**國立臺北科技大學**

**資訊工程系**

**軟體測試與驗證**

**Test Design Specification**

**And**

**Test Case Specification**

**Turbo Editor**

**Team#6**

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**民國 109 年 6 月 23 日**

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# Change History

| Version | Primary Author(s) | Description of Version | Date Completed |
| --- | --- | --- | --- |
| 1.0.0 | 古兆瑋、陳冠穎、劉孝忠 | 樣式及內容初稿。 | 2020/04/20 |
| 1.1.0 | 古兆瑋、陳冠穎、劉孝忠 | 依教授於期中報告提出之建議，於Phase 3修正1.5 Item Pass/Fail Criteria；以及新增Graph Coverage Test Approach與新增使用案例之特殊情形測試。 | 2020/05/20 |
| 1.2.0 | 古兆瑋、陳冠穎、劉孝忠 | Phase 4初稿。 | 2020/06/23 |

# Test Design Specification

## Test Design Specification Identifier

NTUT-108-STV-TurboEditor\_TDS。

## Features to be Tested

|  |  |  |
| --- | --- | --- |
| **Feature ID** | **Description** | **Use Case** |
| F-T-01 | Create New File | Create File |
| F-T-02 | Open File | Read File |
| F-T-03 | Read File’s Info |
| F-T-04 | Rename File | Update File |
| F-T-05 | Edit File |
| F-T-06 | Undo Editing |
| F-T-07 | Redo Editing |
| F-T-08 | Search File with REGEX | Search File |
| F-T-09 | Search File with MATCH CASE |
| F-T-10 | Search File with REPLACE |
| F-T-11 | Set Line Numbers | Set Configuration |
| F-T-12 | Set Syntax Highlight |
| F-T-13 | Set Wrap Content |
| F-T-14 | Set Use Monospace |
| F-T-15 | Set Read Only |
| F-T-16 | Set Font Size |
| F-T-17 | Set Theme |
| F-T-18 | Set Accessory View |
| F-T-19 | Set Use the storage Access Framework |
| F-T-20 | Set Keyboard Suggestion and Swipe |
| F-T-21 | Set Auto Save |
| F-T-22 | Set Encoding |
| F-T-23 | Set Ignore Back Button |
| F-T-24 | Set Split The Text If Too Long |
| F-T-25 | Set Fullscreen Mode |
| F-T-26 | Set Open Last Viewed File At Startup |

## Approach Refinements

本次計畫使用User Scenarios測試技巧，將使用者操作案例之步驟逐步以APP UI測試自動化框架之腳本撰寫之，進行自動化測試。

## Test Identification

|  |  |  |
| --- | --- | --- |
| **Test ID** | **Description** | **Related Use Case** |
| TD-01 | Create New File | Create File |
| TD-02 | Open File | Read File |
| TD-03 | Read File’s Info |
| TD-04 | Rename File | Update File |
| TD-05 | Edit File |
| TD-06 | Undo Editing |
| TD-07 | Redo Editing |
| TD-08 | Search File with REGEX | Search File |
| TD-09 | Search File with MATCH CASE |
| TD-10 | Search File with REPLACE |
| TD-11 | Set Line Numbers | Set Configuration |
| TD-12 | Set Syntax Highlight |
| TD-13 | Set Wrap Content |
| TD-14 | Set Use Monospace |
| TD-15 | Set Read Only |
| TD-16 | Set Font Size |
| TD-17 | Set Theme |
| TD-18 | Set Accessory View |
| TD-19 | Set Use the storage Access Framework |
| TD-20 | Set Keyboard Suggestion and Swipe |
| TD-21 | Set Auto Save |
| TD-22 | Set Encoding |
| TD-23 | Set Ignore Back Button |
| TD-24 | Set Split The Text If Too Long |
| TD-25 | Set Fullscreen Mode |
| TD-26 | Set Open Last Viewed File At Startup |

## Item Pass/Fail Criteria

Test Item的Pass/Fail判斷標準，分為下列兩種方式：

1. 以User Scenario Technique設計之測試案例：以一功能之敘述句，在測試執行後是否成立為Pass/Fail標準，假使功能測試執行後，使敘述句成立則Pass；反之則Fail，而本次測試之目標為使所有與1.2 Features to be Tested及1.4 Test Identification有關之Test Case通過測試(Pass)，證明軟體有達成使用案例的需求。
2. 以Control-Flow Graph Coverage Technique設計之測試案例：以Basis Path Approach，須覆蓋所有分支，意即Statement Coverage及Branch Coverage是100%，證明測試案例是有實際將該段程式碼執行過的。

不論判斷標準為何，最終希望本次測試能夠達成80%的Code Coverage，證明因為測試涵蓋這麼高的覆蓋率，所以測試的結果是可以信任的。

# Test Case Specification

## Test Case Specification Identifier

NTUT-108-STV-TurboEditor\_TCS。

## Test Cases

|  |  |
| --- | --- |
| **Test Case ID** | TC-01 |
| **Test Case Name** | Create File |
| **Related Use Case** | UC-01 |
| **Related Test Item** | TD-01 |
| **Scope** | Turbo Editor |
| **Input Specification** | 1. Launch Application. 2. Click menu button 3. Click "New file" on menu. 4. Input file name. 5. Save the file. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. File explorer shows up for choosing directory and entering name. 3. Empty new file shows up on the screen for entering content. |

|  |  |
| --- | --- |
| **Test Case ID** | TC-02 |
| **Test Case Name** | Read File |
| **Related Use Case** | UC-02 |
| **Related Test Item** | TD-02、TD-03 |
| **Scope** | Turbo Editor |
| **Input Specification** | 1. Launch Application. 2. Click menu button. 3. Click "Open a file" on menu. 4. Select a file to open. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. File explorer shows up. 3. The selected file opens after clicking on it. 4. File content displays on the editor. |

|  |  |
| --- | --- |
| **Test Case ID** | TC-03 |
| **Test Case Name** | Update File |
| **Related Use Case** | UC-03 |
| **Related Test Item** | TD-04、TD-05、TD-06、TD-07 |
| **Scope** | Turbo Editor |
| **Input Specification** | 1. Launch Application. 2. Click menu button. 3. Click "Open a file" on menu. 4. Select an existing file to open. 5. Edit content of the opened file. 6. Click undo button. 7. Click redo button. 8. Click save button. 9. Click “Save”. 10. Click menu of processing file. 11. Click rename button. 12. Enter new file name. 13. Click “OK”. 14. Click menu button. 15. Click “Open a file” button. 16. Select the file just renamed. 17. Edit content. 18. Click save button. 19. Click “Save as” 20. Enter new file name. 21. Choose directory. 22. Click “SAVE”. 23. Click menu button. 24. Click “Open a file” 25. Select the file just saved. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. File explorer shows up. 3. The selected file opens after clicking on it. 4. Original content displays on the editor. 5. Change of content displays on the editor. 6. The change is undone after clicking undo button. 7. The change is redone after clicking redo button. 8. The menu of processing file shows up at the top-right corner of the screen. 9. Rename dialogue pops up for new file name. 10. Message of file cannot be renamed at the bottom of editor. 11. “Save as” dialogue pops up for file “Name” and “Folder”. 12. File explorer shows up for choosing directory and entering name. |

|  |  |
| --- | --- |
| **Test Case ID** | TC-04 |
| **Test Case Name** | Search File |
| **Related Use Case** | UC-04 |
| **Related Test Item** | TD-08、TD-09、TD-10 |
| **Scope** | Turbo Editor |
| **Input Specification** | 1. Launch Application. 2. Click menu button 3. Click "Open a file" on menu. 4. Click search icon. 5. Enter text for searching. 6. Select the wanted file in searching results. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. File explorer shows up. 3. Search field shows up for input 4. Search results displays on screen. 5. The selected file opens after clicking on it. |

|  |  |
| --- | --- |
| **Test Case ID** | TC-05 |
| **Test Case Name** | Set Configuration |
| **Related Use Case** | UC-05 |
| **Related Test Item** | TD-11、TD-12、TD-13、TD-14、TD-15、TD-16、TD-17、TD-18、TD-19、TD-20、TD-21、TD-22、TD-23、TD-24、TD-25、TD-26 |
| **Scope** | Turbo Editor |
| **Input Specification** | 1. Launch Application. 2. Click menu button 3. Click "Preferences" on menu. 4. Enable the features. 5. Disable the features. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. Preferences menu displays on the right side of screen. 3. The selected feature toggle button is on. 4. The selected feature toggle button is off. |

|  |  |
| --- | --- |
| **Test Case ID** | TC-06 |
| **Test Case Name** | Back When Create File |
| **Related Use Case** | UC-01 |
| **Related Test Item** | TD-01 |
| **Scope** | Turbo Editor |
| **Input Specification** | 1. Launch Application. 2. Click menu button. 3. Click "New file" on menu. 4. Input file name. 5. Click “Back” button. 6. Click menu button. 7. Click "New file" on menu. 8. Input file name. 9. Save the file. 10. Type in some text. 11. Click “Back” button. 12. Click “No”. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. File explorer shows up for choosing directory and entering name. 3. Empty new file shows up on the screen for entering content. 4. Change of content displays on the editor. 5. “Save” dialogue pops up for save the file. 6. APP goes back to main menu. |

|  |  |
| --- | --- |
| **Test Case ID** | TC-07 |
| **Test Case Name** | Close APP When Create File |
| **Related Use Case** | UC-01 |
| **Related Test Item** | TD-01 |
| **Scope** | Turbo Editor |
| **Input Specification** | 1. Launch Application. 2. Click menu button. 3. Click "New file" on menu. 4. Input file name. 5. Close the app. 6. Launch Application. 7. Click menu button. 8. Click “Open a file” on menu. 9. Search for the file name input at step 4. 10. Launch Application. 11. Click menu button. 12. Click "New file" on menu. 13. Input file name. 14. Save the file. 15. Type in new text. 16. Close the app. 17. Launch Application. 18. Click menu button. 19. Click “Open a file” on menu. 20. Select the file created at step 10. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. File explorer shows up for choosing directory and entering name. 3. Empty new file shows up on the screen for entering content. 4. Change of content displays on the editor. 5. File explorer shows up for selecting existing files. 6. Search field shows up for input. 7. Search results displays on screen. 8. The selected file opens after clicking on it. 9. APP closes. 10. Editor shows the file content before type in new text. |

|  |  |
| --- | --- |
| **Test Case ID** | TC-08 |
| **Test Case Name** | undo |
| **Scope** | Turbo Editor |
| **Source Code File Name** | Editor.java |
| Source Code | |
|  | |
| Control-Flow Graph | |
|  | |
| **Basis Path** | [2, 3, 4]  [2, 3, 7-14, 18, 19, 20, 21, 19, 23-25, 26] |
| **Input Specification** | 1. Launch Application. 2. Click menu button. 3. Click "Open a file" on menu. 4. Select an existing file to open. 5. Edit content of the opened file. 6. Click undo button. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. File explorer shows up. 3. The selected file opens after clicking on it. 4. Original content displays on the editor. 5. Change of content displays on the editor. 6. The change is undone after clicking undo button. |

|  |  |
| --- | --- |
| **Test Case ID** | TC-09 |
| **Test Case Name** | replaceTextKeepCursor |
| **Scope** | Turbo Editor |
| **Source Code File Name** | Editor.java |
| Source Code | |
|  | |
| Control-Flow Graph | |
|  | |
| **Basis Path** | [3, 4, 6, 7, 8, 14, 16, 17, 18, 23, 25, 27, 29, 30, 35a, 35b, 36, 37, 40, 41]  [3, 4, 6, 7, 8, 14, 16, 17, 18, 23, 25, 27, 29, 30, 35a, 35b, 36, 39, 40, 41]  [3, 4, 6, 10, 11, 14, 16, 20, 23, 25, 27, 29, 32, 35a, 40, 41] |
| **Input Specification** | 1. Launch Application. 2. Click menu button. 3. Click "Open a file" on menu. 4. Select an existing file to open. 5. Highlight some text. 6. Enter new text. |
| **Output Specification** | 1. Menu displays on the left side of screen. 2. File explorer shows up. 3. The selected file opens after clicking on it. 4. Original content displays on the editor. 5. Highlighted text is replaced by new text. |

## Environmental Needs

本測試考量測試中觀測及紀錄(文字、圖像及影像)的方便性，將計畫於個人電腦(PC)上之Android模擬器，透過框架進行APP UI自動化測試，其硬體規格及軟體規格如下。

|  |  |  |
| --- | --- | --- |
| **Hardware Specification and Configuration** | | |
| **種類** | **描述** | **備註** |
| 中央處理器 | Intel® Core™ i7-4770 |  |
| 圖形處理器 | Intel® HD Graphics 4600 | 位於中央處理器內 |
| 硬碟 | INTEL SSDSC2CT240A4 | Intel® SSD 335 Series |
| 記憶體 | DDR3-1333 | 16 GB |
| 顯示器 | VW247N、VN289N |  |

|  |  |  |
| --- | --- | --- |
| **Software Specification and Configuration** | | |
| **名稱** | **版本** | **備註** |
| Microsoft Windows 10專業版 | 1903 |  |
| Android Studio | 3.6.2 | SDK Platform Required |
| Espresso | 3.1.0 |  |
| UI Automator | 2.2.0 |  |

## Special Procedural Requirements

無。

## Intercase Dependencies

無。

# Glossary

|  |  |
| --- | --- |
| **SUT** | 軟體系統測試則通常是以被測系統（System Under Test，SUT）表示正在被測試的系統，目的是測試系統是否能正確操作。這一詞語常用於軟體測試中。[1] |
|  |  |
| **Android** | Android（讀音：英：['ændrɔɪd]，美：[ˈænˌdrɔɪd]），中文常譯作安卓或安致，是一個基於Linux核心的開放原始碼行動作業系統，由Google（Google）成立的開放手機聯盟持續領導與開發，主要設計用於觸控螢幕行動裝置如智慧型手機和平板電腦與其他可攜式裝置。[2] |
|  |  |
| **APP** | A short of “Application” |
|  |  |
| **Turbo Editor** | Simple, Powerful and Open Source Text Editor for Android. Built following the latest Android Guidelines to make the experience the most intuitive on the Store, also on Tablets![3][4] |
|  |  |
| **Espresso** | The core API is small, predictable, and easy to learn and yet remains open for customization. Espresso tests state expectations, interactions, and assertions clearly without the distraction of boilerplate content, custom infrastructure, or messy implementation details getting in the way.  Espresso tests run optimally fast! It lets you leave your waits, syncs, sleeps, and polls behind while it manipulates and asserts on the application UI when it is at rest.[5] |
|  |  |
| **UI Automator** | The UI Automator testing framework provides a set of APIs to build UI tests that perform interactions on user apps and system apps. The UI Automator APIs allows you to perform operations such as opening the Settings menu or the app launcher in a test device. The UI Automator testing framework is well-suited for writing black box-style automated tests, where the test code does not rely on internal implementation details of the target app.[6] |

# Reference

[1] 被測系統(Wikipedia) <https://zh.wikipedia.org/wiki/%E8%A2%AB%E6%B5%8B%E7%B3%BB%E7%BB%9F>

[2] Android(Wikipedia) <https://zh.wikipedia.org/wiki/Android>

[3] Turbo Editor(Google Play) <https://play.google.com/store/apps/details?id=com.maskyn.fileeditor>

[4] Turbo Editor(Github) <https://github.com/vmihalachi/turbo-editor>

[5] Espresso <https://developer.android.com/training/testing/espresso>

[6] UI Automator <https://developer.android.com/training/testing/ui-automator>

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