Introduction to Computer Science
Lesson 11

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Algorithms

- The Concept of an Algorithm

- Algorithm Representation

- Algorithm Discovery

- Iterative Structures

Definition of Algorithm

An algorithm is an **ordered** set of **unambiguous**, **executable** steps that defines a **terminating** process.

Algorithm Representation

- Requires well-defined primitives

- A collection of primitives constitutes a programming language.

Pseudocode Primitives

- Assignment

  name ← *expression*

- Conditional selection

  if *condition* **then** *action*

Pseudocode Primitives (continued)

- Repeated execution

  while *condition* **do** *activity*

- Procedure

  procedure *name* (*generic names*)

Figure 5.4 The procedure Greetings in pseudocode

```
procedure Greetings
Count ← 3;
while (Count > 0) do
    (print the message "Hello" and
        Count ← Count −1)
```

Iterative Structures

- Pretest loop:

  while (*condition***) do**

  (*loop body***)**

- Posttest loop:

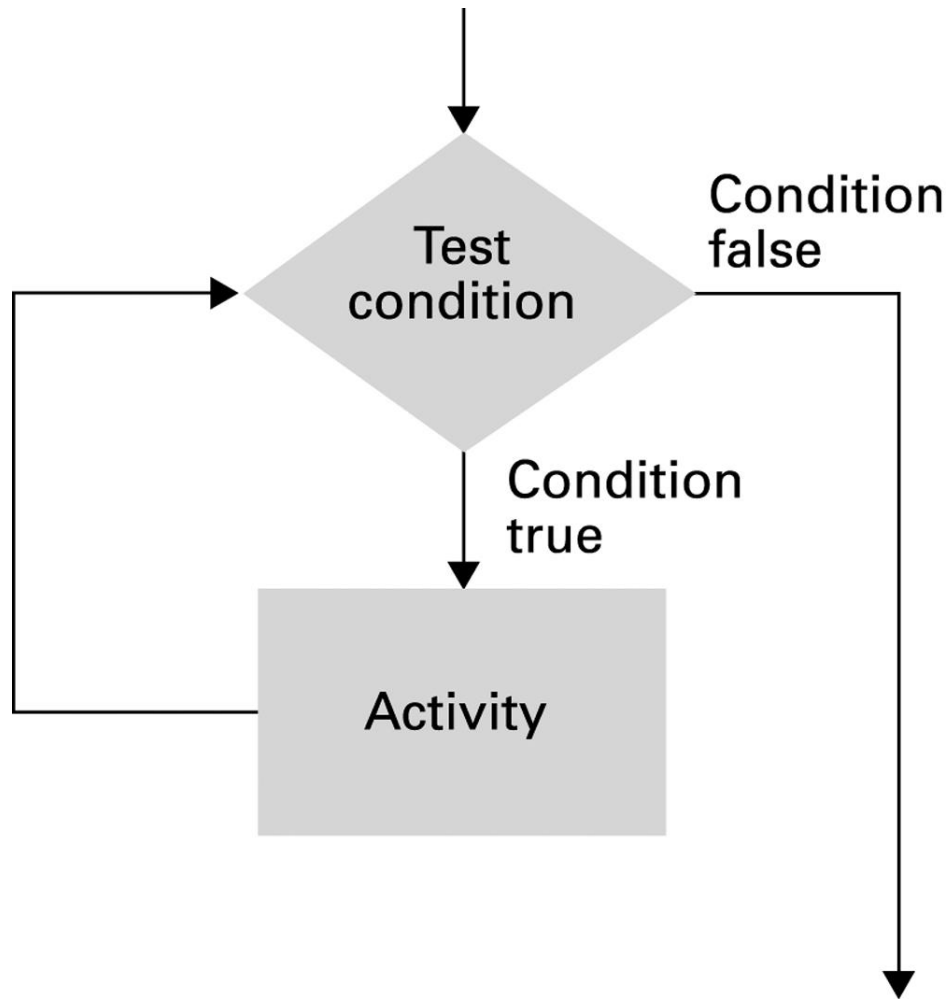 **repeat (***loop body***)**

  until(*condition***)**

Figure 5.8 **The while loop structure**
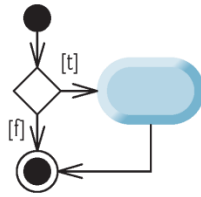
Figure 5.9 **The repeat loop structure**
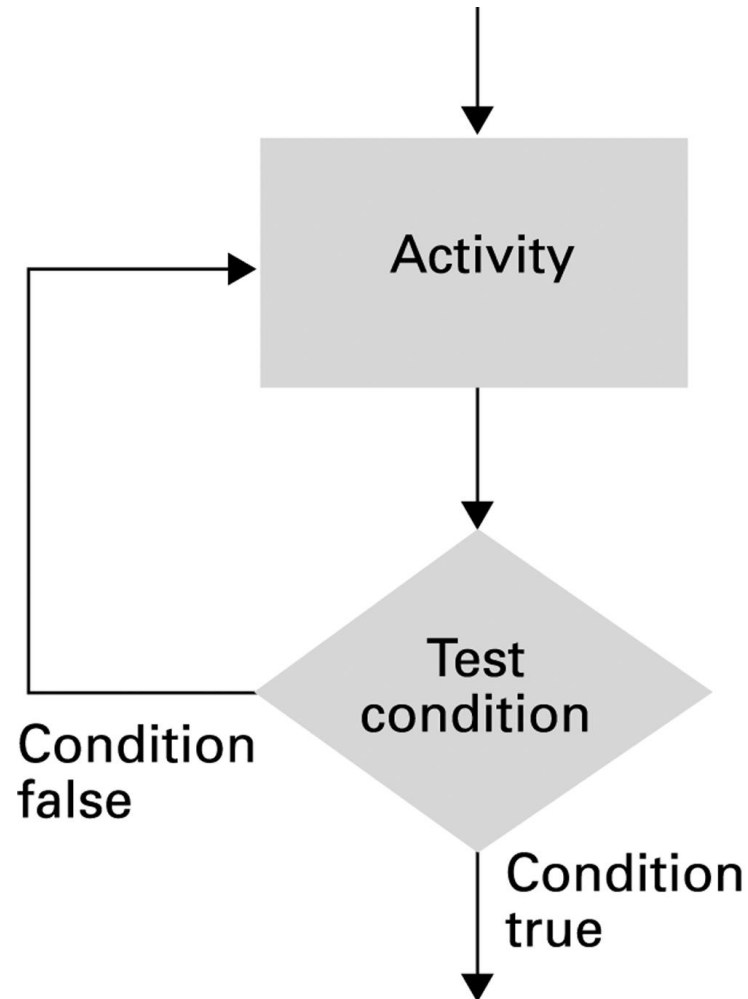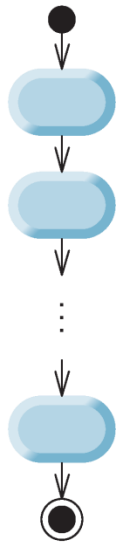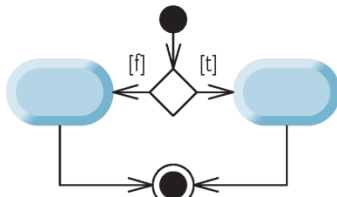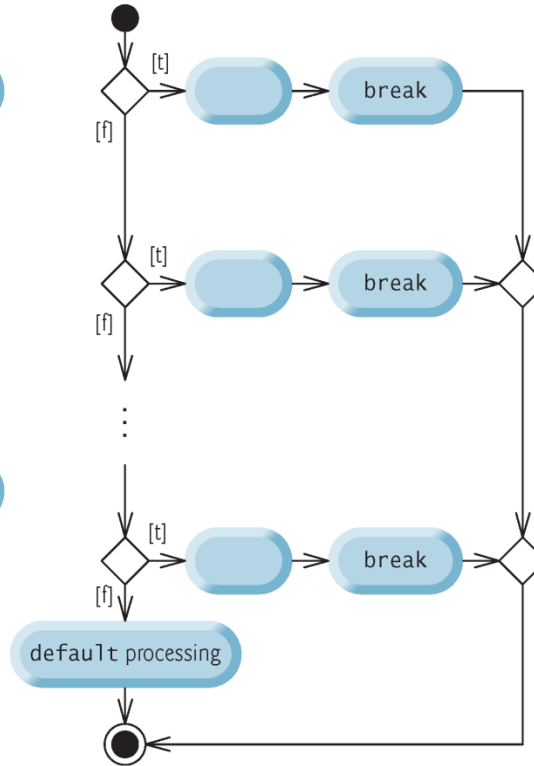
Fig. 5.20 | Java's single-entry/single-exit sequence, selection and repetition statements. (Part 1 of 2.)
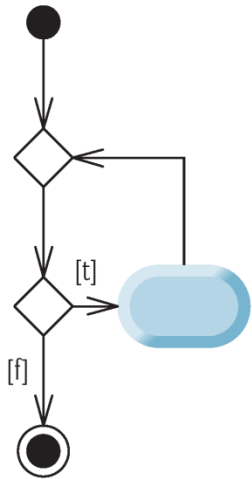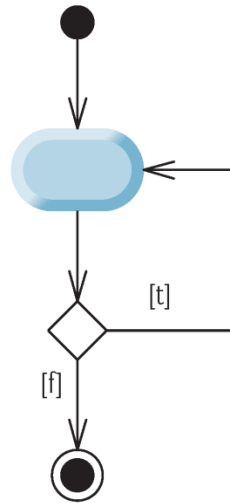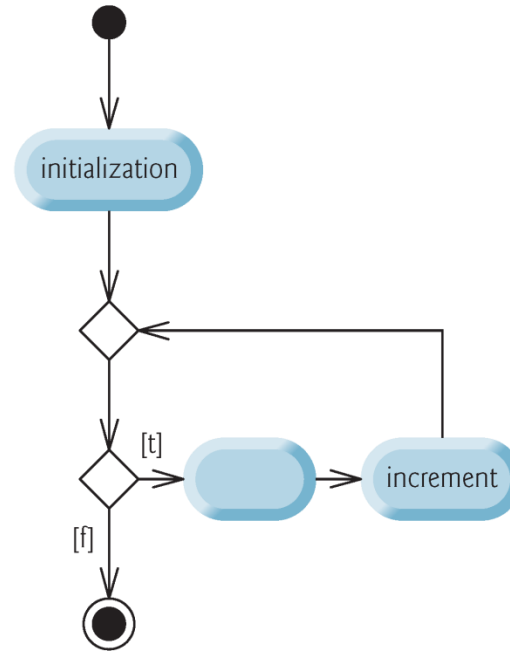
Fig. 5.20 | Java's single-entry/single-exit sequence, selection and repetition statements. (Part 2 of 2.)

Laboratory session in Java

Use of *if* condition

Exercise 1:

> Check if a certain variable has a value, if yes, print the value on the screen.

Use of *if…then…else* condition

Exercise 2:

Check if a certain variable has a value, if the value is greater than zero, print a message showing this, otherwise print another message.

Use of *if…then…else* condition

- Exercise 3
  - Get a text from the keyboard and check whether the text is equal to your name.
  - If yes, show positive message, otherwise show negative message.

For statement

- Exercise 4
  - Print the first 100 numbers!

For statement

- Exercise 5
  - Print the sum of the first 100 numbers!

For statement

- Exercise 6
  - Print the sum of the first N numbers until 100!

For statement

- Exercise 7
  - Enter 10 numbers and then print the numbers you entered.

For statement and if…then…else

- Exercise 8
  - Enter 10 numbers and then print the minimum and the maximum number.

For statement

- Exercise 9
  - Enter 10 numbers and then print the average of these.

For statement and use of array

- Exercise 10
  - Enter 10 numbers and then print these in reverse order.

Array of strings

- Exercise 11
  - Enter 10 names and then print these in reverse order.
  - Print only those that start with "A" or "a"
  - Print only those that start with "A" or "a" and end with "A" or "a".
  - Print only those that contain "A" or "a"
  - Enter 10 players and then the respective number of goals for each.
    - Print the name of the player with more goals.

End of Lesson 11

- Readings
  - Chapter 5