText("");
            }
        }

    }

    private void cb3ActionPerformed(java.awt.event.ActionEvent evt)
{
        itemKoordinat();
    }

    private void bt_exitActionPerformed(java.awt.event.ActionEvent
evt) {
        // TODO add your handling code here:
        dispose();
    }

    /**
    * @param args the command line arguments
    */
    public static void main(String args[]) {
         java.awt.EventQueue.invokeLater(new Runnable() {
           public void run() {
              new PosisiBulan().setVisible(true);
           }
        });
    }

    // Variables declaration - do not modify
    private javax.swing.JButton bt_exit;
    private javax.swing.JButton bt_reset;
    private javax.swing.JButton bt_run;
    private javax.swing.JComboBox cb1;
    private javax.swing.JComboBox cb12;
    private javax.swing.JComboBox cb13;
    private javax.swing.JComboBox cb14;
    private javax.swing.JComboBox cb2;
    private javax.swing.JComboBox cb3;
```

```
private javax.swing.JLabel jLabel1;
private javax.swing.JLabel jLabel10;
private javax.swing.JLabel jLabel11;
private javax.swing.JLabel jLabel12;
private javax.swing.JLabel jLabel13;
private javax.swing.JLabel jLabel14;
private javax.swing.JLabel jLabel15;
private javax.swing.JLabel jLabel16;
private javax.swing.JLabel jLabel17;
private javax.swing.JLabel jLabel18;
private javax.swing.JLabel jLabel19;
private javax.swing.JLabel jLabel2;
private javax.swing.JLabel jLabel20;
private javax.swing.JLabel jLabel21;
private javax.swing.JLabel jLabel22;
private javax.swing.JLabel jLabel23;
private javax.swing.JLabel jLabel24;
private javax.swing.JLabel jLabel25;
private javax.swing.JLabel jLabel26;
private javax.swing.JLabel jLabel27;
private javax.swing.JLabel jLabel28;
private javax.swing.JLabel jLabel29;
private javax.swing.JLabel jLabel3;
private javax.swing.JLabel jLabel30;
private javax.swing.JLabel jLabel31;
private javax.swing.JLabel jLabel32;
private javax.swing.JLabel jLabel33;
private javax.swing.JLabel jLabel34;
private javax.swing.JLabel jLabel35;
private javax.swing.JLabel jLabel36;
private javax.swing.JLabel jLabel37;
private javax.swing.JLabel jLabel38;
private javax.swing.JLabel jLabel39;
private javax.swing.JLabel jLabel4;
private javax.swing.JLabel jLabel40;
private javax.swing.JLabel jLabel41;
private javax.swing.JLabel jLabel42;
private javax.swing.JLabel jLabel43;
private javax.swing.JLabel jLabel44;
```

```
private javax.swing.JLabel jLabel45;
private javax.swing.JLabel jLabel5;
private javax.swing.JLabel jLabel9;
private javax.swing.JPanel jPanel1;
private javax.swing.JPanel jPanel2;
private javax.swing.JLabel lb_alphaBulan;
private javax.swing.JLabel lb_altitudeBulan;
private javax.swing.JLabel lb_azimuthBulan;
private javax.swing.JLabel lb_betaBulan;
private javax.swing.JLabel lb_deltaBulan;
private javax.swing.JLabel lb_iluminasi;
private javax.swing.JLabel lb_jarakBB;
private javax.swing.JLabel lb_lamdaBulan;
private javax.swing.JLabel lb_paralaksBulan;
private javax.swing.JLabel lb_posisiBulan;
private javax.swing.JLabel lb_sudutBulan;
private javax.swing.JTextField tf_BB;
private javax.swing.JTextField tf_altitude;
private javax.swing.JTextField tf_azimuth;
private javax.swing.JTextField tf_bujurEklip;
private javax.swing.JTextField tf_deklinasi;
private javax.swing.JTextField tf_det1;
private javax.swing.JTextField tf_det2;
private javax.swing.JTextField tf_detik;
private javax.swing.JTextField tf_dj1;
private javax.swing.JTextField tf_dj2;
private javax.swing.JTextField tf_iluminasi;
private javax.swing.JTextField tf_jam;
private javax.swing.JTextField tf_lintangEklip;
private javax.swing.JTextField tf_menit;
private javax.swing.JTextField tf_min1;
private javax.swing.JTextField tf_min2;
private javax.swing.JTextField tf_paralaks;
private javax.swing.JTextField tf_pos1;
private javax.swing.JTextField tf_pos2;
private javax.swing.JTextField tf_posNeg1;
private javax.swing.JTextField tf_posNeg2;
private javax.swing.JTextField tf_posNeg3;
private javax.swing.JTextField tf_right;
```

```
private javax.swing.JTextField tf_sudut;
private javax.swing.JTextField tf_tahun;
private javax.swing.JTextField tf_zona;
private javax.swing.JTextField tx_BM;
private javax.swing.JTextField tx_altitude;
private javax.swing.JTextField tx_azimuth;
private javax.swing.JTextField tx_bujurEklip;
private javax.swing.JTextField tx_deklinasi;
private javax.swing.JTextField tx_lintangEklip;
private javax.swing.JTextField tx_miringBumi;
private javax.swing.JTextField tx_paralaks;
private javax.swing.JTextField tx_posNeg1;
private javax.swing.JTextField tx_posNeg2;
private javax.swing.JTextField tx_right;
private javax.swing.JTextField tx_sudut;
// End of variables declaration
```

Lampiran 5
Program Image Desktop

```
package physics;

import java.awt.Graphics;
import java.awt.Image;
import javax.swing.ImageIcon;
import javax.swing.JOptionPane;

public class JImageDesktopPane extends javax.swing.JDesktopPane
{
 public JImageDesktopPane() {
       img = new ImageIcon(getClass().getResource("blue-
moon.jpeg")).getImage();
    }

    @Override
    protected void paintComponent(Graphics g) {
       if(img == null){
          super.paintComponent(g);
       }else{
          try{
             //getValue for sizing Image fit to jdesktop
             int scrW = this.getWidth();
             int scrH = this.getHeight();
             g.drawImage(img, 0, 0, scrW, scrH, null);

          } catch(NullPointerException ex){
             JOptionPane.showMessageDialog(this, "File Background
tidak ditemukan!\nPesan Error : \n"+ex.getMessage(), "Terjadi
Kesalahan!", 0);
          }
       }
    }
    //variabel
    private Image img;
}
```

Lampiran 6
Program Koneksi

```
package physics.inface;
import java.sql.Connection;
/**
@author x_cool
 */
public interface Koneksi {
    String DRIVERSERVER ="org.apache.derby.jdbc.ClientDriver";
    String DRIVEREMBED
="org.apache.derby.jdbc.EmbeddedDriver";
    String FULLURL
="jdbc:derby://localhost:1527/astronomi;user=ainas;password=honai
";
    String URL ="jdbc:derby://localhost:1527/astronomi";
    String HOST ="localhost";
    String PORT ="1527";
    String DB ="astronomi";
    String USERNAME ="ainas";
    String PASSWORD = "honai";
    public void panggilDriver();
    public Connection hubungDBastronomi();
}
```

Lampiran 7
Program Koneksi Astronomi

```
package physics.koneksi;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.SQLException;
import physics.inface.Koneksi;
public class KoneksiAstronomi implements Koneksi {
   String status;
   private Connection konek;

   public void panggilDriver() {
      try{
         Class.forName(Koneksi.DRIVERSERVER);
         System.out.println("Proses pemanggilan driver sukses");
      }
      catch(ClassNotFoundException e){
         System.err.println("Pemanggilan driver javaDB gagal");
      }
      finally{
         System.err.println("Proses pemanggilan driver selesai");
      }
   }
   public Connection hubungDBastronomi() {
      try{
         konek = DriverManager.getConnection(Koneksi.URL,
Koneksi.USERNAME, Koneksi.PASSWORD);
         System.out.println("Koneksi database berhasil");
      }
      catch(SQLException e){
         System.err.println("Koneksi database gagal");
      }
      finally{
         System.err.println("Proses koneksi database selesai");
      }
      return konek;
   }
```

Lampiran 8
Data Konjungsi dari tahun 2007-2012

No.	Tanggal	Bulan	Tahun	Pukul
1	19	1	2007	4:00:40
2	17	2	2007	14:14:16
3	19	3	2007	2:42:30
4	17	4	2007	11:36:06
5	16	5	2007	19:27:20
6	15	6	2007	3:13:09
7	14	7	2007	12:03:46
8	12	8	2007	23:02:33
9	11	9	2007	12:44:17
10	11	10	2007	5:00:45
11	9	11	2007	23:03:08
12	9	12	2007	17:40:21
13	8	1	2008	11:37:03

No.	Tanggal	Bulan	Tahun	Pukul
1	8	1	2008	11:37:03
2	7	2	2008	3:44:24
3	7	3	2008	17:14:09
4	6	4	2008	3:55:17
5	5	5	2008	12:18:18
6	3	6	2008	19:22:39
7	3	7	2008	2:18:37
8	1	8	2008	10:12:33
9	30	8	2008	19:58:04
10	29	9	2008	8:12:23
11	28	10	2008	23:13:58
12	27	11	2008	16:54:43
13	27	12	2008	12:22:30

No.	Tanggal	Bulan	Tahun	Pukul
1	27	12	2008	12:22:30
2	26	1	2009	7:55:16
3	25	2	2009	1:35:04
4	26	3	2009	16:06:00
5	25	4	2009	3:22:33
6	24	5	2009	12:11:02
7	22	6	2009	19:35:02
8	22	7	2009	2:34:32
9	20	8	2009	10:01:29
10	18	9	2009	18:44:20
11	18	10	2009	5:33:04
12	16	11	2009	19:13:42
13	16	12	2009	12:02:12

No.	Tanggal	Bulan	Tahun	Pukul
1	15	1	2010	7:11:28
2	14	2	2010	2:51:23
3	15	3	2010	21:01:15
4	14	4	2010	12:28:57
5	14	5	2010	1:04:23
6	12	6	2010	11:14:37
7	11	7	2010	19:40:24
8	10	8	2010	3:08:03
9	8	9	2010	10:29:46
10	7	10	2010	18:44:26
11	6	11	2010	4:51:44
12	5	12	2010	17:35:44
13	4	1	2011	9:02:42

No.	Tanggal	Bulan	Tahun	Pukul
1	4	1	2011	9:02:42
2	3	2	2011	2:30:43
3	4	3	2011	20:45:53
4	3	4	2011	14:32:19
5	3	5	2011	6:50:40
6	1	6	2011	21:02:35
7	1	7	2011	8:53:52
8	30	7	2011	18:39:48
9	29	8	2011	3:04:04
10	27	9	2011	11:08:36
11	26	10	2011	19:55:47
12	25	11	2011	6:09:42
13	24	12	2011	18:06:22

No.	Tanggal	Bulan	Tahun	Pukul
1	24	12	2011	18:06:22
2	23	1	2012	7:39:21
3	21	2	2012	22:34:45
4	22	3	2012	14:37:10
5	21	4	2012	7:18:28
6	20	5	2012	23:47:07
7	19	6	2012	15:02:07
8	19	7	2012	4:24:04
9	17	8	2012	15:54:29
10	16	9	2012	2:10:38
11	15	10	2012	12:02:29
12	13	11	2012	22:08:00
13	13	12	2012	8:41:33


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