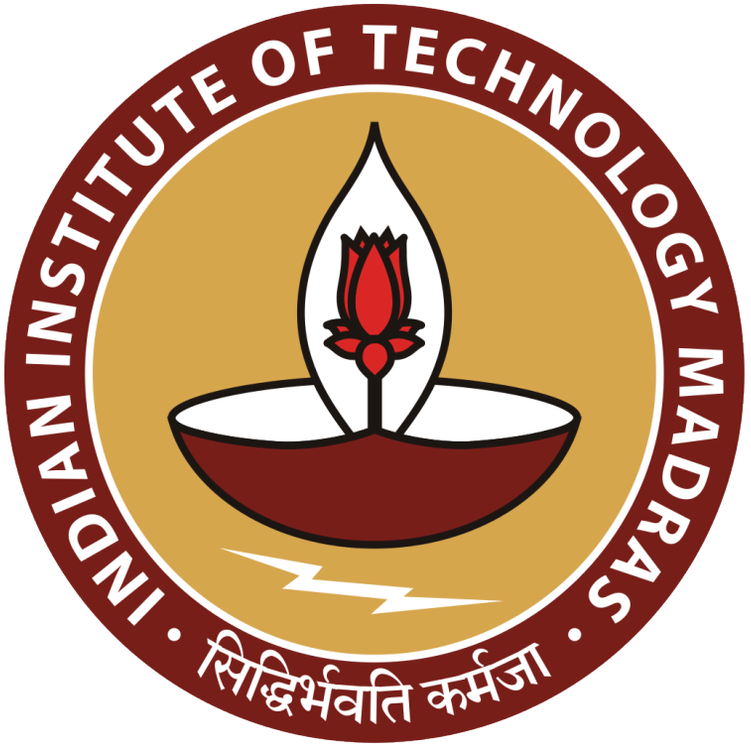


IIT Madras

ONLINE DEGREE

Introduction to Datatypes

Sanity of data: what we observed

- We organised our data set into cards, each storing one data item
- Each card had a number of elements, e.g.:
  - numbers (e.g. marks)
  - sequence of characters (e.g. name, bill item, word etc)
- We observed that there were restrictions on the values each element can take:
  - for example marks has to lie between 0 and 100
  - name cannot have funny characters
- Constraints on the kinds of operations that can be performed:
  - addition of marks is possible
    - but multiplication of marks does not make sense !
  - compare one name with another to generate a **boolean type** (True or False)
    - but cannot add a name with another !

This leads us to the concept of a **Data Type** …

- By associating a **Data Type** (or simply **Type**) with a data element, we can tell the computer (or another person) how we intend to use a data element:
  - What are the values (or range of values) that the element can take ?
  - What are the operations that can be performed on the data element ?

- When we specify that a variable is of a specific type, we are describing the constraints placed on that variable in terms of the values it can store, and the operations that are permitted on it

Basic Data Types

Basic Data Types

Boolean

Basic Data Types

Boolean

Has only two values:
True, False

Basic Data Types

Boolean

Has only two values:
True, False

Operation	Result type
AND, OR	Boolean

Basic Data Types

Boolean

Has only two values:
True, False

Operation	Result type
AND, OR	Boolean

Integer

Basic Data Types

Boolean

Has only two values:
True, False

Operation	Result type
AND, OR	Boolean

Integer

Range of values is:
... , -3, -2, -1, 0, 1, 2, 3, ...

Basic Data Types

Boolean

Has only two values:
True, False

Operation	Result type
AND, OR	Boolean

Integer

Range of values is:
... , -3, -2, -1, 0, 1, 2, 3, ...

Operation	Result type
+, - , ×, ÷	Integer

Basic Data Types

Boolean

Has only two values:
True, False

Operation	Result type
AND, OR	Boolean

Integer

Range of values is:
... , -3, -2, -1, 0, 1, 2, 3, ...

Operation	Result type
+, - , ×, ÷	Integer

There are constraints on division (÷)
For result to be integer, first number has to be divisible by second (e.g. 21 ÷ 7 = 3)
Or we change the definition to take only the quotient and drop the remainder (e.g. 22 ÷ 7 = 3)

Basic Data Types

Boolean

Has only two values:
True, False

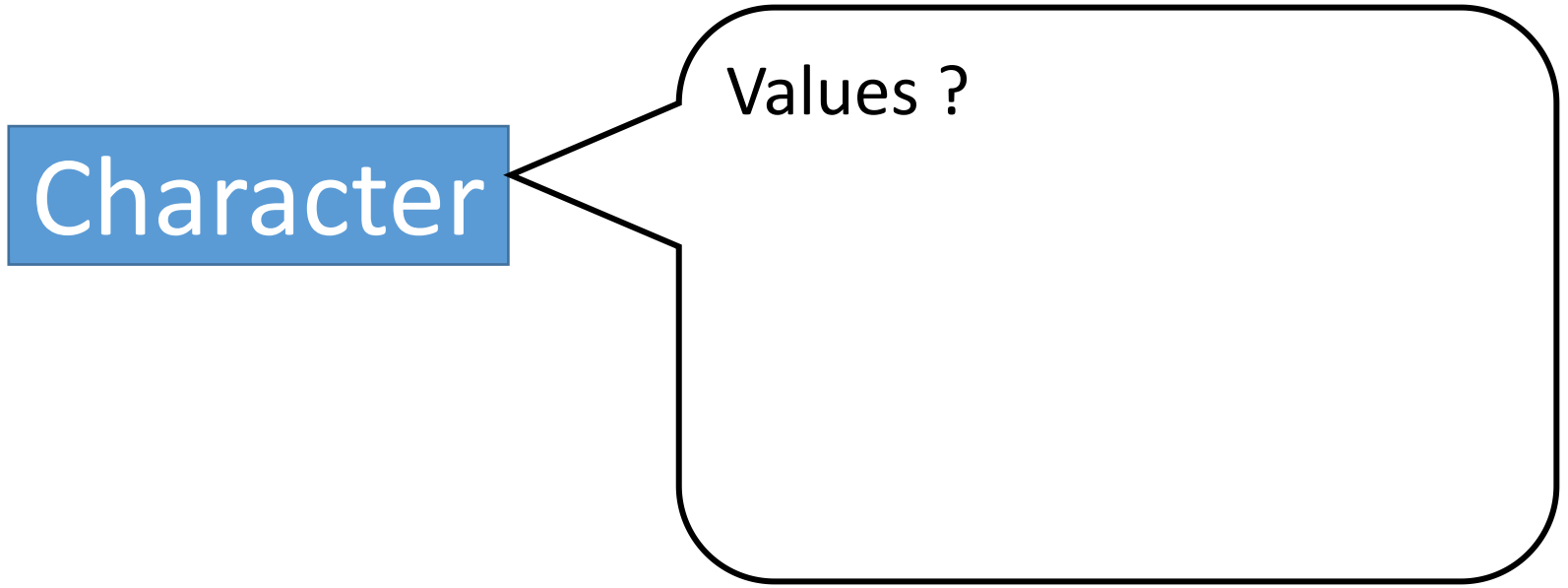
Operation	Result type
AND, OR	Boolean

Integer

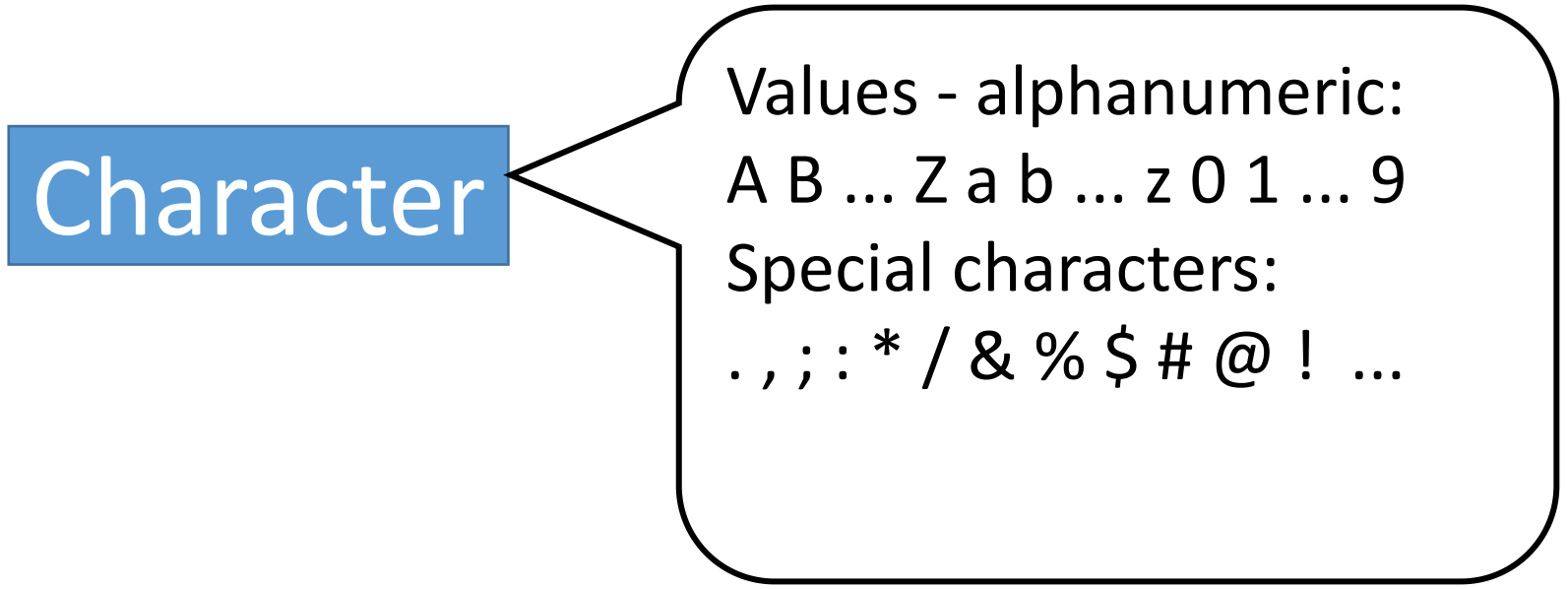
Range of values is:
... , -3, -2, -1, 0, 1, 2, 3, ...

Operation	Result type
+, - , ×, ÷	Integer
<, >, =	Boolean

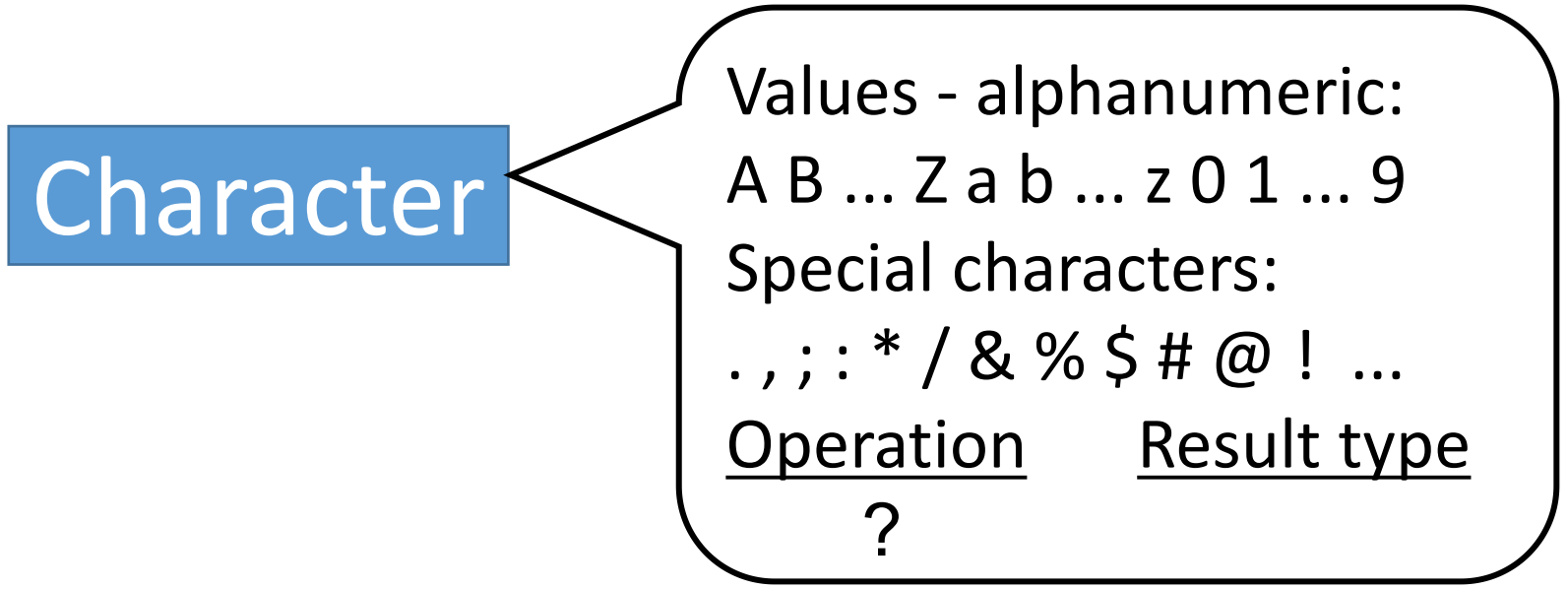
Character Data Type



Character Data Type



Character Data Type



Character Data Type