Primitive data types

COMP 102

Victoria University of Wellington

Numeric data types

We have seen several types of numeric values

- boolean:
  - true, false
- char
  - ‘a’, ‘A’
- int:
  - integer, with no fractional part (size = 32 bits)
  - eg: 75 -14532
  - range: -2,147,483,648 to 2,147,483,647
    -2^{31} to $2^{31} - 1$ or
    Integer.MIN_VALUE to Integer.MAX_VALUE

Numeric data types

We have seen several types of numeric values

- long:
  - integer, but allows a bigger range (size = 64 bits)
  - eg: 7111333555L -123456789123456789L (L to say it is a long, not an int)
  - range: -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
    -2^{63} to $2^{63} - 1$
    Long.MIN_VALUE to Long.MAX_VALUE

Numeric data types

We have seen four types of numeric values

- double:
  - number with a fractional part. (size = 64 bits)
  - eg: 3.4 -193.0 -0.0063 4.8769e23 (= 4.8769×10^{23})
  - range: -2^{1024} to 2^{1024} or roughly -1.8×10^{308} to 1.8×10^{308}
  - precision: (accuracy) 15 decimal digits (precisely, 52 bits)
  - Special values:
    - Double.MAX_VALUE: largest positive finite value 1.797693e+308
    - Double.MIN_VALUE: smallest positive finite value 4.900000e-324
    - Double.NEGATIVE_INFINITY: double value smaller than any other double.
    - Double.POSITIVE_INFINITY: double value larger than any other double.
    - Double.NaN: "not a number": the error value (eg 0.0/0.0).

Primitive data types

- These are primitive data types, not objects
  - In the background they are stored differently to make them more efficient to work with
  - Normally this works seamlessly, except
    - ArrayList cannot store primitive data types!

More numeric data types

We have seen two "wrapper" types of numeric values

- Integer:
  - wrapping up an int as an object so that it can be put into a list (for example)
- Double:
  - wrapping up a double as an object so that it can be put into a list (for example)

There are wrapper types for all the other numeric types.

Java will (in most cases) convert automatically between primitive and wrapper types.

Other numeric types

Integer types:

- byte (8 bits) -128 to 127
- short (16 bits) -32,768 to 32,767
  - Seldom used – just use int normally

Floating point:

- float (32 bits) smaller than doubles, less precision
  - eg 1.0f -0.4f
  - Seldom used, but sometimes needed for colours, eg Color.getHSBColor(0.4f, 1.0f, 1.0f);