
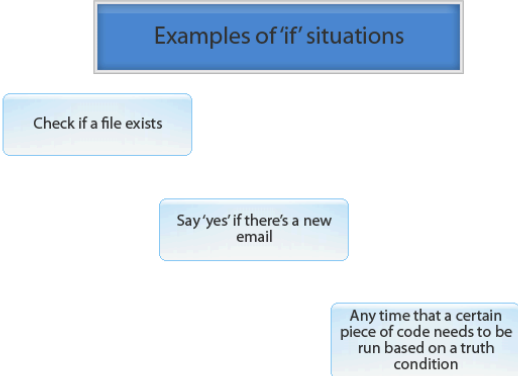


# 'An Introduction to If, For, and While in Ruby' – Storyboard / Instruction

Scott Simpson, February 2011 :: EDTEC 671

Slide	Image	Material	Type
1		<b>Text:</b> "An Introduction to If, For, and While in Ruby"	Intro
2		<b>Narration:</b> "The If, For, and While statements are three very commonly used control structures in Ruby.  For and While are loops, which are pieces of code that execute a certain number of times based on a condition. They allow us to perform operations on each item in a list, or do something while a value is true.  The If control structure executes code only when a value is true, but it does not loop, or iterate. This is useful if we want to change the function of a program for just one conditional.  <b>Visual:</b> Abstract representation of a loop and an if statement.	Instruction
2		<b>Narration:</b> Examples of if situations include checking if a file exists, and saying 'yes' if there's a new email. Basically, an if statement lets us run a certain piece of code based on a truth condition.	Example

<p>3</p>	<p style="text-align: center;"><b>Multiple Choice</b></p> <p><b>An example of an 'if' situation is:</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> A) a block of code that adds two numbers together</li> <li><input type="radio"/> B) a block of code that loops based on a condition</li> <li><input type="radio"/> C) a block of code that runs when a value is true</li> </ul> <p style="font-size: small;">Question 1 of 1</p> <p style="text-align: center;"> <input type="button" value="Clear"/> <input type="button" value="Back"/> <input type="button" value="Skip"/> <input type="button" value="Submit"/> </p>	<p><b>Quiz</b> – definition of if</p> <ul style="list-style-type: none"> <li>a) This is a loop. Try again.</li> <li>b) Correct.</li> <li>c) An 'if' situation needs to test whether something is true. Try again.</li> </ul>	<p>Practice/Feedback</p>
<p>4</p>	<p style="text-align: center;"><b>Examples of 'loop' situations</b></p> <div style="display: flex; flex-direction: column; align-items: center; gap: 20px;"> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px 15px; background-color: #e6f2ff;">Counting to 100</div> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px 15px; background-color: #e6f2ff;">Capitalizing each word in a list</div> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px 15px; background-color: #e6f2ff;">Any time a piece of code needs to be run over and over, based on a condition</div> </div>	<p><b>Narration:</b> Examples of loops include counting to 100 and capitalizing each word in a list. If you need to apply the same code to each item in a list or array, or need to perform a counting operation, a loop is what you need to use.</p>	<p>Example</p>
<p>5</p>	<p style="text-align: center;"><b>Multiple Choice</b></p> <p><b>A loop is:</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> A) A piece of code that executes based on something being true.</li> <li><input type="radio"/> B) A piece of code that executes a certain number of times based on a condition.</li> <li><input type="radio"/> C) A piece of code that executes over and over.</li> </ul> <p style="font-size: small;">Question 2 of 2</p> <p style="text-align: center;"> <input type="button" value="Clear"/> <input type="button" value="Back"/> <input type="button" value="Skip"/> <input type="button" value="Submit"/> </p>	<p><b>Quiz</b> – definition of loop</p> <ul style="list-style-type: none"> <li>a) Correct.</li> <li>b) This is one thing that a loop needs can do, but it also needs to repeat. Try again.</li> <li>c) A loop situation needs to repeat based on information that it receives. Try again.</li> </ul>	<p>Practice/Feedback</p>

6	<div> <p>The 'if' block</p> </div> <div> <pre>n = 5 if n &lt; 4   puts "cats!" end puts "dogs!"</pre> </div> <div> <p>Result: dogs!</p> </div>	<p><b>Narration:</b> An 'if' block runs only <u>if</u> something is true. In this example, n is equal to five. The if block asks if n is less than 4, which is not the case, so we only see 'dogs', and not 'cats' in the result. 'Cats' was never written as output by the loop, but 'dogs' was, because it was outside of the block.</p> <p><b>Visual:</b> A basic 'if' block in Ruby, and the result of running it.</p>	Instruction
7	<div> <p>Examples of programs using 'if' blocks</p> </div> <div> <p>A program that tells the user whether a number they entered is even.</p> </div> <div> <p>A piece of a program that alerts the user that something is true.</p> </div>	<p><b>Narration:</b> A program that tells the user whether a number they entered is even would rely on an 'if' block to test the number.</p> <p>A program that alerts the user that something is true would also rely on an 'if' block. If the condition is false, the 'if' block would not return anything.</p>	Instruction
8	<div> <p>Multiple Choice</p> </div> <div> <p>An example of an 'if' block is</p> </div> <div> <ul style="list-style-type: none"> <li><input type="radio"/> A) a program that plays a music file.</li> <li><input type="radio"/> B) a program that counts the number of lines in a file.</li> <li><input type="radio"/> C) a program that tells the user if there's an internet connection.</li> </ul> </div> <div> <p>Question 1 of 2</p> </div> <div> <p>Clear Back Skip Submit</p> </div>	<p><b>Quiz</b> – identify 'if' block</p> <ul style="list-style-type: none"> <li>a) Correct.</li> <li>b) This program doesn't check to see if anything is true. Try again.</li> <li>c) This program doesn't check to see if anything is true. Try again.</li> </ul> <ul style="list-style-type: none"> <li>a) This program loads and plays a file, but doesn't care if anything is true. Try again.</li> <li>b) Correct.</li> <li>c) This program loops across a file, but doesn't check to see if something is true. Try again.</li> </ul>	Practice/Feedback

## Multiple Choice

An example of an 'if' block is:

- A) a program that draws a circle on the screen.
- B) a program that calculates the cube root of 50.
- C) a program that checks to see if a certain file exists.

Question 1 of 3

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Submit

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## Sequence

Arrange in sequence

- A) end
- B) puts "x is three!"
- C) if x == 3
- D) x = 3

Question 3 of 3

Clear

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Skip

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Quiz – put 'if' block in order

Correct.

Practice/Feedback

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## The 'for' loop

```
myArray = [1, 2, 3, 4, 5]
for n in myArray
  puts n+5
end
```

Result:

```
6
7
8
9
10
```

**Narration:** A 'for' loop allows us to iterate through items in a list or array. Usually, we'll assign a variable as a placeholder for whichever item in the list we're working with. In this example, we'll use the variable 'n' to stand in for each of the numbers in the array in turn. The structure of the for loop can be read like a regular sentence: For 'n' in myArray, put n plus five. We need to write 'end' at the end of the code that we want to loop over. There are many shorthand ways of doing 'for' loops in Ruby, but this shows the basic idea.

**Visual:** a basic 'for' loop in Ruby, and the result of running it.

Instruction

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Examples of programs using a 'for' loop

A program that asks for three numbers, returns their square, and exits.

A program that displays a list of files in a folder.

**Narration:** The first example here, 'a program that asks for three numbers, returns their square, and exits' will probably store the numbers in an array. This program would then operate on each of the items in the array. The second example, 'a program that displays a list of files in a folder' would print a line for each file in a directory list.

Instruction

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Multiple Choice

An example of a 'for' loop is:

- A) a program that reads a list of words and returns their definition.
- B) a program that only exits when the user types 'quit'.
- C) a program that determines if a certain file exists on disk.

Question 1 of 3

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Multiple Choice

An example of a 'for' loop is:

- A) a program that asks for 3 numbers and returns those numbers multiplied by 2.
- B) a program that plays a music file.
- C) a program that prints 'Cats are fuzzy.'

Question 2 of 3

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Quiz – identify 'for' loops

- a) This program only has one conditional, not a set. Try again.
- b) This is an example of a conditional loop that executes while something is true. A 'for' loop operates on a set or list of values. Try again.
- c) Correct.
  
- a) Correct.
- b) This program doesn't rely on a set of items. Try again.
- c) This program only prints one line, and doesn't rely on a set of items. Try again.

Practice/Feedback

<p>13</p>	<p style="text-align: center;"><b>Sequence</b></p> <p><b>Arrange in sequence</b></p> <ol style="list-style-type: none"> <li>1. puts "#{x} squared is:"</li> <li>2. puts x^2</li> <li>3. end</li> <li>4. for x in (0..5)</li> </ol> <p style="font-size: small;">Question 3 of 3</p> <p style="text-align: center;"> <input type="button" value="Clear"/> <input type="button" value="Back"/> <input type="button" value="Skip"/> <input type="button" value="Submit"/> </p>	<p><b>Quiz</b> – put ‘for’ loop in order</p> <p>Correct. This loop is structured like a sentence: For x in zero through five, it puts x and puts x squared.</p>	<p>Practice/Feedback</p>
<p>14</p>	<p style="text-align: center;"><b>The ‘while’ loop</b></p> <pre style="border: 1px solid red; padding: 5px;"> n = 0 while n &lt; 5   puts n   n = n + 1 end </pre> <p style="font-size: small;">Result:</p> <pre style="border: 1px solid red; padding: 5px;"> 0 1 2 3 4 </pre>	<p><b>Narration:</b> A ‘while’ loop runs a piece of code <u>while</u> a certain condition is true. In this example, we start with n equal to zero. The while loop then checks to see if n is less than five. While it is, it prints the value of n, and then adds one to n. As you can see from the result, the loop runs five times, and then stops when n reaches five because n is no longer less than five.</p> <p><b>Visual:</b> A basic ‘while’ loop in Ruby, and the result of running it.</p>	<p>Instruction</p>
<p>15</p>	<p style="text-align: center;"><b>Examples of programs using ‘while’ loops</b></p> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="border: 1px solid lightblue; padding: 5px; width: 45%;"> <p style="font-size: small;">A program that counts up to 100, then exits.</p> </div> <div style="border: 1px solid lightblue; padding: 5px; width: 45%;"> <p style="font-size: small;">A game that asks the user to guess a random number, and does not exit until the user guesses correctly.</p> </div> </div>	<p><b>Narration:</b> A program that counts to 100 uses a while loop, because it prints a value, adds one to it, and continues until the value reaches 100.</p> <p>A game that asks the user to guess a random number will loop <u>while</u> the answer is wrong. When the answer is correct, the loop exits.</p>	<p>Instruction</p>

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### Multiple Choice

An example of a 'while' loop is:

- A) A program that lists all of the files in a folder.
- B) A program that grants access only after the correct password is typed in.
- C) A program that calculates the volume of a cone, given base and height.

Question 1 of 3

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### Multiple Choice

An example of a 'while' loop is:

- A) a program that counts to 1,000.
- B) a program that draws a circle on the screen.
- C) a program that downloads a PDF file.

Question 2 of 3

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**Quiz** – identify 'while' loop

- a) This program operates on a set list of items. It doesn't have to wait for a conditional to be true. Try again.
  - b) Correct.
  - c) This program does not need to loop.
- 
- a) Correct.
  - b) This program doesn't need to loop and has no conditional. Try again.
  - c) This program doesn't need to loop and has no conditional. Try again.

Practice/Feedback

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### Sequence

Arrange in sequence

1. while gets != "exit\n"
2. puts "The program is still running!"
3. end

Question 3 of 3

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**Quiz** – put 'while' loop in order

Correct. This loop is structured like a sentence: While 'gets' is not 'exit', it puts 'the program is still running!'

Practice/Feedback

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**True/False**

A 'while' loop continues until a condition is false.

- A) True
- B) False

Question 1 of 5

**True/False**

An 'if' block only executes once, if at all.

- A) True
- B) False

Question 2 of 5

**Test - if or while?**

Test

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**True/False**

An 'for' loop requires a list of items.

- A) True
- B) False

Question 3 of 5

**Test - while or for?**

Test

	<p style="text-align: center;"><b>True/False</b></p> <p>A 'while' loop would be the best way to check if a file exists on disk.</p> <p> <input type="radio"/> A) True  <input type="radio"/> B) False </p> <p style="text-align: right; font-size: small;">Question 4 of 5</p> <p style="text-align: right;"> <input type="button" value="Clear"/> <input type="button" value="Back"/> <input type="button" value="Skip"/> <input type="button" value="Submit"/> </p>				
<b>20</b>	<p style="text-align: center;"><b>Matching</b></p> <p>Match the following</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p style="font-size: small;">Column 1</p> <p><input type="text" value=""/> 'while' loop</p> <p><input type="text" value=""/> 'if' block</p> <p><input type="text" value=""/> 'for' loop</p> </td> <td style="width: 50%; vertical-align: top;"> <p style="font-size: small;">Column 2</p> <p>A) count to 100</p> <p>B) check whether x = 1</p> <p>C) count lines in a text file</p> </td> </tr> </table> <p style="text-align: right; font-size: small;">Question 5 of 5</p> <p style="text-align: right;"> <input type="button" value="Clear"/> <input type="button" value="Back"/> <input type="button" value="Skip"/> <input type="button" value="Submit"/> </p>	<p style="font-size: small;">Column 1</p> <p><input type="text" value=""/> 'while' loop</p> <p><input type="text" value=""/> 'if' block</p> <p><input type="text" value=""/> 'for' loop</p>	<p style="font-size: small;">Column 2</p> <p>A) count to 100</p> <p>B) check whether x = 1</p> <p>C) count lines in a text file</p>	<p><b>Test</b> – match loops types to examples.</p>	<p>Test</p>
<p style="font-size: small;">Column 1</p> <p><input type="text" value=""/> 'while' loop</p> <p><input type="text" value=""/> 'if' block</p> <p><input type="text" value=""/> 'for' loop</p>	<p style="font-size: small;">Column 2</p> <p>A) count to 100</p> <p>B) check whether x = 1</p> <p>C) count lines in a text file</p>				
<b>21</b>		<p>Summary – overall performance</p>	<p>Summary</p>		