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Module 3  
Data Types, Variables, and  
Constants

Lecture  
Data Types, Variables, and  
Constants


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# Module 3 Learning Objectives

Bloom Level	Number	Name	Description	Course Learning Objectives
3: Apply	1	Given Types	Develop a console application that uses specified data types	Basic Programming Concepts
3: Apply	2	Selected Types	Develop a console application that uses programmer-selected data types	Basic Programming Concepts
2: Understand	3	Data Type Comparison	Compare and contrast different C# data types	Basic Programming Concepts
3: Apply	4	Calculations	Develop a console application that uses variables and constants for calculations	Basic Programming Concepts



Remember from the previous lecture that  
everything in a computer is represented in binary



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## In-Lecture Quiz

If we have  $b$  bits, how many distinct values can we represent?

- A:  $2^b$
  - B:  $\log_2 b$
  - C: 8
  - D: 1024
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- What does 01000001 mean?
- It depends on how we interpret it
  - Could mean 65
  - Could mean A
  - Could mean a lot of other things!
- The data type of a variable or constant tells us how to interpret the bits

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- Data type also determines the valid operations for the value
  - Adding an integer to a pixel value (almost) never makes sense
    - There's always an exception!
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		•
		•
		•
40	01000001	
41	11010101	
42	00000000	
43	01110101	
44	10011001	
45	01010101	
		•
		•
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How do we get a space in memory, that we can refer to by name rather than memory address, with bits that will be interpreted the way we want them to be?

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## In-Lecture Quiz

We get memory allocated for a variable in C# by doing what to the variable?

- A: defining it
  - B: declaring it
  - C: desalinizing it
  - D: beating it with a stick
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- When we declare a variable we provide the data type and the variable name
    - Optionally, we provide a value as well
  - When we declare a constant we provide the data type, the constant name, and the value
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## In-Lecture Quiz

What's the difference between variables and constants?

- A: The value of a variable can change while we run the program and the value of a constant can't
  - B: Variables are variable and constants are constant
  - C: The compiler has to know the value of a constant at compile time
  - D: Variables are green and constants are blue
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- Recap

- Data types tell us how to interpret the bits and what operations are valid for the value the bits represent
- We declare variable and constants to get memory space for values we need to store

- Next Time

- Numeric data types
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