MULTIMEDIA UNIVERSITY

TCP2201 Object Oriented Analysis and Design
Lab 5 – Key Listeners and Multimedia Libraries
SAMPLE SOLUTION

Exercise

Changes to the given lab code are highlighted in red below and commented where necessary

```
import javax.swing.*;
import javax.swing.event.*;
import java.awt.event.*;
import java.awt.*;
import javax.sound.midi.*;

public class Piano implements ChangeListener, KeyListener {
      Synthesizer midiSynth;
      Instrument[] instr;
      MidiChannel[] mChannel;
      boolean isPlaying = false; // is a sound already playing?
      int keyPressed; // keep track of which keyboard key was pressed

      Piano(){
            JFrame frame = new JFrame("Pea-Air-Know v3");
            JButton[] w = new JButton[8];
            JButton[] b = new JButton[6];

            // NOT SHOWN IN TUTORIAL-------------------------
            JPanel jp = new JPanel(new FlowLayout(FlowLayout.LEFT));
            String[] instList = {"Piano","Guitar","Trumpet","Organ"};

            JComboBox<String> setInst = new JComboBox<String>(instList);
            frame.add(setInst,BorderLayout.NORTH);
            setInst.addActionListener(new ActionListener(){
                  public void actionPerformed(ActionEvent e){
                        JComboBox tmp = (JComboBox)e.getSource();
                        String instName = (String)tmp.getSelectedItem();
                        if (instName.equals("Piano"))
                              mChannel[0].programChange(1,1);
                        else if (instName.equals("Guitar"))
                              mChannel[0].programChange(1,25);
                        else if (instName.equals("Trumpet"))
                              mChannel[0].programChange(1,57);
                        else if (instName.equals("Organ"))
                              mChannel[0].programChange(1,20);
                  }
            });
            // ----------------------------------------------
            JLayeredPane panel = new JLayeredPane();
            frame.add(panel,BorderLayout.CENTER);
```

```
        //frame.addKeyListener(this); // optional, YMMV
        //panel.addKeyListener(this); // optional

        for (int i = 0; i < 8; i++) { // one additional button here
              w[i] = new JButton();
              w[i].setBackground(Color.WHITE);
              w[i].setLocation(i * 70, 0);
              w[i].setSize(70, 300);
              w[i].addChangeListener(this);
              w[i].setName("w"+Integer.toString(i));
              w[i].addKeyListener(this);
              panel.add(w[i], 0, -1);
        }

        for (int i = 0; i < 6; i++) {
              if (i==2)
                    continue;
              b[i] = new JButton();
              b[i].setBackground(Color.BLACK);
              b[i].setLocation(35 + i * 70, 0);
              b[i].setSize(70, 150);
              b[i].addChangeListener(this);
              b[i].setName("b"+Integer.toString(i));
              b[i].addKeyListener(this);
              panel.add(b[i], 1, -1);
        }

        try{
          midiSynth = MidiSystem.getSynthesizer();
          midiSynth.open();
          instr = midiSynth.getDefaultSoundbank().getInstruments();
          mChannel = midiSynth.getChannels();
        } catch(MidiUnavailableException e){

        }

        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setSize(570, 320); // I have extra button so added 70px
        frame.setResizable(false);
        frame.setVisible(true);
  }

  @Override
  public void stateChanged(ChangeEvent e){
        JButton tmp = (JButton)e.getSource();
        String btnName= tmp.getName(); // return "nickname" of button
        if(tmp.getModel().isPressed()){ // check if its pressed
              isPlaying = true; // if yes, then set bool to true
              switch(btnName){
                    case "w0":
                          keyPressed=60;
                          mChannel[0].noteOn(60, 127);
                          break;
                    case "b0":
                          keyPressed=61;
```

```
                        mChannel[0].noteOn(61,127);
                        break;
                  case "w1":
                        keyPressed=62;
                        mChannel[0].noteOn(62,127);
                        break;
                  case "b1":
                        keyPressed=63;
                        mChannel[0].noteOn(63,127);
                        break;
                  case "w2":
                        keyPressed=64;
                        mChannel[0].noteOn(64,127);
                        break;
                  case "w3":
                        keyPressed=65;
                        mChannel[0].noteOn(65,127);
                        break;
                  case "b3":
                        keyPressed=66;
                        mChannel[0].noteOn(66,127);
                        break;
                  case "w4":
                        keyPressed=67;
                        mChannel[0].noteOn(67,127);
                        break;
                  case "b4":
                        keyPressed=68;
                        mChannel[0].noteOn(68,127);
                        break;
                  case "w5":
                        keyPressed=69;
                        mChannel[0].noteOn(69,127);
                        break;
                  case "b5":
                        keyPressed=70;
                        mChannel[0].noteOn(70,127);
                        break;
                  case "w6":
                        keyPressed=71;
                        mChannel[0].noteOn(71,127);
                        break;
                  case "w7":
                        keyPressed=72;
                        mChannel[0].noteOn(72,127);
                        break;
            }
      } else {
            if(isPlaying){
                  mChannel[0].noteOff(keyPressed);
            }
            isPlaying=false;
      }
} // end of stateChanged
```

```
	public void keyPressed(KeyEvent e){
		char c = e.getKeyChar();
		if(!isPlaying){
			isPlaying = true;
			switch(c){
				case 'z':
					keyPressed=60;
					mChannel[0].noteOn(60, 127);
					break;
				case 's':
					keyPressed=61;
					mChannel[0].noteOn(61,127);
					break;
				case 'x':
					keyPressed=62;
					mChannel[0].noteOn(62,127);
					break;
				case 'd':
					keyPressed=63;
					mChannel[0].noteOn(63,127);
					break;
				case 'c':
					keyPressed=64;
					mChannel[0].noteOn(64,127);
					break;
				case 'v':
					keyPressed=65;
					mChannel[0].noteOn(65,127);
					break;
				case 'g':
					keyPressed=66;
					mChannel[0].noteOn(66,127);
					break;
				case 'b':
					keyPressed=67;
					mChannel[0].noteOn(67,127);
					break;
				case 'h':
					keyPressed=68;
					mChannel[0].noteOn(68,127);
					break;
				case 'n':
					keyPressed=69;
					mChannel[0].noteOn(69,127);
					break;
				case 'j':
					keyPressed=70;
					mChannel[0].noteOn(70,127);
					break;
				case 'm':
					keyPressed=71;
					mChannel[0].noteOn(71,127);
					break;
				case ',':
					keyPressed=72;
```

```
                              mChannel[0].noteOn(72,127);
                              break;
                        }
                  }
            }
            public void keyReleased(KeyEvent e){
                  if(isPlaying){
                              mChannel[0].noteOff(keyPressed);
                        }
                  isPlaying=false;
            }
            public void keyTyped(KeyEvent e){}


            public static void main(String[] args) {
                  new Piano();
            }
}
```