



Unit:
**Designing and Developing Object-Oriented
Computer Programs**

Assignment title:
Home Appliance Rental System

Sample Assignment

Important notes

- Please refer to the *Assignment Presentation Requirements* for advice on how to set out your assignment. These can be found on the NCC Education website. Click on 'Policies & Advice' on the main menu and then click on 'Student Support'.
- You must read the NCC Education documents *What is Academic Misconduct? Guidance for Candidates* and *Avoiding Plagiarism and Collusion: Guidance for Candidates* and ensure that you acknowledge all the sources that you use in your work. These documents are available on the NCC Education website. Click on 'Policies & Advice' on the main menu and then click on 'Student Support'.
- You **must** complete the *Statement and Confirmation of Own Work*. The form is available on the NCC Education website. Click on 'Policies & Advice' on the main menu and then click on 'Student Support'.
- Please make a note of the recommended word count. You could lose marks if you write 10% more or less than this.
- You must submit a paper copy and digital copy (on disk or similarly acceptable medium). Media containing viruses, or media that cannot be run directly, will result in a fail grade being awarded for this assessment.
- All electronic media will be checked for plagiarism.

Scenario

You are contracted to develop a home appliance rental application for a local startup company. The renting business company provides affordable rental services for people looking to hire home electrical appliances from small to large for a minimum period of time starting from ONE (1) month. Examples of types of appliances are TV, fridge, freezer, washing machine, dryer, dishwasher, microwave, etc.

The application should have TWO (2) types of users which are administrator and customer. An administrator can view, add, edit, and delete an item. A customer can create an account with a username and password. The usernames can only contain letters and numbers. The password must be of length between EIGHT (8) and SIXTEEN (16) characters, and contain at least ONE (1) lowercase and ONE (1) uppercase letter. A customer can search, view, and order an item after they successfully log in the application.

Your program should include the following requirements.
Functional Requirements:

- Customers can register.
- Customers can search appliances by type and view sorted appliances by energy consumption (see the table below for some common appliances, or research for your chosen appliances) or weekly cost. They can also add appliance items to a shopping cart.
- Calculation of the total price.
- Administrators can add, edit and delete appliance items.
- Log in page for customers and administrators. Appropriately handle the situation when a reasonable number of failed login attempts occur.

Appliance	Power usage	Typical usage	Estimated annual running costs
LCD TV	0.21kWh per hour	6 hours a day (power on)	£130
Fridge Freezer (A spec)	408kWh per year	24 hours a day	£115
Tumble Dryer	2.50kWh per cycle	148 uses a year	£105
Electric hob	0.71kWh per use	424 uses a year	£85
Electric oven	1.56kWh per use	135 uses per year	£60
Dishwasher	1.44kWh per use (at 65°C)	135 uses per year	£55
Kettle	0.11kWh per use based on heating 1 litre of water	1,542 uses per year	£48

(Hutson, S. (2022). Which appliances use the most energy? Compare The Market. <https://www.comparethemarket.com/energy/content/which-appliances-use-the-most-energy/>)

Non-functional Requirements:

- Set up the GUI
- Provide FIVE (5) types of appliances of your choice.
- Each type has TEN (10) appliances.
- Each appliance is rented for a monthly fee.
- Each appliance should have an appropriate description, such as brand, model, dimensions, colour, energy consumption, monthly fee etc.
- All FIVE (5) types of appliances should have different minimum rental contract periods starting from ONE (1) month.
- The application users are customers and administrators.
- Provide appropriate errors and help messages, and guidance for customer

Task 1 (60 Marks)

- a) You need to design and implement a program (written in C#) which fulfils all the requirements as outlined above. **(50 marks)**
- b) The quality of your program will be assessed in terms of program structure, OOP principles including encapsulation, algorithms using appropriate control structures (loops and selections), and readability including appropriate comments. **(10 marks)**

Task 2 (20 Marks)

You will need to develop a test plan and implement it. You should write a FIVE HUNDRED (500) word report about the plan, which should include the test plan, purpose of each test, together with test scripts*, and the testing results* with full details.

An additional FIVE HUNDRED (500) word discussion should be included to justify how the data was selected and executed.

*There is no word limit for the test scripts and testing results.

The minimum requirements for a pass mark include developing and implementing a test plan including test cases with some possible/invalid inputs for any TWO (2) functions mentioned above to ensure the functions handle the inputs as they should.

Possible exceptions should be considered and tested to make sure they are properly handled.

Task 3 (20 Marks)

You need to:

- Create a fully detailed class diagram, which should be accompanied by a FIVE HUNDRED (500) word justification of the design of your classes. Note that you are **NOT** allowed to use any tools that automatically build class diagrams.

Submission requirements

Your program must be submitted as a zip file of the full project.

- Your program should be written in **C#**.
- Whatever IDE you use, it should be possible to open and run the project directly from the extracted archive.
- A single document with ONE THOUSAND AND FIVE HUNDRED (1500) word including a test plan, how the data was selected and executed, and justification of your class diagram.

Candidate checklist

Please use the following checklist to ensure that your work is ready for submission.

Have you read the NCC Education documents *What is Academic Misconduct? Guidance for Candidates* and *Avoiding Plagiarism and Collusion: Guidance for Candidates* and ensured that you have acknowledged all the sources that you have used in your work?

Have you completed the *Statement and Confirmation of Own Work* form and attached it to your assignment? **You must do this.**

Have you ensured that your work has not gone over or under the recommended word count by more than 10%?

Have you ensured that your work does not contain viruses and can be run directly?