

# TINKER ACADEMY

## SCRATCH Computer Programming Adventure (Beginner)

### Handout 8: More Block Programming

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

#### Setup Instructions In Classroom

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](mailto: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](mailto:classes@tinkeracademy.com) with your name and student ID.

## Virtual Machine Installation

### 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”.

## Getting Ready to Program

### Open StarterPack8.sb

We will be using StarterPack8.sb for this class.

Click on StarterPack8.sb (under Courses, TA-SCR-1, starterpack. starterpack8)

Now either

- Right Click and select “Open with Scratch 2” to open the program in Scratch 2
- Double click to open the program in Scratch 2

## Structure Of Our Program

### Structure of StarterPack8.sb

The Scratch Program in StarterPack8.sb has

1. A Sprite named “Karel”. Karel is a Robot.
2. Sprites named “Box 0”, “Box 1”, “Box 2”, “Box 3”, “Box 4” and “Box 5”
3. Sprites named “Signal 0”, “Signal 1”, “Signal 2”, “Signal 3”, “Signal 4”, “Signal 5”
4. A Sprite named “Engine”
5. Sprites named “Train 0”, “Train 1”, “Train 2”, “Train 3”, “Train 4”, “Train 5”
6. A Sprite named “Plane”
7. A Sprite named “Beacon1”
8. A Sprite named “Beacon2”
9. The Stage - with a special backdrop of Karel’s city

### About Karel’s City

Karel lives in a city. The Center of the City is at (0,0) of the Stage. Karel’s city has roads going east to west and south to south. The intersection of 2 roads is called a “corner”.

Karel’s City now has a Plane and an airport.

“Karel Airways” is an airplane takes off from “Karel Airport” and flies over the city.

Karel is the pilot of the Plane.

### Use Beacons to Control the Plane

The airport has 2 Beacons.

Beacon1 controls the Plane's take-off.

Beacon2 controls the Plane's landing.

The Plane starts with Beacon1 turns yellow.

The Plane taxis along the runway and takes off when the Beacon1 turns green.

Once the Plane is airborne, you can control its direction by keeping the mouse down over a point on the stage. The Plane will then turn and fly in the direction of the point.

The Plane will land when Beacon2 is activated (turns green).

The Plane will turn and fly towards Beacon1 as part of its landing path, turn towards the runway and land, taxiing along the runway until it comes to a complete stop at Beacon2.

In this Handout...

### **In this Handout, we will do the following**

- Program the plane to start
- Program the plane to taxi along the runway
- Program the plane to fly towards the mouse down position
- Program the plane to land safely back on the runway
- Program Karel to be the pilot

About Our Program

### **What should our Program do?**

1. Our program should start when the green flag is clicked.
2. The Beacons control the airport runway
3. When the Beacon1 turns yellow, the Plane will start and Karel the pilot will board onto the plane
4. When the Beacon1 turns green, the Plane will taxi along the runway and take off

5. Once the Plane is airborne it will continue to fly over the city turning back once its reaches the city boundaries
6. The plane will turn towards the mouse-pointer if the mouse is pressed down
7. The plane will begin descent and follow the landing path if the Beacon2 is activated

### Remember

Each Beacon controls either take-off or landing

1. Beacon1 controls take-off
2. Beacon2 controls landing

### Class Activity in this Handout

We will program the following

1. Program Beacon1 for take-off
2. Program Beacon2 for landing
3. Program the Plane for take off, fly by and land

### Program Beacon1 for TakeOff

The code below will broadcast messages to stop, start or takeoff the plane.

### Make the Code Change

1. Click on the Beacon1 Sprite
2. Add the following to the When Sprite Clicked block

if costume # = 1 then
broadcast STOP-PLANE
if costume # = 2 then
broadcast START-PLANE
if costume # = 3 then
broadcast TAKEOFF-PLANE



## Program Beacon2 for Landing

The code below will broadcast messages to land the plane.

### Make the Code Change

1. Click on the Beacon2 Sprite
2. Add the following to the When Sprite Clicked block

if costume # = 1 then
broadcast STOP-PLANE
if costume # = 2 then
broadcast LAND-PLANE

## Add the Variables for the Plane

The code below adds the variables required by the Plane.

### Add the following Variables

1. PLANE-ACTION
2. PLANE-FLYING
3. PLANE-LANDING
4. PLANE-STARTED
5. PLANE-STOPPED
6. PLANE-TAKING-OFF

All the Variables are For All Sprites

### Set the Initial Values of the Variables

The code below sets the initial values of the variables.

1. Click on the Stage

2. Add the following blocks to the When Flag Clicked Script

set PLANE-STOPPED to 0
set PLANE-STARTED to 1
set PLANE-TAKING-OFF to 2
set PLANE-FLYING to 3
set PLANE-LANDING to 4

3. Click on the Plane Sprite
4. Add the following blocks to the When Flag Clicked Script

set PLANE-ACTION to PLANE-STOPPED
-----------------------------------

### Add the Receivers for the START-PLANE messages

The code below will add receivers to the Beacon1 messages

#### Make the Code Change

The code below sets the PLANE-ACTION to PLANE-STARTED when the START-PLANE message is received

1. Click on the Plane Sprite
2. Add the following Script

When I receive START-PLANE
set PLANE-ACTION to PLANE-STARTED

### Start the Plane Engines

The code below will add the plane engine sound

### Make the Code Change

The code below adds the plane engine sound

1. Click on the Plane Sprite
2. Add the following Script

When Flag Clicked
forever
if PLANE-ACTION = PLANE-STOPPED then
stop all sounds
else
play sound plane until done

### Let's Take Off

The code below will handle the receiver for the TAKEOFF-PLANE messages

1. Click on the Plane Sprite
2. Add the following Script

When I receive TAKEOFF-PLANE
go to front
set PLANE-ACTION to PLANE-TAKING-OFF
glide 2 secs to x: 180 y: 100

### Let's Fly the Plane

1. Click on the green flag to begin

2. Click on Beacon1 to start the plane
3. Click on Beacon1 to start take-off

The Plane should take-off and fly around the city

Hey Karel needs to be the Pilot

Karel needs to be the pilot of the plane.

Add the following code for Karel to board the plane for take off

1. Click on the Karel Sprite
2. Add the following Script

When I receive START-PLANE
go to front
glide 1 secs to x: -50 y: 0
glide 1 secs to x: -50 y: 80
glide 1 secs to x: -90 y: 90
glide 1 secs to x: -90 y: 100
hide

Restart the program.

When the plane is started, Karel should now board to the plane and get ready for take-off!

Add the code for Karel to exit the plane after landing

1. Click on the Karel Sprite
2. Add the following Script

When I receive PLANE-STOPPED
------------------------------

go to front
show
glide 1 secs to x: -90 y: 100
glide 1 secs to x: -90 y: 90
glide 1 secs to x: -50 y: 80
glide 1 secs to x: -50 y: 0
glide 1 secs to x: 0 y: 0
say WOOHOO! for 2 secs

### Add the Receivers for the LAND-PLANE messages

The code below will add receivers to the Beacon2 messages

### Make the Code Change

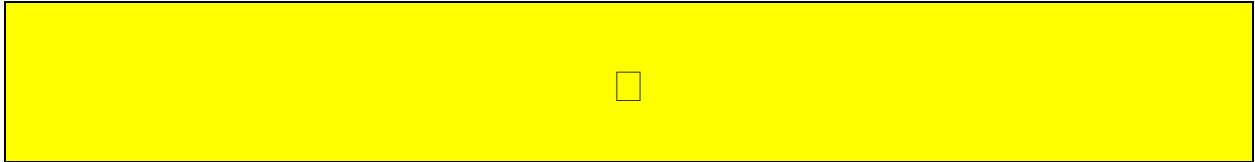
The code below lands the plane when the LAND-PLANE message is received

1. Click on the Plane Sprite
2. Add the following Script

When I receive LAND-PLANE
if PLANE-ACTION = PLANE-FLYING
set PLANE-ACTION to PLANE-LANDING
point towards Beacon1
glide distance to Beacon1/100 secs to x: xposition of Beacon1 y: yposition of Beacon1
go to front
point in direction -90
glide 6 secs to x: -100 y: 100

set PLANE-ACTION to PLANE-STOPPED
wait 1 secs
repeat 12
turn 15 degrees
wait 0.2 secs
broadcast PLANE-STOPPED

Save your changes.



That was a LOT we covered!

You made it to the end of the course! Awesome!



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## Quiz 8: More Block Programming

Make sure you read this Handout!

Open the Quiz

Make sure you are on the Home WiFi.

Follow the instructions in “Updating the Course” in this Handout.

Open Quiz8.odt under “Courses” “TA-SCR-1” “quiz” “quiz8”

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 the Home WiFi.

Follow the instructions in “Submitting Quiz and Homework” in this Handout.



## Homework 8: More Block Programming

**Make sure you read this Handout!**

### Overview

In this Homework, you will add code to get Karel to load the plane with the freight boxes before take-off

### Open the Homework

Follow the instructions in “Updating the Course” in this Handout.

Open Homework8.sb under “Courses” “TA-SCR-1” “homework” “homework8”

- Select “Homework8 v.sb”
- Right Click, Select Open With Scratch 2 OR
- Double click the file

### Complete the Homework

#### Adds the scripts to Karel

1. When I receive START-PLANE message
2. Karel should initially glide over to Box5, and load the box into the plane.
3. Karel should repeat the steps for Box4, Box3, Box2 and Box1

The freight box should be hidden once its loaded into the plane

#### Test your changes

1. Start the Program.
2. Activate Beacon1 to yellow
3. Karel should load the Plane with the boxes of freight before boarding the plane

4. Activate the Beacon1 to green
5. The plane should taxi and take off as before

Submit the Homework

Make sure you are on the Home WiFi.

Follow the instructions in “Submitting Quiz and Homework” in this Handout.