CSCI 1304: Programming I

Chapter 2 Basic Computation

Part 1 Variables and Data Types

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Lecture 6

Week 3

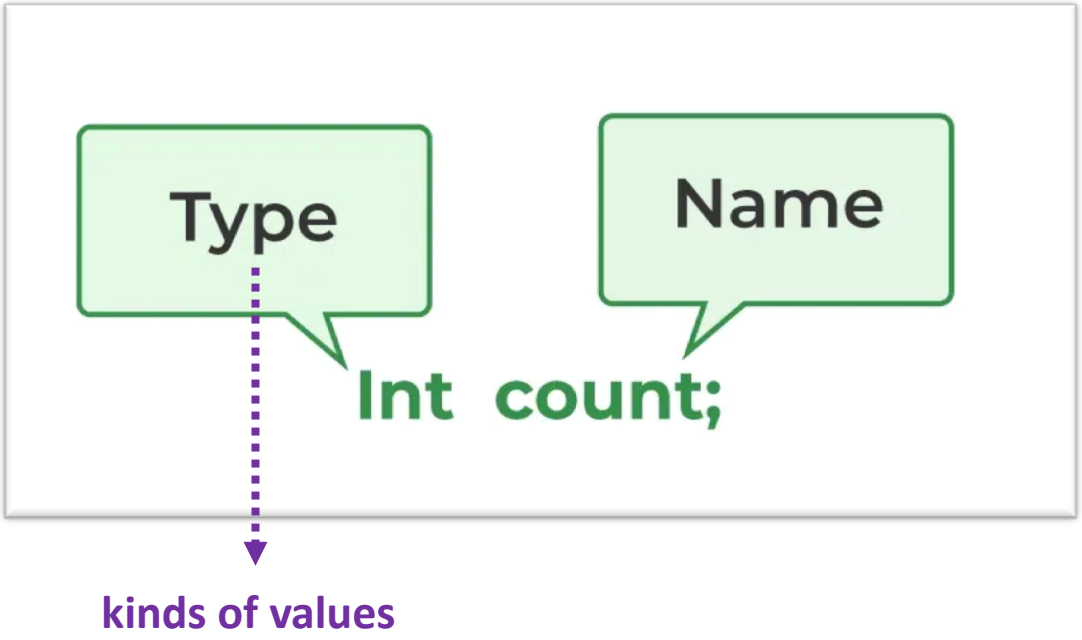
Objectives

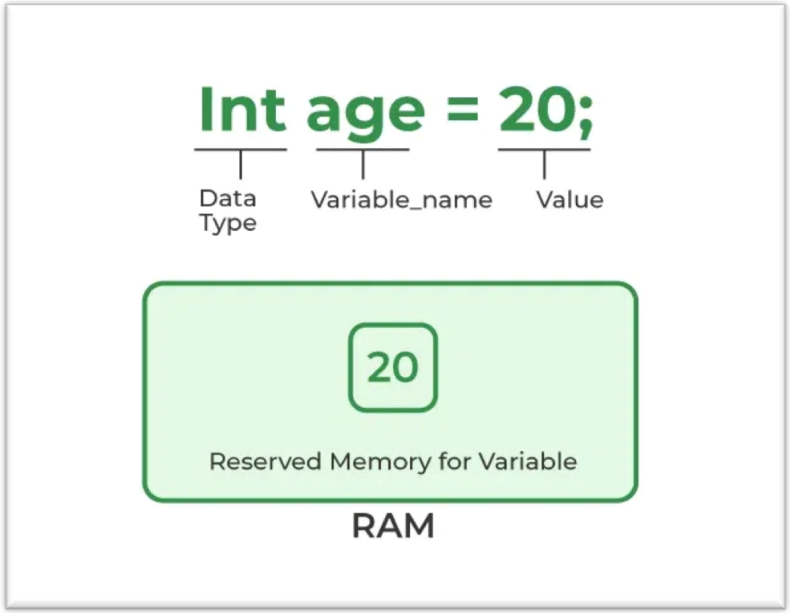
- Describe the Java **data types** used for simple data .
- Write **Java statements** to declare variables.

Variables

- Variables **store data** such as **numbers** and **letters**.
- Places to store data.
- They are implemented as **memory locations**.

Syntax





https://www.geeksforgeeks.org/variables-in-java/

Variables

- Class EggBasket.

```
public class EggBasket
{
    public static void main (String [] args)
    {
        int numberOfBaskets, eggsPerBasket, totalEggs;
        numberOfBaskets = 10;
        eggsPerBasket = 6;
        totalEggs = numberOfBaskets * eggsPerBasket;
        System.out.println ("If you have");
        System.out.println (eggsPerBasket + " eggs per basket and");
        System.out.println (numberOfBaskets + " baskets, then");
        System.out.println ("the total number of eggs is " + totalEggs);
    }
}
```

Variables

Assigning values

Variables

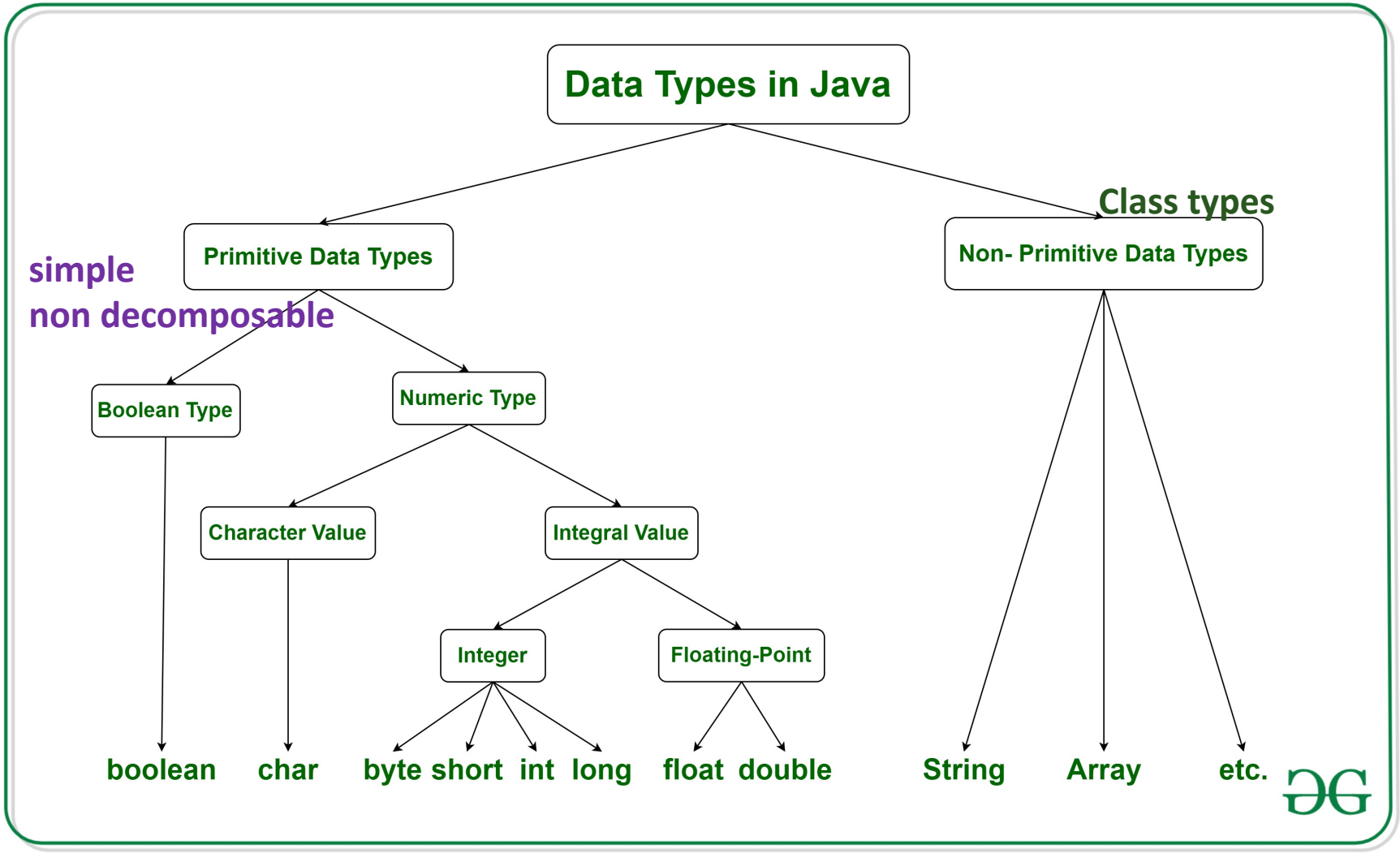
- Class EggBasket **(Output)**

```
If you have
6 eggs per basket and
10 baskets, then
the total number of eggs is 60
```

Naming and Declaring Variables

- Choose names that are helpful such as **`count`** or **`speed`**, but not **`c`** or **`s`**.
  - **Example**: **`numberOfBaskets, eggsPerBasket , studentAge, universityName.`**
- A variable's *type* determines what **kinds of values** it can hold (**`int`**, **`double`**, **`char`**, etc.).
- A variable must be declared before it is used.

Data Types



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Data Types

Type Name	Kind of Value	Memory Used	Range of Values
byte	Integer	1 byte	–128 to 127
short	Integer	2 bytes	–32,768 to 32,767
int	Integer	4 bytes	–2,147,483,648 to 2,147,483,647
long	Integer	8 bytes	–9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
float	Floating-point	4 bytes	$\pm 3.40282347 \times 10^{+38}$ to $\pm 1.40239846 \times 10^{-45}$
double	Floating-point	8 bytes	$\pm 1.79769313486231570 \times 10^{+308}$ to $\pm 4.94065645841246544 \times 10^{-324}$
char	Single character (Unicode)	2 bytes	All Unicode values from 0 to 65,535
boolean		1 or more bytes	True or false

Data Types

- **Four** integer types (`byte`, `short`, `int`, and `long`)
  - `int` is most common
  - Example: `0  -1  365  12000`
- **Two** floating-point types (`float` and `double`)
  - `double` is more common
  - Example: `0.99  -22.8  3.14159 5.0`
- **One** character type (`char`)
  - Example: `'a'  'A'  '#'  ' '`
- **One** boolean type (`boolean`)
  - Example: `true  false`

Data Types (Char ' ')

ASCII & Unicode Characters

- Character data types are encoded as numbers

ASCII is the American Standard Code for Information Interchange

Letter	ASCII Code	Letter	ASCII Code
A	01000001	N	01001110
B	01000010	O	01001111
C	01000011	P	01010000
D	01000100	Q	01010001
E	01000101	R	01010010
F	01000110	S	01010011
G	01000111	T	01010100
H	01001000	U	01010101
I	01001001	V	01010110
J	01001010	W	01010111
K	01001011	X	01011000
L	01001100	Y	01011001
M	01001101	Z	01011010

- Java uses two bytes to store characters as Unicode

- **Unicode** is a 16-bit character encoding established by the Unicode Consortium.

https://tutorials.freshersnow.com/java-category/java-unicode-system/