TINKER ACADEMY

SCRATCH Computer Programming Adventure (Advanced)

Handout 6: Applications of Data Structures

Note your Student ID. You will need to use it throughout the Course.

Connect to the Local Class Network
1. Select WiFi "TINKER ACADEMY"
2. This network has only LOCAL access and does NOT connect to the internet

Update the Course
1. Ensure you are connected to "TINKER ACADEMY"
2. Restart the VM. Login into the VM.
3. Open Firefox in the VM
4. Your Instructor would tell you what to type in the browser. (Typically it is 192.168.1.5)
5. You should see a page with a list of entries.
6. Click on CourseUpdate<Date>.zip. This will download CourseUpdate<Date>.zip onto your VM
7. Open Nautilus. Click on Downloads. You should see the file CourseUpdate<Date>.zip
8. Right Click on CourseUpdate<Date>.zip. Select Extract Here.
9. Open the extracted folder
10. Double click Course Update. Select "Run" in the window.

Update the Course (Alternate Approach In Class Using USB)
1. Borrow a USB drive from the Instructor
2. If you are on VirtualBox
    a. Click on Devices in the Top level Menu
    b. Select Drag 'n' Drop
    c. Select Bidirectional
3. If you are on VirtualBox (Another Way)
    a. Shutdown Virtual Machine
    b. Click on VM in the VirtualBox Manager
    c. Click on the Settings
    d. Click General
    e. Click Advanced Tab

      f.   Select "Bidirectional" under Drag 'n' Drop

      g. Click OK

      h. Start Virtual Machine

4. If you are on VMWare
   a. Open the virtual machine settings editor (VM > Settings),
   b. Click the Options tab
   c. Select Guest isolation.
   d. Deselect Disable drag and drop to and from this virtual machine
5. Open Nautilus, Click on Desktop
6. Drag the file CourseUpdate<Date>.zip from Windows or Mac onto Desktop in your Virtual Machine
7. Right Click on CourseUpdate<Date>.zip. Select Extract Here.
8. Open the extracted folder
9. Double click Course Update. Select "Run" in the window.
10. Eject the USB Drive and hand it back to the Tinker Academy instructor

Setup Instructions At Home

Connect to your Home WiFi Network

Updating the Course (Using Wifi)
1. Make sure you are on the Home WiFi Network.
2. Click the "Setup" folder in "Nautilus" under "Bookmarks"
3. Double click "Course Update". Choose "Run".
   If you see a window popup with the message "update course failed".
   Hop onto Skype, and request help in the class chat group.
   And send an email to classes@tinkeracademy.com with your name and student ID.
4. Follow the instructions in this handout (last 2 pages) on the quiz and homework steps.

Submitting Quiz and Homework
1. Make sure you are on the Home WiFi Network.
2. Click the "Setup" folder in "Nautilus" under "Bookmarks"
3. Double click "Course Submit". Choose "Run".
   If you see a window popup with the message "submit course failed".
   Hop onto Skype, and request help in the class chat group.
   And send an email to classes@tinkeracademy.com with your name and student ID.

Installing the Virtual Machine (VM)

1. Borrow the USB drive from your Tinker Academy instructor
2. Create the folder "tinkeracademy" (without the quotes) under Documents using Finder or Windows Explorer. Type it in *exactly* as indicated.
3. Copy the folder "installers" from the USB drive to under "tinkeracademy" using Finder or Windows Explorer
4. Eject the USB Drive and hand it back to the Tinker Academy instructor
5. Locate the VirtualBox installer under "tinkeracademy" using Finder or Windows Explorer

If your Laptop is	Double click on
Windows 7	VirtualBox-4.3.12-93733-Win.exe
Windows 8	VirtualBox-4.3.14-95030-Win.exe
Mac	VirtualBox-4.2.26-95022-OSX.dmg

6. Install the VirtualBox application
7. Congratulations, You completed a major milestone. Give yourself a pat on the back :)

Importing the Virtual Machine (VM)

1. Locate the Virtual Machine "tinkeracademy.ova" under "tinkeracademy"
2. Double click on "tinkeracademy.ova". You should get the import screen in VirtualBox with an "Import" Button. Click on the "Import" button to Import the Virtual Machine.

Starting the Virtual Machine (VM)

1. Once the Import is complete and successful, you should see the VM "TinkerAcademy" in the side panel in VirtualBox.
2. If it says "Powered Off" click on the Start Button (Green Arrow) in the VirtualBox Toolbar. This will start the VM.
3. If it says "Running" click on the Show Button (Green Arrow) in the VirtualBox Toolbar. This should display the VM window.
4. Once the VM starts up you will be presented with a login screen. Type in "password" without the quotes. Type it in exactly as indicated and hit "Enter".
5. Once the login is completed you should see a Desktop with a few icons. The Screen might go fuzzy for a few seconds before displaying the Desktop. *That is ok.*
6. Congratulations. You are now running Linux within your laptop.
7. Double click on the "Firefox" icon in the Sidebar. This should launch Firefox. Verify you have network access. Close "Firefox"

Launching the Virtual Machine in Full Screen
1. Use the VirtualBox menu View->Switch to Fullscreen to switch the VM to fullscreen mode
2. Use the same VirtualBox menu View->Switch to Fullscreen to switch the VM back out of fullscreen mode

Shutting Down the Virtual Machine
1. Click on the red close window button (to the top left on a Mac, top right in Windows).
2. You will prompted with a confirmation message asking if you want to "Power Off" the machine. Click the button to confirm power off.
3. In a few minutes the VM will shut down and you should see the VirtualBox side panel with the "Tinker academy" VM indicating "Powered Off".

Restarting the Virtual Machine
1. Start VirtualBox
2. Click on the VM "TinkerAcademy" in the VirtualBox side panel.
3. Click on the Start Button (Green Arrow) in the VirtualBox Toolbar. This will start the VM.
4. Once the VM startup you will be presented with a login screen.

Right Click in VM on Mac
1. Open System Preferences, Trackpad
2. Enable "Secondary Click", Toggle the small arrow to the right and select "Click with two fingers".

Open StarterPack6.sb2
We will use StarterPack6.sb2 **updated from previous class** to begin to implement Tic Tac Toe using data structures

1. Click the "Courses" folder under "Bookmarks". Navigate to the TA-SCR-2 and locate the Scratch program "StarterPack6.sb2" under "starterpack4".
2. Select the file. Right click and select "Open With Scratch 2". This will open the Scratch Program StarterPack6.sb2 in the Scratch GUI.

Structure of StarterPack6.sb
The Scratch Program in StarterPack6.sb has
1. A Stage with the Tic Tac Toe backdrop
2. Sprites named "Marker 1" to Marker 9 for the "Tic Tac Toe" markers

What will our Program do?
In our program, we will represent the 2D matrix of Tic Tac Toe using a list data structure.
We will then implement Tic Tac Toe for 2 players.

Refresher

In the previous Handout we started defining the Script to handle clicks on the Stage.

The TURN Variable

The TURN Variable will be used to keep track of the turn
The value of the variable will start at 0
The variable increases by 1 when a turn is completed

The expression TURN mod 2 will indicate if a Cross or Circle should be drawn

Value	Indicates
0	Cross will be drawn
1	Circle will be drawn

2	<mark>Cross</mark> will be drawn
3	<mark>Circle</mark> will be drawn
4	<mark>Cross</mark> will be drawn
5	<mark>Circle</mark> will be drawn
6	<mark>Cross</mark> will be drawn
7	<mark>Circle</mark> will be drawn

and so on...

In this Handout

The Script would need to update the ROW and the CELL which was clicked, update the variables and broadcast a message to the controller.

The controller would need to do the following

1. Update the Marker
   a. Check the value of the TURN variable
   b. Identify which marker would need to be moved
   c. Request the marker to move to the appropriate slot and show itself
   d. Update the TIC_TAC_TOE list using the MAP function
2) Check if the game is completed
   a) If the last turn created a winning combination the game is a won by the last player
   b) Else If no more turns are possible (all slots filled up) the game is a draw
3) Update the board if the game is complete
   a) Draw the line through the winning combination
   b) Let the user know of the win

Quiz 6: Applications of Data Structures

Open the Quiz

==Make sure you are on WiFi==.
Follow the instructions in "Updating the Course" in this Handout.
Open Quiz6.odt under "Courses" "TA-SCR-2" "quiz" "quiz6"

Complete the Quiz

1. Attempt each question. Type in the answers in the "Answer:" box.
2. Save the file using File->Save or Ctrl-S

Submit the Quiz

==Make sure you are on WiFi==.
Follow the instructions in "Submitting Homework" in this Handout.

Homework 6: Applications of Data Structures

The Homework is a continuation of the simple drawing application.
Click on the green flag to start the application.
Click on the START button to begin the drawing mode.
Keep the mouse button pressed down and drag the mouse to draw shapes on the Stage.

Open the Homework

Make sure you are on WiFi.
Follow the instructions in "Updating the Course" in this Handout.
Open Homework6.sb2 under "Courses" "TA-SCR-2" "homework" "homework6"

Complete the Homework

We are now going to add code to support computer based game play

To get started, we are going to make simple controller changes so that the first player is a human and the second player is the computer

The Human plays the Cross Marker
The computer plays the Circle Marker.
You changes should support the following

1. The First Player is Human and will make moves by clicking on the board slots.
2. After each move by the human player, the controller should make some move (ANY move) to move the appropriate Circle Markers into an empty slot if it exists.

Test your program. If your program does not run successfully you will not get any credit.

Submit the Homework

Make sure you are on WiFi.
Follow the instructions in "Submitting Homework" in this Handout.