# Data Driven Programming Assessment 2

# Part 2 - Develop a 2D-Shapes Calculator

## Development requirements

Here are the requirements for the “2D-Shapes Calculator” program.

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| 1 | User is able to use a command line-based console interface to operate the calculator. |
| 2 | User is able to choose the target shape from a predefined list, including square, rectangle, circle, trapezoid. |
| 3 | User is able to choose what to calculate for each selected geometry shape from a predefined list, including area and perimeter. |

You are required to

* Design and develop a software program that meets the above requirements
* Develop a test plan that covers the requirements using provided template
* Execute the test plan to verify the program
* Generate a test report using provided template

You are also required to follow the questions in the step 1 and step 2 below to finish all the tasks and answer all the questions.

## Development environment

* Visual studio
* SQLite DB-browser

## Organisational guidelines

* C# Coding Conventions - <https://docs.microsoft.com/en-us/dotnet/csharp/fundamentals/coding-style/coding-conventions>
* Software test principles and guidelines. See attached file below.



## Step 1 – Software design & development

In this step, you are required design and develop the application using a selected programming language (e.g. C#).

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| **1.1.** Read the project brief for this application, review and clarify user requirements with user. And list all user requirements using bullet points. |
| **Answer:**   * Requirement 1 … * …… |
| **1.2.** Plan and determine the class hierarchy (inheritance tree) to satisfy user requirements. You are required to use the following notation to represent the inheritance relationship. |
| **Answer:** |
| **1.3.** Plan and determine the member fields and methods for **each** class documented in question 2 above. You are required to use the following notation to represent a class. |
| **Answer:** |
| **1.4.** In terms of object-oriented programming, explain “inheritance”, “polymorphism” and “overriding methods”. You may explain the three terms by using an example. |
| **Answer:**   |  |  | | --- | --- | | **Terms** | **Your answers** | | **inheritance** |  | | **polymorphism** |  | | **overriding methods** |  | |
| **1.5** Implement all classes according to the design above using an OOP programming language (e.g. C#). You need to make sure:   * Inheritance and polymorphism (overriding methods) have been correctly implemented. * Code conventions are followed * Codes are fully documented using comments   Provide a screenshot of the codes for each class definition. |
| **Answer:**   |  |  | | --- | --- | | Class 1 |  | | Class 2 |  | | …… |  |   Add more rows as you need in the table above to cover all classes.  I have followed code conversions  I have fully documented using comments |
| **1.6** Implement two versions of constructors for all classes with member fields.   * One constructor accepts zero parameter and initialize each member fields to a reasonable default value. * The other constructor accepts a number of parameters for initializing all member fields.   Provide a screenshot of the two constructors for each class. |
| **Answer:**   |  |  |  | | --- | --- | --- | | Class Name | Constructor #1 – without parameter  Screenshot | Constructor #2 – with parameter  Screenshot | |  |  |  | |  |  |  |   Add more rows as you need in the table above to cover all classes. |
| **1.7** Implement the console user interface according to the requirements. Provide a screenshot of the codes.  You need to make sure:   * Code conventions are followed * Codes are fully documented using comments |
| **Answer:**  Your screenshot  I have followed code conversions  I have fully documented using comments |

| **Skills to be observed for step 1 by assessor** | | **1. Date:** | | **2. Date:** | | **Comment** |
| --- | --- | --- | --- | --- | --- | --- |
|  | |  | |
| **Satisfactory** | | **Satisfactory** | |
| **Yes** | **No** | **Yes** | **No** |
| 1.8 | Learner correctly implemented polymorphism for code extensibility |  |  |  |  |  |
| 1.9 | Learner applied documentation conventions and documented the application according to organisational documentation conventions |  |  |  |  |  |
| 1.10 | Learner applied code conventions to organisational requirements |  |  |  |  |  |
| 1.11 | Learner communicated relationships between ideas and information, in a style appropriate to the audience and purpose, and selects the vocabulary, grammatical structures and conventions appropriate to the text, in relation to coding, recording outcomes, and documenting activitie. |  |  |  |  |  |
| 1.12 | Learner selected from, and flexibly applies, mathematical and problem-solving strategies and techniques, in a programming context |  |  |  |  |  |
| 1.13 | Learner recognised and followed, explicit and implicit standard and meets expectations associated with own role when developing code that is compliant with standards and guidelines |  |  |  |  |  |
| 1.14 | Learner used a formal decision-making process, identifying and evaluating several choices against a limited set of criteria, when selecting language data types, operators and expressions |  |  |  |  |  |
| 1.15 | Learner evaluated the effectiveness of decisions, in terms of how well they meet the stated design specifications |  |  |  |  |  |
| 1.16 | Learner used analytical processes to decide on a course of action when debugging |  |  |  |  |  |
| 1.17 | Learner utilised features within applications in order to develop software programs |  |  |  |  |  |
| 1.18 | Learner recognised, and used language and symbols, when applying the coding syntax |  |  |  |  |  |
| 1.19 | Learner actively identified systems, devices and applications with the potential to meet current and future needs regarding programming |  |  |  |  |  |

## Step 2 – Software test

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| **2.1** Identify unit test requirements for each class and list all requirements with bullet points. |
| **Answer:** |
| **2.2** Identify system test requirements for the application and list all requirements with bullet points |
| **Answer:** |
| **2.3** Discuss and confirm the above development requirements with a member in software development team.  Note: The member in software development team can be role played by another student. You are required to discuss the following items in the meeting. |
| **Answer:**   |  |  | | --- | --- | | **Participants/roles** |  | | **Meeting date** |  | | **Scope of test** | *What will be included in the test, and what will not be.* | | **Types of tests** | *e.g. unit test, system test …* | | **Tools** | *What are the software tool used in the test* | | **Benefits** | *Discuss the benefits of the selected type of test, tools…* | |
| **2.4** Identify organisational guidelines and frameworks related to testing. List them all using bullet points |
| **Answer:** |
| **2.5** Discuss at least three test-case design techniques and explain how they are applied in your test case design. |
| **Answer:**  Test-case design technique #1   |  | | --- | | Discuss this technique | | Explain how you apply this technique in your test case design |   Test-case design technique #2   |  | | --- | | Discuss this technique | | Explain how you apply this technique in your test case design |   Test-case design technique #3   |  | | --- | | Discuss this technique | | Explain how you apply this technique in your test case design | |
| **2.6** Develop test plan and test cases using provided template.  You are required to apply the test-case design techniques discussed above and develop TWO test cases with EACH technique.  Write the submitted test plan file name in the answer box below. |
| **Answer:**  *Test plan file name* |
| **2.7** Develop unit test procedures using an auto testing framework (e.g. Visual Studio Unit Testing). Provide a screenshot of the unit test codes (if the codes are too long, screenshot 2 test case for this question and your teacher will check all the codes in your code submission). |
| **Answer:** |
| **2.8** Perform manual test according to system test plan, screenshot the test results (for at least two test cases). |
| **Answer:** |
| **2.9** Perform auto test according to unit test plan, screenshot the test results (for at least two test cases). |
| **Answer:** |
| **2.10** Discuss and confirm the above test results with a member in software development team.  Note: The member in software development team and be role played by another learner. |
| **Answer:**   |  |  | | --- | --- | | **Participants/roles** |  | | **Meeting date** |  | | **Meeting minutes** |  | |
| **2.11** Produce and save test reports using provided template.  Write the submitted test plan file name in the answer box below. |
| **Answer:**  *Test report file name* |
| **2.12** Manage defects and review software, amending further defects. You are required to record how did you managed defect for at least one issue based on the test results using the template below. |
| **Answer:**  Issue description  Code review and root cause analysis  Resolution description |

| **Skills to be observed for this step 2 by assessor** | | **1. Date:** | | **2. Date:** | | **Comment** |
| --- | --- | --- | --- | --- | --- | --- |
|  | |  | |
| **Satisfactory** | | **Satisfactory** | |
| **Yes** | **No** | **Yes** | **No** |
| 2.13 | Learner identified test and script requirements including data structures |  |  |  |  |  |
| 2.14 | Learner analysed and identified test data using multiple test-case design techniques. |  |  |  |  |  |
| 2.15 | Learner defined and designed test cases. |  |  |  |  |  |
| 2.16 | Learner documented test plan and script according to organisational guidelines and industry standards |  |  |  |  |  |
| 2.17 | Learner designed and implemented algorithm required in test procedures |  |  |  |  |  |
| 2.18 | Learner took responsibility for planning, sequencing and prioritising tasks and own workload |  |  |  |  |  |

Please use the check list below to check if you have got everything ready before submitting the assessment for review.

|  |  |
| --- | --- |
| **Submission check list** | |
| Assessment document with all questions answered |  |
| All source codes |  |
| Test plan document for system test |  |
| Test plan document for unit test |  |
| Test report document for system test |  |
| Test report document for unit test |  |