A-LEVEL COMPUTER SCIENCE • HOLIDAY HOMEWORK 假期作业

12 Software Development – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	**中文**	**Write it 3 times** (English)		
structure chart	结构图			
state-transition diagram	状态转换图			
dry run	手工跟踪			
white-box testing	白盒测试			
black-box testing	黑盒测试			
integration testing	集成测试			
test plan	测试计划			
extreme data	极端数据			

Recall

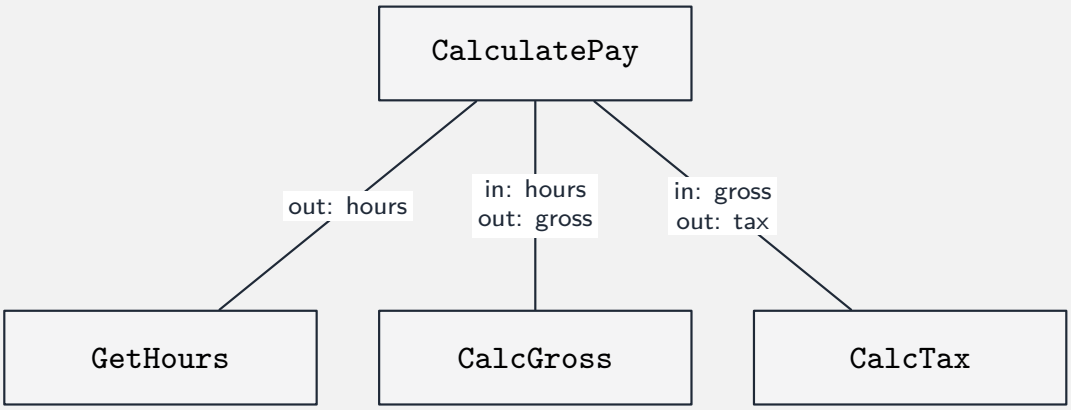
In **Part 1** you met the development life cycle and its models (waterfall, iterative, agile), the three error types (syntax, run-time, logic), test data (normal, abnormal, boundary) and the kinds of maintenance. Part 2 adds tools for *designing* a program, and methods for *testing* it.

New ideas

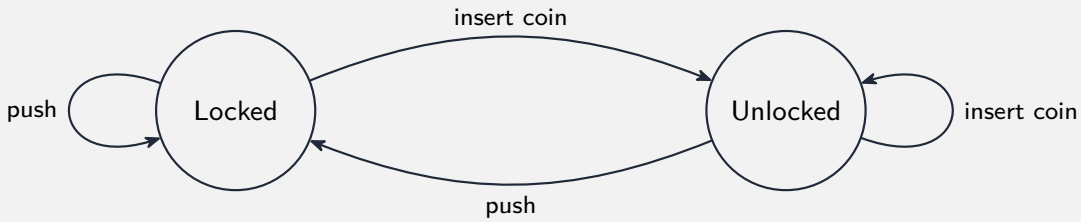
Read these first. Each idea has a short worked example. Then do the Practice.

■

A **structure chart** 结构图 shows a program broken into modules (subroutines), with the parameters passed between them —the caller above, the modules it calls below, and small arrows for the data going down and results coming back up.



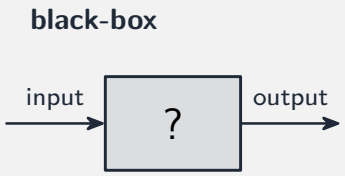
A **state-transition diagram** 状态转换图 shows the states a system can be in and the events that move it between them —useful for a vending machine, a lock, or a traffic light.



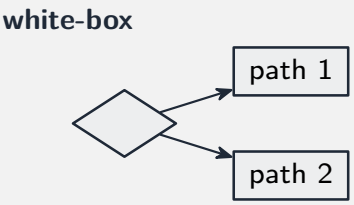
Worked example. A "make a drink" program's structure chart shows a top module calling `takeMoney`, `chooseDrink` and `dispense`, with the price passed down and an "ok?" result passed back up.

■ **2 Testing methods**

- a **dry run** 手工跟踪—trace the code by hand, writing each variable in a table;
- **white-box testing** 白盒测试—designed from the *code's* structure, to cover every branch;
- **black-box testing** 黑盒测试—designed from the *specification* only: give inputs, check the outputs;
- **integration testing** 集成测试—combine the modules and test that they work together.



test from the spec



test every path in the code

Worked example. Black-box: a tester only knows "input two numbers, get their sum", so they try $2 + 3$ and expect 5. White-box: a tester who can see the code chooses inputs that make every `IF` branch run.

■ 3 Test strategy and test data

A test strategy is the overall plan; a **test plan** 测试计划 lists each test with its input, expected output and a column for the actual output. As well as normal, abnormal and boundary values, include **extreme data** 极端数据—the largest and smallest values that are still accepted.

Watch out: black-box testing cannot tell you a hidden branch of code was never run —that is exactly what white-box testing checks.

Practice

12.1 State what a structure chart shows about a program. [2]

12.2 State what a state-transition diagram shows, and give one system it suits. [2]

12.3 State one difference between white-box and black-box testing. [2]

12.4 A field accepts marks from 0 to 100. Give one example each of (a) normal, (b) abnormal, (c) boundary data. [3]

12.5 State what integration testing checks. [1]

12.6 Explain *why* a project uses both black-box and white-box testing, rather than just one. [2]

12.7 Challenge. A turnstile is either `Locked` or `Unlocked`. Describe, in words, a state-transition for it: name two events and state what each one changes. [2]