Name: Dan Cassidy

Class: CSCI-C 490, Mobile Application Development

Assignment: Homework 3 Part 1

Date: 2015-07-10

```java
/**
* Now define Anteater Class
*/
class Anteater extends Organism
{
    public static final int ANTEATER_BREED  = 8;
    public static final int ANTEATER_STARVE = 3;

    // Number of ticks since eating.
    private int starveTicks = 0;

    /**
     * Default constructor.
     */
    public Anteater()
    {
        super();
    }

    /**
     * 3-parameter constructor.
     *
     * @param world The World object this Anteater lives in.
     * @param x The x coordinate of the spot in <b>world</b> this Anteater inhabits.
     * @param y The y coordinate of the spot in <b>world</b> this Anteater inhabits.
     */
    public Anteater(World world, int x, int y)
    {
        super(world, x, y);
    }

    // Basic code reused from Ant.breed() method with changes to create an Anteater object instead
    // of an Ant object.

    /**
     * Adjusts the breed counter for the Anteater object and creates a new one when the appropriate
     * condition is met.
     */
    public void breed()
    {
        breedTicks++;
        if (breedTicks == ANTEATER_BREED)
        {
            breedTicks = 0;
            // Try to create a new Anteater object. Because world reference is passed in and
            // Anteater object adds itself to that world, Anteater reference doesn't need to be
            // explicitly saved.
            if ((y > 0) && (world.getAt(x, y - 1) == null))
            {
                new Anteater(world, x, y - 1);
            }
            else if ((y < World.WORLDSIZE - 1) && (world.getAt(x, y + 1) == null))
            {
                new Anteater(world, x, y + 1);
            }
            else if ((x > 0) && (world.getAt(x - 1, y) == null))
            {
                new Anteater(world, x - 1, y);
            }
            else if ((x < World.WORLDSIZE - 1) && (world.getAt(x + 1, y) == null))
            {
                new Anteater(world, x + 1, y);
            }
        }
    }

    // Basic code reused from Ant.move() method, with optimizations for move checking and additions
    // to handle starvation.

    /**
     * Moves an Anteater object around and handles the starvation counter.
     */
    public void move()
    {
        starveTicks++;
        int direction = (int) (Math.random() * 4);

        // up
        if (direction == 0)
        {
            if ((y > 0) && !(world.getAt(x, y - 1) instanceof Anteater))
            {
                // Reset starvation counter if Anteater "ate".
                if (world.getAt(x, y - 1) instanceof Ant)
                    starveTicks = 0;

                // Move to new spot.
                world.setAt(x, y - 1, world.getAt(x, y));
                world.setAt(x, y, null);
                y--;
            }
        }
        // down
        else if (direction == 1)
        {
            if ((y < World.WORLDSIZE - 1) && !(world.getAt(x, y + 1) instanceof Anteater))
            {
                // Reset starvation counter if Anteater "ate".
                if (world.getAt(x, y + 1) instanceof Ant)
                    starveTicks = 0;

                // Move to new spot.
                world.setAt(x, y + 1, world.getAt(x, y));
                world.setAt(x, y, null);
                y++;
            }
        }
        // left
        else if (direction == 2)
        {
            if ((x > 0) && !(world.getAt(x - 1, y) instanceof Anteater))
            {
                // Reset starvation counter if Anteater "ate".
                if (world.getAt(x - 1, y) instanceof Ant)
                    starveTicks = 0;

                // Move to new spot.
                world.setAt(x - 1, y, world.getAt(x, y));
                world.setAt(x, y, null);
                x--;
```

```java
            }
        }
        // right
        else
        {
            if ((x < World.WORLDSIZE - 1) && !(world.getAt(x + 1, y) instanceof Anteater))
            {
                // Reset starvation counter if Anteater "ate".
                if (world.getAt(x + 1, y) instanceof Ant)
                    starveTicks = 0;

                // Move to new spot.
                world.setAt(x + 1, y, world.getAt(x, y));
                world.setAt(x, y, null);
                x++;
            }
        }
    }

    /**
     * Checks to see if the anteater is starving.
     *
     * @return boolean, indicating whether the anteater is starving (true) or not (false).
     */
    public boolean starve()
    {
        return (starveTicks == ANTEATER_STARVE ? true : false);
    }

    /**
     * Returns "X" as the printable character for an Anteater object.
     */
    public String getPrintableChar()
    {
        return "X";
    }
} // Anteater

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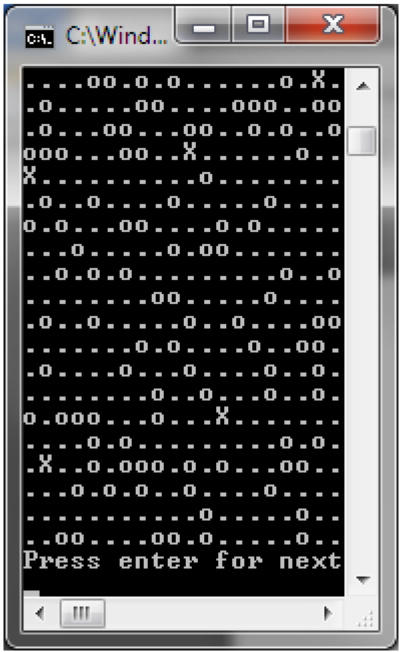
Read from left to right, top to bottom.



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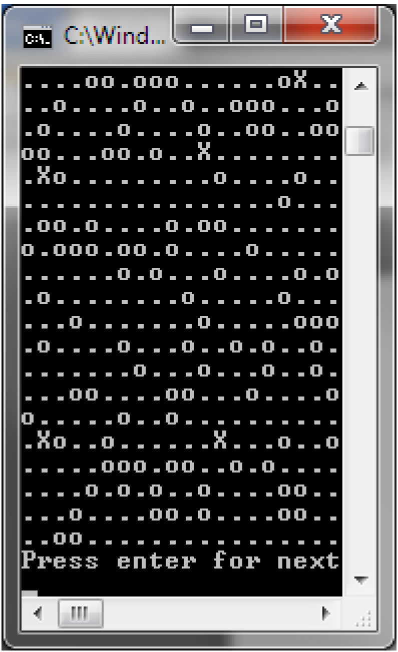

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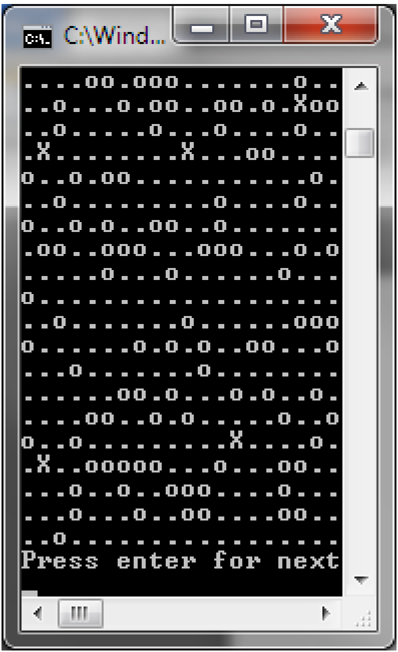

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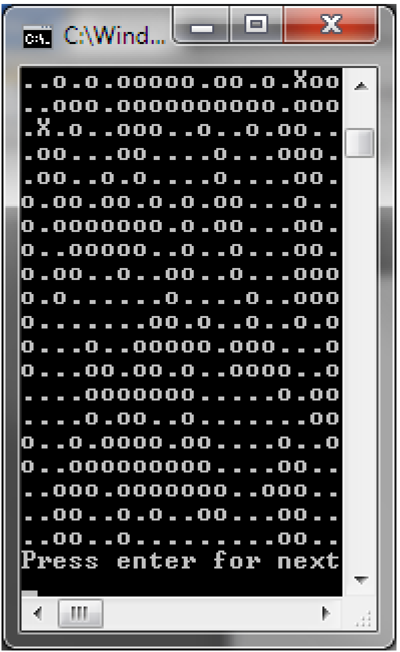

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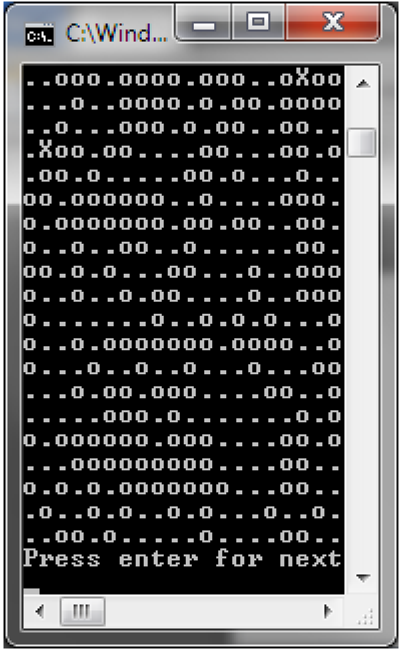

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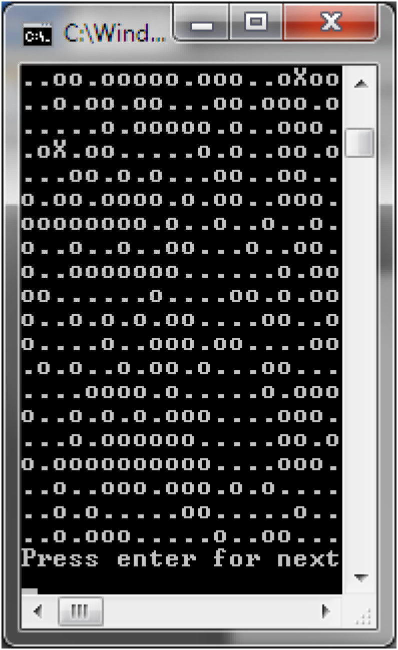

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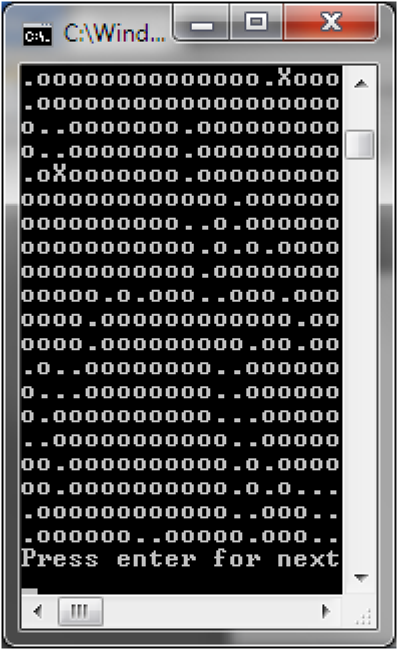

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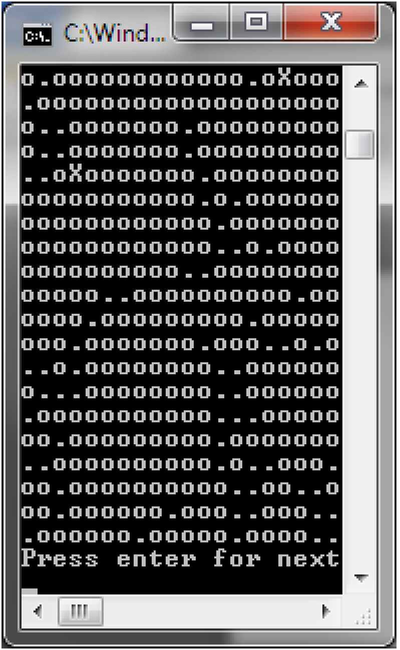

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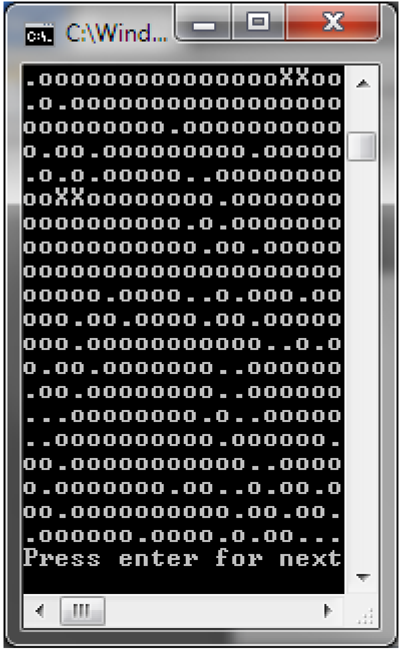

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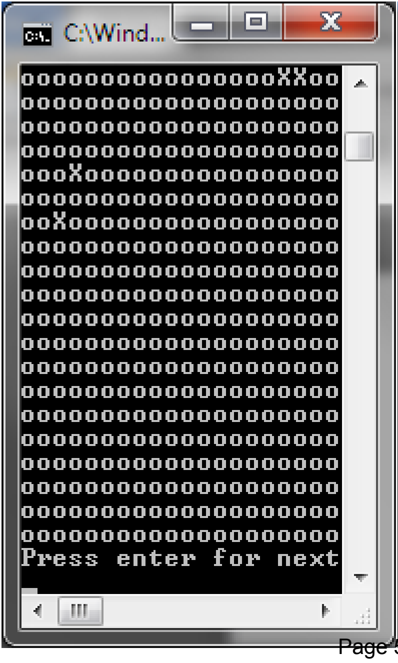

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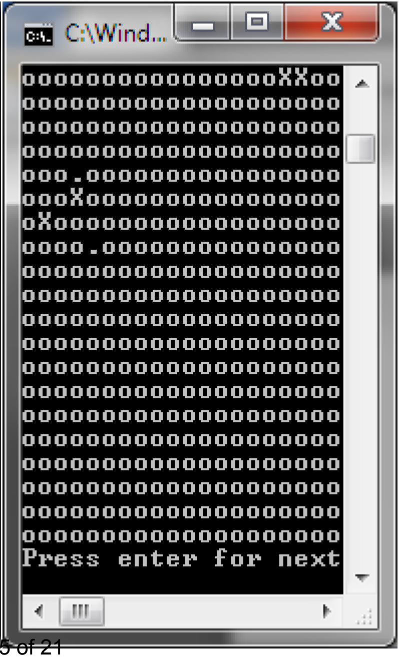

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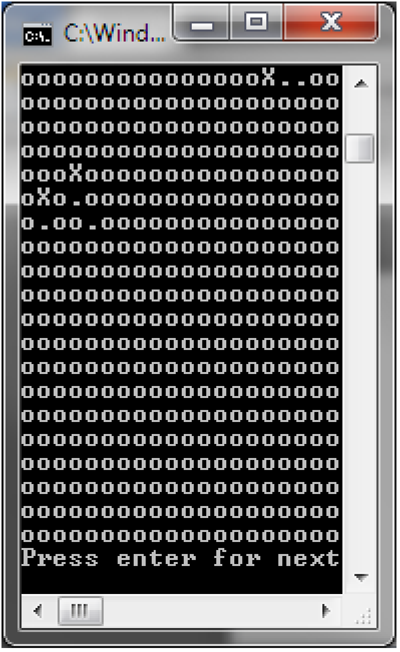

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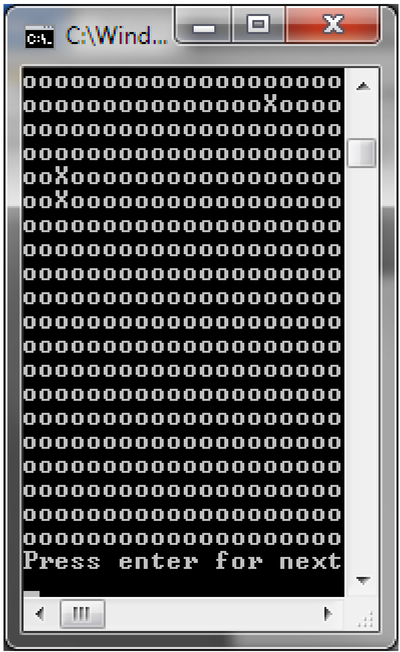

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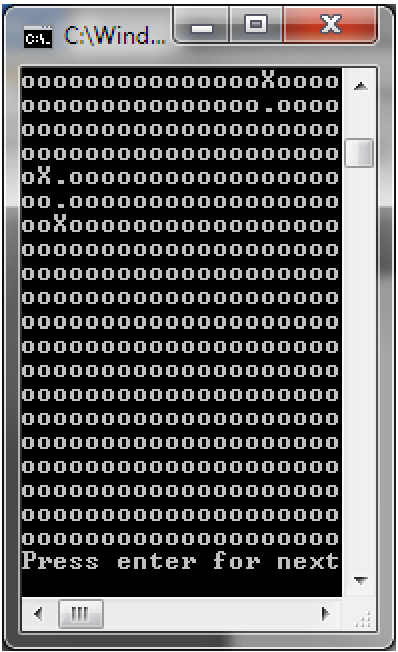

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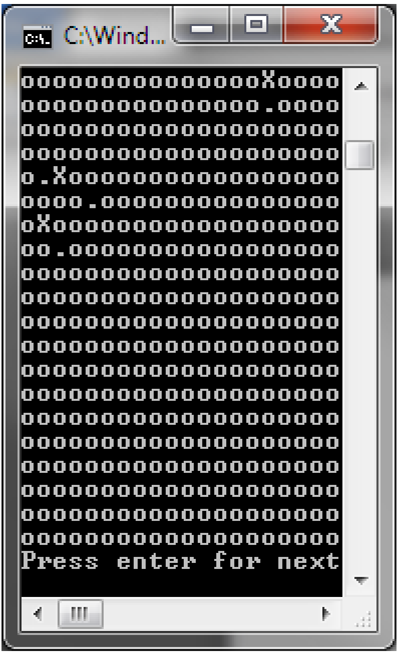

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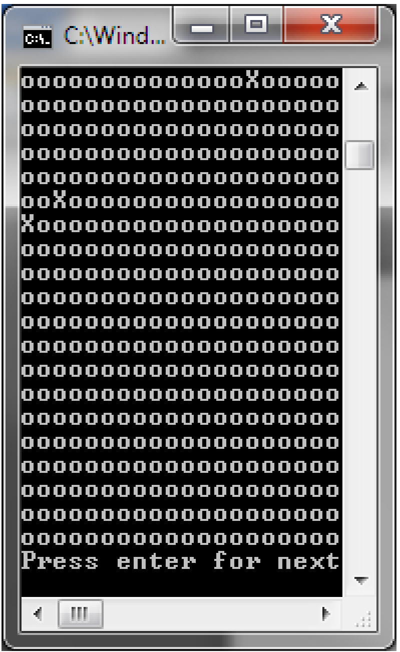

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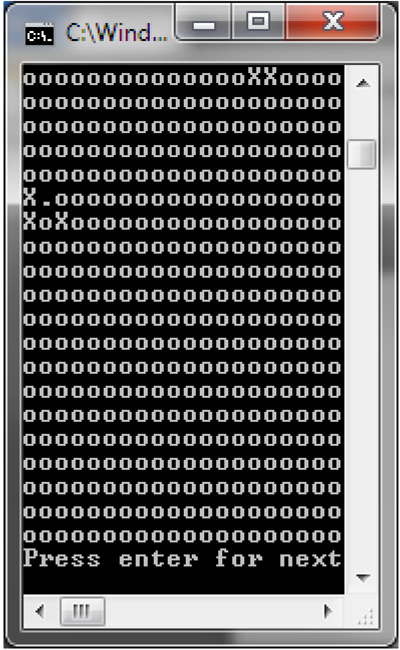

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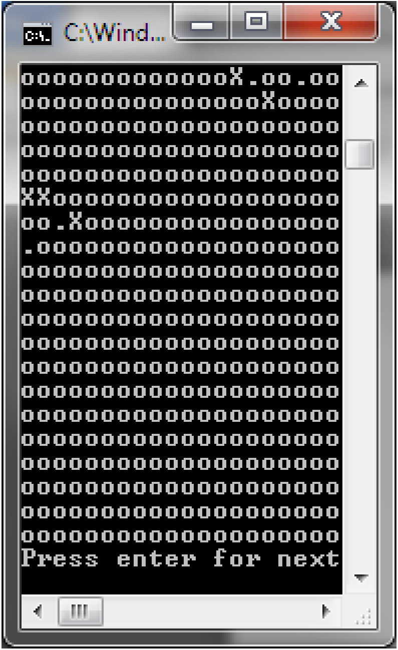

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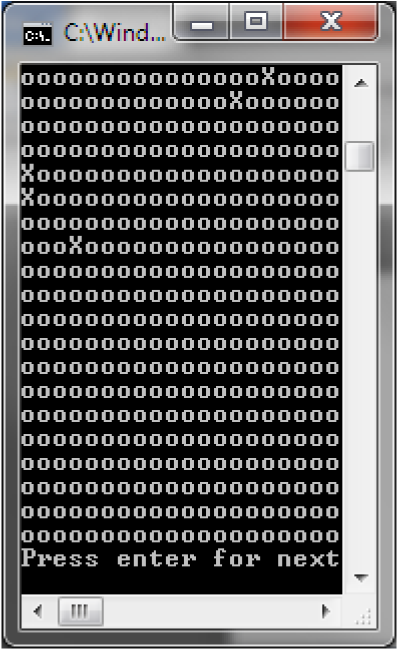

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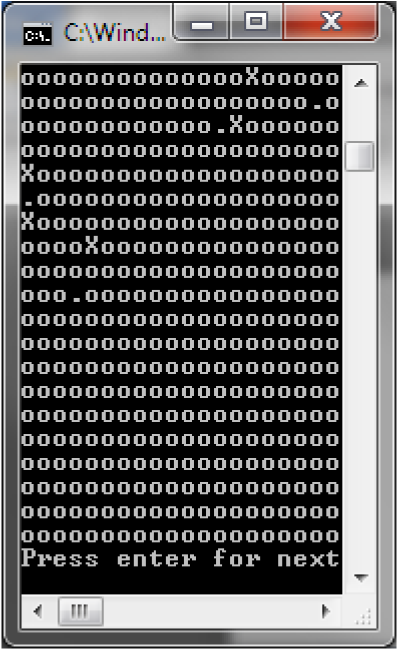

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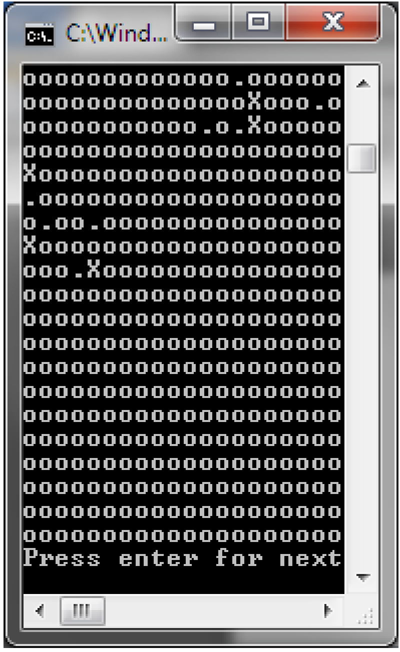

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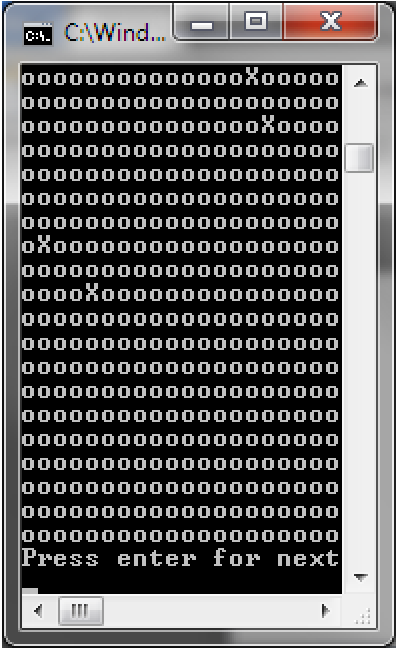

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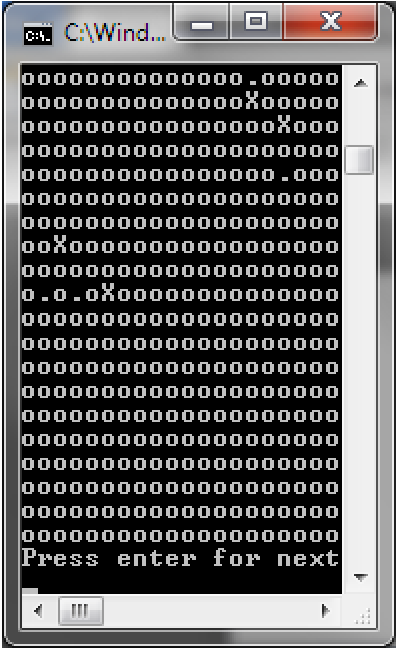

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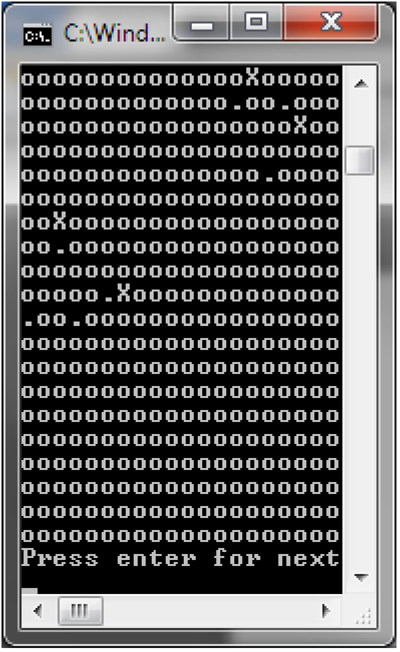

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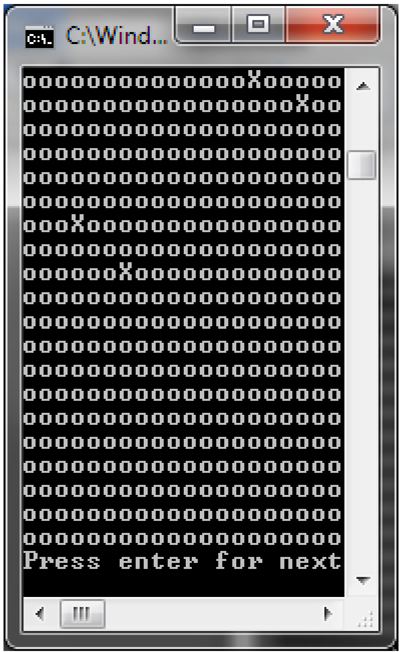

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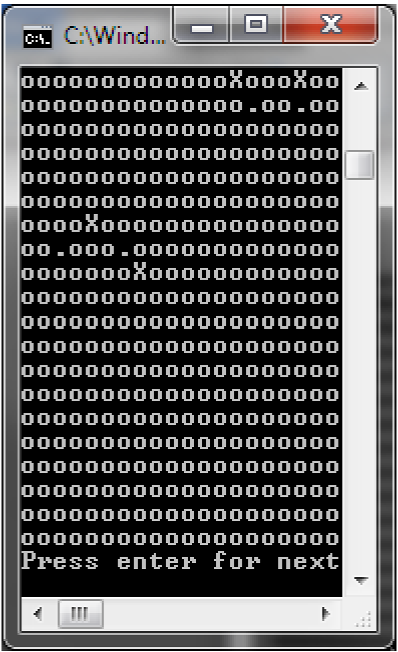

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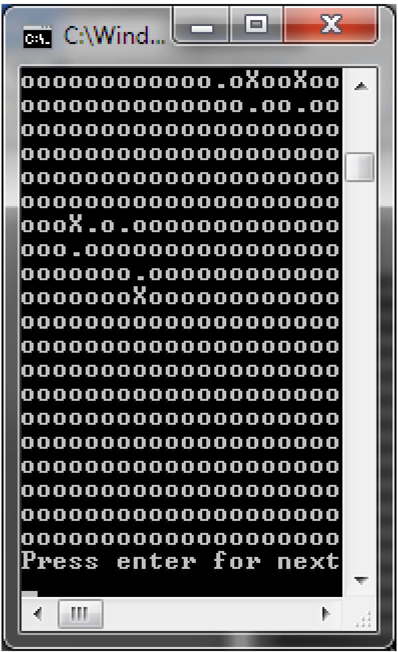

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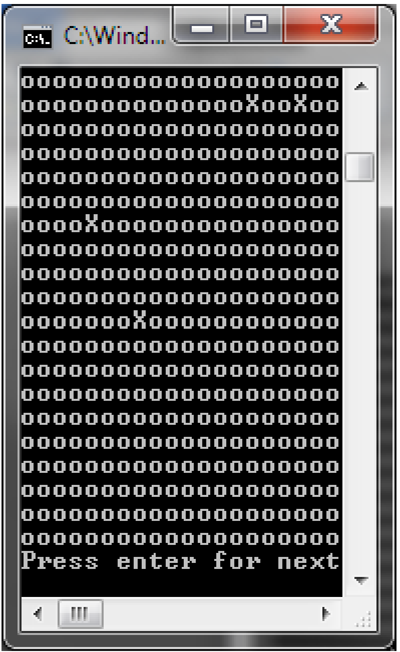

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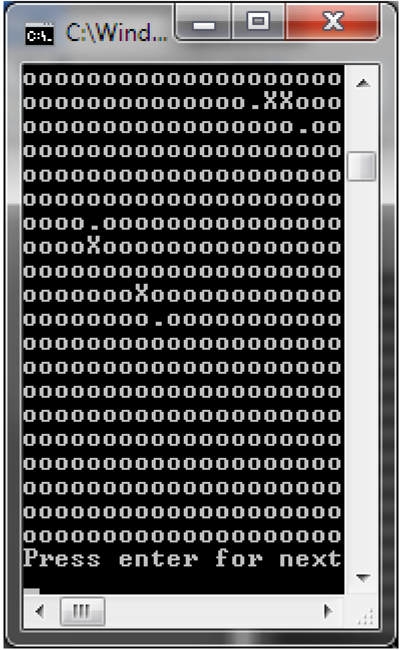

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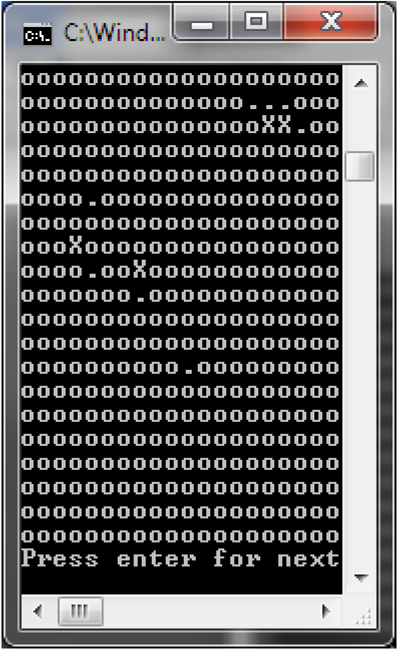

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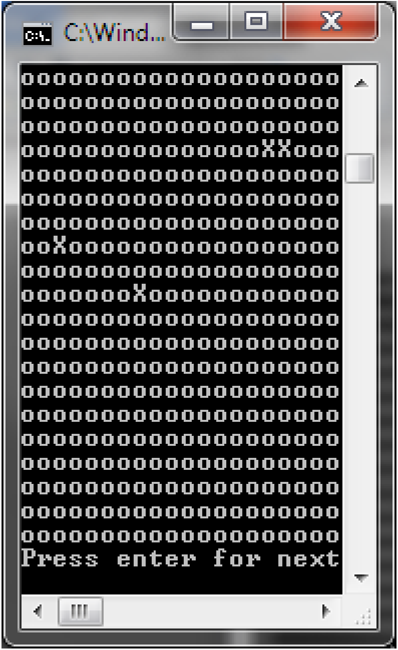

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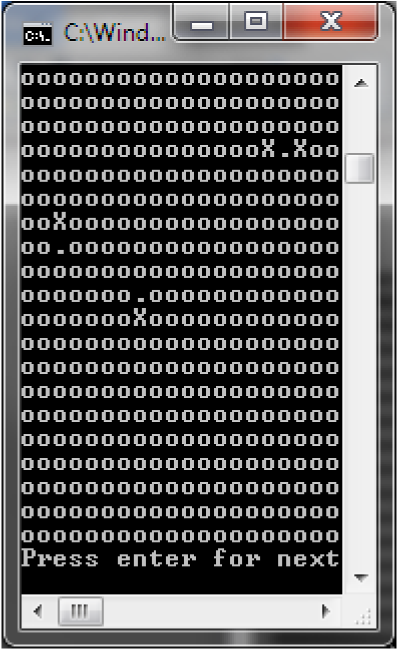

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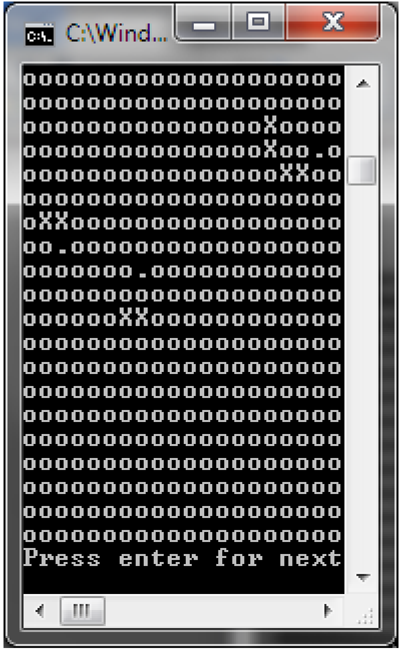

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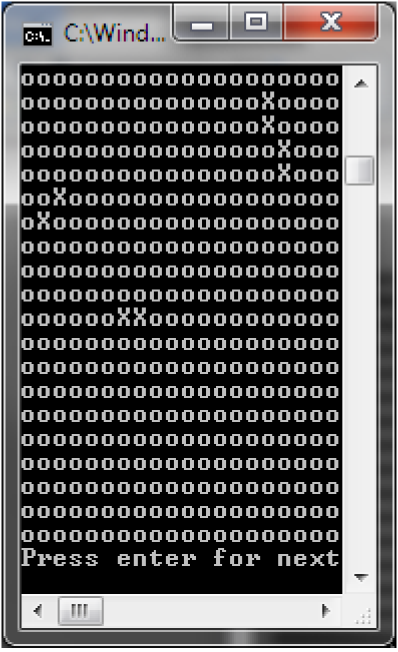

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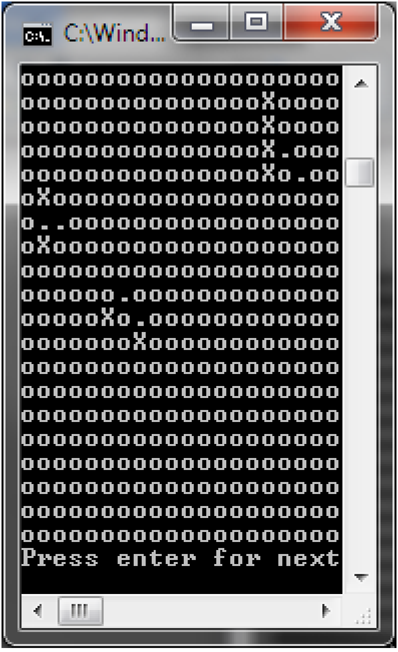

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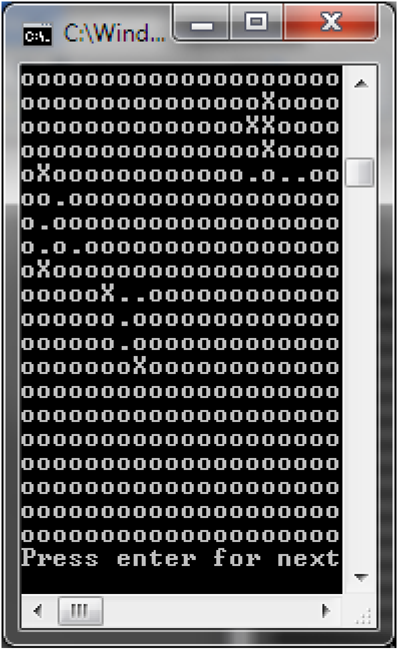

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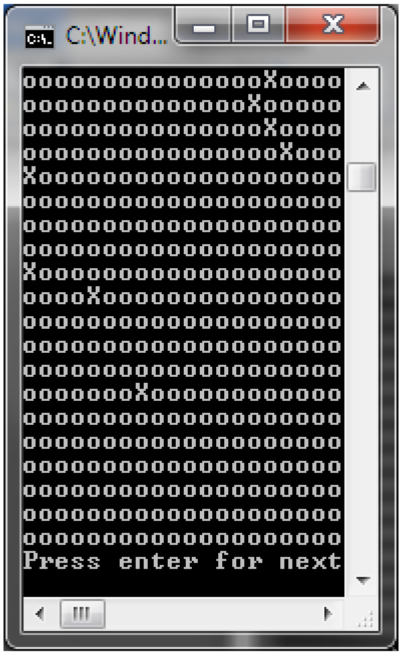

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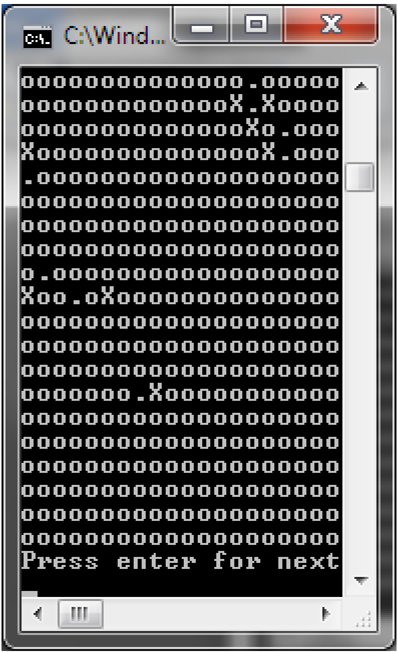

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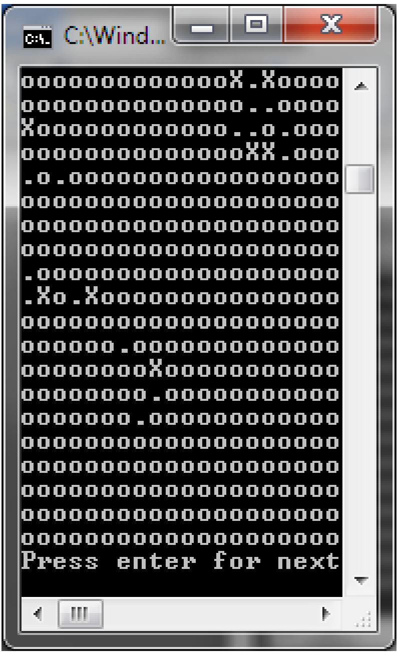

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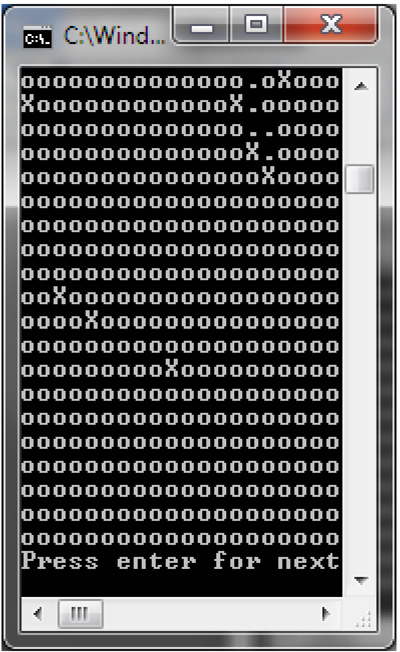

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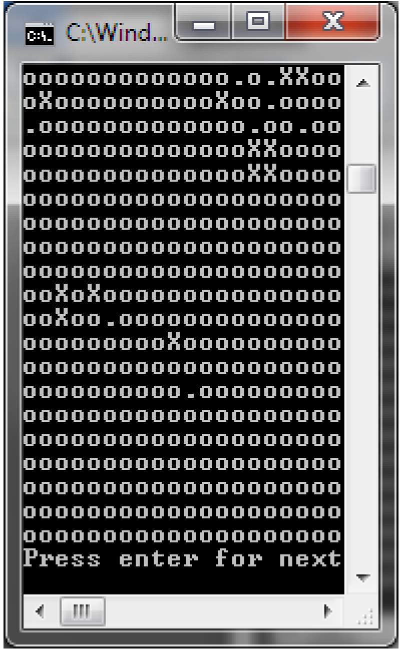

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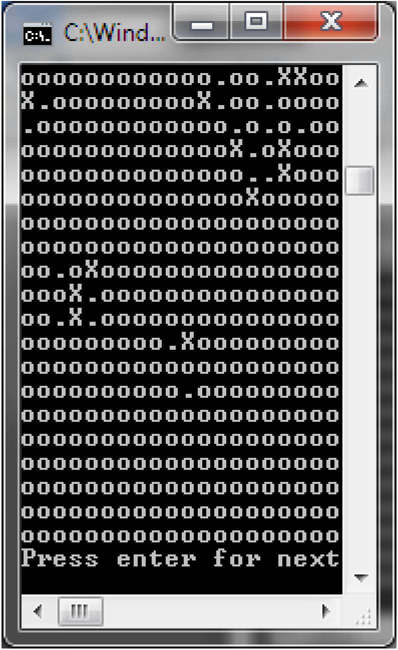

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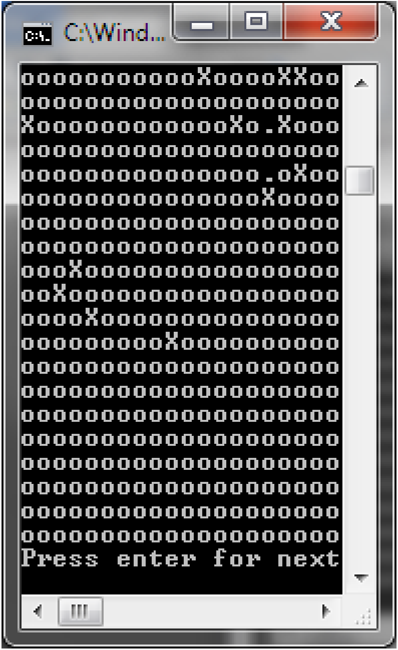

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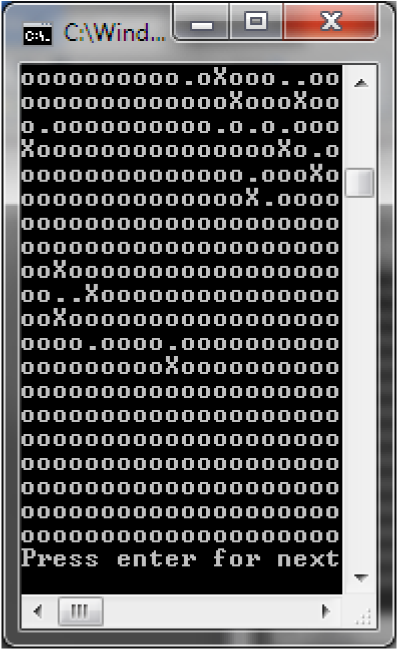

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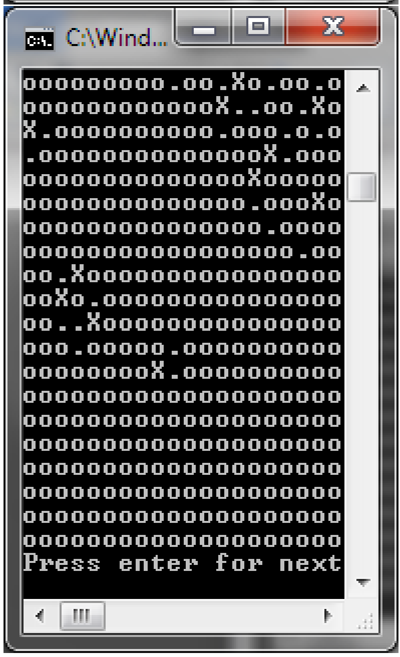

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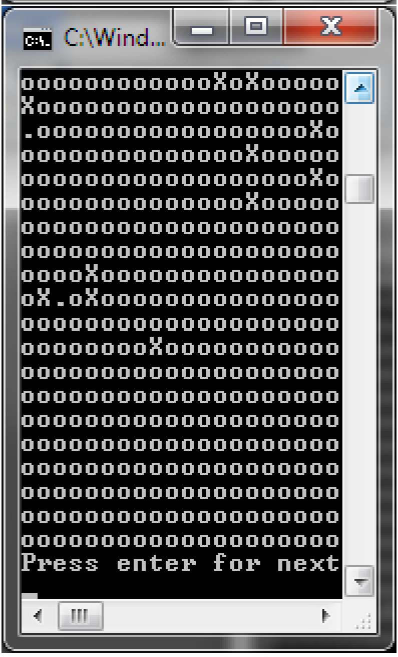

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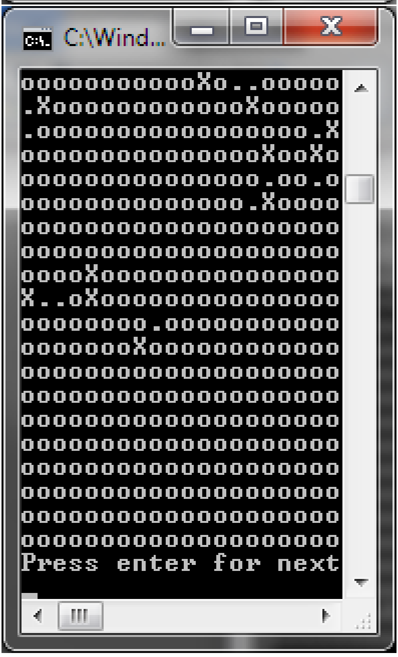

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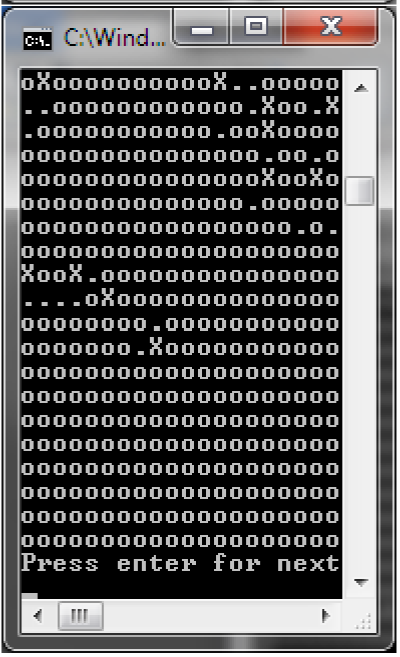

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Name: Dan Cassidy

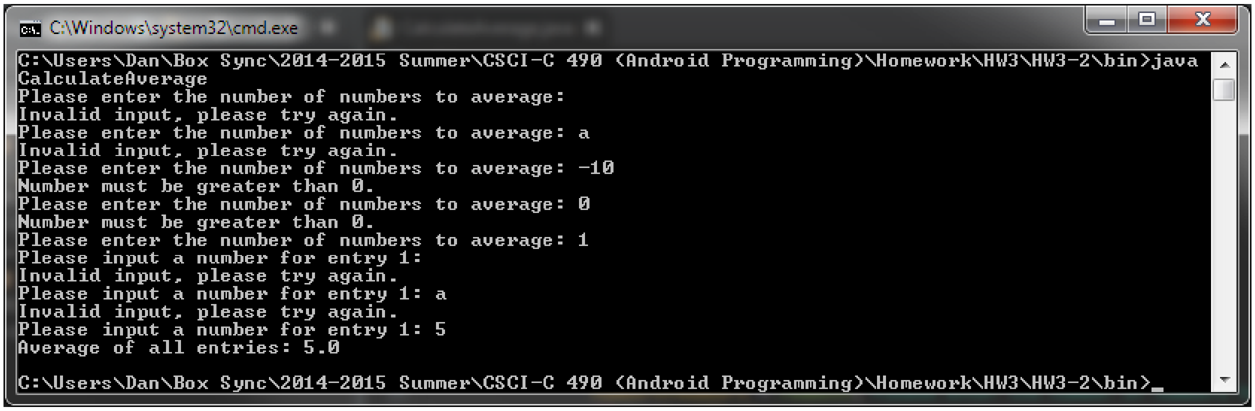
Class: CSCI-C 490, Mobile Application Development

Assignment: Homework 3 Part 2

Date: 2015-07-10

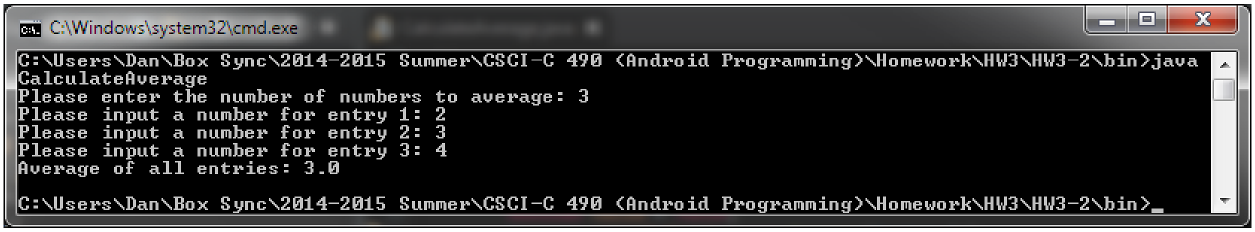
```java
/*--------------------------------------------------------------------------------------------------
 * Author:      Dan Cassidy
 * Date:        2015-07-10
 * Assignment:  HW3-2
 * Source File: CalculateAverage.java
 * Language:    Java
 * Course:      CSCI-C 490, Android Programming, MoWe 08:00
--------------------------------------------------------------------------------------------------*/
import java.util.Scanner;

/**
 * A small class to calculate the average of a given number of integers.
 *
 * @author Dan Cassidy
 */
public class CalculateAverage
{

    public static void main(String[] args)
    {
        int numberOfNumbers = 0;
        boolean valid = false;
        Scanner consoleInput = new Scanner(System.in);

        // Loop while input is not valid.
        while (!valid)
        {
            try
            {
                numberOfNumbers = readInt("Please enter the number of numbers to average: ");
                if (numberOfNumbers <= 0)
                    throw new Exception("Number must be greater than 0.");
                valid = true;
            }
            catch (Exception ex)
            {
                System.out.println(ex.getMessage());
            }
        }

        // Declare an array of the specified size and then ask for input for all elements.
        int[] numbers = new int[numberOfNumbers];
        for (int counter = 0; counter < numbers.length; counter++)
            numbers[counter] = readInt("Please input a number for entry " + (counter + 1) + ": ");

        System.out.println("Average of all entries: " + average(numbers));
    }

    /**
     * Computes the average (arithmetic mean) of an array of numbers. If <b>numbers</b> is null or
     * an empty array, 0 is returned.
     *
     * @param numbers An array of integers, from which their average will be computed.
     * @return double, representing the average of the elements contained in <b>numbers</b>.
     */
    public static double average(int[] numbers)
    {
        // No need to throw an error, just return 0 if the argument is no good.
        if (numbers == null || numbers.length == 0)
            return 0;
        // Compute and return the average.
        double sum = 0;
        for (int number : numbers)
            sum += number;
        return sum / numbers.length;
    }

    /**
     * Reads an integer from the console.
     *
     * @param prompt A String object containing the prompt text for a user entering a number.
     * @return int, holding the integer read from the console.
     */
    public static int readInt(String prompt)
    {
        int number = 0;
        boolean valid = false;
        Scanner consoleInput = new Scanner(System.in);

        // Loop while input is not valid.
        while (!valid)
        {
            try
            {
                System.out.print(prompt);
                number = Integer.parseInt(consoleInput.nextLine());
                valid = true;
            }
            catch (NumberFormatException ex)
            {
                System.out.println("Invalid input, please try again.");
            }
        }

        return number;
    }
}
```

Shows the program handling invalid input, then the edge case of 1 number.



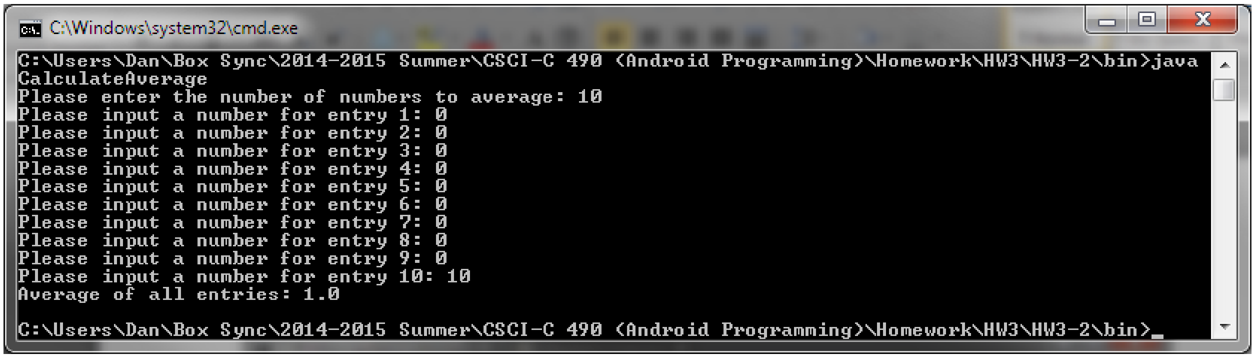
```
C:\Users\Dan\Box Sync\2014-2015 Summer\CSCI-C 490 (Android Programming)\Homework\HW3\HW3-2\bin>java
CalculateAverage
Please enter the number of numbers to average:
Invalid input, please try again.
Please enter the number of numbers to average: a
Invalid input, please try again.
Please enter the number of numbers to average: -10
Number must be greater than 0.
Please enter the number of numbers to average: 0
Number must be greater than 0.
Please enter the number of numbers to average: 1
Please input a number for entry 1:
Invalid input, please try again.
Please input a number for entry 1: a
Invalid input, please try again.
Please input a number for entry 1: 5
Average of all entries: 5.0

C:\Users\Dan\Box Sync\2014-2015 Summer\CSCI-C 490 (Android Programming)\Homework\HW3\HW3-2\bin>_
```

Shows handling 3 numbers.



```
C:\Users\Dan\Box Sync\2014-2015 Summer\CSCI-C 490 (Android Programming)\Homework\HW3\HW3-2\bin>java
CalculateAverage
Please enter the number of numbers to average: 3
Please input a number for entry 1: 2
Please input a number for entry 2: 3
Please input a number for entry 3: 4
Average of all entries: 3.0

C:\Users\Dan\Box Sync\2014-2015 Summer\CSCI-C 490 (Android Programming)\Homework\HW3\HW3-2\bin>_
```

Shows handling 10 numbers.



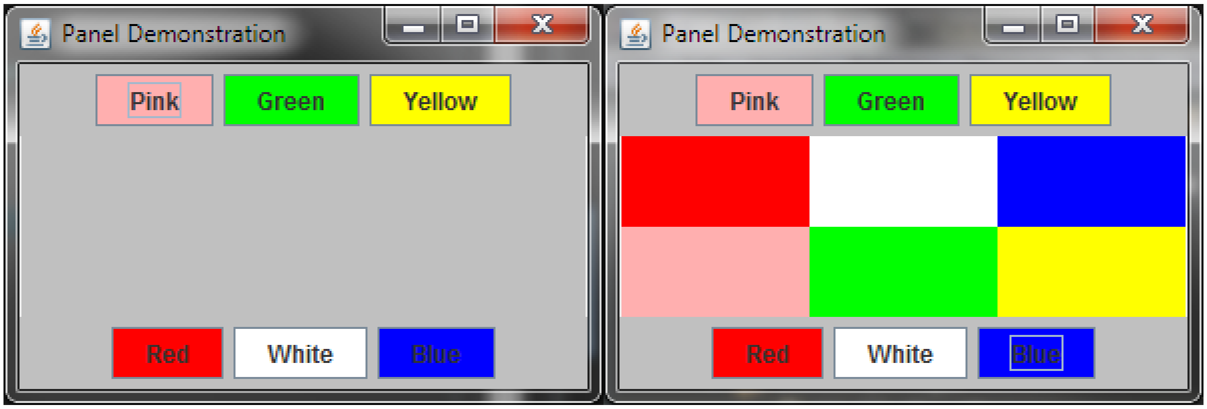
```
C:\Users\Dan\Box Sync\2014-2015 Summer\CSCI-C 490 (Android Programming)\Homework\HW3\HW3-2\bin>java
CalculateAverage
Please enter the number of numbers to average: 10
Please input a number for entry 1: 0
Please input a number for entry 2: 0
Please input a number for entry 3: 0
Please input a number for entry 4: 0
Please input a number for entry 5: 0
Please input a number for entry 6: 0
Please input a number for entry 7: 0
Please input a number for entry 8: 0
Please input a number for entry 9: 0
Please input a number for entry 10: 10
Average of all entries: 1.0

C:\Users\Dan\Box Sync\2014-2015 Summer\CSCI-C 490 (Android Programming)\Homework\HW3\HW3-2\bin>_
```

Name:	Dan Cassidy
Class:	CSCI-C 490, Mobile Application Development
Assignment:	Homework 3 Part 3
Date:	2015-07-13

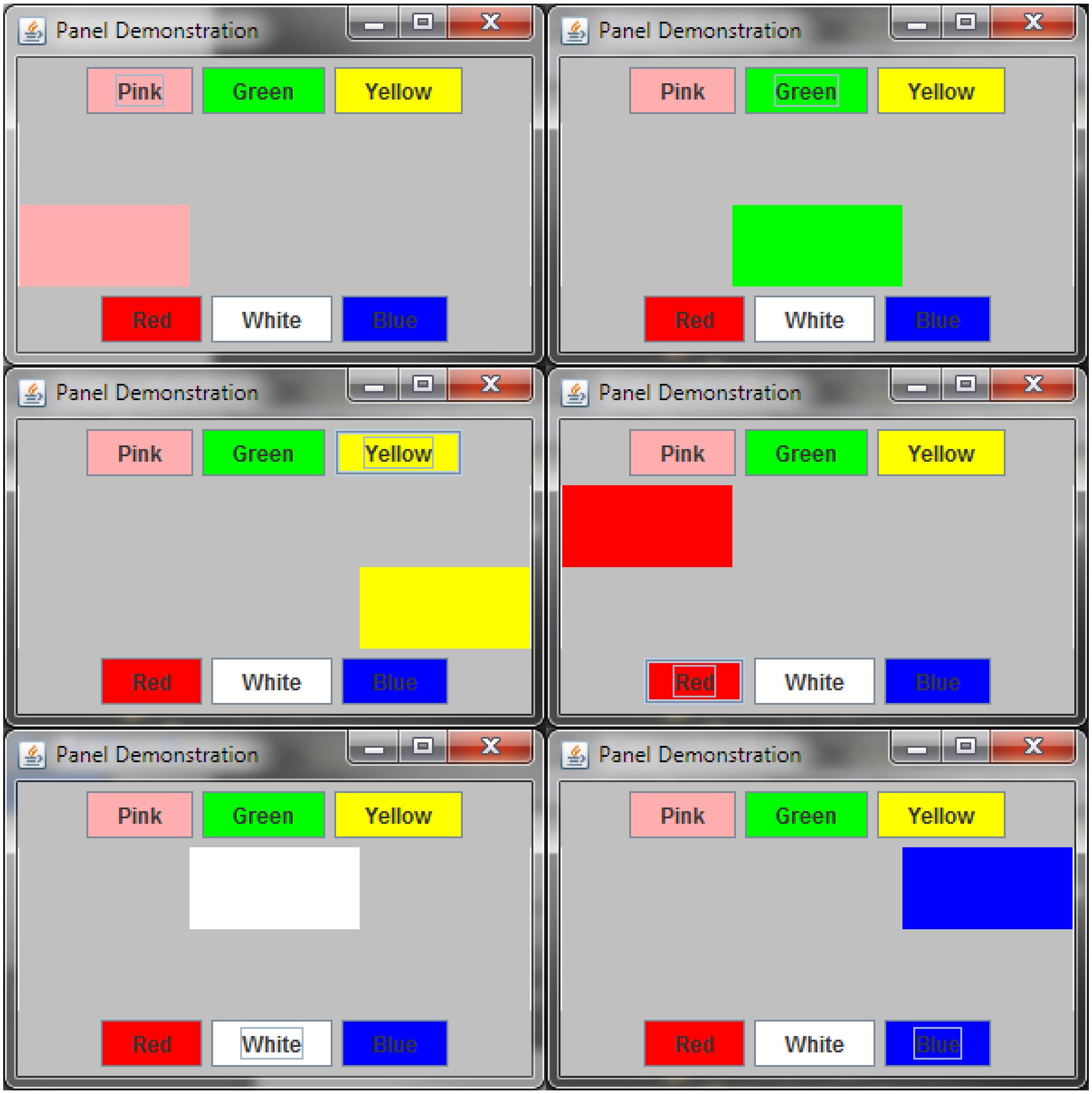
```java
/**
 * Default constructor. Handles the setup of all the GUI elements.
 */
public ModifiedPanelDemo()
{
    super("Panel Demonstration");
    setSize(WIDTH, HEIGHT);
    setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    setLayout(new BorderLayout());

    // Set up the top row of buttons.
    JPanel buttonPanel1 = new JPanel();
    buttonPanel1.setBackground(Color.LIGHT_GRAY);
    buttonPanel1.setLayout(new FlowLayout());

    JButton pinkButton = new JButton("Pink");
    pinkButton.setBackground(Color.PINK);
    pinkButton.addActionListener(this);
    buttonPanel1.add(pinkButton);

    JButton greenButton = new JButton("Green");
    greenButton.setBackground(Color.GREEN);
    greenButton.addActionListener(this);
    buttonPanel1.add(greenButton);

    JButton yellowButton = new JButton("Yellow");
    yellowButton.setBackground(Color.YELLOW);
    yellowButton.addActionListener(this);
    buttonPanel1.add(yellowButton);

    add(buttonPanel1, BorderLayout.NORTH);

    // Set up the main color panel.
    JPanel biggerPanel = new JPanel();
    biggerPanel.setLayout(new GridLayout(2, 3));

    // Begin new row in main color panel.
    redPanel = new JPanel();
    redPanel.setBackground(Color.LIGHT_GRAY);
    biggerPanel.add(redPanel);

    whitePanel = new JPanel();
    whitePanel.setBackground(Color.LIGHT_GRAY);
    biggerPanel.add(whitePanel);

    bluePanel = new JPanel();
    bluePanel.setBackground(Color.LIGHT_GRAY);
    biggerPanel.add(bluePanel);

    // Begin new row in main color panel.
    pinkPanel = new JPanel();
    pinkPanel.setBackground(Color.LIGHT_GRAY);
    biggerPanel.add(pinkPanel);

    greenPanel = new JPanel();
    greenPanel.setBackground(Color.LIGHT_GRAY);
    biggerPanel.add(greenPanel);

    yellowPanel = new JPanel();
    yellowPanel.setBackground(Color.LIGHT_GRAY);
```

```java
        biggerPanel.add(yellowPanel);

        add(biggerPanel, BorderLayout.CENTER);

        // Set up the bottom row of buttons.
        JPanel buttonPanel2 = new JPanel();
        buttonPanel2.setBackground(Color.LIGHT_GRAY);
        buttonPanel2.setLayout(new FlowLayout());

        JButton redButton = new JButton("Red");
        redButton.setBackground(Color.RED);
        redButton.addActionListener(this);
        buttonPanel2.add(redButton);

        JButton whiteButton = new JButton("White");
        whiteButton.setBackground(Color.WHITE);
        whiteButton.addActionListener(this);
        buttonPanel2.add(whiteButton);

        JButton blueButton = new JButton("Blue");
        blueButton.setBackground(Color.BLUE);
        blueButton.addActionListener(this);
        buttonPanel2.add(blueButton);

        add(buttonPanel2, BorderLayout.SOUTH);
    }

    /**
     * Handles events generated by the buttons.
     *
     * @param e Specifies the generated event.
     */
    public void actionPerformed(ActionEvent e)
    {
        String buttonString = e.getActionCommand();

        if (buttonString.equals("Pink"))
            pinkPanel.setBackground(Color.PINK);
        else if (buttonString.equals("Green"))
            greenPanel.setBackground(Color.GREEN);
        else if (buttonString.equals("Yellow"))
            yellowPanel.setBackground(Color.YELLOW);
        else if (buttonString.equals("Red"))
            redPanel.setBackground(Color.RED);
        else if (buttonString.equals("White"))
            whitePanel.setBackground(Color.WHITE);
        else if (buttonString.equals("Blue"))
            bluePanel.setBackground(Color.BLUE);
        else
            System.out.println("Unexpected error.");
    }

```

Default window, and fully colored window.



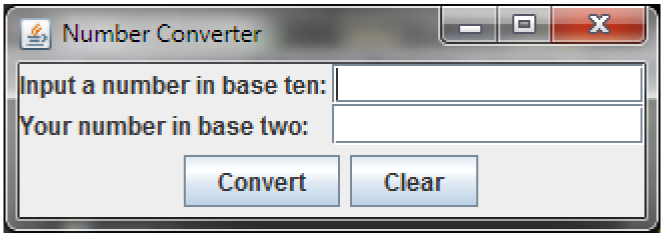
Demonstrating that each of the buttons affects only their own panels.



Name:	Dan Cassidy
Class:	CSCI-C 490, Mobile Application Development
Assignment:	Homework 3 Part 4
Date:	2015-07-13

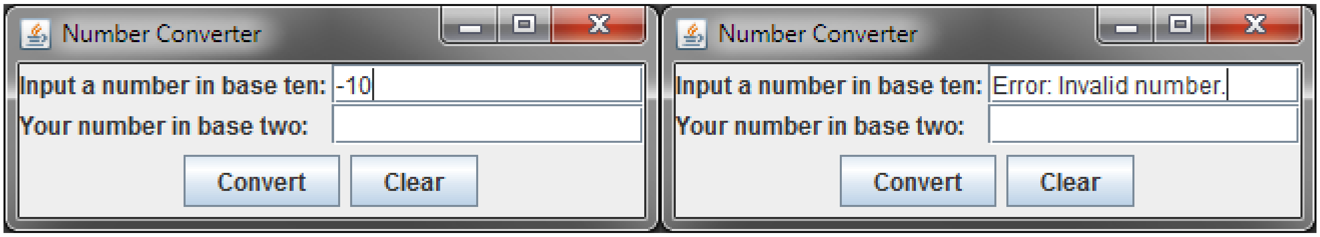
```java
/*--------------------------------------------------------------------------------------------------
 * Author:      Dan Cassidy
 * Date:        2015-07-13
 * Assignment:  HW3-4
 * Source File: NumberConverter.java
 * Language:    Java
 * Course:      CSCI-C 490, Android Programming, MoWe 08:00
--------------------------------------------------------------------------------------------------*/
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.awt.BorderLayout;
import java.awt.FlowLayout;
import java.awt.GridLayout;

import javax.swing.JButton;
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JPanel;
import javax.swing.JTextField;

/**
 * Small GUI-based program to convert a base ten number into a base two number.
 *
 * @author Dan Cassidy
 */
public class NumberConverter extends JFrame implements ActionListener
{
    private JTextField textBaseTen;
    private JTextField textBaseTwo;

    /**
     * Entry point for the class.
     *
     * @param args Command line arguments. <i>Ignored</i>.
     */
    public static void main(String[] args)
    {
        NumberConverter gui = new NumberConverter();
        gui.setVisible(true);
    }

    /**
     * Default constructor. Handles the setup of all the GUI elements.
     */
    public NumberConverter()
    {
        super("Number Converter");
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        setLayout(new BorderLayout());

        // Set up the labels and input text boxes.
        JPanel inputPanel = new JPanel();
        inputPanel.setLayout(new GridLayout(2, 2));

        JLabel labelBaseTen = new JLabel("Input a number in base ten: ");
        inputPanel.add(labelBaseTen);

        textBaseTen = new JTextField();
        inputPanel.add(textBaseTen);

        JLabel labelBaseTwo = new JLabel("Your number in base two: ");
        inputPanel.add(labelBaseTwo);

        textBaseTwo = new JTextField();
        inputPanel.add(textBaseTwo);

        add(inputPanel, BorderLayout.NORTH);

        // Set up the buttons.
        JPanel buttonsPanel = new JPanel();
        buttonsPanel.setLayout(new FlowLayout());

        JButton buttonConvert = new JButton("Convert");
        buttonConvert.addActionListener(this);
        buttonsPanel.add(buttonConvert);

        JButton buttonClear = new JButton("Clear");
        buttonClear.addActionListener(this);
        buttonsPanel.add(buttonClear);

        add(buttonsPanel, BorderLayout.SOUTH);

        // Make the UI arrange itself.
        pack();
    }

    /**
     * Handles events generated by the buttons.
     *
     * @param e Specifies the generated event.
     */
    @Override
    public void actionPerformed(ActionEvent e)
    {
        String buttonString = e.getActionCommand();

        // Convert button was clicked.
        if (buttonString.equals("Convert"))
        {
            try
            {
                textBaseTwo.setText(convertToBaseTwo(textBaseTen.getText()));
            }
            catch (IllegalArgumentException ex)
            {
                textBaseTen.setText("Error: Invalid number.");
            }
            catch (Exception ex)
            {
                textBaseTen.setText(ex.getMessage());
                ex.printStackTrace();
            }
            textBaseTen.requestFocus();
        }
        // Clear button was clicked.
        else if (buttonString.equals("Clear"))
        {
            textBaseTen.setText("");
            textBaseTwo.setText("");
            textBaseTen.requestFocus();
        }
        // Error.
        else
            System.out.println("Unexpected error.");
    }

    /**
     * Converts a base ten number into a base two number.
     *
     * @param inputNumber Contains the number to be converted from base ten to base two.
     * @return String, holding the number to be displayed.
     * @throws NumberFormatException if <b>inputNumber</b> cannot be parsed into an integer.
     * @throws IllegalArgumentException if <b>inputNumber</b> is negative.
     */
    private String convertToBaseTwo(String inputNumber)
    {
        String result = "";

        // Try to parse the input string, then check if the number is good. If parsing fails or the
        // number is bad, exceptions are thrown.
        int number = Integer.parseInt(inputNumber);
        if (number < 0)
            throw new IllegalArgumentException();

        // Handle the number.
        if (number == 0)
            result = "0";
        else
            while (number != 0)
            {
                result = (number % 2) + result;
                number /= 2;
            }

        return result;
    }

}
```

Default window.



Input a number in base ten:
Your number in base two:

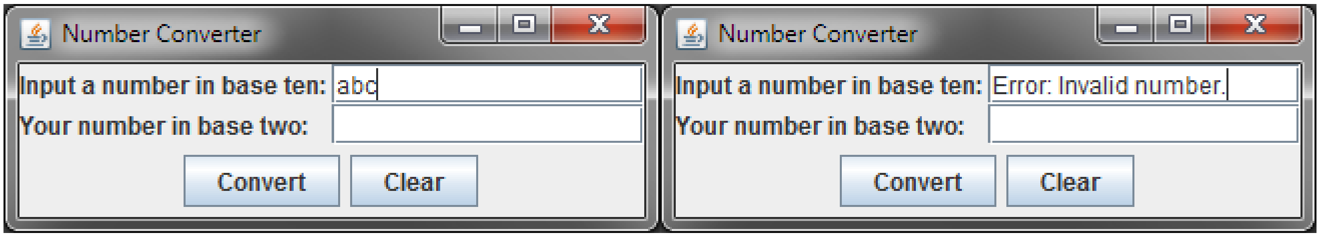
Demonstrating how the program handles negative values.



Input a number in base ten: -10
Your number in base two:

Input a number in base ten: Error: Invalid number.
Your number in base two:

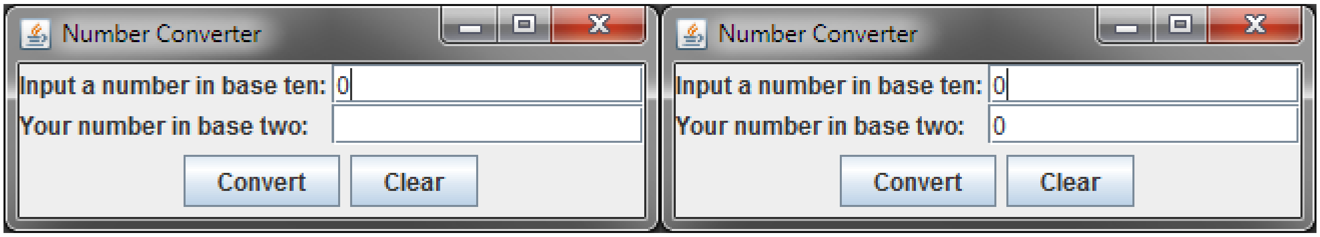
Demonstrating how the program handles bad input.



Input a number in base ten: abc
Your number in base two:

Input a number in base ten: Error: Invalid number.
Your number in base two:

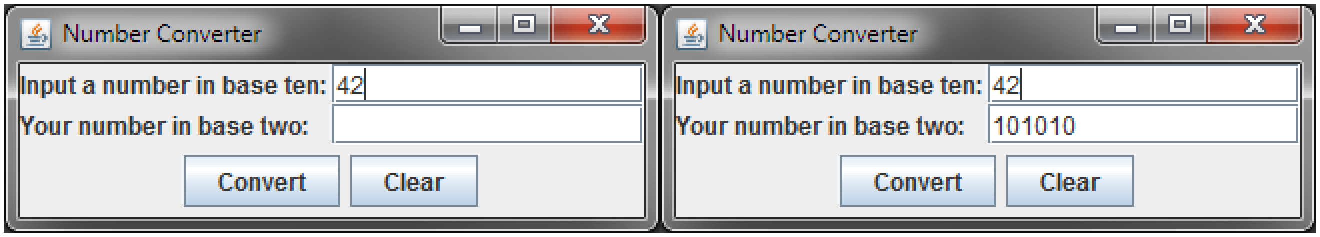
Demonstrating the edge case of ‘0’.



Input a number in base ten: 0
Your number in base two:

Input a number in base ten: 0
Your number in base two: 0

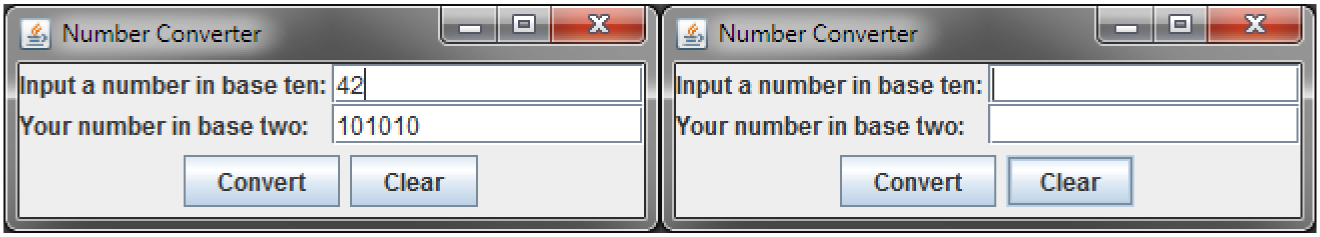
Demonstrating a normal case.



Input a number in base ten: 42
Your number in base two:

Input a number in base ten: 42
Your number in base two: 101010

Demonstrating the clear action.



Input a number in base ten: 42
Your number in base two: 101010

Input a number in base ten:
Your number in base two: