Lab9

NYCU Go Programming 2024

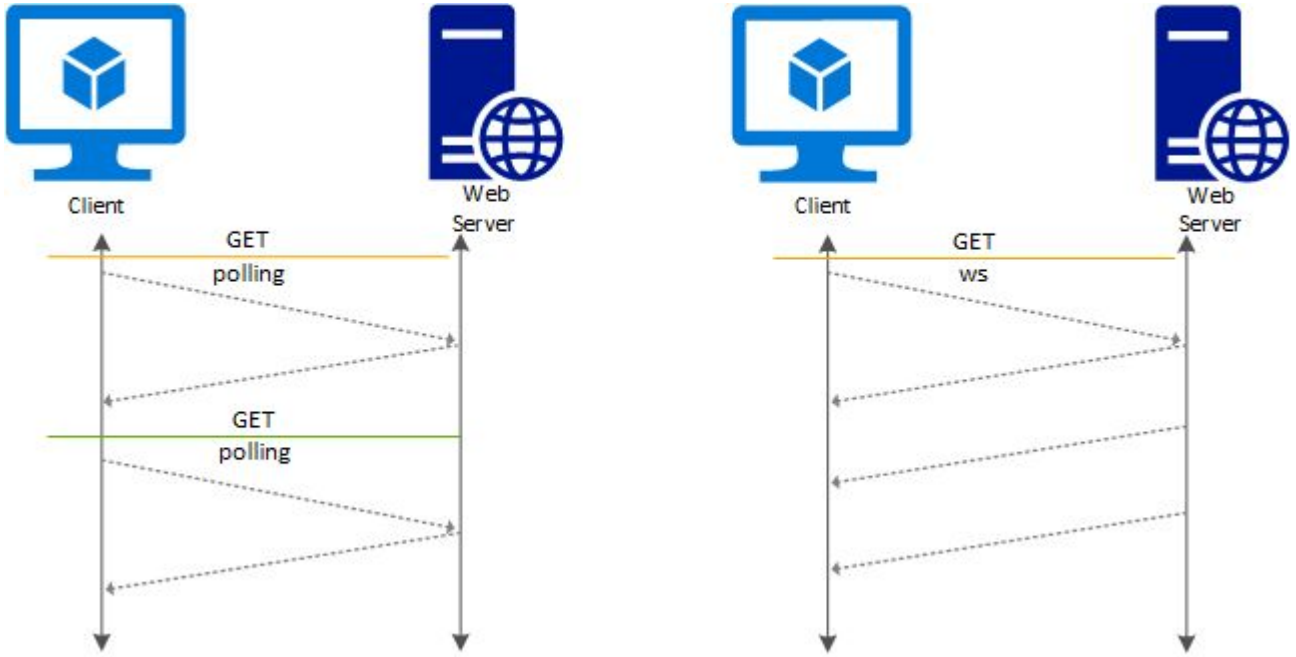
2024/12/10

WebSocket

- WebSocket is a computer communications protocol, providing simultaneous two-way communication channels over a single Transmission Control Protocol (TCP) connection.
- WebSocket is distinct from the Hypertext Transfer Protocol (HTTP) used to serve most webpages. Both protocols are located at layer 7 in the OSI model and depend on TCP at layer 4.
- The WebSocket protocol enables full-duplex interaction between a web browser (or other client application) and a web server with lower overhead than half-duplex alternatives such as HTTP polling, facilitating real-time data transfer from and to the server.

WebSocket

傳統的網頁若要在 client 端被動接收 server 端的訊息，通常是用輪詢 (polling)，需要由 client 不斷主動向 server 詢問，而透過 WebSocket 則可以在 socket 連線之後由 server 主動向 client 送訊息。



https://docs.microsoft.com/zh-tw/azure/application-gateway/application-gateway-websocket

ReactiveX

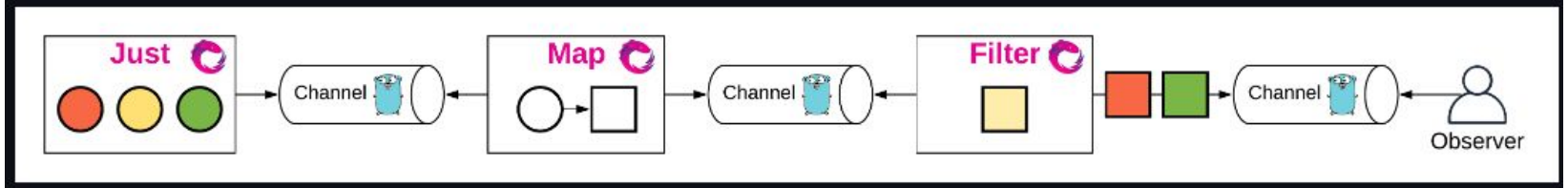
- ReactiveX (also known as Reactive Extensions) is a software library originally created by Microsoft that allows imperative programming languages to operate on sequences of data regardless of whether the data is synchronous or asynchronous.
- It is an implementation of reactive programming.
- Observables and observers
  - An observer subscribes to an observable sequence. The sequence then sends the items to the observer one at a time, usually by calling the provided callback function. The observer handles each one before processing the next one.
- Reactive operators
  - An operator is a function that takes one observable (the source) as its first argument and returns another observable

主要關注在資料的處理和流動，將資料作為 observable 並推送給 observer 讀取，在中間可以做各種操作轉換、過濾和監控等

RxGo (Reactive Extensions for the Go Language, doc.)

RxGo

The RxGo implementation is based on the concept of pipelines. A pipeline is a series of stages connected by channels, where each stage is a group of goroutines running the same function.



Let's see a concrete example with each box being an operator:

- We create a static Observable based on a fixed list of items using the `Just` operator.
- We define a transformation function (convert a circle into a square) using the `Map` operator.
- We filter each yellow square using the `Filter` operator.

In this example, the final items are sent in a channel, available to a consumer. There are many ways to consume or to produce data using RxGo. Publishing the results in a channel is only one of them.

Each operator is a transformation stage. By default, everything is sequential. Yet, we can leverage modern CPU architectures by defining multiple instances of the same operator. Each operator instance being a goroutine connected to a common channel.

The philosophy of RxGo is to implement the ReactiveX concepts and leverage the main Go primitives (channels, goroutines, etc.) so that the integration between the two worlds is as smooth as possible.

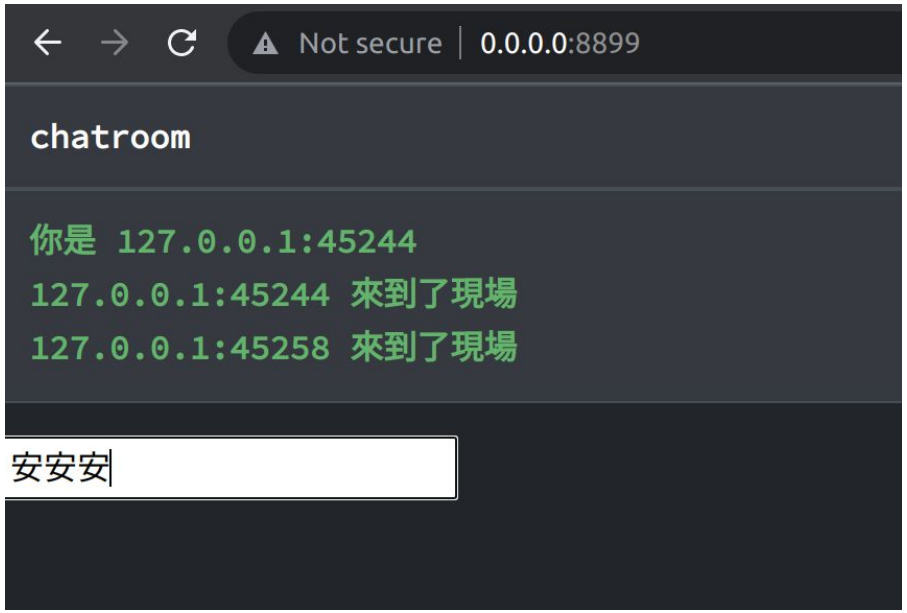
Lab9: 網頁聊天室

這是一個透過 WebSocket 做成的網頁聊天室，請使用 RxGo 的 Filter 和 Map 在原本傳訊息的 channel 中過濾掉髒話和修改政治人物人名。

- Filter: 若訊息中存在跟 swear_word.txt 任何一行一樣的內容，把該訊息過濾(不顯示出來)。
- Map: 訊息中所有跟 sensitive_name.txt 任何一行一樣的內容，則把該內容第二個字改為 '*'。
- 由於要練習 RxGo，所以可以修改 InitObservable() 與額外定義 function，但不能修改其他部分。

Lab9： 網頁聊天室

正常情況



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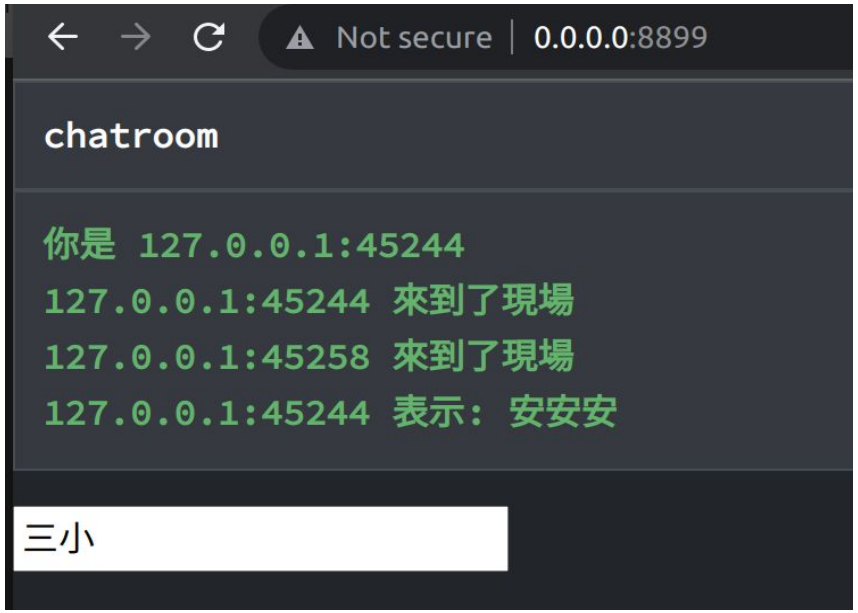
Lab9: 網頁聊天室

Filter



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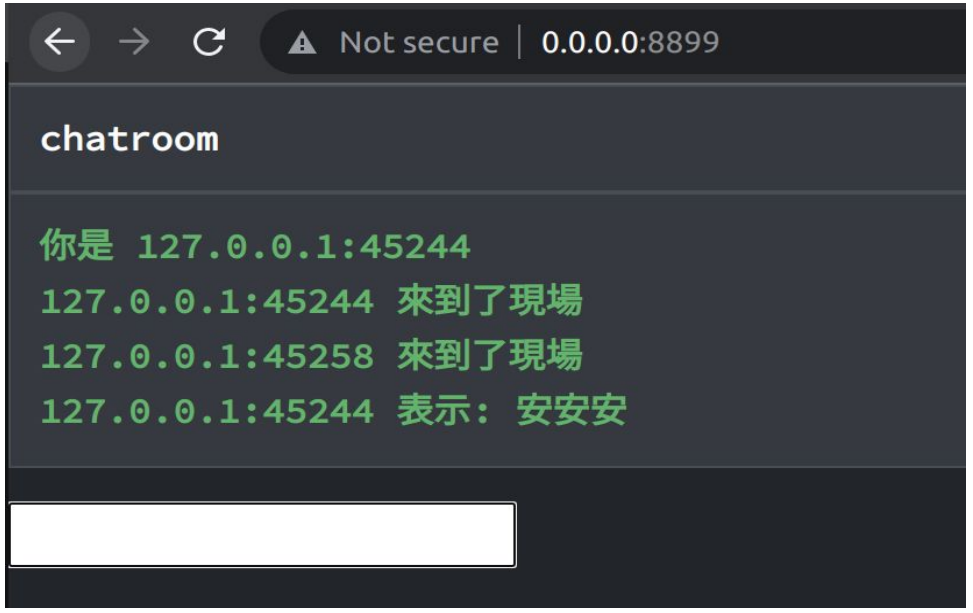

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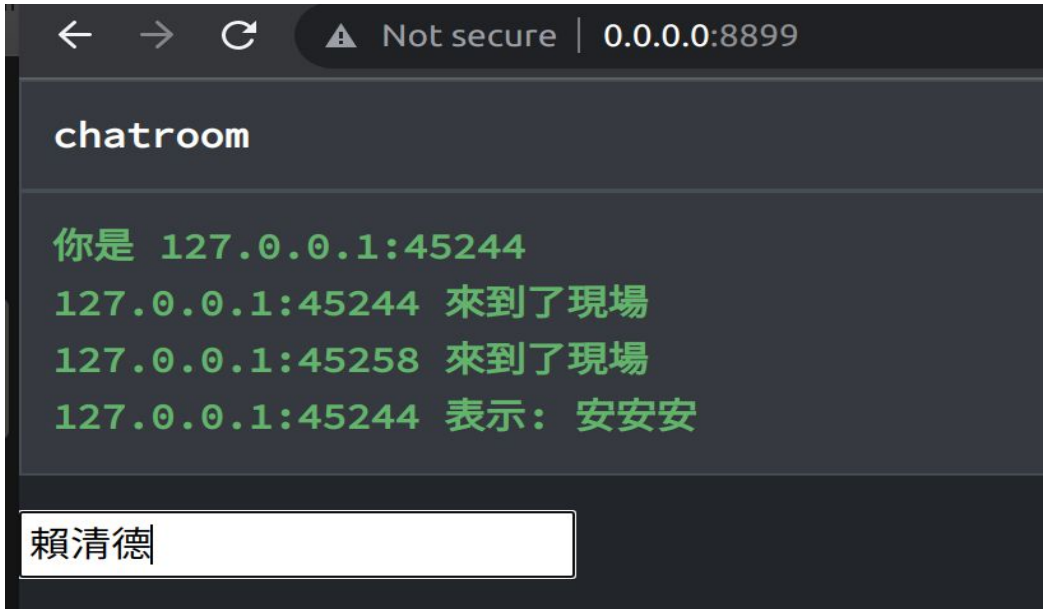
Map



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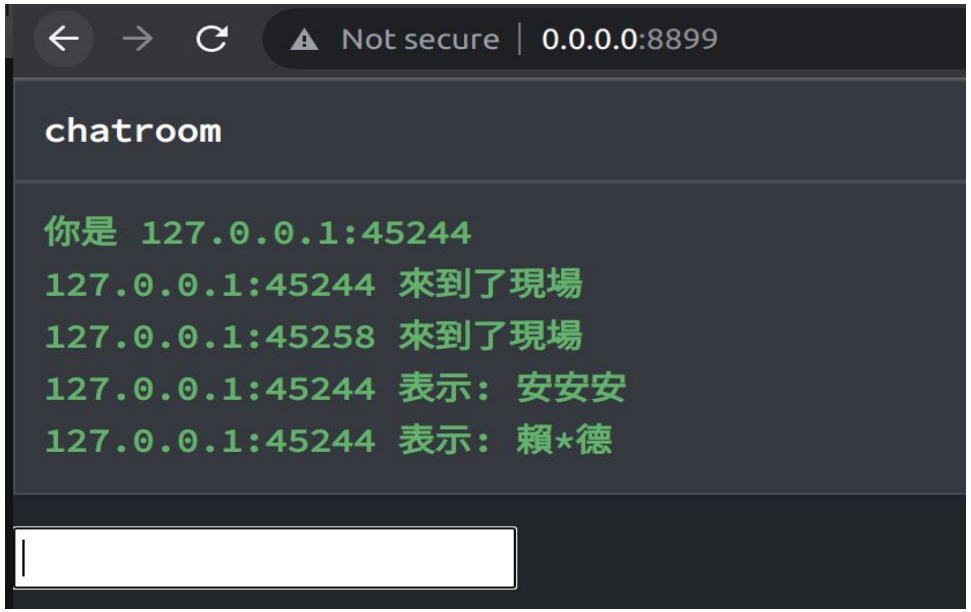

Lab9: 網頁聊天室

- .github
  - workflows
    - lab9.yml
- lab9
  - go.mod
  - go.sum
  - lab9.go
  - swear_word.txt
  - sensitive_name.txt
  - static
    - index.html
  - validate.py

```
$ python validate.py
```

Hint

Example(Filter)

```
)

func main() {
    observable := rxgo.Just(1, 2, 3, 4, 5, 6, 7)()
    observable = observable.Filter(func(i interface{}) bool {
        return i.(int)%2 == 0
    })
    ch := observable.Observe()
    for item := range ch {
        fmt.Println(item.V)
    }
}
```

```
o  go run test2.go
2
4
6
 a13579and2468@a13579a
o
```

Reference

- 髒話列表 - 世界大典 (shoutwiki.com)
- 分類:台灣政治人物 - 維基語錄, 自由的名人名言錄 (wikiquote.org)