Object-Oriented Programming I

Sequence

Slides by Magdin Stoica
Updates by Georg Feil

Learning Outcomes

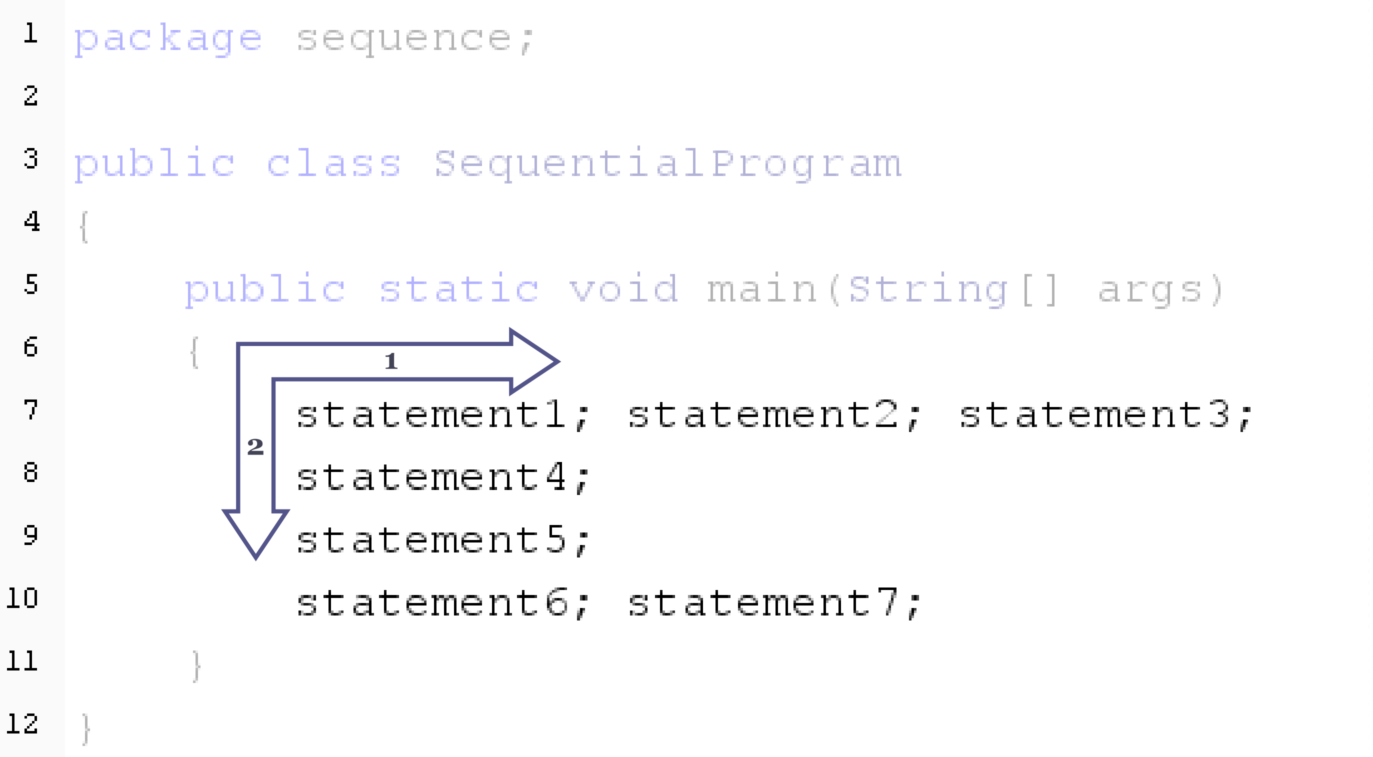
1. Characterize the sequential aspect of statement execution in a program
2. Identify the sequence of statements of simple programs that contain simple statements as well as method calls
3. Create simple programs that involve a sequence of statements, methods grouping statements and method call statements
4. Compare the analysis of statement execution with the analysis of information remembered by programs in variables
5. Identify the limitations of the sequence of a method of control of the order of statements that execute in a program

Statement Sequence

- The simplest way to organize the statements that execute in a program is as a sequence of statements.
  - A sequence usually contains more than one statement
  - A sequence could be made of only one statement
- The first sequence of statements that executes is the sequence defined by the main method
- Statements arranged in a simple sequence are executed:
  - Left to right
  - Top to bottom
  - This is the same order that we read words in a book (English)
- Statements are executed one at a time. Each statement must be completed before the next one can be executed.

The main method defines the sequence of statements that executes first

Statement Sequence Order



```
package sequence;

public class SequentialProgram
{
    public static void main(String[] args)
    {
        statement1; statement2; statement3;
        statement4;
        statement5;
        statement6; statement7;
    }
}
```

Sequence: Lines vs. Statements

Line Execution Order	Statement Execution Order
1. Line 7	1. Statement1
	2. Statement2
	3. Statement3
2. Line 8	4. Statement4
3. Line 9	5. Statement5
4. Line 10	6. Statement6
	7. Statement7

For clarity we usually place each statement on a separate line so there is no difference

Method Call Statements

- Methods contain a sequence of statements
- A method call statement is an instruction to the machine to execute all the statements defined by the method
    - The execution will "jump" to the first statement in the sequence defined by the method (remembering where it came from)
    - The execution will "jump back" when the last statement of the method (or return) is executed
- A method can call another method, which could call another method, and so on
    - Sequence that executes another sequence which can execute another sequence...

A method call statement
does not complete
until all the
statements defined by the method
execute
(or a ‘return’ executes)

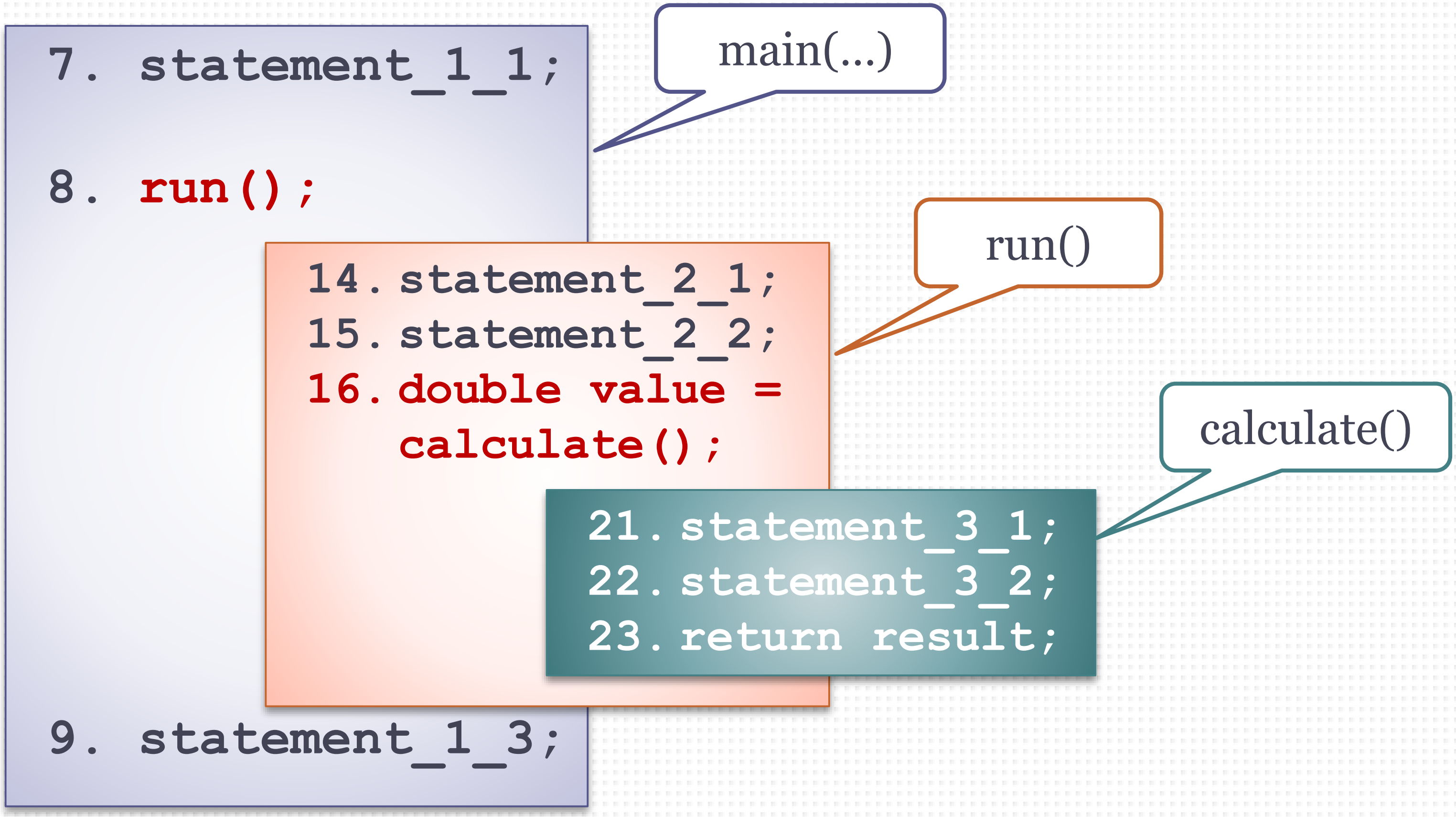
A sequential program with method calls

```
package sequence;

public class SequentialProgram
{
    public static void main(String[] args)
    {
        statement_1_1;
        run();
        statement_1_3;
    }

    private void run()
    {
        statement_2_1;
        statement_2_2;
        double value = calculate();
    }

    private double calculate()
    {
        statement_3_1;
        statement_3_2;
        return result;
    }
}
```

Exercise 1: Identifying Sequences

- What is the sequence of statements that executes for the calculate() method?
  - Identify the line numbers
  - Identify the actual statements
- What is the sequence of statements that executes for the run() method?
  - Identify the line numbers
  - Identify the actual statements
- What is the sequence of statements that executes for the whole program?
  - Identify the line numbers
  - Identify the actual statements

Sequences and Method Calls



main(...)

```
7.  statement_1_1;

8.  run();

9.  statement_1_3;
```

run()

```
14. statement_2_1;
15. statement_2_2;
16. double value =
    calculate();
```

calculate()

```
21. statement_3_1;
22. statement_3_2;
23. return result;
```