Level 3 Develop software using Java (7266/7267-305)

e-Quals
Assignment guide for Candidates
Assignment C

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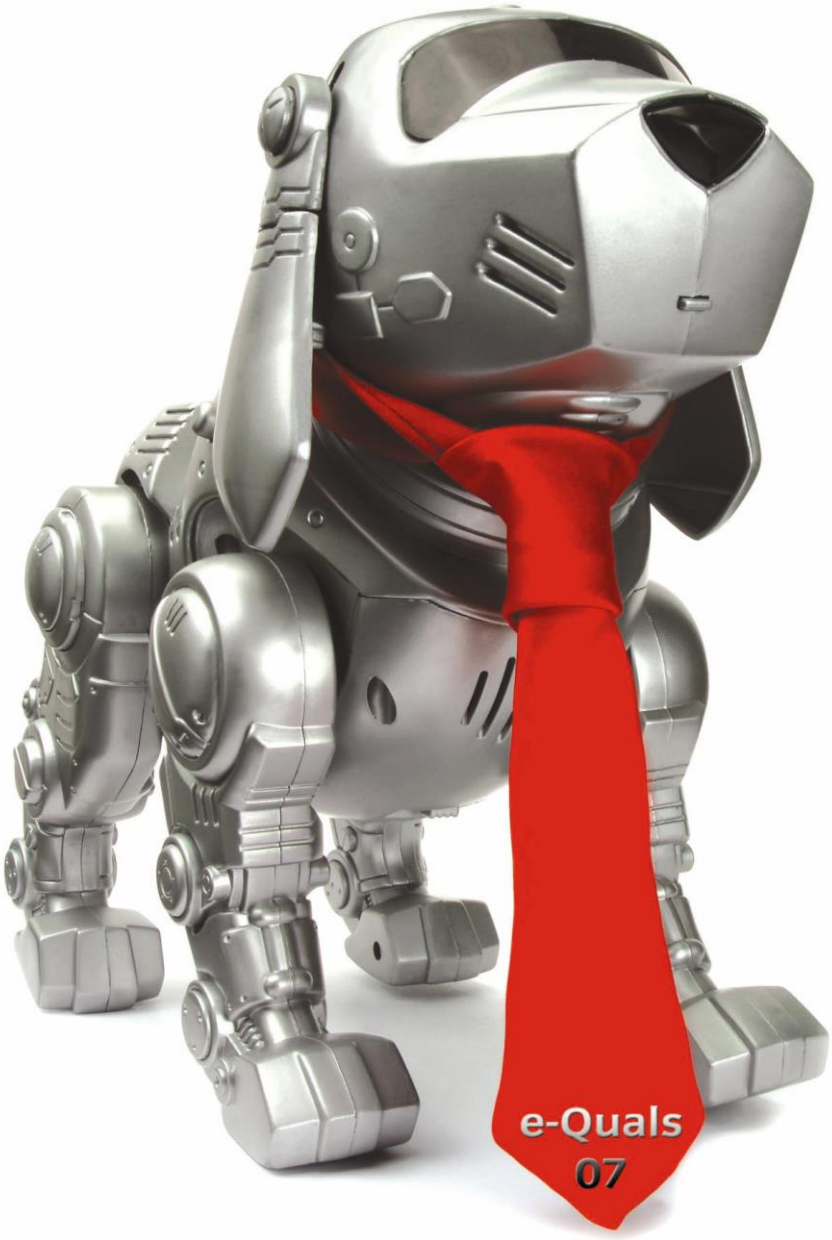

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Introduction – Information for Candidates

About this document

This assignment comprises part of the assessment for Level 3 Develop software using Java (7266/7267-305).

Health and safety

You are asked to consider the importance of safe working practices at all times.

You are responsible for maintaining the safety of others as well as your own. Anyone behaving in an unsafe fashion will be stopped and a suitable warning given. You will **not** be allowed to continue with an assignment if you compromise any of the Health and Safety requirements. This may seem rather strict but, apart from the potentially unpleasant consequences, you must acquire the habits required for the workplace.

Time allowance

The recommended time allowance for this assignment is **6 hours**.

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Candidate instructions

Candidates are advised to read **all instructions** carefully before starting work and to check with your assessor, if necessary, to ensure that you have fully understood what is required.

Time allowance: 6 hours

Assignment set up: A scenario is provided below for this assignment.

This assignment is made up of **three** tasks

- **Task A** - provides a detailed design specification that should be followed by candidates when developing their program.
- **Task B** - requires the candidate to test and document the program.
- **Task C** - provides presentation criteria that should be followed by candidates when producing their work.

Scenario

A software development company, RealTime Design, is developing software for automating the regulation of heating and ventilation in a greenhouse. As an employee of RealTime Design, you have been asked to design, create and test the software.

The initial system is to provide a computer simulation of the system using keyboard inputs instead of inputs from sensor devices and screen output instead of signals to the equipment.
The optimum conditions of the greenhouse are keyed in and the computerised system attempts to maintain these conditions. It uses measurements of: e.g. temperature to decide whether to open ventilation vents, turn on heaters, turn on sprinklers, etc.

The system must be designed so that eventually it can control more than one greenhouse.

Task A

Candidates should use the following detailed specification to fulfil the company's requirements:

In this task you are required to design, create and test the software to fulfil the specification.

The system must control

- 4 vents which can be closed, half-open or fully open
- 2 sprinkler systems that can be on or off
- 4 radiator systems that can be on or off.

The inputs are:

- temperature in degrees Centigrade
- humidity as a percentage

- draught in terms of miles per hour.

The rules are as follows:
Too hot:

- turn a radiator off
- if all radiators are off, open a closed vent to half-open
- if no vents are closed, fully open a half-open vent
- if all vents are fully open, turn on a sprinkler
- if all sprinklers are already on, display an error message.

Too cold:

- set a fully open vent to half-open
- if none are fully open, close a half-open vent
- if none are half-open, turn a sprinkler off
- if none are on, turn on a radiator
- if they are all on, display an error message.

Too humid:

- turn a sprinkler off
- if no sprinklers are on, half-open a vent
- if no vents are closed, fully open a vent
- if all vents are open and all sprinklers off, display an error message.

Too dry:

- turn a sprinkler on
- if all sprinklers are on, start to close vents
- if both sprinklers are on and all vents are closed, display an error message.

Too draughty:

- half-close a fully open vent
- if no vents are fully open, close a half-open vent
- if all vents are closed, display an error message.

1 Design a solution for the software. Document the methods in a program description language (pseudocode, flowchart or structured English):

a. The software should start with all vents closed and the heating and sprinklers off.
b. Initially the software must ask the user what the optimum conditions in the greenhouse are (temperature, humidity, draught).
c. Appropriate range checking must be carried out.
d. The software must loop continuously until inputting a ‘q’ or ‘Q’ (for quit) signals termination.
e. The software must display on screen the current state of all sprinklers, vents and radiators.
f. The software must then ask for the current temperature reading in the greenhouse. If this is outside the allowed range, action should be taken as outlined in the specification.
g. The software must display on screen the current state of all sprinklers, vents and radiators.
h. The software must then ask for the current humidity reading. If this is outside the allowed range, action should be taken as outlined in the specification.
i. The software must display on screen the current state of all sprinklers, vents and radiators.

j. The software must then ask for the current draught reading. If this is outside the allowed range, action should be taken as outlined in the specification.
k. The software must display on screen the current state of all sprinklers, vents and radiators.
l. At any time when an input is requested eg temperature; the software may be interrupted by entering a character input. If a 'q' or 'Q' (for quit) is entered this terminates the software. If a 'r' or 'R' (for reset) is entered this allows the optimum conditions to be changed. The cycle of entering readings then continues. All other character inputs must be ignored.
m. If conditions are such that the software can take no further action, an appropriate error message must be displayed on screen. Pressing the RETURN key must allow the software to continue.

2 Error handling routines must be included to deal with exceptions.

3 Document the layout of any input and output screens used.

4 Write the code for the software.

Task B

In this task you are required to test and document the program.

1 Create test data to test the software and determine the expected results.

2 Prepare a test plan.

3 Test the software, compare the actual results to the expected results keeping a log for each test which identifies any discrepancies between actual and expected results and records any amendments made to correct errors.

4 Produce instructions for the operation of the software for the end user.

5 Produce a printed program listing.

Task C

Candidates should follow the criteria below when producing their work:

1 The program conforms to the design specification.

2 The code is structured.

3 Meaningful names are used for classes, methods and attributes using consistent naming conventions.

Note

- Candidates should produce the following for their assessor:
  - Program description language algorithms for each method in the class.
  - Screen layouts.
  - A printed program listing.
  - Test data, test plan, expected results, actual results and the log of testing.
  - End user instructions.
- At the conclusion of this assignment, hand all paperwork and removable media to the test supervisor.
- Ensure that your name is on the removable media and all documentation.
- If the assignment is taken over more than one period, all removable media and paperwork must be returned to the test supervisor at the end of each sitting.

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