**國立臺北科技大學**

**資訊工程系**

**軟體測試與驗證**

**Test Result Summary**

**Turbo Editor**

**Team#6**

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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。 | 2020/06/23 |

# Test Plan and Result

## Description

本次測試將會以SUT中，以Turbo Editor的Feature List中，較常使用到的主要項目作為Test Items，並將其歸類為相對應的Use Cases，使往後Test Cases設計時有相對應的Use Cases。

## 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 |

## Features Not To Be Tested

|  |  |  |
| --- | --- | --- |
| **Feature ID** | **Description** | **Use Case** |
| F-NT-01 | Create New Folder | Create File |
| F-NT-02 | Open Folder | Read File |
| F-NT-03 | Share File |
| F-NT-04 | Rename Folder | Update File |
| F-NT-05 | Edit Folder |

## 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Use Case有關以及與1.2 Features To Be Tested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 Approach

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 Design 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 |

## Test Case Identification

|  |  |  |
| --- | --- | --- |
| **Test Case ID** | **Description** | **Related Test Item** |
| TC-01 | Create File | TD-01 |
| TC-02 | Read File | TD-02、TD-03 |
| TC-03 | Update File | TD-04、TD-05、TD-06、TD-07 |
| TC-04 | Search File | TD-08、TD-09、TD-10 |
| TC-05 | Set Configuration | 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 |
| TC-06 | Back When Create File | TD-01 |
| TC-07 | Close APP When Create File | TD-01 |
| TC-08 | undo |  |
| TC-09 | replaceTextKeepCursor |  |

## Test Result

|  |  |  |
| --- | --- | --- |
| **Test Case ID** | **Description** | **Pass / Fail** |
| TC-01 | Create File | Pass |
| TC-02 | Read File | Pass |
| TC-03 | Update File | Pass |
| TC-04 | Search File | Pass |
| TC-05 | Set Configuration | Pass |
| TC-06 | Back When Create File | Pass |
| TC-07 | Close APP When Create File | Pass |
| TC-08 | undo | Pass |
| TC-09 | replaceTextKeepCursor | Pass |
| Pass Rate | | 9/9 (100%) |
| Code Coverage | | 44% (<80%) |

## Test Analysis

依據1.4 Item Pass/Fail Criteria之敘述，以User Scenarios方法設計之測試案例編號TC-01至TC-05有確實以相關Use Case進行設計；特意模擬使用者可能會造成的例外狀況之測試案例編號TC-06至TC-07有確實以相關Use Case進行設計；以Control-Flow Graph方法設計之測試案例編號TC-08及TC-09有確實以控制流程圖進行設計，也確實按照設計去實作，並執行測試通過。但程式碼覆蓋率(Code Coverage)未達到預期的80%，主要原因是我們高估了User Scenarios黑箱測試可以達到的程式碼覆蓋率，我們以為以APP最主要且幾乎是所有的功能去測試的話，應該可以達到至少80%的期望，但可能是Use Case的Extension寫得不夠多，應該要多考慮些例外，才能將程式碼覆蓋率提升，亦或是以白箱測試的方式去提升。

## Software Bug Found through Testing

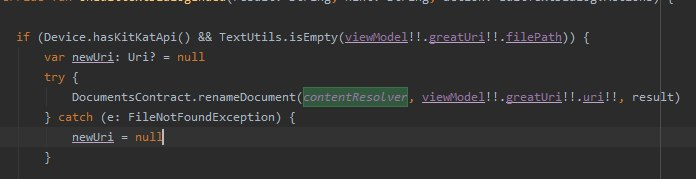


圖1.10.1: 原始程式碼

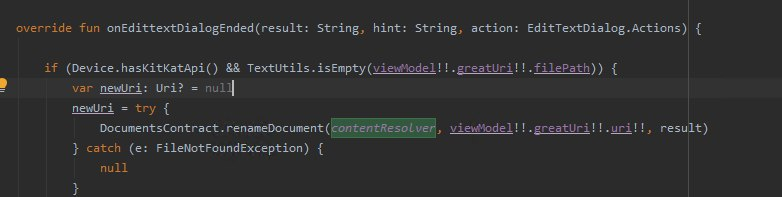


圖1.10.2: 修訂後之程式碼

在測試的過程中，我們發現此應用程式rename檔案或資料夾的功能沒有作用，所以在實作測試案例時實際去追蹤了一下程式碼，才發現原來變數newUri從頭到尾都沒有被賦予值，後來重新理解了原先的程式碼價購後，我們重新將try-catch的區塊賦予給變數newUri後，成功的解決無法rename檔案或資料夾的問題。

## Summary

總結來說，本次測試根據了Software Test Plan的目標訂定測試方向以及分析測試需求，並且在Test Design Specification依據Software Test Plan的規格去分析Test Item，之後於Test Case Specification進行對各個Test Item有關之測試案例的設計，而最後在執行已實作測試案例之後，於本文件分析本次軟體測試的結果與紀錄我們對於本次軟體測試的總結，最終雖然程式碼覆蓋率並沒辦法達成需求，也並未以所有於課堂上教過的Approach進行設計，但我們還是有學習到如何以APP的測試工具進行測試的設計，以及使用部分Approach設計測試案例的能力。

# 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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