

CSCI 1304: Programming I

Chapter 2 Basic Computation

Part 1 Variables and Data Types

Dr. Nour Almadhoun Alserr

Lecture 6

Week 3



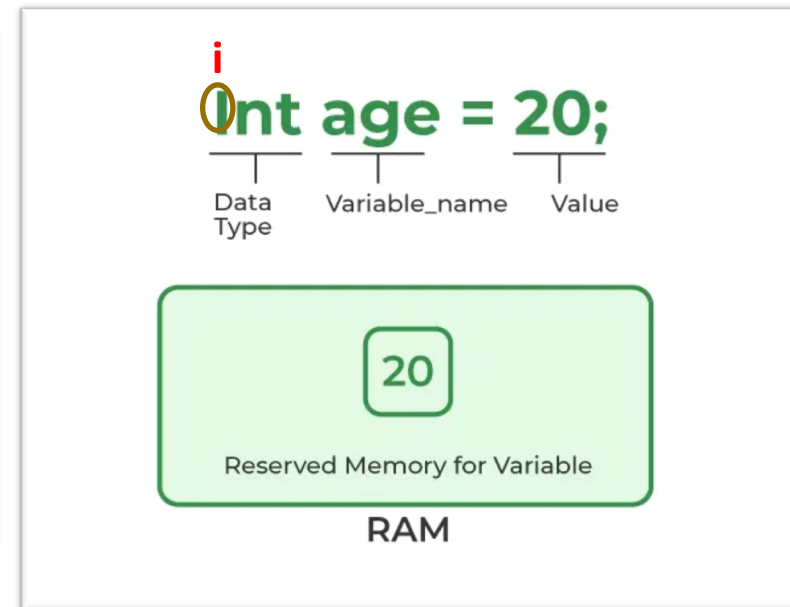
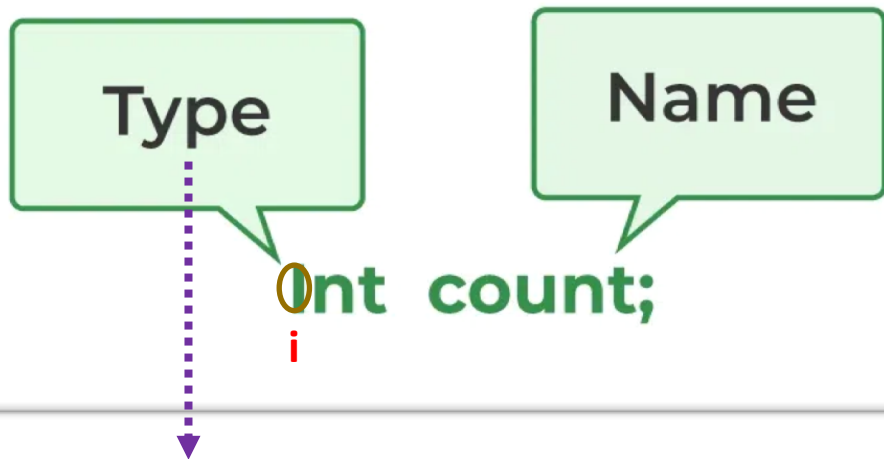
Objectives

- 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



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

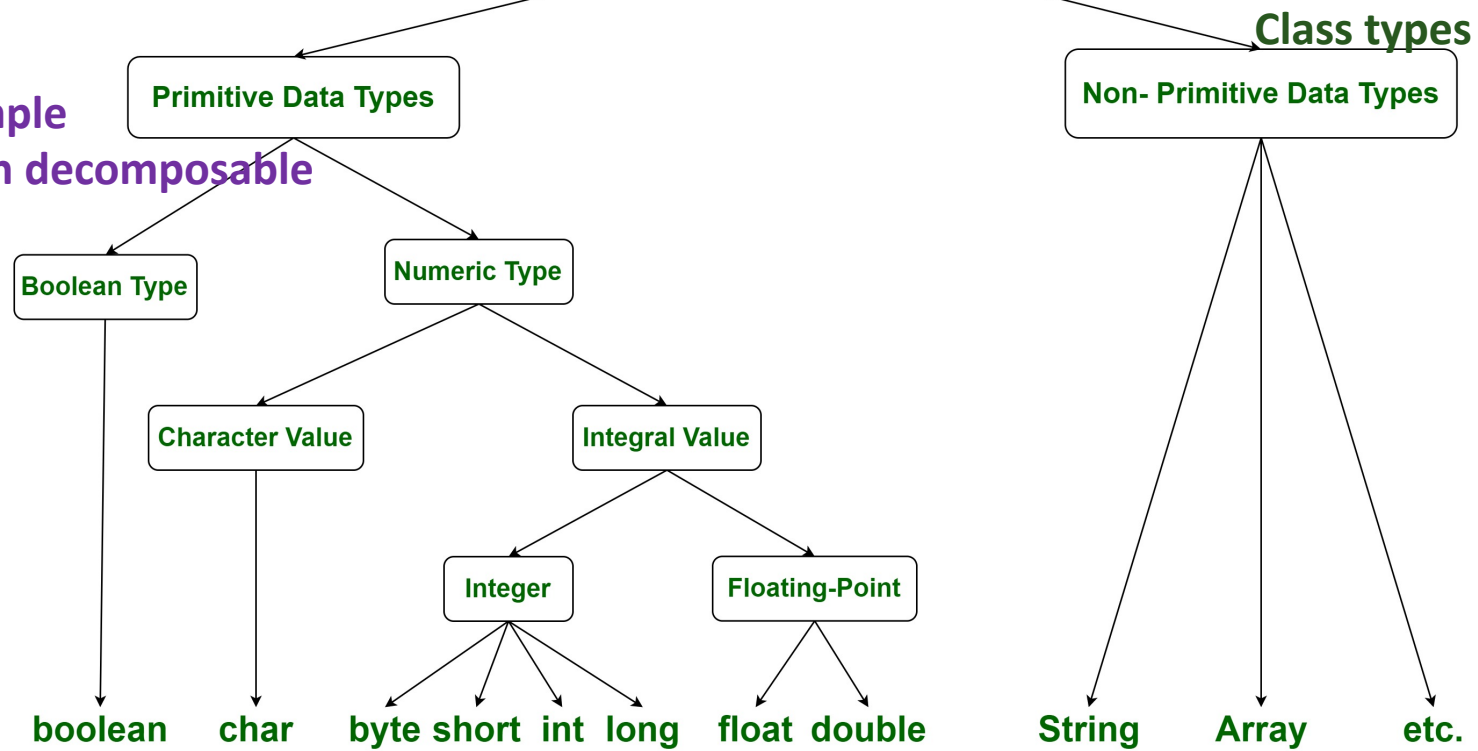
Naming and Declaring Variables

- 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

Data Types in Java

simple
non decomposable



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.