

## Availability of Slides

Go to

[nbc.rutgers.edu/~jt](http://nbc.rutgers.edu/~jt)

to see the powerpoint  
slides and/or podcasts  
for this lecture

Jt Scratch Lesson 3A • Summer 2012 • slide 1

## Scratch Programming

Lesson 3A : Decisions

## Problem

Write code to calculate the bill for a customer who gets their car fixed. The car shop has to cover its costs - parts and labor - but also wants to make a profit. They usually make a profit of 25%, but if they believe the car is worth over \$35000, they will increase their profit to 50%.

Jt Scratch Lesson 3A • Summer 2012 • slide 3

## Variables

- RepairCost - cost to shop of parts and labor
- ProfitRate - 25 or 50%
- Profit - dollars of profit made
- Bill - what customer has to pay

Jt Scratch Lesson 3A • Summer 2012 • slide 4

## Simplified Problem

- How would we calculate the bill if the shop always made 25% profit?

Jt Scratch Lesson 3A • Summer 2012 • slide 5

## Simplified Problem

- How would we calculate the bill if the shop always made 25% profit?

ProfitRate ← .25

Jt Scratch Lesson 3A • Summer 2012 • slide 6

## Simplified Problem

- How would we calculate the bill if the shop always made 25% profit?

ProfitRate ← .25

Example:

RepairCost ← \$200

Ji Scratch Lesson 3A • Summer 2012 • slide 7

## Simplified Problem

- How would we calculate the bill if the shop always made 25% profit?

ProfitRate ← .25

Example:

RepairCost ← \$200

How much is Profit?

Ji Scratch Lesson 3A • Summer 2012 • slide 8

## Simplified Problem

- How would we calculate the bill if the shop always made 25% profit?

ProfitRate ← .25

Example:

RepairCost ← \$200

How much is Profit? ← \$50

Ji Scratch Lesson 3A • Summer 2012 • slide 9

## Simplified Problem

- How would we calculate the bill if the shop always made 25% profit?

ProfitRate ← .25

Example:

RepairCost ← \$200

How much is Profit? ← \$50

How much is Bill?

Ji Scratch Lesson 3A • Summer 2012 • slide 10

## Simplified Problem

- How would we calculate the bill if the shop always made 25% profit?

ProfitRate ← .25

Example:

RepairCost ← \$200

How much is Profit? ← \$50

How much is Bill? ← \$250

Ji Scratch Lesson 3A • Summer 2012 • slide 11

## Simplified Problem

- How would we calculate the bill if the shop always made 25% profit?

ProfitRate ← .25

Example:

RepairCost ← \$200

How much is Profit? ← \$50

How much is Bill? ← \$250

Ji Scratch Lesson 3A • Summer 2012 • slide 12

## Simplified Problem

- What are the equations using variables?  
ProfitRate ← .25  
RepairCost ← \$200  
Profit? ← \$50  
Bill? ← \$250

Ji Scratch Lesson 3A • Summer 2012 • slide 13

## Simplified Problem

- What are the equations using variables?  
ProfitRate ← .25  
RepairCost ← \$200  
Profit? ← \$50  
Bill? ← \$250  
Equation for Profit?

Ji Scratch Lesson 3A • Summer 2012 • slide 14

## Simplified Problem

- What are the equations using variables?  
ProfitRate ← .25  
RepairCost ← \$200  
Profit? ← \$50  
Bill? ← \$250  
Equation for Profit?  
**ProfitRate \* RepairCost**

Ji Scratch Lesson 3A • Summer 2012 • slide 15

## Simplified Problem

- What are the equations using variables?  
ProfitRate ← .25  
RepairCost ← \$200  
Profit? ← \$50  
Bill? ← \$250  
Equation for Bill?

Ji Scratch Lesson 3A • Summer 2012 • slide 16

## Simplified Problem

- What are the equations using variables?  
ProfitRate ← .25  
RepairCost ← \$200  
Profit? ← \$50  
Bill? ← \$250  
Equation for Bill?  
**RepairCost + Profit**

Ji Scratch Lesson 3A • Summer 2012 • slide 17

## ProfitRate

- However, ProfitRate is not necessarily 25%

Ji Scratch Lesson 3A • Summer 2012 • slide 18

## ProfitRate

- However, ProfitRate is not necessarily 25%
- We cannot just assign it the value of .25

Ji Scratch Lesson 3A • Summer 2012 • slide 19

## ProfitRate

- However, ProfitRate is not necessarily 25%
- We cannot just assign it the value of .25
- It is based on the value of the car.

Ji Scratch Lesson 3A • Summer 2012 • slide 20

## ProfitRate

- However, ProfitRate is not necessarily 25%
- We cannot just assign it the value of .25
- It is based on the value of the car
- New variable needed:

Ji Scratch Lesson 3A • Summer 2012 • slide 21

## ProfitRate

- However, ProfitRate is not necessarily 25%
- We cannot just assign it the value of .25
- It is based on the value of the car
- New variable needed: **CarValue**

Ji Scratch Lesson 3A • Summer 2012 • slide 22

## ProfitRate

- However, ProfitRate is not necessarily 25%
- We cannot just assign it the value of .25
- It is based on the value of the car
- New variable needed: CarValue
- ProfitRate gets set according to CarValue

Ji Scratch Lesson 3A • Summer 2012 • slide 23

## ProfitRate

- However, ProfitRate is not necessarily 25%
- We cannot just assign it the value of .25
- It is based on the value of the car
- New variable needed: CarValue
- ProfitRate gets set according to CarValue
- The code must **decide** what value to use

Ji Scratch Lesson 3A • Summer 2012 • slide 24

## How can you make a decision?

Ji Scratch Lesson 3A • Summer 2012 • slide 25

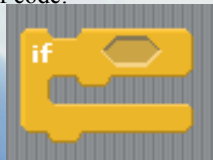
## How can you make a decision?

- IF  
Used to perform or not to perform some segment of code:

Ji Scratch Lesson 3A • Summer 2012 • slide 26

## How can you make a decision?

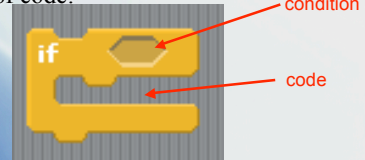
- IF  
Used to perform or not to perform some segment of code:



Ji Scratch Lesson 3A • Summer 2012 • slide 27

## How can you make a decision?

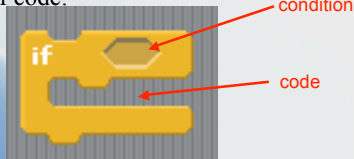
- IF  
Used to perform or not to perform some segment of code:



Ji Scratch Lesson 3A • Summer 2012 • slide 28

## How can you make a decision?

- IF  
Used to perform or not to perform some segment of code:

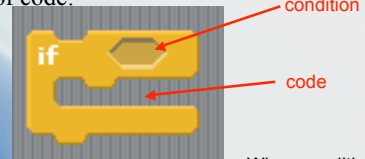


The code is **sometimes** performed

Ji Scratch Lesson 3A • Summer 2012 • slide 29

## How can you make a decision?

- IF  
Used to perform or not to perform some segment of code:



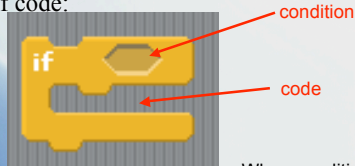
The code is **sometimes** performed **When condition is true**

Ji Scratch Lesson 3A • Summer 2012 • slide 30

## How can you make a decision?

- IF

Used to perform or not to perform some segment of code:



Sometimes nothing happens

When condition  
is false

Jt Scratch Lesson 3A • Summer 2012 • slide 31

## How can you make a decision?

- IF/ELSE

Used to choose between two segments of code

Jt Scratch Lesson 3A • Summer 2012 • slide 32

## How can you make a decision?

- IF/ELSE

Used to choose between two segments of code

- exactly one of the two choices will happen

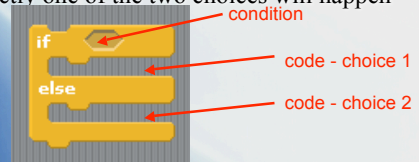
Jt Scratch Lesson 3A • Summer 2012 • slide 33

## How can you make a decision?

- IF/ELSE

Used to choose between two segments of code

- exactly one of the two choices will happen



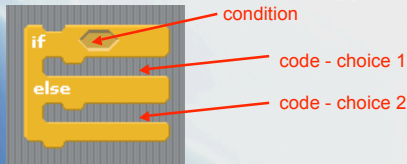
Jt Scratch Lesson 3A • Summer 2012 • slide 34

## How can you make a decision?

- IF/ELSE

Used to choose between two segments of code

- exactly one of the two choices will happen



Something will definitely happen

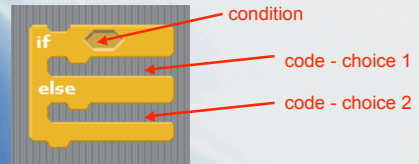
Jt Scratch Lesson 3A • Summer 2012 • slide 35

## How can you make a decision?

- IF/ELSE

Used to choose between two segments of code

- exactly one of the two choices will happen



A plain IF might do nothing but ...

Jt Scratch Lesson 3A • Summer 2012 • slide 36

### How can you make a decision?

- IF/ELSE

Used to choose between two segments of code  
- exactly one of the two choices will happen

**But an IF/ELSE will always do something...**

Jt Scratch Lesson 3A • Summer 2012 • slide 37

### How can you make a decision?

- IF/ELSE

Used to choose between two segments of code  
- exactly one of the two choices will happen

**Either Code Choice 1 will happen ...**

Jt Scratch Lesson 3A • Summer 2012 • slide 38

### How can you make a decision?

- IF/ELSE

Used to choose between two segments of code  
- exactly one of the two choices will happen

**Either Code Choice 1 will happen ...**

when condition is true

Jt Scratch Lesson 3A • Summer 2012 • slide 39

### How can you make a decision?

- IF/ELSE

Used to choose between two segments of code  
- exactly one of the two choices will happen

**... or Code Choice 2 will happen ...**

Jt Scratch Lesson 3A • Summer 2012 • slide 40

### How can you make a decision?

- IF/ELSE

Used to choose between two segments of code  
- exactly one of the two choices will happen

**... or Code Choice 2 will happen ...**

when condition is false

Jt Scratch Lesson 3A • Summer 2012 • slide 41

### How can you make a decision?

- IF/ELSE

Used to choose between two segments of code  
- exactly one of the two choices will happen

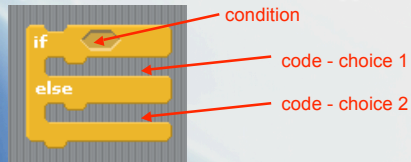
**... but only one code segment will happen ...**

Jt Scratch Lesson 3A • Summer 2012 • slide 42

## How can you make a decision?

- IF/ELSE

Used to choose between two segments of code  
- exactly one of the two choices will happen



... never both ...

Ji Scratch Lesson 3A • Summer 2012 • slide 43

## Conditions

- The part of the IF or If/ELSE that is used to make a decision

Ji Scratch Lesson 3A • Summer 2012 • slide 44

## Conditions

- The part of the IF or If/ELSE that is used to make a decision
- It is a code component that the computer can determine to be TRUE or FALSE

Ji Scratch Lesson 3A • Summer 2012 • slide 45

## Conditions

- The part of the IF or If/ELSE that is used to make a decision
- It is a code component that the computer can determine to be TRUE or FALSE
- Example: Is CarValue > 35000

Ji Scratch Lesson 3A • Summer 2012 • slide 46

## Conditions

- The part of the IF or If/ELSE that is used to make a decision
- It is a code component that the computer can determine to be TRUE or FALSE
- Example: Is CarValue > 35000
- Conditions are made of three components:  
Part1 RelationalOperator Part2

Ji Scratch Lesson 3A • Summer 2012 • slide 47

## Conditions

- The part of the IF or If/ELSE that is used to make a decision
- It is a code component that the computer can determine to be TRUE or FALSE
- Example: Is CarValue > 35000
- Conditions are made of three components:  
Part1 RelationalOperator Part2

Ji Scratch Lesson 3A • Summer 2012 • slide 48



## Conditions

- The part of the IF or If/ELSE that is used to make a decision
- It is a code component that the computer can determine to be TRUE or FALSE
- Example: Is CarValue > 35000
- Conditions are made of three components:

Part1 RelationalOperator Part2

Value

Ji Scratch Lesson 3A • Summer 2012 • slide 49

## Conditions

- The part of the IF or If/ELSE that is used to make a decision
- It is a code component that the computer can determine to be TRUE or FALSE
- Example: Is CarValue > 35000
- Conditions are made of three components:

Part1 RelationalOperator Part2

Variable

Ji Scratch Lesson 3A • Summer 2012 • slide 50

## Conditions

- The part of the IF or If/ELSE that is used to make a decision
- It is a code component that the computer can determine to be TRUE or FALSE
- Example: Is CarValue > 35000
- Conditions are made of three components:

Part1 RelationalOperator Part2

Equation

Ji Scratch Lesson 3A • Summer 2012 • slide 51

## Examples



Ji Scratch Lesson 3A • Summer 2012 • slide 52

## Examples

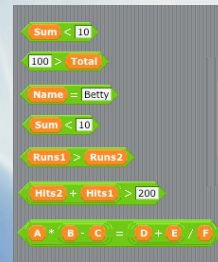
- These all can be placed in the condition part of an IF or IF/ELSE



Ji Scratch Lesson 3A • Summer 2012 • slide 53

## Examples

- These all can be placed in the condition part of an IF or IF/ELSE



Here



Ji Scratch Lesson 3A • Summer 2012 • slide 54

### Examples

- These all can be placed in the condition part of an IF or IF/ELSE

Sum < 10  
100 > Total  
Name = Betty  
Sum < 10  
Runs1 > Runs2  
Hits2 + Hits1 > 200  
A \* B - C = D + E / F

if

else

or here

Ji Scratch Lesson 3A • Summer 2012 • slide 55

### Examples

Sum < 10  
100 > Total  
Name = Betty  
Sum < 10  
Runs1 > Runs2  
Hits2 + Hits1 > 200  
A \* B - C = D + E / F

variable RelOP value

Ji Scratch Lesson 3A • Summer 2012 • slide 56

### Examples

Sum < 10  
100 > Total  
Name = Betty  
Sum < 10  
Runs1 > Runs2  
Hits2 + Hits1 > 200  
A \* B - C = D + E / F

value RelOP variable

Ji Scratch Lesson 3A • Summer 2012 • slide 57

### Examples

Sum < 10  
100 > Total  
Name = Betty  
Sum < 10  
Runs1 > Runs2  
Hits2 + Hits1 > 200  
A \* B - C = D + E / F

variable RelOP value

Ji Scratch Lesson 3A • Summer 2012 • slide 58

### Examples

Sum < 10  
100 > Total  
Name = Betty  
Sum < 10  
Runs1 > Runs2  
Hits2 + Hits1 > 200  
A \* B - C = D + E / F

variable RelOP value

Ji Scratch Lesson 3A • Summer 2012 • slide 59

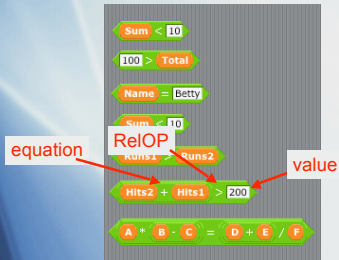
### Examples

Sum < 10  
100 > Total  
Name = Betty  
Sum < 10  
Runs1 > Runs2  
Hits2 + Hits1 > 200  
A \* B - C = D + E / F

variable RelOP variable

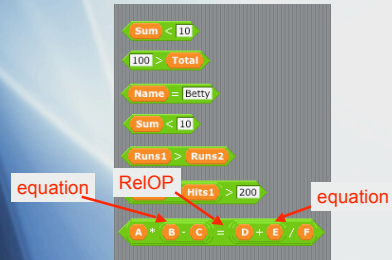
Ji Scratch Lesson 3A • Summer 2012 • slide 60

## Examples



Jt Scratch Lesson 3A • Summer 2012 • slide 61

## Examples



Jt Scratch Lesson 3A • Summer 2012 • slide 62

## Examples



Jt Scratch Lesson 3A • Summer 2012 • slide 63

## Back to our Car Shop

- Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%

Jt Scratch Lesson 3A • Summer 2012 • slide 64

## Back to our Car Shop

- Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%
- We have to have the code **decide**

Jt Scratch Lesson 3A • Summer 2012 • slide 65

## Back to our Car Shop

- Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%
- We have to have the code **decide**
  - What two statements in Scratch can you use to make a decision?

Jt Scratch Lesson 3A • Summer 2012 • slide 66

## Back to our Car Shop

- Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%
- We have to have the code decide
- What two statements in Scratch can you use to make a decision?

IF  
IF/ELSE

Ji Scratch Lesson 3A • Summer 2012 • slide 67

## Back to our Car Shop

- Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%
- We have to have the code decide
- What two statements in Scratch can you use to make a decision?

IF  
IF/ELSE      Which should we use?

Ji Scratch Lesson 3A • Summer 2012 • slide 68

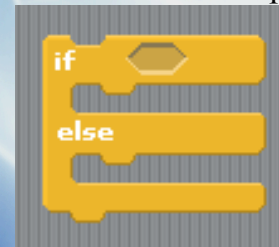
## Back to our Car Shop

- Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%
- We have to have the code decide
- What two statements in Scratch can you use to make a decision?

~~IF~~  
IF/ELSE

Ji Scratch Lesson 3A • Summer 2012 • slide 69

## Back to our Car Shop

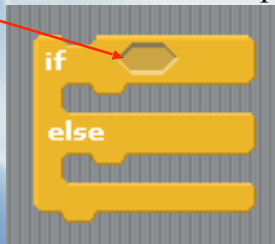


Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%

Ji Scratch Lesson 3A • Summer 2012 • slide 70

## Back to our Car Shop

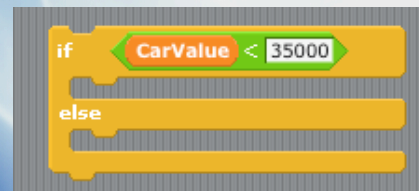
What condition can we use to make our decision?



Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%

Ji Scratch Lesson 3A • Summer 2012 • slide 71

## Back to our Car Shop



Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%

Ji Scratch Lesson 3A • Summer 2012 • slide 72

## Back to our Car Shop

What do we do in each case?

```
if (CarValue < 35000)
  // empty
else
  // empty
```

Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%

Ji Scratch Lesson 3A • Summer 2012 • slide 73

## Back to our Car Shop

```
if (CarValue < 35000)
  set ProfitRate to .25
else
  set ProfitRate to .5
```

Remember ProfitRate is usually 25% as long as CarValue is less than \$35000, otherwise it is 50%

Ji Scratch Lesson 3A • Summer 2012 • slide 74

## Car Shop: Complete Code: Input

```
when clicked
  ask How much do you think customer's car is worth? and wait
  set CarValue to answer
  ask What was the total cost to fix the car? and wait
  set RepairCost to answer
```

Ji Scratch Lesson 3A • Summer 2012 • slide 75

## Car Shop: Complete Code: Decide Which Profit Rate

```
if (CarValue < 35000)
  set ProfitRate to .25
else
  set ProfitRate to .5
```

Ji Scratch Lesson 3A • Summer 2012 • slide 76

## Car Shop: Complete Code: Calculate Profit & Bill

Remember: Equations using variables?

ProfitRate ← .25

RepairCost ← \$200

Profit? ← \$50

Bill? ← \$250

Equation for Profit? ProfitRate \* RepairCost

Equation for Bill? RepairCost + Profit

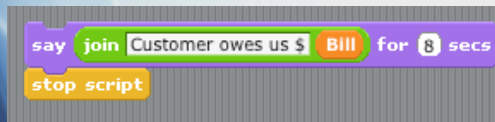
Ji Scratch Lesson 3A • Summer 2012 • slide 77

## Car Shop: Complete Code: Calculate Profit & Bill

```
set Profit to RepairCost * ProfitRate
set Bill to RepairCost + Profit
```

Ji Scratch Lesson 3A • Summer 2012 • slide 78

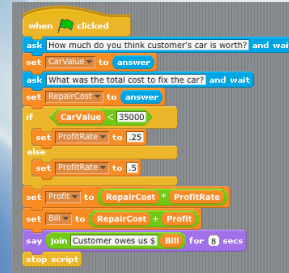
## Car Shop: Complete Code: Display Bill



```
say join Customer owes us $ Bill for 8 secs
stop script
```

Jt Scratch Lesson 3A • Summer 2012 • slide 79

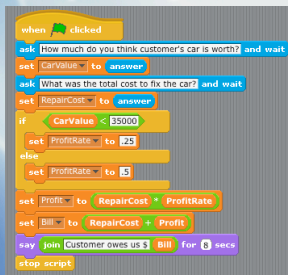
## Car Shop: Complete Code:



```
when clicked
ask How much do you think customer's car is worth? and wait
set CarValue to answer
ask What was the total cost to fix the car? and wait
set RepairCost to answer
if CarValue < 35000
set ProfitRate to 25
else
set ProfitRate to 5
set Profit to RepairCost * ProfitRate
set Bill to RepairCost + Profit
say join Customer owes us $ Bill for 8 secs
stop script
```

Jt Scratch Lesson 3A • Summer 2012 • slide 80

## Car Shop: Complete Code:



```
when clicked
ask How much do you think customer's car is worth? and wait
set CarValue to answer
ask What was the total cost to fix the car? and wait
set RepairCost to answer
if CarValue < 35000
set ProfitRate to 25
else
set ProfitRate to 5
set Profit to RepairCost * ProfitRate
set Bill to RepairCost + Profit
say join Customer owes us $ Bill for 8 secs
stop script
```

Demo CarRepair 1

Jt Scratch Lesson 3A • Summer 2012 • slide 81

## Car Shop: Variation

Lets have them tell us the cost of parts and labor as two separate values.

Jt Scratch Lesson 3A • Summer 2012 • slide 82

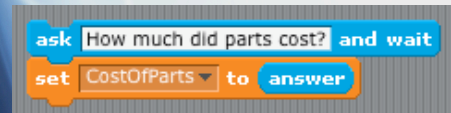
## Car Shop: Variation

Lets have them tell us the cost of parts and labor as two separate values. **First ask for cost of parts.**

Jt Scratch Lesson 3A • Summer 2012 • slide 83

## Car Shop: Variation

Lets have them tell us the cost of parts and labor as two separate values. **First ask for cost of parts.**



```
ask How much did parts cost? and wait
set CostOfParts to answer
```

Jt Scratch Lesson 3A • Summer 2012 • slide 84

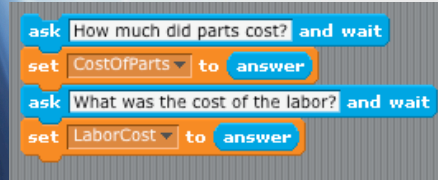
## Car Shop: Variation

Lets have them tell us the cost of parts and labor as two separate values. Then ask for cost of labor.

Jt Scratch Lesson 3A • Summer 2012 • slide 85

## Car Shop: Variation

Lets have them tell us the cost of parts and labor as two separate values. Then ask for cost of labor.



```
ask How much did parts cost? and wait
set CostOfParts to answer
ask What was the cost of the labor? and wait
set LaborCost to answer
```

Jt Scratch Lesson 3A • Summer 2012 • slide 86

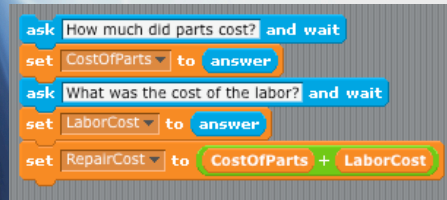
## Car Shop: Variation

Lets have them tell us the cost of parts and labor as two separate values. RepairCost is sum of these.

Jt Scratch Lesson 3A • Summer 2012 • slide 87

## Car Shop: Variation

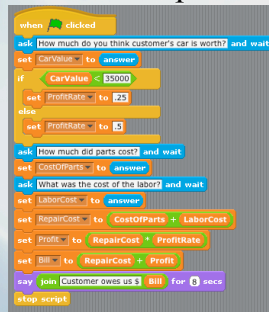
Lets have them tell us the cost of parts and labor as two separate values. RepairCost is sum of these.



```
ask How much did parts cost? and wait
set CostOfParts to answer
ask What was the cost of the labor? and wait
set LaborCost to answer
set RepairCost to CostOfParts + LaborCost
```

Jt Scratch Lesson 3A • Summer 2012 • slide 88

## Car Shop: Variation - Complete

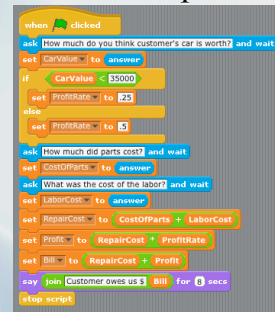


```
when clicked
ask How much do you think customer's car is worth? and wait
set CarValue to answer
if CarValue < $5000
  set ProfitRate to 25
else
  set ProfitRate to 5
ask How much did parts cost? and wait
set CostOfParts to answer
ask What was the cost of the labor? and wait
set LaborCost to answer
set RepairCost to CostOfParts + LaborCost
set Profit to RepairCost * ProfitRate
set Bill to RepairCost + Profit
say join Customer owes us $ Bill for 8 secs
stop script
```

Jt Scratch Lesson 3A • Summer 2012 • slide 89

## Car Shop: Variation - Complete

Demo CarRepair 2



```
when clicked
set CarValue to answer
if CarValue < $5000
  set ProfitRate to 25
else
  set ProfitRate to 5
ask How much did parts cost? and wait
set CostOfParts to answer
ask What was the cost of the labor? and wait
set LaborCost to answer
set RepairCost to CostOfParts + LaborCost
set Profit to RepairCost * ProfitRate
set Bill to RepairCost + Profit
say join Customer owes us $ Bill for 8 secs
stop script
```

Jt Scratch Lesson 3A • Summer 2012 • slide 90

## Car Shop: Variation 2

- How about if we figure out labor costs based on how much we pay our mechanics each hour, how many hours they worked on the car, and how many workers were involved.

Ji Scratch Lesson 3A • Summer 2012 • slide 91

## Car Shop: Variation 2

- How about if we figure out labor costs based on how much we pay our mechanics each hour, how many hours they worked on the car, and how many workers were involved.

Example: We pay mechanics \$50 an hour each and 2 of them worked on the car for 3 hours each.

Ji Scratch Lesson 3A • Summer 2012 • slide 92

## Car Shop: Variation 2

- How about if we figure out labor costs based on how much we pay our mechanics each hour, how many hours they worked on the car, and how many workers were involved.

Example: We pay mechanics \$50 an hour each and 2 of them worked on the car for 3 hours each.

What is our labor cost?

Ji Scratch Lesson 3A • Summer 2012 • slide 93

## Car Shop: Variation 2

- How about if we figure out labor costs based on how much we pay our mechanics each hour, how many hours they worked on the car, and how many workers were involved.

Example: We pay mechanics \$50 an hour each and 2 of them worked on the car for 3 hours each.

What is our labor cost? \$300

Ji Scratch Lesson 3A • Summer 2012 • slide 94

## Car Shop: Variation 2

- How about if we figure out labor costs based on how much we pay our mechanics each hour, how many hours they worked on the car, and how many workers were involved.

Example: We pay mechanics \$50 an hour each and 2 of them worked on the car for 3 hours each.

What is our labor cost? \$300

Some variables

Ji Scratch Lesson 3A • Summer 2012 • slide 95

## Car Shop: Variation 2

- How about if we figure out labor costs based on how much we pay our mechanics each hour, how many hours they worked on the car, and how many workers were involved.

Example: We pay mechanics \$50 an hour each and 2 of them worked on the car for 3 hours each.

What is our labor cost? \$300

Some variables

Ji Scratch Lesson 3A • Summer 2012 • slide 96



## Car Shop: Variation 2

- How about if we figure out labor costs based on how much we pay our mechanics each hour, how many hours they worked on the car, and how many workers were involved.

Example: We pay mechanics \$50 an hour each and 2 of them worked on the car for 3 hours each.

What is our labor cost? \$300

What is general equation?  $\text{LaborCost} = ?$

Ji Scratch Lesson 3A • Summer 2012 • slide 97

## Car Shop: Variation 2

- How about if we figure out labor costs based on how much we pay our mechanics each hour, how many hours they worked on the car, and how many workers were involved.

Example: We pay mechanics \$50 an hour each and 2 of them worked on the car for 3 hours each.

What is our labor cost? \$300

```
set LaborCost to RepairHours * NumberOfRepairPeople * HourlyLaborRate
```

Ji Scratch Lesson 3A • Summer 2012 • slide 98

## Car Shop: Variation 2

- Of course we have to get the three values as input...

Ji Scratch Lesson 3A • Summer 2012 • slide 99

## Car Shop: Variation 2

- Of course we have to get the three values as input...

```
ask How much does shop currently charge for each hour of labor? and wait
set HourlyLaborRate to answer
ask How many hours did it take to fix the car? and wait
set RepairHours to answer
ask How many workers did it take? and wait
set NumberOfRepairPeople to answer
```

Ji Scratch Lesson 3A • Summer 2012 • slide 100

## Car Shop: Variation 2 Complete

Ji Scratch Lesson 3A • Summer 2012 • slide 101

## Car Shop: Variation 2 Complete

### I. Ask initial questions, decide ProfitRate

```
when clicked
ask How much does shop currently charge for each hour of labor? and wait
set HourlyLaborRate to answer
ask How much do you think customer's car is worth? and wait
set CarValue to answer
if CarValue < $5000
set ProfitRate to .25
else
set ProfitRate to .5
```

Ji Scratch Lesson 3A • Summer 2012 • slide 102

## Car Shop: Variation 2 Complete

### II. Ask rest of the questions

```
ask How much did parts cost? and wait
set CostOfParts to answer
ask How many hours did it take to fix the car? and wait
set RepairHours to answer
ask How many workers did it take? and wait
set NumberOfRepairPeople to answer
```

Ji Scratch Lesson 3A • Summer 2012 • slide 103

## Car Shop: Variation 2 Complete

### III. Calculate all the aspects of bill and display it

```
set LaborCost to RepairHours * NumberOfRepairPeople * HourlyLaborRate
set RepairCost to CostOfParts + LaborCost
set Profit to RepairCost * ProfitRate
set Bill to RepairCost + Profit
say join Customer owes us $ Bill for 3 secs
stop script
```

Ji Scratch Lesson 3A • Summer 2012 • slide 104

## Car Shop: Variation 2 Complete

```
when clicked
ask How much does shop currently charge for each hour of labor? and wait
set HourlyLaborRate to answer
ask How much do you think customer's car is worth? and wait
set CarValue to answer
if CarValue < $5000
  set ProfitRate to 25
else
  set ProfitRate to 5
ask How many hours did car cost? and wait
set CostOfParts to answer
ask How many hours did it take to fix the car? and wait
set RepairHours to answer
ask How many workers did it take? and wait
set NumberOfRepairPeople to answer
set LaborCost to RepairHours * NumberOfRepairPeople * HourlyLaborRate
set RepairCost to CostOfParts + LaborCost
set Profit to RepairCost * ProfitRate
set Bill to RepairCost + Profit
say join Customer owes us $ Bill for 3 secs
stop script
```

mer 2012 • slide 105

## Car Shop: Variation 2 Complete

Demo:  
CarRepair  
3

```
when clicked
ask How much does shop currently charge for each hour of labor? and wait
set HourlyLaborRate to answer
ask How much do you think customer's car is worth? and wait
set CarValue to answer
if CarValue < $5000
  set ProfitRate to 25
else
  set ProfitRate to 5
ask How many hours did car cost? and wait
set CostOfParts to answer
ask How many hours did it take to fix the car? and wait
set RepairHours to answer
ask How many workers did it take? and wait
set NumberOfRepairPeople to answer
set LaborCost to RepairHours * NumberOfRepairPeople * HourlyLaborRate
set RepairCost to CostOfParts + LaborCost
set Profit to RepairCost * ProfitRate
set Bill to RepairCost + Profit
say join Customer owes us $ Bill for 3 secs
stop script
```

mer 2012 • slide 106

## Car Shop: With Multimedia

Demo: CarRepair

Ji Scratch Lesson 3A • Summer 2012 • slide 107

## Car Shop: With Multimedia

What's new?

Ji Scratch Lesson 3A • Summer 2012 • slide 108

## Car Shop: With Multimedia

What's new?  
Multiple Costumes

Ji Scratch Lesson 3A • Summer 2012 • slide 109

## Car Shop: With Multimedia

What's new?  
Multiple Costumes

- each with own name

Ji Scratch Lesson 3A • Summer 2012 • slide 110

## Car Shop: With Multimedia

What's new?  
Multiple Costumes

- each with own name
- statement to switch to new one:

Ji Scratch Lesson 3A • Summer 2012 • slide 111

## Car Shop: With Multimedia

What's new?  
Multiple Costumes

- each with own name
- statement to switch to new one:

Ji Scratch Lesson 3A • Summer 2012 • slide 112

## Car Shop: With Multimedia

What's new?  
Multiple Sounds

Ji Scratch Lesson 3A • Summer 2012 • slide 113

## Car Shop: With Multimedia

What's new?  
Multiple Stage Backgrounds

Ji Scratch Lesson 3A • Summer 2012 • slide 114

## Car Shop: With Multimedia

What's new?  
Multiple Stage Backgrounds

Ji Scratch Lesson 3A • Summer 2012 • slide 115

## Car Shop: With Multimedia

What's new?  
Multiple Stage Backgrounds  
Statement to switch to any one.

Ji Scratch Lesson 3A • Summer 2012 • slide 116

## Car Shop: With Multimedia

What's new?  
Multiple Stage Backgrounds  
Statement to switch to any one.

Ji Scratch Lesson 3A • Summer 2012 • slide 117

## Car Shop: With Multimedia

What's new?  
Multiple Stage Backgrounds  
For example this stage script is triggered at start to show first background

Ji Scratch Lesson 3A • Summer 2012 • slide 118

## Car Shop: With Multimedia

What's new?  
More Motion & Control

Ji Scratch Lesson 3A • Summer 2012 • slide 119

## Car Shop: With Multimedia

What's new?  
More Motion & Control  
Have script pause for a while

Ji Scratch Lesson 3A • Summer 2012 • slide 120

## Car Shop: With Multimedia

What's new?  
More Motion & Control

Have sprite move at a steady pace to a new screen location over a specified time period



Ji Scratch Lesson 3A • Summer 2012 • slide 121

## Car Shop: With Multimedia

What's new?  
Having an item trigger an action to occur to another sprite or to the stage

Ji Scratch Lesson 3A • Summer 2012 • slide 122

## Car Shop: With Multimedia

What's new?  
Having an item trigger an action to occur to another sprite or to the stage



Ji Scratch Lesson 3A • Summer 2012 • slide 123

## Car Shop: With Multimedia

What's new?  
Having an item trigger an action to occur to another sprite or to the stage

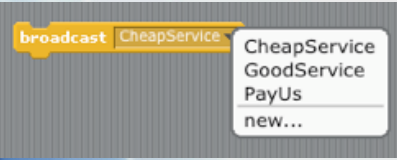
Sends a "message" of your choice out to other items.



Ji Scratch Lesson 3A • Summer 2012 • slide 124

## Car Shop: With Multimedia

What's new?  
Having an item trigger an action to occur to another sprite or to the stage



Ji Scratch Lesson 3A • Summer 2012 • slide 125

## Car Shop: With Multimedia

What's new?  
Having an item trigger an action to occur to another sprite or to the stage

Can make New message at any time



Ji Scratch Lesson 3A • Summer 2012 • slide 126

## Car Shop: With Multimedia

What's new?  
Having an item trigger an action to occur to another sprite or to the stage

Scripts can be triggered by such messages

Ji Scratch Lesson 3A • Summer 2012 • slide 127

## Car Shop: With Multimedia

What's new?  
Having an item trigger an action to occur to another sprite or to the stage



Scripts can be triggered by such messages

Ji Scratch Lesson 3A • Summer 2012 • slide 128

## Car Shop: With Multimedia

Much of the multimedia action in the car shop is triggered by particular messages broadcast by the car sprite. [Here are some scripts the stage has:](#)

Cheap service show

Ji Scratch Lesson 3A • Summer 2012 • slide 129

## Car Shop: With Multimedia

Much of the multimedia action in the car shop is triggered by particular messages broadcast by the car sprite. [Here are some scripts the stage has:](#)

Cheap service show



Ji Scratch Lesson 3A • Summer 2012 • slide 130

## Car Shop: With Multimedia

Much of the multimedia action in the car shop is triggered by particular messages broadcast by the car sprite. [Here are some scripts the stage has:](#)

Luxury service show



Ji Scratch Lesson 3A • Summer 2012 • slide 131

## Car Shop: With Multimedia

Much of the multimedia action in the car shop is triggered by particular messages broadcast by the car sprite. [Here are some scripts the stage has:](#)

Credit Card time



Ji Scratch Lesson 3A • Summer 2012 • slide 132

# Car Shop: With Multimedia

Complete Car Script

Scratch Lesson 3A • Summer 2012 • slide 133

# Car Shop: With Multimedia

Complete Car Script (Part I)

Scratch Lesson 3A • Summer 2012 • slide 134

# Car Shop: With Multimedia

Complete Car Script (Part I)

Let viewers enjoy starting background a while

Scratch Lesson 3A • Summer 2012 • slide 135

# Car Shop: With Multimedia

Complete Car Script (Part I)

Move sprite to starting position

Scratch Lesson 3A • Summer 2012 • slide 136

# Car Shop: With Multimedia

Complete Car Script (Part I)

Show sprite as starting question mark

Scratch Lesson 3A • Summer 2012 • slide 137

# Car Shop: With Multimedia

Complete Car Script (Part I)

Tell viewer the essence of the shop and calculation

Scratch Lesson 3A • Summer 2012 • slide 138

## Car Shop: With Multimedia

Complete Car Script (Part II)

Ask for key values

Ji Scratch Lesson 3A • Summer 2012 • slide 139

## Car Shop: With Multimedia

Complete Car Script (Part II)

Explain why they are being shown the multimedia show

Ji Scratch Lesson 3A • Summer 2012 • slide 140

## Car Shop: With Multimedia

Complete Car Script (Part III)

For inexpensive car, change costume to jalopy and play trouble starting sound, drive car to Joe, and show donut sequence. Time it well, use waits if useful.

Ji Scratch Lesson 3A • Summer 2012 • slide 141

## Car Shop: With Multimedia

Complete Car Script

Most importantly, set ProfitRate so upcoming calculation uses 25%

Ji Scratch Lesson 3A • Summer 2012 • slide 142

## Car Shop: With Multimedia

Complete Car Script (Part III)

Otherwise it is an expensive car, So change costume to sports car and play zoom sound, drive car into shop, and show luxury sequence. Time it well, use waits if useful.

Ji Scratch Lesson 3A • Summer 2012 • slide 143

## Car Shop: With Multimedia

Complete Car Script (Part IV)

Of course, prepare for calculations by setting ProfitRate for 50%

Ji Scratch Lesson 3A • Summer 2012 • slide 144



## Car Shop: With Multimedia

Complete Car Script (V) Ask for other necessary values, exactly as we did in previous versions of code

Ji Scratch Lesson 3A • Summer 2012 • slide 145

## Car Shop: With Multimedia

Complete Car Script (Part VI) And do calculations like we have been doing:

Ji Scratch Lesson 3A • Summer 2012 • slide 146

## Car Shop: With Multimedia

Complete Car Script (Part VII) Finally signal stage to switch to credit card background and show how much customer owes

Ji Scratch Lesson 3A • Summer 2012 • slide 147

## Car Shop: With Multimedia

Complete Car Script (Part VII) Finally signal stage to switch to credit card background and show how much customer owes

Remember this stage script?

Ji Scratch Lesson 3A • Summer 2012 • slide 148

## Complete Script

We are done, it was fun

Ji Scratch Lesson 3A • Summer 2012 • slide 149

## Complete Script

We are done, it was fun

I. Start

Ji Scratch Lesson 3A • Summer 2012 • slide 150

Complete Script

We are done,  
it was fun



II. Ask  
type of car

Ji Scratch Lesson 3A • Summer 2012 • slide 151

Complete Script

We are done,  
it was fun




III. Handle  
cheap car

Ji Scratch Lesson 3A • Summer 2012 • slide 152

Complete Script

We are done,  
it was fun




IV. Or handle  
nice car

Ji Scratch Lesson 3A • Summer 2012 • slide 153

Complete Script

We are done,  
it was fun

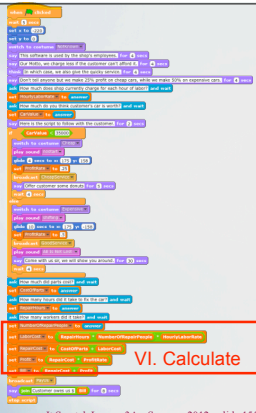


V. Ask for  
other values

Ji Scratch Lesson 3A • Summer 2012 • slide 154

Complete Script

We are done,  
it was fun




VI. Calculate

Ji Scratch Lesson 3A • Summer 2012 • slide 155

Complete Script

We are done,  
it was fun




VII. Display  
bill & end

Ji Scratch Lesson 3A • Summer 2012 • slide 156

Complete Script

We are done,  
it was fun



The image shows a Scratch script for a character. The script starts with a 'when green flag clicked' event, followed by a 'say' block with the text 'We are done, it was fun' and a duration of 2 seconds. This is followed by a 'wait' block for 2 seconds, then a 'say' block with the text 'We are done, it was fun' and a duration of 2 seconds. The script ends with a 'say' block with the text 'We are done, it was fun' and a duration of 2 seconds.

It Scratch Lesson 3A • Summer 2012 • slide 157

Availability of Slides

Go to

[nbc.rutgers.edu/~jt](http://nbc.rutgers.edu/~jt)

to see the powerpoint  
slides and/or podcasts  
for this lecture

It Scratch Lesson 3A • Summer 2012 • slide 158