COSC 123 Computer Creativity

Decisions and Loops

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COSC 123- Dr. Ramon Lawrence **Key Points** 1) The If/Else statement is used to make decisions. 2) A decision requires a condition that consists of relational operators and Boolean functions. 3) A set of statements can be executed multiple times using While and Loop statements. Page 2





Demonstration Exercise Decisions

Use intersection.a2w.

Tasks:

- ♦Play the animation.
- ♦Modify so that the biker turns left 90% of the time.
- Modify so that the bike turn is smoother by moving forward and turning right at the same time.
- Modify so that the biker plays says "Hello" regardless of which direction turned.

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Demonstration Exercise Nested Decisions

Use intersection2.a2w.

Tasks:

- ♦Play the animation.
- Modify so that if the bike goes left he says "whoo hoo" while at the same time spinning around once.
- Modify so that there is a 50% of turning back around if the decision was to go straight.
- Add comments to say what each block of code in your if/else statements does.

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Relational Operators

Relational operators are used to compare numeric data:

- Greater than
 Greater than or equal
 Less than
 Less than or equal
- ♦== Equal
- ♦!= Not equal

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Relational Operators			
Question: True or false: a is true and b is false. What is both a and b?			
A) true			
B) false			



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Decision Exercises

- Exercise #1: Turning Boat Create a water world with a boat. ◆Make the boat turn one half turn to the right if a random number between 1 and 100 is even otherwise one half turn to the left if the random number is odd.
- ♦All your code can be in the my first method.

Exercise #2: Turning Zamboni - Create a world with a zamboni. •Create a method called turn for the zamboni that has a

- parameter called num. ◆In the turn method, decide if **num** is between 50 and 100
- inclusive. If it is, turn the zamboni around.
- ◆Test your code with four method calls in my first method with the values 75, 50, 25, 150. Go forward 10 meters before each call. Page 13

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The While Statement	
A While statement executes the sta as its condition remains true.	tements it contains as long
 The condition is checked at the star of every loop <i>iteration</i>. 	rt of the loop and at the start
 An infinite loop is a loop whose con and the loop never ends. 	dition never becomes false,
Example:	
(133) = 1 ~	create new variable
⊟While 1 - <= 5	
dragon T move up T 5 meters T more T	
dragon = turn left = 1 revolution = more =	
dragon = move down = 5 meters = more =	
<u>i</u> set value to (<u>i</u> + 1 ⊂) ⊂ more ~	
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Demonstration Exercise Decisions

Use SpeedingCar.a2w.

Tasks:

♦Play the animation.

- ◆Modify so that the it calculates the total distance the car travels during its trip. Print out the result when the car comes to a stop
- Modify so that the distance is updated while the car is moving. Display the result as a 3D text object in the window.
- Modify so that the speed is also continuously updated.

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While Statement			
Question: How many times does this While statement execute?			
[123] j = 1 ~	create new variable		
⊡White 1 ▼ < 5 ▼ ▼			
dragon = move up = 5 meters = more =			
<u>i =</u> set value to (<u>i = + 1 =)</u> = more =			
A) 0			
B) 3			
C) 4			
D) 5			
E) 6			
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While Statement (2)	
Question: How many times does this execute?	While statement
122) = 1 ~	create new variable
□While 1 - <= 4	
dragon T move up T 5 meters T more T	
A) 0	
B) 3	
C) 4	
D) 5	
E) infinite	
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Ques	stion:	How far o	ff the ground	is the dragon?	?
23 j = 1					create new varia
- While	17	= 4 ~ ~			
	either	== 1 = ·	• or [] == 4 = =	, or both 🤟	
	dragon	move up 🕾 i met	ers 🗠 more 🖘		
E	lse dragon 📹	move down 🖘 i n	neters 🗢 more 🕾		
inc	rement i 🖯	by 1 more 🕾			
	~		a) a		E) 40





Exercises Decisions and Loops

Exercise #1: Counting - Create a world with a 3D text object that counts from 1 to 10. Then counts down from 10 to 1.

Exercise #2: Jumping - Create a world where four characters perform jumps in unison five times. Each time give one of the characters a 30% chance to replace a jump with a full turn.

Exercise #3: Bouncing Ball - Create a world where a ball rolls off a table, bounces on the ground, and comes to rest. Decrease the height of the bounce by half each time. Move the ball away from the table slightly each bounce. Stop when the bounce height is small.

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Conclusion

Decisions using the **lf/Else** statement allow for controlling the flow of a program and decide when to execute certain statements.

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Repetition of a block of statements can be done using:

- ♦While statement that executes statements until its condition is false
- ◆Loop statement that executes statements a specific number of times
- An infinite loop is a loop whose condition never becomes false (the loop never ends).

Decisions using If/Else statements and repetition using While/Loop statements can be nested. $$P_{age\,26}$$

Objectives

Key terms: decision, loop, condition

Alice skills:

- ♦Making decisions with If/Else.
- ◆Conditions: relational operators and Boolean (logical) operators. ♦Nested If/Else decisions.
- •Repetition using the **while** statement.
- •Repetition using the Loop statement.
- Nested repetition statements.
- ♦Using 3D Text boxes.

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