國立台灣大學資訊工程學系

106 學年度第一學期軟體工程課程

Software Requirement Specification

Converse.js 功能擴充專案計畫

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1. System Architecture

1.1 Introduction

21 世紀網路蓬勃發展，人們遠距離溝通的方式不斷的改變：從紙筆書信轉移到 e-mail，大幅減少了送信的時間；從電話簡訊轉移到網路即時通訊軟體，降低了傳輸資料的花費。在講求效率的現代化社會中，除了要更快速傳遞訊息，也期待能用簡短的內容表達想告訴對方的事。在即時通訊軟體發展初期，人們只能透過各種符號組成簡易的表情來展現自己的情緒狀態，隨著軟體進步，逐漸發展成表情符號圖示、小貼圖，甚至動態語音圖片等，讓使用者能更快速的傳情說話。

對撰寫程式的工程師而言，給同事的訊息可能是簡短的程式碼片段，然而，現有的即時通訊軟體均以提供生動活潑的訊息內容為主要訴求，並無針對程式碼片段進行排版，部分自動轉換表情符號或貼圖的功能甚至會自動將將其為圖片或其他符號，自動調整的縮排與空白字元間距也影響到程式碼片段原有的排版方式，造成工程師溝通的困擾。因此，本團隊希望藉由修改現有的開源即時通訊軟體，調整輸入訊息與呈現內容的方式，使工程師也能利用即時通訊軟體清楚的傳送程式碼片段，增加工作效率。

本團隊開發之即時通訊軟體修改自 Converse.js，透過增加 Markdown、圖片上傳、Youtube 影片分享及檔案上傳等功能，使其達到方便工程師使用的需求。系統架構如下圖所示，包含使用者介面、Converse.js 模組及本團隊開發之 Markdown 模組、Image 模組、Youtube Plugin 模組及 File 模組，各模組均從 Converse.js 中的 chatview 延伸出去，再與現有的 API 或功能套件進行溝通與資訊交換。使用者將透過 UI 介面控制 Converse.js 中的 chatview，由 Markdown 模組處理及轉換帶有 markdown 標記的訊息；由 Image 模組上傳圖片至 Imgur 取得下載連結，顯示訊息中連結的圖片；由 Youtube Plugin 模組顯示訊息中的 Youtube 影片並以網頁撥放器開啟；由 File 模組上傳檔案至 File.io 並取得下載連結。其餘基本聊天室功能包含暱稱設定，建立聊天室及選

擇好友等功能則沿用 Converse.js 原有之內容，其與一般通訊軟體常見之功能無異。

本文件敘述 Converse.js 功能擴充需求之詳細內容與其系統架構。需求部分可分為 Functional 需求與 interface 需求兩部分，前者包含 Markdown、Image Upload、Youtube Plugin 及 File Upload 等四項，並建立數個個處理該需求的 Module 及修改 Converse.js 原有的 Module；後者為因應 Functional 需求而增加或修改的 Module 間所需要的溝通及使用者操作 interface 需求。根據上述需求建立系統架構圖，並以 Goal-driven Use Case 的精神，設計 13 個 Use Case，做為確認無需求被遺漏與未來測試資料撰寫之參考。

1.2 Architecture Expression

Following are the new functionalities of the system:

Module	Descriptions
Markdown module	This module provides 7 markdown functionalities, including code block, heading, URL, table, number/bulleted list, emphasize, and function toggle.
Image module	This module provides image-upload-related functionalities.
Youtube plugin module	This module provides Youtube-plugin-related functionalities.
File Module	This module provides file-upload-related functionalities.

Following are the system components that already exist, but would be going to interact with our new functions:

Module	Descriptions
UI module	Composed of HTML templates and SASS stylesheets. This module provides interfaces of IM to users.
Chatbox module	This module handles everything about sending and receiving messages on the client side.
Server	This is the XMPP server.
Third party module	This module includes 3 websites: Imgur, Youtube and File.io .

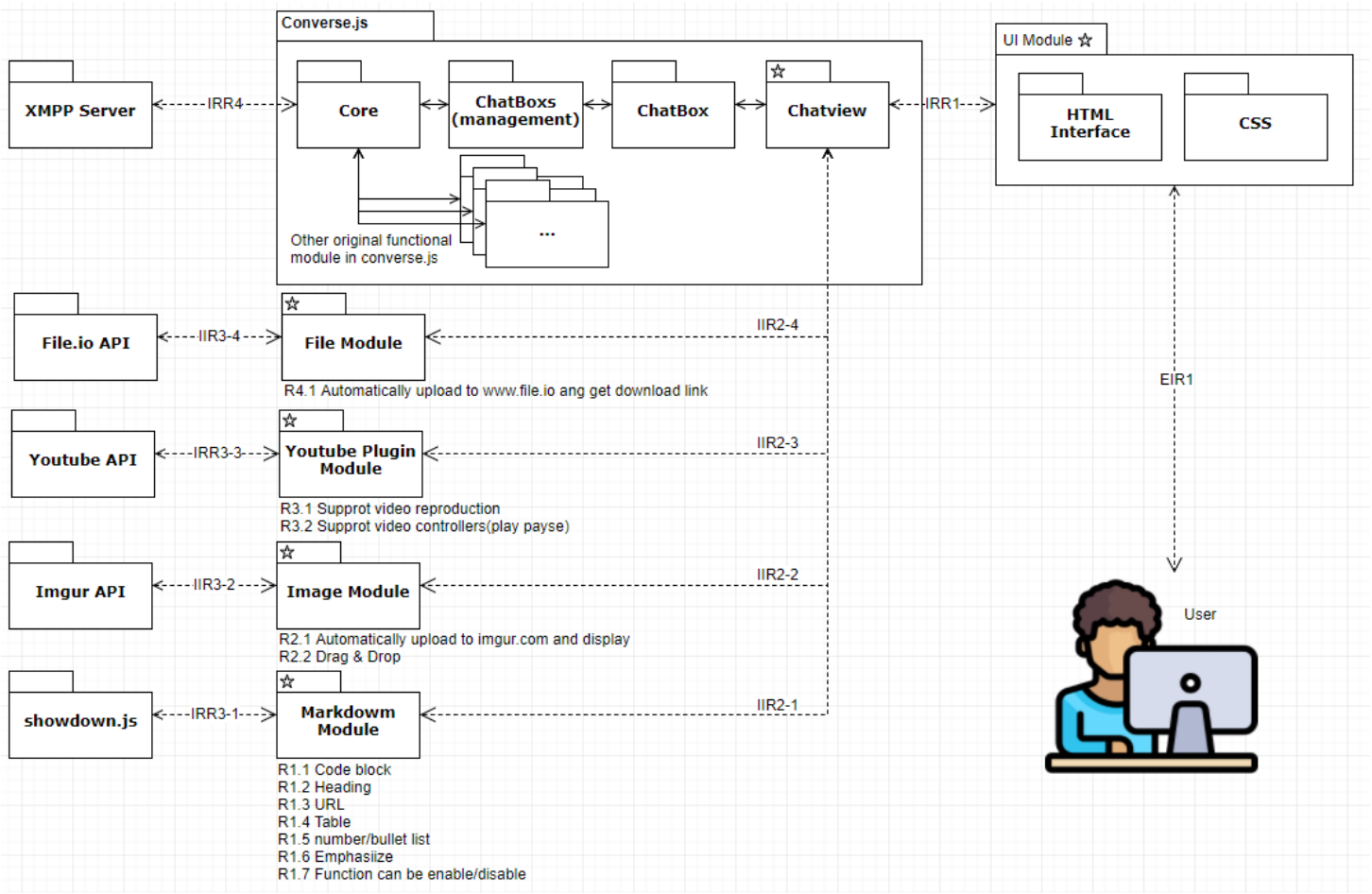

Figure 1: System Architecture

2. Functional Requirement

Markdown Module	
R1.1	**Code block**
	Code block is a block using **monospaced font**. User can input source code Inline or blocks:
R1.1.1	Inline Inline code has back-ticks (‘) around it. Such like: It is `source code’ .

R1.1.2	In a block
	keying in 4 blank character or a tabular character (tab) in the head. Such like:
	function y = (int x){
	y = x ^ 2;
	}

R1.2	**Heading**
	keying 1 to 6 hashtag character (#) can change the line style to heading H1 to H6. Such like: # this is heading H1. ## this is heading H2. ### this is heading H3. #### this is heading H4. ##### this is heading H5. ###### this is heading H6.
R1.3	**URL**
	If there are some Hyperlinks string in text. Such like http://www.google.com.tw/ https://tw.yahoo.com/ ftp://myftp.hinet.com.tw/ The Hyperlinks string will change to a HTML Hyperlinks. User

	can click it to open a website.
R1.4	**Table**
	Keying some vertical line character(|) to separate data can make a HTML table. Such like: |A|B|C| |1|2|3|
R1.5	**Numbered list and Bulleted list**
R1.5.1	If the first character is a number and a dot (.) behind it and space ( ) between the item. The line will change to Numbered list. Such like: 1. train 2. car
R1.5.2	If the first character is a plus (+), a dash (-) or an asterisk (*) behind it and space ( ) between the item. The line will change to Bulleted list. Such like: . apple . orange . mango or + apple + orange + mango or * apple * orange * mango
R1.6	**Emphasize**
R1.6.1	A emphasize text has asterisk character (*) or underline character (_) around it. Using single asterisk (*) or underline (_) will change to HTML tag . Such like: this is *very* important. this is _very_ important.

R1.6.2	Using double asterisk (**) or underline (__) will change to HTML tag . Such like: this is **really** important. this is __really__ important.
R1.7	**Function can be enabled or disabled**
	The function in R1.1 to R1.6 can be enable or disable in control panel.
R1.7.1	For R1.1
R1.7.2	For R1.2
R1.7.3	For R1.3
R1.7.4	For R1.4
R1.7.5	For R1.5
R1.7.6	For R1.6
Image Upload Module	
R2.1	**Automatically upload to Imgur.com and display**
	The function allows users to view images in the chat by embedding its URL, these images are upload to Imgur.com.
R2.2	**Drag & Drop**
	The function allows users to upload images into the chat via drag & drop and being able to send them.
Youtube Plugin Module	
R3.1	**Support video reproduction**
R3.1.1	Be able to watch the Youtube video in IM after paste Youtube URL
R3.1.2	The video won' t be played unless you press the 'playing button'
R3.1.3	When video is playing, the title and Youtube logo will be hided.
R3.2	**Support video controllers (play,pause)**
R3.2.1	Button for playing and pausing Youtube video.
R3.2.2	Website link button: user can go to the Youtube website of this

	video by this button.
R3.2.3	Fullscreen button: user can watch the video with full screen or with normal size.
R3.2.4	Volume button: User can change the volume and mute the video.
R3.2.5	User can see the timeline and change the time of the video.
File Upload Module	
R4.1	**Automatically upload to File.io and display**
	The function allows users to send files in the chat by embedding its URL, these files are upload to File.io
R4.2	**Drag & Drop**
	The function allows users to upload files into the chat via drag & drop and being able to send them.

3. Interface Requirement

3.1 External Interface Requirements

EIR1	**UI module and user**
	UI module display correct interfaces to user.

3.2 Internal Interface Requirements

IIR1	**UI module and chatview module**
	Chatview determines how messages should display on the user interface. That is, chatview calls the correct template and stylesheet for a message.
IIR2-1	**Chatview module and markdown module**
	The Markdown module turn messages into the right formats and let chatview handle the rest parts (sending and receiving).
IIR2-2	**Chatview module and Image module**
	The Image module turn messages into the right formats and let chatview handle the rest parts (sending and receiving).
IIR2-3	**Chatview module and Youtube plugin modules**
	The Youtube plugin module turn messages into the right formats and let chatview handle the rest parts (sending and receiving).
IIR2-4	**Chatview module and File module modules**
	The File module turn messages into the right formats and let chatview handle the rest parts (sending and receiving).
IIR3-1	**Markdown Module and showdown.js**
	The user enters a message with markdown label or code, and the showdown.js will convert message text to HTML DOM object with markdown style.
IIR3-2	**Image module and Imgur API**
	After a user has chosen an image, the image module

	automatically upload it to Imgur.com, and get the URL.
IIR3-3	**Youtube plugin module and Youtube API**
	Youtube plugin module captures videos from Youtube.com according to the URL that user provided.
IIR3-4	**File module and File.io API**
	After a user has chosen a file, the file module automatically upload it to www.file.io, and get the URL.
IIR4	**Chatbox module and server**
	This interface connects client and server via XMPP protocol.

4. Goal-driven Use Case Diagram

4.1 Introduction to Goal-driven Approach

本專案採用 Goal Driven(目標導向)Use Case 表示，強化表現出本系統所想達到的目標，以及此系統的非功能性需求的描述，以及和使用案例的相依關係，此系統分為三個層面去做分析：能力面、觀點面、內容面。根據能力面，判斷此目標是否該被完全滿足，分出強制性的目標和非強制性的目標。根據觀點面，判斷目標若是以角色觀點來描述，將之稱為角色相關；若與系統相關，稱作系統相關。在從內容面判斷，若此目標為系統上定義的功能，稱作功能性目標；相反的將之稱為非功能性目標。

4.2 Objective Statement

目標名稱	目標屬性	目標描述
support markdown fuctions	(R,A,F)	User can take advantage of variety of markdown functions.
Markdown function control	(R,A,F)	User can decide whether to turn on or turn off markdown triggers.
support image uploading	(R,A,F)	User can upload images and send it to others.
watch video	(R,A,F)	When user sends or receives a youtube link the chat box will show a player framework for user to play.
support file uploading	(R,A,F)	User can upload files and send it to others.

屬性	說明	屬性	說明
R	Rigid	**S**	Soft
A	Actor-Specific	**Y**	System-Specific
F	Functional	**N**	Nonfunctional

Table1: 目標屬性說明

4.3 Goal-driven Use Case Diagram

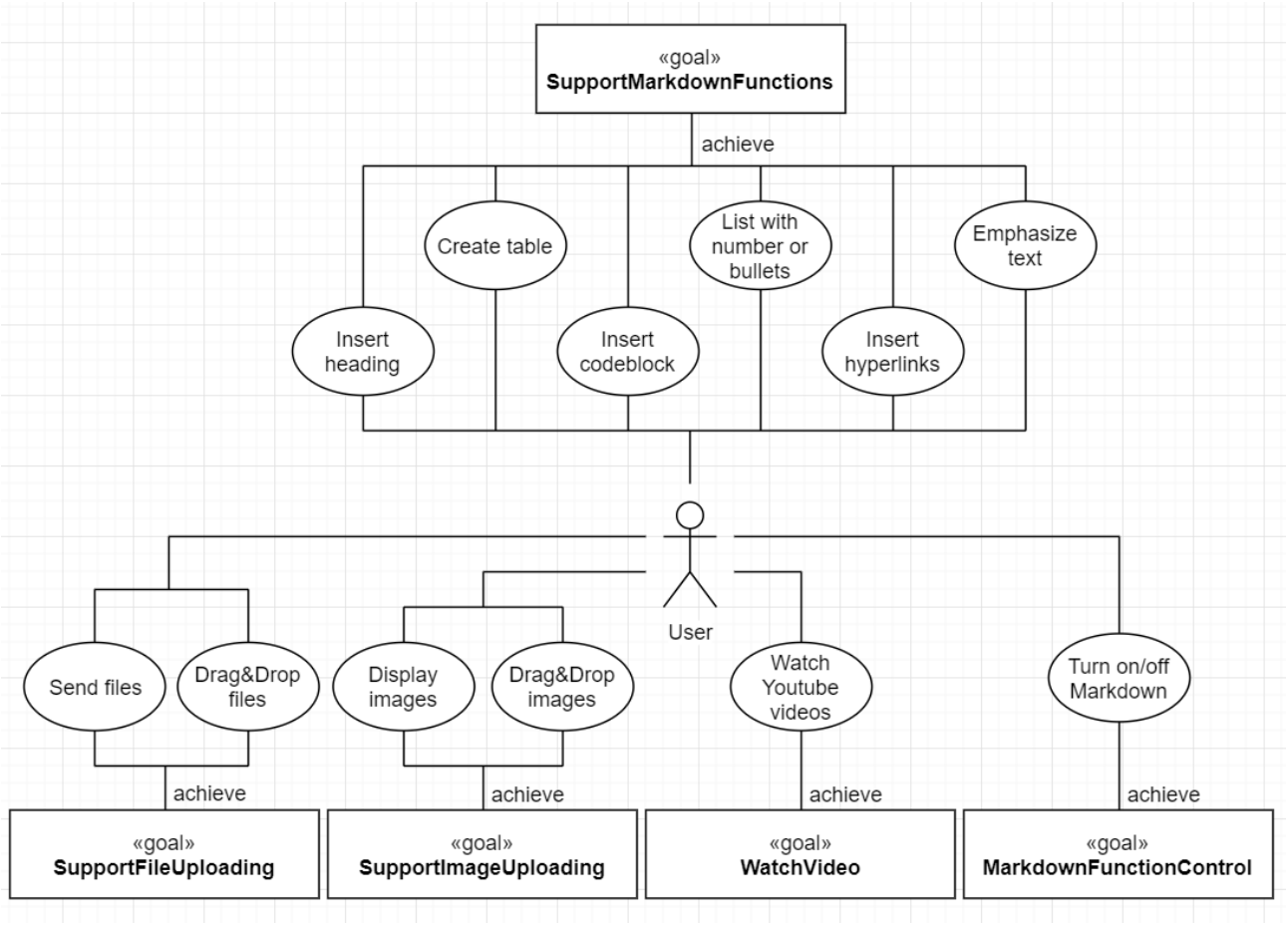

Figure2: Goal-driven Use Case Diagram

4.4 Actor Description and Actor Use Case Matrix

Actor Name	Actor Description
User	Users who use Converse.js

Table 2: Actor Description Table

Use Case	User
UC-R1.1	V
UC-R1.2	V
UC-R1.3	V
UC-R1.4	V
UC-R1.5	V
UC-R1.6	V
UC-R1.7	V
UC-R2.1	V
UC-R2.2	V
UC-R3	V
UC-R4.1	V
UC-R4.2	V

Table 3: Actor Use Case Matrix

4.5 Use case specification

Use Case ID	UC-R1.1
Use Case Name	**使用 Markdown 中的 Code block 功能**
Goal	包含特定格式的輸入內容成功轉換為 **Code block**
Requirement	R1.1.1 Code block Inline R1.1.2 Code black in a black

Description	使用者輸入
	`It is `Hello, World!` The first program.'`
	並送出訊息，視窗以 Code block 形式顯示訊息。使用者再輸入
	`#include <iostream>`
	`using namespace std;`
	`int main()`
	`{`
	`cout << "Hello, world!" << endl;`
	`return 0;`
	`}`
	並送出訊息，視窗以 Code block 形式顯示訊息。

Actor	user
Assumptions	
Constraints	
Priority	
Pre-Conditions	Code block 功能為 enable 狀態
Post-Conditions	
Basic Flow	同 **Description**
Alternative Flows	輸出使用者輸入的內容，不做任何修改
Exceptional Flows	輸出使用者輸入的內容，不做任何修改
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	
Artifacts	
Use Case Glossary	

Use Case ID	UC-R1.2
Use Case Name	使用 Markdown 中的 heading 功能
Goal	包含特定格式的輸入內容成功轉換為 handing
Requirement	R1.2

Description	使用者輸入
	`###### heading H6`
	`##### heading H5`
	`#### heading H4`
	`### heading H3`
	`## heading H2`
	`# heading H1`
	`normal`
	並送出訊息，視窗顯示對應 H1 到 H6 的標題文字

Actor	user
Assumptions	
Constraints	
Priority	
Pre-Conditions	heading 功能為 enable 狀態
Post-Conditions	
Basic Flow	同 Description
Alternative Flows	輸出使用者輸入的內容，不做任何修改
Exceptional Flows	輸出使用者輸入的內容，不做任何修改
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	
Artifacts	
Use Case Glossary	

Use Case ID	UC-R1.3
Use Case Name	**使用 Markdown 中的 URL 功能**
Goal	包含特定格式的輸入內容成功轉換為**網頁超連結**
Requirement	R1.3
Description	使用者輸入 try this! https://www.google.com.tw Google it! 並送出訊息，視窗自動將超連結部分(即 http:// https:// ftp://開頭之網址)轉換為網頁超連結，其餘部分保持或套用其他 **Markdown 轉換**
Actor	user
Assumptions	
Constraints	
Priority	
Pre-Conditions	URL 功能為 enable 狀態
Post-Conditions	
Basic Flow	同 **Description**
Alternative Flows	輸出使用者輸入的內容，不做任何修改
Exceptional Flows	輸出使用者輸入的內容，不做任何修改
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	
Artifacts	
Use Case Glossary	

Use Case ID	UC-R1.4
Use Case Name	使用 Markdown 中的 table 功能
Goal	包含特定格式的輸入內容成功轉換為 table
Requirement	R1.4
Description	使用者輸入 Firstname|Lastname|Age Joy|Smith|50 Eve|Jackson|94 John|Doe|80 並送出訊息，視窗自動將內容轉換為 3*3 表格
Actor	user
Assumptions	
Constraints	若已進行 R1.1，R1.2，R1.6 之轉換，則不進行此轉換
Priority	
Pre-Conditions	table 功能為 enable 狀態
Post-Conditions	
Basic Flow	同 Description
Alternative Flows	輸出使用者輸入的內容，不做任何修改
Exceptional Flows	輸出使用者輸入的內容，不做任何修改
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	
Artifacts	
Use Case Glossary	

Use Case ID	UC-R1.5
Use Case Name	**使用 Markdown 中的 list with number or bullets 功能**
Goal	包含特定格式的輸入內容成功轉換為 **list**
Requirement	R1.5
Description	使用者輸入 1. apple 2. banana 3. cat + apple + orange + mango 並送出訊息，視窗自動將內容轉為編號清單與項目清單
Actor	user
Assumptions	
Constraints	
Priority	
Pre-Conditions	list 功能為 enable 狀態
Post-Conditions	
Basic Flow	同 **Description**
Alternative Flows	輸出使用者輸入的內容，不做任何修改
Exceptional Flows	輸出使用者輸入的內容，不做任何修改
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	
Artifacts	
Use Case Glossary	

Use Case ID	UC-R1.6
Use Case Name	使用 Markdown 中的 emphasize 功能
Goal	包含特定格式的輸入內容成功**加上的 emphasize 標籤**
Requirement	R1.6
Description	
Actor	user
Assumptions	使用者輸入 this is *very* important. you should __pay attention__. 並送出訊息，視窗自動將 very 加上標籤， pay attention 加上標籤
Constraints	若已進行 R1.1，R1.2，R1.4 之轉換，則不進行此轉換
Priority	第二順位，即在 R1.3，R1.4 後轉換
Pre-Conditions	emphasize 功能為 enable 狀態
Post-Conditions	
Basic Flow	同 **Description**
Alternative Flows	輸出使用者輸入的內容，不做任何修改
Exceptional Flows	輸出使用者輸入的內容，不做任何修改
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	
Artifacts	
Use Case Glossary	

Use Case ID	UC-R1.7
Use Case Name	**透過控制視窗啟用或停用 Markdown 功能**
Goal	測試所有 Markdown 是否能透過 control panel 設定之 enable 或 disable 狀態進行功能啟用或停用
Requirement	R1.7
Description	測試從 control panel 啟用與停用每一個 Markdown 的功能，檢查每一個功能是否正常運作或停用不運作
Actor	
Assumptions	
Constraints	
Priority	
Pre-Conditions	
Post-Conditions	
Basic Flow	1 使用者開啟 control panel 2.啟用第一項功能 R1.1 code block 3.執行使用者案例 UC-R1.1 4.檢查是否正常運作 5.停用第一項功能 R1.1 code block 6.執行使用者案例 UC-R1.1 7.檢查是否停止運作 8. 將 R1.1 換成 R1.2，UC-R1.1 換成 UC-R1.2，重複執行第 2 至第 7 步驟，直到完成 R1.6 及 UC-R1.6 的測試為止
Alternative Flows	
Exceptional Flows	
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	
Artifacts	
Use Case Glossary	

Use Case ID	UC - R2.1
Use Case Name	Display images
Goal	Achieve "Automatically upload to Imgur.com and display"
Requirement	R2.1
Description	A user can send images into chat and see them.
Actor	User
Assumptions	
Constraints	
Priority	High
Pre-Conditions	User must be logged into the system and be inside a chat room
Post-Conditions	The system will send user images to the chatroom
Basic Flow	1. User tries to send image to the chatroom 2. User selects image to send. 3. User press "Select".
Alternative Flows	
Exceptional Flows	
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	The image must not be too big. (>7MB)
Artifacts	
Use Case Glossary	

Use Case ID	UC R2.2
Use Case Name	User drag and drop images
Goal	Achieve "Drag and Drop"
Requirement	R2.2
Description	The user just need to drag his image into the drag and drop zone.
Actor	User
Assumptions	
Constraints	
Priority	High
Pre-Conditions	User must be logged into the system and be inside a chat room
Post-Conditions	The system will send user images to the chatroom
Basic Flow	1. User selecst image to send. 2. User drags image to the drop zone
Alternative Flows	
Exceptional Flows	
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	The image must not be too big. (>7MB).
Artifacts	
Use Case Glossary	

Use Case ID	UC-R3
Use Case Name	youtube function
Goal	user can watch youtube video in this IM
Requirement	R3.1 and R3.2
Description	user wants to watch youtube video in this IM
Actor	user
Assumptions	
Constraints	
Priority	medium
Pre-Conditions	
Post-Conditions	
Basic Flow	user sends youtube URL to the chatroom this URL will become a youtube video and can be played.
Alternative Flows	
Exceptional Flows	
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	
Artifacts	
Use Case Glossary	

Use Case ID	UC - R4.1
Use Case Name	Send Files
Goal	Achieve “Automatically upload to File.io and display”
Requirement	R2.1
Description	A user can send files into chat and view them.
Actor	User
Assumptions	
Constraints	
Priority	High
Pre-Conditions	User must be logged into the system and be inside a chat room
Post-Conditions	The system will send user files to the chatroom
Basic Flow	1. User tries to send the file to the chatroom 2. User selects the file to send. 3. User press “Select”.
Alternative Flows	
Exceptional Flows	
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	The file must not be too big. (>5GB)
Artifacts	
Use Case Glossary	

Use Case ID	UC R4.2
Use Case Name	User drags and drops files
Goal	Achieve "Drag and Drop"
Requirement	R4.2
Description	The user just need to drag his file into the drag and drop zone to send it.
Actor	User
Assumptions	
Constraints	
Priority	High
Pre-Conditions	User must be logged into the system and be inside a chat room
Post-Conditions	The system will send user files to the chatroom
Basic Flow	1. User selects a file to send. 2. User drags file to the drop zone
Alternative Flows	
Exceptional Flows	
Use Use Case	
Extends Use Case	
Business Rules	
Special Requirements	The file must not be too big. (>5GB).
Artifacts	
Use Case Glossary	

5. Traceability Matrix

5.1 Traceability Matrix of Requirements V.S Requirements

需求	R 1.1	R 1.2	R 1.3	R 1.4	R 1.5	R 1.6	R 1.7	R 2.1	R 2.2	R 3.1	R 3.2	R 4.1	R 4.2
R1.1	--						v						
R1.2		--					v						
R1.3			--				v						
R1.4				--			v						
R1.5					--		v						
R1.6						--	v						
R1.7	v	v	v	v	v	v	--						
R2.1								--					
R2.2									--				
R3.1										--			
R3.2											--		
R4.1												--	
R4.2													--

5.2 Traceability Matrix of Requirements V.S Use Case

需求	UC-R1.1	UC-R 1.2	UC-R 1.3	UC-R 1.4	UC-R 1.5	UC-R 1.6	UC-R 1.7	UC-R 2.1	UC-R 1.2	UC-R3	UC-R4.1	UC-R4.2
R1.1	v						v					
R1.2		v					v					
R1.3			v				v					
R1.4				v			v					
R1.5					v		v					
R1.6						v	v					
R1.7	v	v	v	v	v	v	v					
R2.1								v				
R2.2									v			
R3.1										v		
R3.2										v		
R4.1											v	
R4.2												v

5.3 Traceability Matrix of Requirements V.S subsystem function

需求	Markdown Module	Image Upload Module	Youtube Plugin Module	File Module
R1.1	v			
R1.2	v			
R1.3	v			
R1.4	v			
R1.5	v			
R1.6	v			
R1.7	v			
R2.1		v		
R2.2		v		
R3.1			v	
R3.2			v	
R4.1				v
R4.2				v