Laporan Praktikum 8 - Graphical User Interface (GUI)

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Kelas : D3TI2C

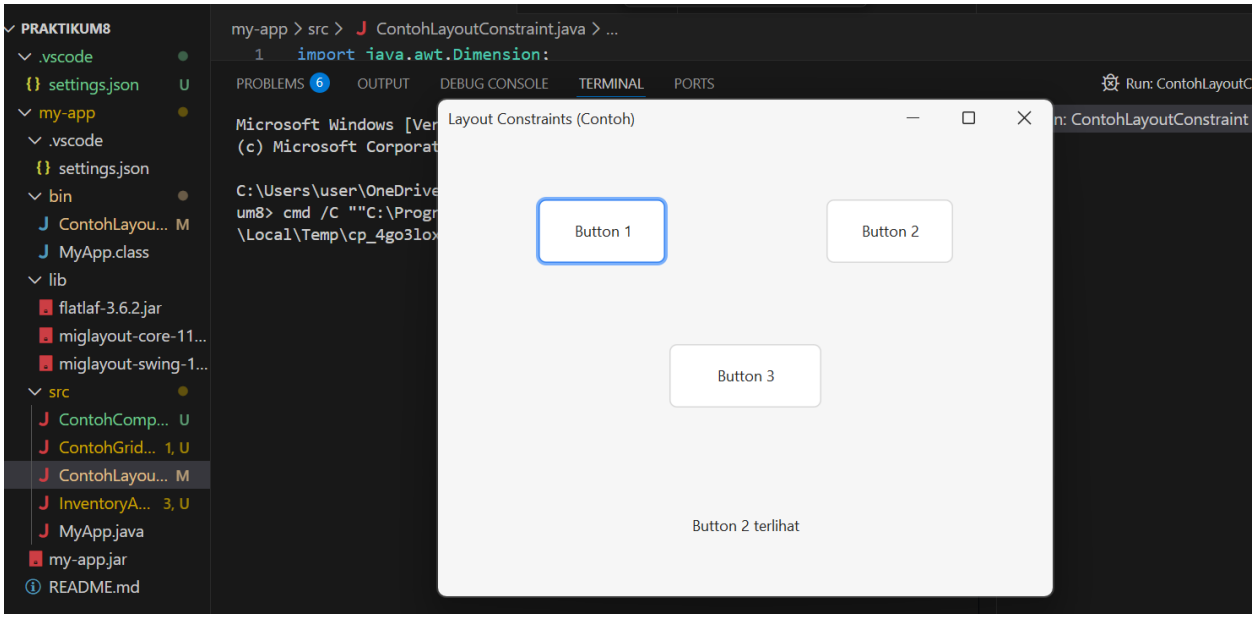
Mata Kuliah : Pemrograman Berbasis Objek

1. Layout Constraint
   a. Kode Program

```
import java.awt.Dimension;

import javax.swing.JButton;
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JPanel;
import javax.swing.SwingUtilities;
import javax.swing.UIManager;
import javax.swing.UnsupportedLookAndFeelException;

import com.formdev.flatlaf.themes.FlatMacLightLaf;
import net.miginfocom.swing.MigLayout;

public class ContohLayoutConstraint {

    public static void main(String[] args) {

        try {
            UIManager.setLookAndFeel(new FlatMacLightLaf());
        } catch (UnsupportedLookAndFeelException e) {
            System.err.println("Gagal mengatur Look and Feel: " + e.getMessage());
        }

        SwingUtilities.invokeLater(() -> {
            JFrame frame = new JFrame("Layout Constraints (Contoh)");
            frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
            frame.setPreferredSize(new Dimension(500, 400));

            // hidemode 3 = saat komponen disembunyikan, ruangnya dilipat
            String layoutConstraints = "fill, insets 20, hidemode 3";
            // ubah menjadi dua kolom sehingga button3 bisa span 2 dan berada di
tengah bawah
```

```
        JPanel panel = new JPanel(new MigLayout(layoutConstraints,
"[grow][grow]"));

        JButton button1 = new JButton("Button 1");
        JButton button2 = new JButton("Button 2");
        JButton button3 = new JButton("Button 3");

        // Menambahkan tombol: button1 & button2 sejajar, button3 di bawah dan
span 2 kolom (tengah)
        panel.add(button1, "w 100!, h 50!, align center");
        panel.add(button2, "w 100!, h 50!, align center, wrap");

        panel.add(button3, "span 2, w 120!, h 50!, align center, wrap");

        JLabel statusLabel = new JLabel("Button 2 terlihat");
        panel.add(statusLabel, "span 2, align center, gaptop 20");

        // Tombol untuk hide/show Button 2
        button1.addActionListener(e -> {
            boolean isVisible = button2.isVisible();
            button2.setVisible(!isVisible);

            if (isVisible) {
                statusLabel.setText("Button 2 Disembunyikan (Ruang Kosong
Dilipat)");
            } else {
                statusLabel.setText("Button 2 Terlihat Kembali");
            }

            panel.revalidate();
            panel.repaint();
        });

        frame.add(panel);
        frame.pack();
        frame.setLocationRelativeTo(null);
        frame.setVisible(true);
    });
  }
}
```

b. Hasil Running


PRAKTIKUM8
.vscode
settings.json
my-app
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ContohLayou... M
MyApp.class
lib
flatlaf-3.6.2.jar
miglayout-core-11...
miglayout-swing-1...
src
ContohComp... U
ContohGrid... 1, U
ContohLayou... M
InventoryA... 3, U
MyApp.java
my-app.jar
README.md
my-app > src > ContohLayoutConstraint.java > ...
1 import java.awt.Dimension;
PROBLEMS 6
OUTPUT
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TERMINAL
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Microsoft Windows [Ver
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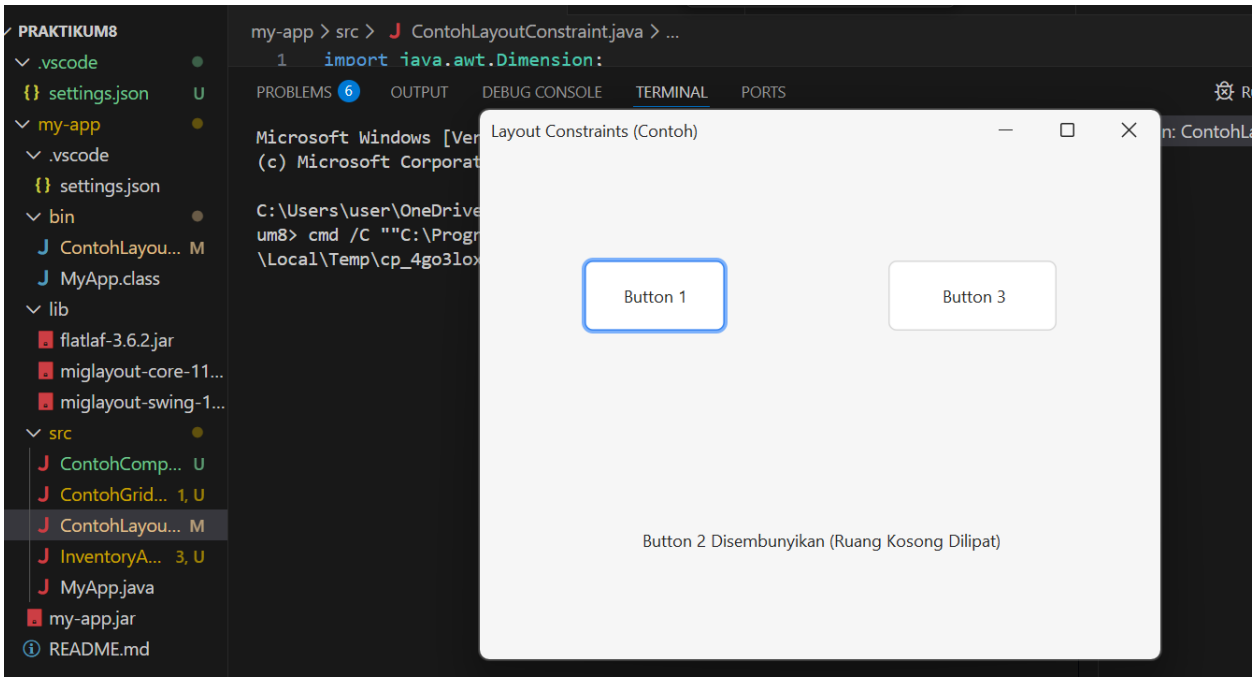
C:\Users\user\OneDrive
um8> cmd /C ""C:\Progr
\Local\Temp\cp_4go3lox
Layout Constraints (Contoh)
Button 1
Button 2
Button 3
Button 2 terlihat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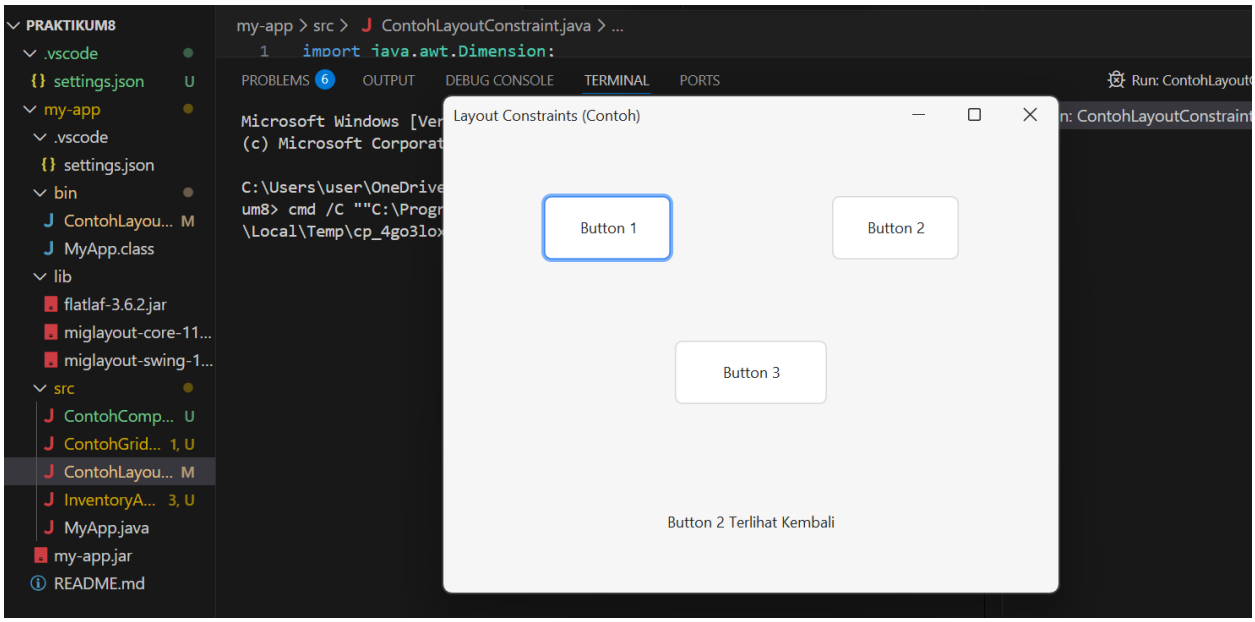
\Local\Temp\cp_4go3lox
Layout Constraints (Contoh)
Button 1
Button 3
Button 2 Disembunyikan (Ruang Kosong Dilipat)



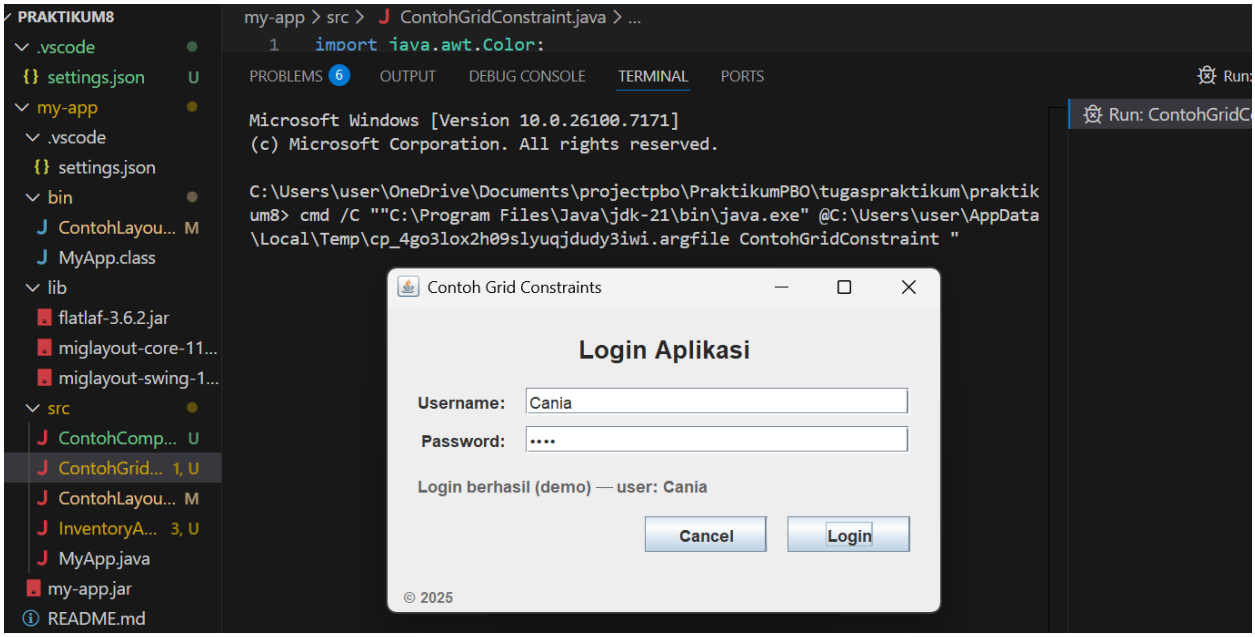
2. Column/Row Constraint
   a. Kode Program

```
import java.awt.Color;
import java.awt.Dimension;
import java.awt.Font;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

import javax.swing.BorderFactory;
import javax.swing.JButton;
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JPanel;
import javax.swing.JPasswordField;
import javax.swing.JTextField;
import javax.swing.SwingUtilities;
import javax.swing.border.EmptyBorder;

import net.miginfocom.swing.MigLayout;

public class ContohGridConstraint {
    public static void main(String[] args) {
        SwingUtilities.invokeLater(() -> {
            JFrame frame = new JFrame("Contoh Grid Constraints");
            frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
            frame.setPreferredSize(new Dimension(420, 260));

            // Panel utama dengan padding
```

```
        JPanel container = new JPanel(new MigLayout("insets 10, fill", "[grow]"));
        container.setBorder(new EmptyBorder(8, 12, 12, 12));

        // Header
        JLabel header = new JLabel("Login Aplikasi");
        header.setFont(header.getFont().deriveFont(Font.BOLD, 18f));
        header.setForeground(new Color(40, 40, 40));
        container.add(header, "wrap, align center, gapbottom 10");

        // Form dengan dua kolom: label kanan, field fill
        String colConstraints = "[right][grow, fill]";
        JPanel form = new JPanel(new MigLayout("wrap 2, gapy 8, insets 0",
colConstraints));
        JPasswordField passwordField = new JPasswordField(18);

        form.add(new JLabel("Username:"), "gapright 8");
        form.add(usernameField, "growx, pushx");

        form.add(new JLabel("Password:"), "gapright 8");
        form.add(passwordField, "growx, pushx, wrap");

        container.add(form, "growx, pushx, wrap");

        // Status label
        JLabel statusLabel = new JLabel(" ");
        statusLabel.setFont(statusLabel.getFont().deriveFont(12f));
        statusLabel.setForeground(new Color(100, 100, 100));
        container.add(statusLabel, "growx, pushx, wrap, gapbottom 8");

        // Tombol di kanan: Cancel | Login
        JPanel btnPanel = new JPanel(new MigLayout("insets 0, fill",
"[grow][][]"));
        JButton loginBtn = new JButton("Login");
        cancelBtn.setPreferredSize(new Dimension(90, 28));
        loginBtn.setPreferredSize(new Dimension(90, 28));

        btnPanel.add(new JLabel(), "growx"); // spacer
        btnPanel.add(cancelBtn, "sg btn");
        btnPanel.add(loginBtn, "sg btn, gapleft 8");

        container.add(btnPanel, "growx, pushx, wrap");

        // Footer: copyright 2025, docked ke bawah kiri
        JLabel footer = new JLabel("\u00A9 2025");
        footer.setFont(footer.getFont().deriveFont(11f));
        footer.setForeground(new Color(120, 120, 120));
```

```
        container.add(footer, "dock south, align left, gaptop 8");

        // Aksi tombol simpel untuk feedback UI
        loginBtn.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                String user = usernameField.getText().trim();
                char[] pass = passwordField.getPassword();
                if (user.isEmpty()) {
                    statusLabel.setText("Isi username terlebih dahulu.");
                } else if (pass.length == 0) {
                    statusLabel.setText("Isi password terlebih dahulu.");
                } else {
                    statusLabel.setText("Login berhasil (demo) — user: " + user);
                }
            }
        });

        cancelBtn.addActionListener(e -> {
            usernameField.setText("");
            passwordField.setText("");
            statusLabel.setText(" ");
        });

        frame.setContentPane(container);
        frame.pack();
        frame.setLocationRelativeTo(null);
        frame.setVisible(true);
      });
    }
}
```

b. Hasil Running

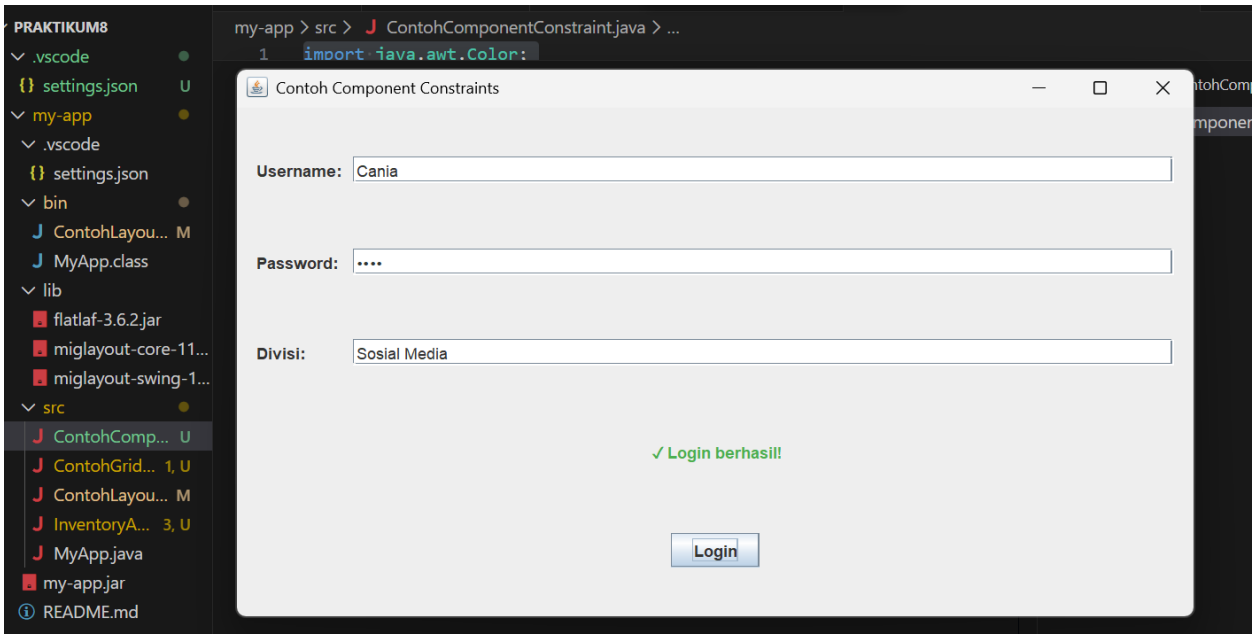


3. Component Constraint
   a. Kode Program

```
import java.awt.Color;
import java.awt.Dimension;
import javax.swing.JButton;
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JPanel;
import javax.swing.JPasswordField;
import javax.swing.JTextField;
import javax.swing.SwingUtilities;
import net.miginfocom.swing.MigLayout;

public class ContohComponentConstraint {
    public static void main(String[] args) {
        SwingUtilities.invokeLater(() -> {
            JFrame frame = new JFrame("Contoh Component Constraints");
            frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
            frame.setPreferredSize(new Dimension(400, 280));

            JPanel panel = new JPanel(new MigLayout("fill, wrap 2, gapy 5, gapx 8,
insets 15"));
            panel.add(new JLabel("Username:"));
            JTextField usernameField = new JTextField();
            panel.add(usernameField, "growx, pushx");

            panel.add(new JLabel("Password:"));
            JPasswordField passwordField = new JPasswordField();
            panel.add(passwordField, "growx, pushx");
```

```
        panel.add(new JLabel("Divisi:"));
        JTextField divisiField = new JTextField();
        panel.add(divisiField, "growx, pushx");

        // Label status
        JLabel statusLabel = new JLabel(" ");
        statusLabel.setForeground(new Color(76, 175, 80));
        panel.add(statusLabel, "span 2, align center, gaptop 8, wrap");

        JButton loginBtn = new JButton("Login");
        loginBtn.addActionListener(e -> {
            String username = usernameField.getText().trim();
            String divisi = divisiField.getText().trim();
            char[] password = passwordField.getPassword();

            if (username.isEmpty() || divisi.isEmpty() || password.length == 0) {
                statusLabel.setText("Semua field harus diisi!");
                statusLabel.setForeground(new Color(244, 67, 54));
            } else {
                statusLabel.setText("✓ Login berhasil!");
                statusLabel.setForeground(new Color(76, 175, 80));
            }
        });

        panel.add(loginBtn, "span 2, align center, gaptop 5");

        frame.add(panel);
        frame.pack();
        frame.setLocationRelativeTo(null);
        frame.setVisible(true);
    });
  }
}
```

b. Hasil Running



4. Komponen swing penyusun UI

   a. Analisis Komponen Swing pada UI:

      1) Label teks (JLabel): Menampilkan teks deskripsi seperti Nama Produk, Stok, dan Kategori.

      2) Input teks (JTextField): Tempat pengguna memasukkan data seperti nama produk dan jumlah stok.

      3) Dropdown (JComboBox<String>): Memberikan pilihan kategori produk yang dapat dipilih pengguna.

      4) Checkbox (JCheckBox): Menyediakan opsi tambahan seperti Prioritas Kirim.

      5) Tombol (JButton): Menjalankan aksi utama, yaitu menyimpan data dan menampilkan notifikasi.

      6) Area Log (JTextArea dalam JScrollPane): Menampilkan riwayat atau log aktivitas penyimpanan.

      7) Layout Manager (MigLayout): Mengatur posisi dan tata letak komponen secara fleksibel dan rapi.

      8) Frame Utama (JFrame): Berfungsi sebagai jendela utama tempat seluruh UI ditampilkan.

      9) Panel (JPanel): Wadah yang menampung semua komponen UI menggunakan layout MigLayout.

b. Kode Program

```
import java.awt.*;
import java.awt.event.FocusAdapter;
import java.awt.event.FocusEvent;
import java.awt.event.MouseAdapter;
import java.awt.event.MouseEvent;
import javax.swing.*;
import javax.swing.border.EmptyBorder;
import javax.swing.plaf.basic.BasicComboBoxRenderer;
import net.miginfocom.swing.MigLayout;

public class InventoryApp {
   public static void main(String[] args) {
      SwingUtilities.invokeLater(() -> {
         try {

UIManager.setLookAndFeel(UIManager.getSystemLookAndFeelClassName());
         } catch (Exception ex) {
            // ignore
         }

         JFrame frame = new JFrame("Inventory App");
         frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
         frame.setPreferredSize(new Dimension(900, 520));

         JPanel main = new JPanel(new MigLayout("fill, insets 12, gap 12",
"[300px][grow]", "[grow]"));
         main.setBackground(new Color(246,246,246));

         // Left panel (form)
         JPanel left = new JPanel(new MigLayout("wrap 2, gapy 8, gapx 8, insets
16", "[95px][grow]", "[]20[]"));
         left.setBackground(new Color(246,246,246));

left.setBorder(BorderFactory.createCompoundBorder(BorderFactory.createLineBor
der(new Color(224,224,224)), new EmptyBorder(8,8,8,8)));

         JLabel lblNama = new JLabel("Nama Produk:");
         lblNama.setFont(lblNama.getFont().deriveFont(12f));
         RoundedTextField tfNama = new RoundedTextField(20);
         tfNama.setPreferredSize(new Dimension(180, 30));

         JLabel lblStok = new JLabel("Stok:");
         lblStok.setFont(lblStok.getFont().deriveFont(12f));
         RoundedTextField tfStok = new RoundedTextField(8);
         tfStok.setPreferredSize(new Dimension(180, 30));
```

```
        JLabel lblKategori = new JLabel("Kategori:");
        lblKategori.setFont(lblKategori.getFont().deriveFont(12f));


        RoundedComboBox<String> combo = new RoundedComboBox<>(new
String[]{"Elektronik","Pakaian","Makanan"});
        combo.setPreferredSize(new Dimension(170, 30));

        JLabel lblPrior = new JLabel("Prioritas Kirim:");
        lblPrior.setFont(lblPrior.getFont().deriveFont(12f));
        JCheckBox cbPrior = new JCheckBox("Ya, Prioritas");
        cbPrior.setBackground(new Color(246,246,246));

        // Spacer and save button centered
        RoundedButton btnSave = new RoundedButton("Simpan & Notifikasi");
        btnSave.setPreferredSize(new Dimension(180,36));

        left.add(lblNama);
        left.add(tfNama, "h 32!");
        left.add(lblStok);
        left.add(tfStok, "h 32!");
        left.add(lblKategori);
        left.add(combo, "growx");
        left.add(lblPrior);
        left.add(cbPrior);
        left.add(new JLabel(""), "span 2, grow, push");
        left.add(btnSave, "span 2, align center");

        // Right panel (log)
        JPanel right = new JPanel(new MigLayout("wrap 1, insets 12", "[grow,
fill]"));

right.setBorder(BorderFactory.createCompoundBorder(BorderFactory.createLineB
order(new Color(224,224,224)), new EmptyBorder(8,8,8,8)));

        JLabel lblLog = new JLabel("Log Aktivitas Tambahan:");
        lblLog.setFont(lblLog.getFont().deriveFont(Font.BOLD, 12f));
        JTextArea taLog = new JTextArea(12,30);
        taLog.setEditable(false);
        taLog.setLineWrap(true);
        taLog.setWrapStyleWord(true);
        taLog.setBackground(new Color(250,250,250));
        taLog.setBorder(BorderFactory.createLineBorder(new
Color(220,220,220)));
        right.add(taLog, "grow, push");
```

```
        main.add(left, "growy");
        main.add(right, "grow, push");

        // Action
        btnSave.addActionListener(ev -> {
            String nama = tfNama.getText().trim();
            String stok = tfStok.getText().trim();
            String kategori = (String) combo.getSelectedItem();
            String prior = cbPrior.isSelected() ? "YA" : "TIDAK";

            if (nama.isEmpty() || stok.isEmpty()) {
                JOptionPane.showMessageDialog(frame, "Nama produk dan stok
tidak boleh kosong!", "Error", JOptionPane.ERROR_MESSAGE);
                return;
            }

            taLog.append("\n[INFO] Disimpan: " + nama + " (" + kategori + ")");

            CustomSuccessDialog.show(frame,
                "Data Produk Berhasil Disimpan!\n" +
                "Nama: " + nama + "\n" +
                "Stok: " + stok + "\n" +
                "Kategori: " + kategori + "\n" +
                "Prioritas: " + prior);

            tfNama.setText("");
            tfStok.setText("");
            combo.setSelectedIndex(0);
            cbPrior.setSelected(false);
        });

        frame.add(main);
        frame.pack();
        frame.setLocationRelativeTo(null);
        frame.setVisible(true);
    });
  }

  // --- Custom components ---
  static class RoundedTextField extends JTextField {
    private final int arc = 8;
    public RoundedTextField(int cols){
        super(cols);
        setOpaque(false);
        setBorder(BorderFactory.createEmptyBorder(6,8,6,8));
```

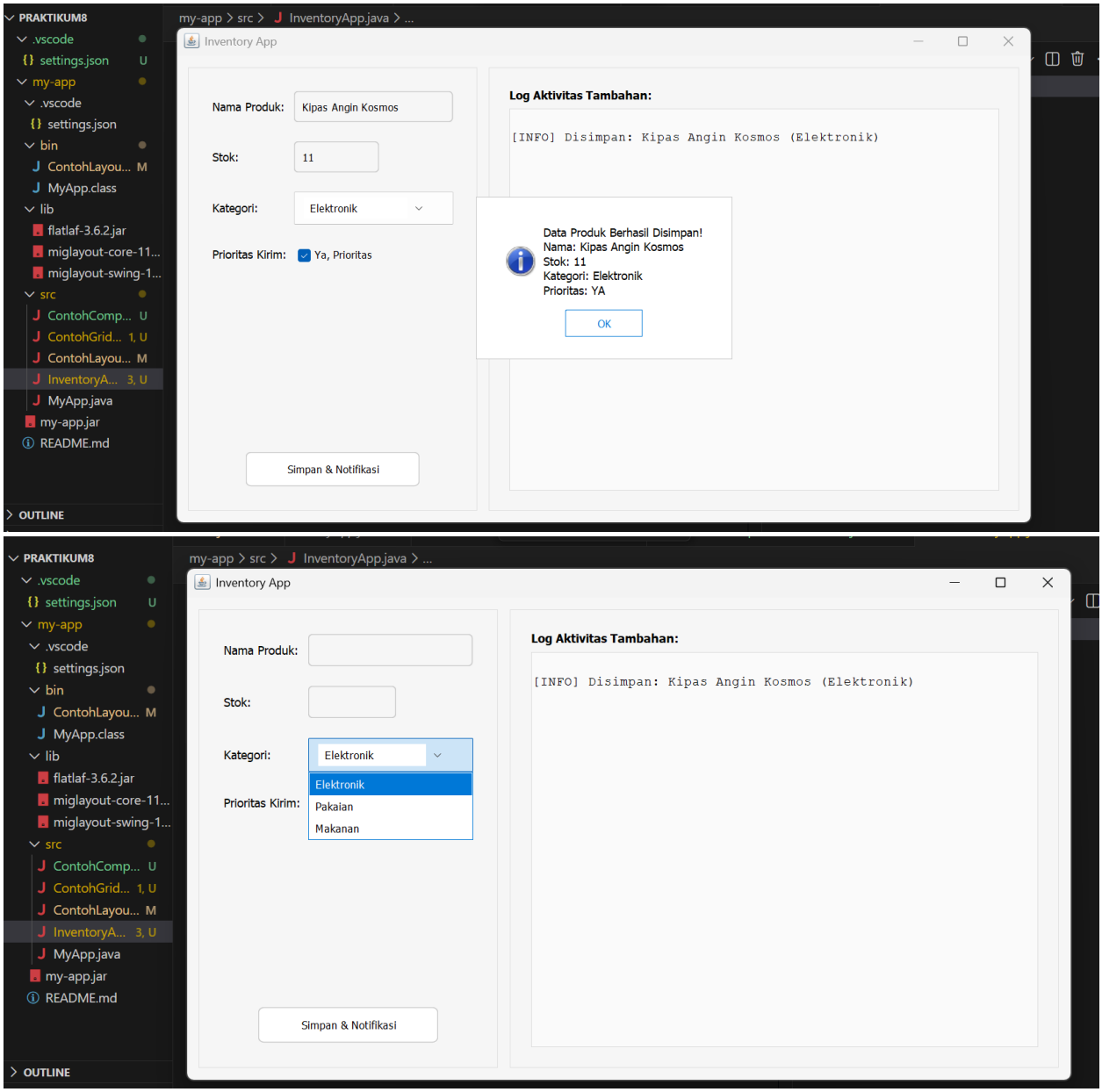
```
        addFocusListener(new FocusAdapter(){
           public void focusGained(FocusEvent e){ repaint(); }
           public void focusLost(FocusEvent e){ repaint(); }
        });
     }
     @Override protected void paintComponent(Graphics g){
        Graphics2D g2 = (Graphics2D) g.create();
        g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING,
RenderingHints.VALUE_ANTIALIAS_ON);
        if (isFocusOwner()) g2.setColor(new Color(232,244,255)); else
g2.setColor(getParent().getBackground());
        g2.fillRoundRect(0,0,getWidth(),getHeight(),arc,arc);
        if (isFocusOwner()) g2.setColor(new Color(0,120,215)); else
g2.setColor(new Color(200,200,200));
        g2.setStroke(new BasicStroke(1f));
        g2.drawRoundRect(0,0,getWidth()-1,getHeight()-1,arc,arc);
        g2.dispose();
        super.paintComponent(g);
     }
  }

  static class RoundedButton extends JButton {
     private final int arc = 10;
     public RoundedButton(String text){
        super(text);
        setContentAreaFilled(false);
        setFocusPainted(false);
        setBorder(BorderFactory.createEmptyBorder(8,12,8,12));
     }
     @Override protected void paintComponent(Graphics g){
        Graphics2D g2 = (Graphics2D)g.create();
        g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING,
RenderingHints.VALUE_ANTIALIAS_ON);
        Color bg = getModel().isArmed() ? new Color(200,225,255) :
Color.WHITE;
        g2.setColor(bg);
        g2.fillRoundRect(0,0,getWidth(),getHeight(),arc,arc);
        g2.setColor(new Color(200,200,200));
        g2.drawRoundRect(0,0,getWidth()-1,getHeight()-1,arc,arc);
        g2.dispose();
        super.paintComponent(g);
     }
  }

  static class RoundedComboBox<E> extends JComboBox<E> {
     public RoundedComboBox(E[] items){
```

```
        super(items);
        setOpaque(false);
        // reserve extra right padding for custom arrow area
        setBorder(BorderFactory.createEmptyBorder(4,8,4,28));
        setRenderer(new BasicComboBoxRenderer(){
           @Override public Component getListCellRendererComponent(JList list,
Object value, int index, boolean isSelected, boolean cellHasFocus){
               JLabel l = (JLabel) super.getListCellRendererComponent(list, value,
index, isSelected, cellHasFocus);
               l.setBorder(new EmptyBorder(4,6,4,6));
               return l;
           }
        });
     }
     @Override protected void paintComponent(Graphics g){
        int arc = 10;
        Graphics2D g2 = (Graphics2D) g.create();
        g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING,
RenderingHints.VALUE_ANTIALIAS_ON);

        // background
        g2.setColor(getParent().getBackground());
        g2.fillRoundRect(0,0,getWidth(),getHeight(),arc,arc);

        // border
        g2.setColor(new Color(200,200,200));
        g2.setStroke(new BasicStroke(1f));
        g2.drawRoundRect(0,0,getWidth()-1,getHeight()-1,arc,arc);

        // Draw blue arrow area on right
        int aw = 26;
        int ax = getWidth() - aw;
        int ay = 2;
        int ah = getHeight() - 4;
        g2.setColor(new Color(0,120,215)); // blue
        g2.fillRoundRect(ax, ay, aw, ah, arc, arc);

        // draw chevron (down) in white
        g2.setColor(Color.WHITE);
        g2.setStroke(new BasicStroke(2.2f, BasicStroke.CAP_ROUND,
BasicStroke.JOIN_ROUND));
        int cx = ax + aw/2;
        int cy = getHeight()/2 - 1;
        int s = 4;
        g2.drawLine(cx - s, cy - 1, cx, cy + 2);
        g2.drawLine(cx + s, cy - 1, cx, cy + 2);
```

```
            g2.dispose();

            // let super draw the text/editor on top
            super.paintComponent(g);
        }
    }

    static class BlueIconButton extends JButton {
        public BlueIconButton() {
            setContentAreaFilled(false);
            setFocusPainted(false);
            setBorder(BorderFactory.createEmptyBorder());
        }
        @Override protected void paintComponent(Graphics g) {
            Graphics2D g2 = (Graphics2D) g.create();
            g2.setRenderingHint(RenderingHints.KEY_ANTIALIASING,
RenderingHints.VALUE_ANTIALIAS_ON);
            int w = getWidth();
            int h = getHeight();
            int arc = 12;

            // Blue rounded background
            g2.setColor(new Color(0, 120, 215));
            g2.fillRoundRect(0, 0, w, h, arc, arc);

            // White chevron arrows
            g2.setColor(Color.WHITE);
            g2.setStroke(new BasicStroke(2.6f));

            int cx = w / 2;
            int cy = h / 2;
            int size = 4;

            // UP arrow (chevron)
            g2.drawLine(cx - size, cy - 4, cx, cy - 8);
            g2.drawLine(cx + size, cy - 4, cx, cy - 8);

            // DOWN arrow (chevron)
            g2.drawLine(cx - size, cy + 4, cx, cy + 8);
            g2.drawLine(cx + size, cy + 4, cx, cy + 8);

            g2.dispose();
        }
    }
```

```
   static class CustomSuccessDialog {
       public static void show(Window owner, String message){
           JDialog dlg = new JDialog(owner, "Sukses",
Dialog.ModalityType.APPLICATION_MODAL);
dlg.setUndecorated(true);
insets 12"));

p.setBorder(BorderFactory.createCompoundBorder(BorderFactory.createLineBord
er(new Color(200,200,200)), new EmptyBorder(10,12,10,12)));

           JLabel icon = new
JLabel(UIManager.getIcon("OptionPane.informationIcon"));
           JLabel lbl = new JLabel("<html>" + message.replaceAll("\n","<br>") +
"</html>");

           JButton ok = new JButton("OK");
           ok.setPreferredSize(new Dimension(80,28));
           // tampilkan OK sebagai teks berwarna biru tanpa latar putih
           ok.setFocusPainted(false);
           ok.setContentAreaFilled(false);
           ok.setOpaque(false);
           ok.setForeground(new Color(0,120,215));
           ok.setBorder(BorderFactory.createLineBorder(new Color(0,120,215), 1,
true));
           JPanel content = new JPanel(new MigLayout("ins 6, wrap 2", "[][grow]"));
           content.setBackground(Color.WHITE);
           content.add(icon);
           content.add(lbl);
           p.add(content);
           p.add(ok, "align center");

           ok.addActionListener(e -> dlg.dispose());

           dlg.add(p);
           dlg.pack();
           dlg.setLocationRelativeTo(owner);
           dlg.setVisible(true);
       }
   }
}
```

c. Hasil Running



5. Pengalaman pembelajaran yang didapat:

Selama mempelajari materi Graphical User Interface, baik melalui teori, praktikum, maupun pengerjaan tugas, saya memperoleh pemahaman yang lebih jelas mengenai pengaturan layout constraint, termasuk penggunaan column, row, dan component constraint. Saya juga mampu menerapkan konsep tersebut dalam pembuatan antarmuka menggunakan Swing dan MigLayout. Pembelajaran ini secara pribadi membantu saya mengembangkan keterampilan teknis serta meningkatkan kemampuan saya dalam merancang dan mengatur struktur tampilan secara lebih sistematis.