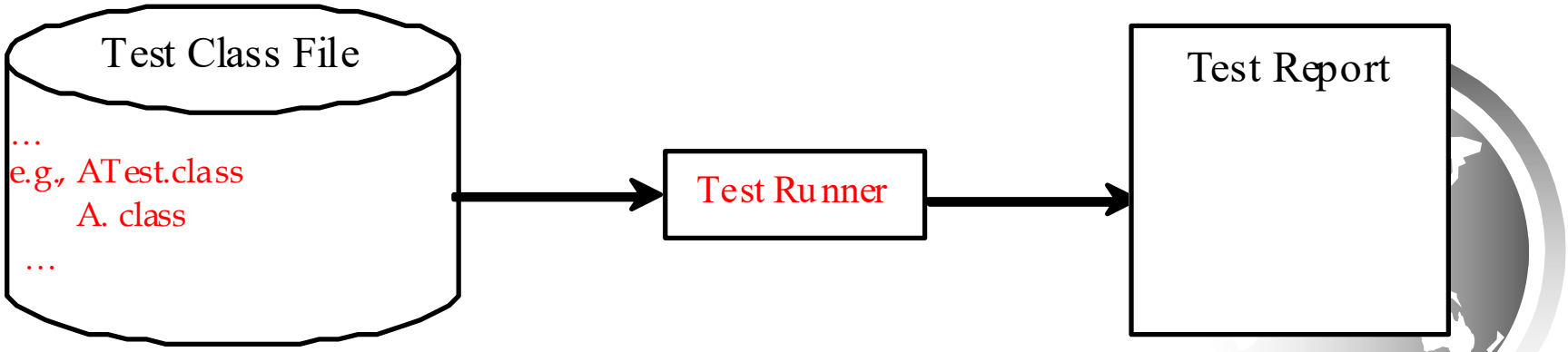
Chapter 44 Testing Using JUnit

Objectives

- To know what JUnit is and how JUnit works (§44.2).
- To create and run a JUnit test class from the command window (§44.2).
- To create and run a JUnit test class from NetBeans (§44.3).
- To create and run a JUnit test class from Eclipse (§44.4).

JUnit Basics

JUnit is the de facto framework for testing Java programs. JUnit is a third-party open source library packed in a jar file. The jar file contains a tool called *test runner*, which is used to run test programs. Suppose you have a class named A. To test this class, you write a test class named ATest. This test class, called a *test class*, contains the methods you write for testing class A. The test runner executes ATest to generate a test report, as shown in Figure 44.1.



Obtaining and Running JUnit

You will see how JUnit works from an example. To create the example, first you need to download JUnit from http://sourceforge.net/projects/junit/files/. At present, the latest version is junit-4.10.jar. Download this file to c:\book\lib and add it to the classpath environment variable as follows:

set classpath=.;%classpath%;c:\book\lib\junit-4.10.jar

To test if this environment variable is set correctly, open a new command window, and type the following command:

java org.junit.runner.JUnitCore

A JUnit Test Class

To use JUnit, create a test class. By convention, if the class to be tested is named A, the test class should be named ATest. A simple template of a test class may look like this:

```
package mytest;
import org.junit.*;
import static org.junit.Assert.*;
public class ATest {
  @Test
  public void m1() {
    // Write a test method
  }
  @Test
  public void m2() {
    // Write another test method
  }
  @Before
  public void setUp() throws Exception {
    // Common objects used by test methods may be set up here
  }
}
```

Run the Test

To run the test from the console, use the following command:

java org.junit.runner.JUnitCore mytest.ATest

Test ArrayList

Listing 44.1 is an example of a test class for testing java.util.ArrayList.

```
package mytest;
import org.junit.*;
import static org.junit.Assert.*;
import java.util.*;
public class ArrayListTest {
  private ArrayList<String> list = new ArrayList<String>();

  @Before
  public void setUp() throws Exception {
  }
  @Test
  public void testInsertion() {
    list.add("Beijing");
    assertEquals("Beijing", list.get(0));
    list.add("Shanghai");
    list.add("Hongkong");
    assertEquals("Hongkong", list.get(list.size() - 1));
  }

  @Test
  public void testDeletion() {
    list.clear();
    assertTrue(list.isEmpty());

    list.add("A");
    list.add("B");
    list.add("C");
    list.remove("B");
    assertEquals(2, list.size());
  }
}
```

Test the Loan Class

```
package mytest;
import org.junit.*;
import static org.junit.Assert.*;
public class LoanTest {
  @Before
  public void setUp() throws Exception {
  }
  @Test
  public void testPaymentMethods() {
    double annualInterestRate = 2.5;
    int numberOfYears = 5;
    double loanAmount = 1000;
    Loan loan = new Loan(annualInterestRate, numberOfYears,
      loanAmount);
    assertTrue(loan.getMonthlyPayment() ==
      getMonthlyPayment(annualInterestRate, numberOfYears,
      loanAmount));
    assertTrue(loan.getTotalPayment() ==
      getTotalPayment(annualInterestRate, numberOfYears,
      loanAmount));
  }

  /** Find monthly payment */
  private double getMonthlyPayment(double annualInterestRate,
      int numberOfYears, double loanAmount) {
    double monthlyInterestRate = annualInterestRate / 1200;
    double monthlyPayment = loanAmount * monthlyInterestRate / (1 -
      (1 / Math.pow(1 + monthlyInterestRate, numberOfYears * 12)));
    return monthlyPayment;
  }
  /** Find total payment */
  public double getTotalPayment(double annualInterestRate,
      int numberOfYears, double loanAmount) {
    return getMonthlyPayment(annualInterestRate, numberOfYears,
      loanAmount) * numberOfYears * 12;
  }
}
```