visual programming

What is Variable?

Bachelor of Information Systems
Institut Teknologi Del

Learning Objective(s)

This material should address the following question(s).

- What is variable?
- How to declare and use variable?

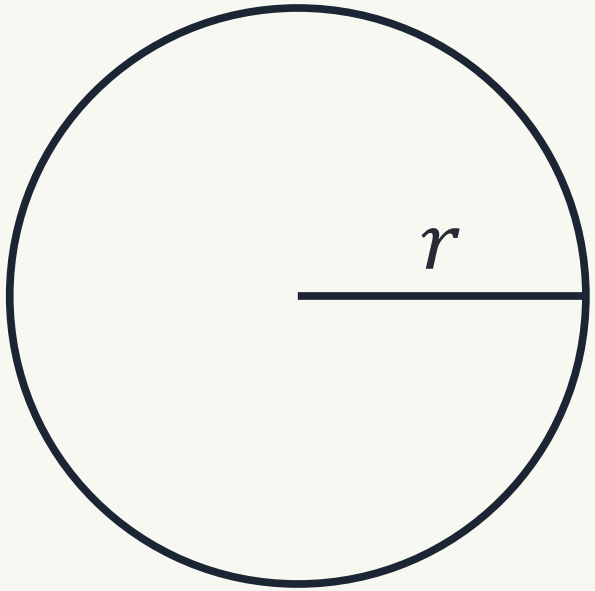
Discussion Point

Variable:
The Core Concepts.

Problem

- In the circle area calculation, we have three values:
  - π is a constant, whereas
  - r and A are variable values, they may change.

$$A = \pi r^2$$



Question

What is **variable**?

Definition

*In programming, a **variable** is a labeled-space in the (main) memory used for storing a value (data).*

In other words, it is a container *for a value (data).*

Variable

- A variable is a labeled by a unique name → **identifier**.
  - An identifier has to be unique and meaningful.
  - Should form a noun.

- Writing convention:
  - `snake_case` or `CamelCase`.

- Which of the following identifiers are good?
  - `full_name`, `TotalPrice`, `buy`, and `box1`.

A `Real`-typed data.

`27.14cm`

Say, `line_length` is a variable, its type is `Real`.

In the example, both of the value and the variable have the same type, `Real`.

Variable stores the value but not the metric.

Discussion Point

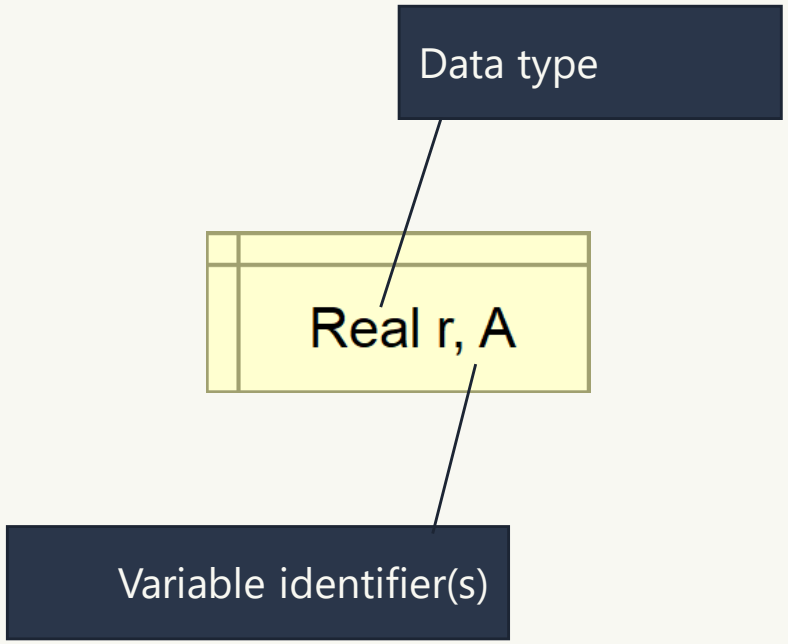
The **Lifecycle** of A Variable.

Variable Lifecycle

- At this phase, the underlying Operating Systems will reserve a space in the main memory.
  - Different data type requires different memory space.
  - Some languages do not require explicit data type.
    - E.g. PHP,, JavaScript, etc.

Variable Declaration

- The **Declare Statement** is used to declare a variable.

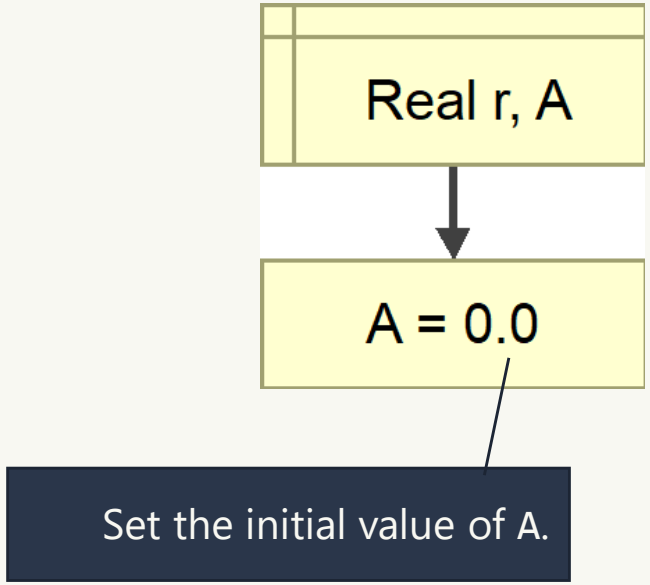


Variable Lifecycle

- At the initialization phase, we set an initial value of a variable.
  - Optional, but it is a **good practice**.
  - Some programming languages do not handle uninitialized variables.
  - An uninitialized variable may contain … anything → latent vault.

Variable Initialization

- The **Assign Statement** is used to setup the initial value of a variable.

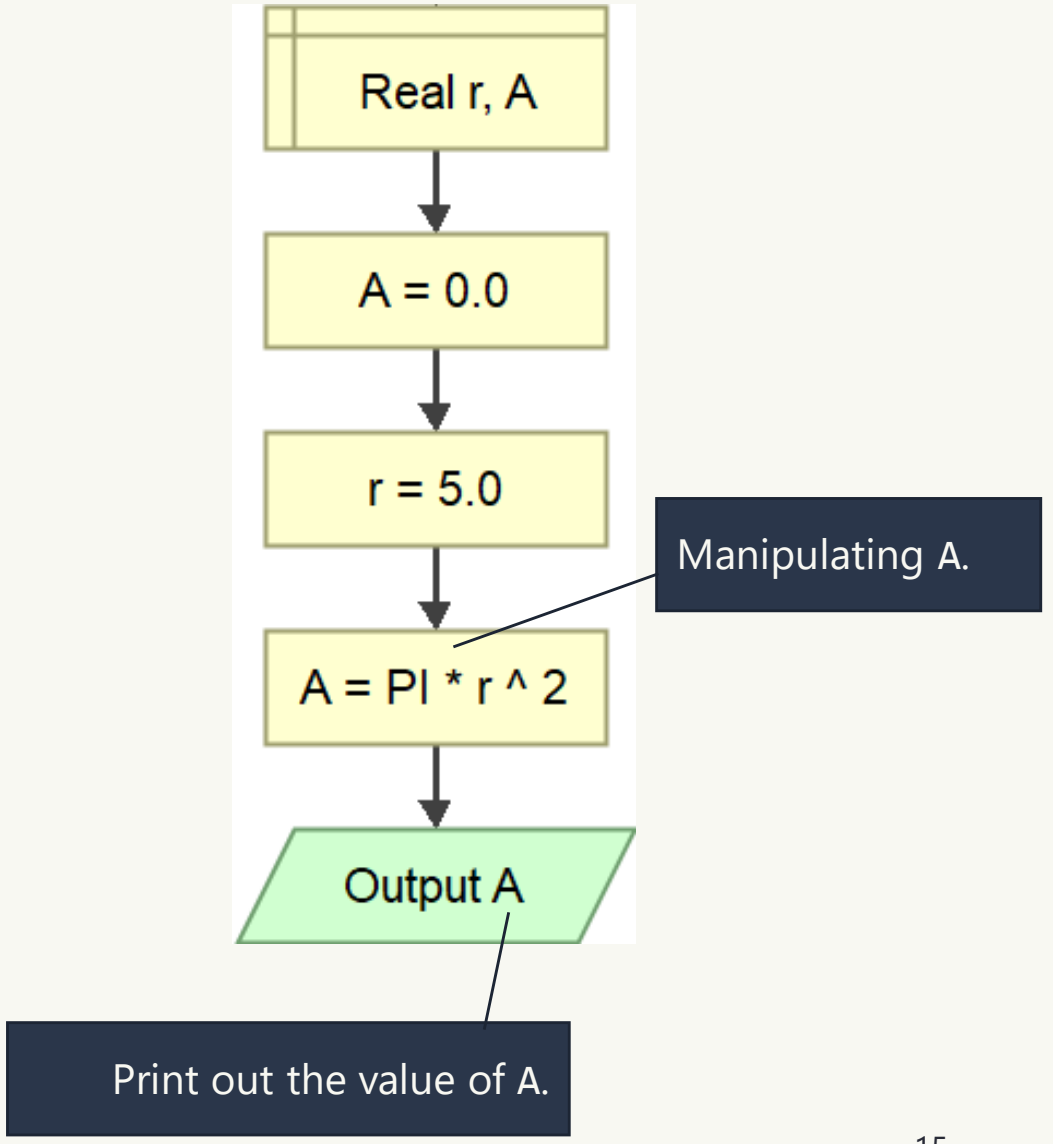


Variable Lifecycle

- During this phase, the variable is available for any operation relevant to the data type.
  - E.g. change its value, use it in an operation, etc.

Manipulating Variable

- Many type of statements are used to manipulate a variable.

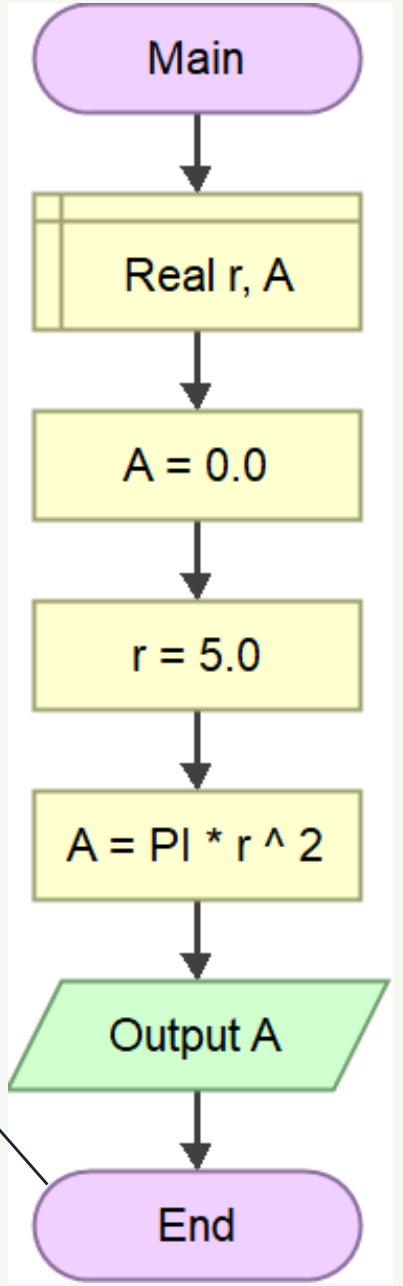


Variable Lifecycle

- When everything is done, unused variables are destroyed.
  - This phase frees up the reserved space in the (main) memory.
  - Most programming language does this automatically.

Destroying Variable

- A variable will be marked as destroyed when either one of the following points is reached:
  - the end of the scope; or
  - the end of the program.



Both A and r will be marked as destroyed once the solution ends.

Variables in Java

```
 1|  public class UsingVariable {
 2|
 3|    public static void main(String[] args) {
 4|      double PI = 3.14; // declaration & initialization
 5|
 6|      double r, A; // declaration
 7|
 8|      r = 5.0; // used, manipulation
 9|
10|      A = PI * Math.pow(r, 2); // used
11|
12|      System.out.println(A); // used
13|    } // once this routine ends, the pi, r, and a are destroyed
14|
15|  }
```

Discussion Point

Value **Casting**.

Question

Is it possible to a variable to store a value
with **different** type?

Variable: Value Casting

- For instance, a `String`-typed variable to store an `Integer` value.

- In such situation, some programming languages will try to ***cast*** or "convert" the value into the strorage's type.
  - A casted value may lose its actual value.
    - E.g. casting a `Real`-typed value into an `Integer` value, `8.12` → `8`.
  - The casting capabilities is **vary** from language to language.
    - Check the documentation!

A `Real`-typed data.

`3.14`

What if the variable is an `Integer`?

In such case, the platform will try to cast the value.

Not all types are castable.

In the example, **`3.14`** is *casted* to **`3`**.
It **loses** its fractional value.

Final **Thoughts.**

Conclusion

1. A variable is a labeled-space to store a value.
   - Its value may change from time to time, modifiable.
2. The lifecycle of a variable:
   - declaration → initialization → manipulation → destroyed.
3. A value may be casted to another type.

References

Wassberg, J. (2020). Computer Programming for Absolute Beginners. Packt.

Declaring Variables – Flowgorithm
http://www.flowgorithm.org/documentation/declare.html

– E O F –

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