Introductory Java 4

J4

Arrays, Operators, Expressions

Statements, Blocks, Random

Java Arrays

Arrays hold a fixed number of values of a given type that can be accessed by an index

- Declaring:
  ```
  int[] values;
  ```

- Initializing:
  ```
  values = new int[8]; // 8-element array
  ```

- Accessing:
  ```
  int x = values[3]; // the 4th element
  ```

- Getting the length:
  ```
  values.length
  ```

Multi-Dimensional Arrays

Multidimensional Arrays in Java = Arrays of Arrays

- Declaring:
  ```
  int[][] sudoku;
  ```

- Initializing:
  ```
  sudoku = new int[9][9]; // 9-by-9-element array
  ```

- Accessing:
  ```
  int x = sudoku[3][6]; // the 7th int in the 4th array
  ```

- NOTE: inner array sizes may differ
  ```
  sudoku[3] = new int[5]; // not a sudoku anymore
  ```

Java Operators

- Arithmetic `+`   `-`   `*`   `/`   `%`
- Assignment `=`   `+=`   `-=`   `*=`   `/=`   `%=`
- Unary `+`   `-`   `++`   `--`   `!`
- Equality `==`   `!=`
- Relational `>`   `>=`   `<`   `<=`
- Logical `&&`   `||`
- **`instanceof`**
- Bitwise `~`   `&`   `^`   `|`   `<<`   `>>`   `>>>`

Expressions

- A unit of code that evaluates to a **single value**

  - Variables

  - Literals

  - Combinations of Expressions

    - Operators

    - Method Invocations (J7)

    - Array Accesses

    - Conditional Expressions (J5)

    - Object Creation (O1)

```
x  currentGear

0 "hello" true
scanners[x + 5].nextInt()
```

Statements

Higher-level units of code
for sequence, selection, and iteration

- **Expression** Statements
  (expression terminating with ';')

- **Declaration** Statements (e.g. `int x;`)

- **Control Flow** Statements

- **Blocks**
  (zero or more statements between balanced braces '{' and '}')

The Random Class

The `Random` class provides a pseudo-random number generator:

```
Random rand = new Random();
```

You can optionally provide a seed (for determinism):

```
Random rand = new Random(12345);
```

You can then generate random numbers of different types:

```
int i = rand.nextInt(10); // number in 0-9
```