Proposal: Go Exercise

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1 INTRODUCTION

For our project, we chose to create a program that highlights a particular feature of a lesser used programming language. Specifically, we will be using Go, which is a relatively esoteric language we haven’t been exposed to, to implement an exercise interval timer. Through this program, we aim to highlight the particular features of Go that support concurrency.

2 STRENGTHS OF GO

Go is a general purpose object-oriented programming language that was aimed to be suitable for modern large scale systems [1]. Some of its major features include concise syntax, expressive type system, concurrency, garbage collection, fast compilation of code, and efficient execution [1]. Of particular interest to our project, is Go’s support for concurrency.

Go supports concurrency through two main language features: goroutines and channels. A goroutine is a thread that is managed by the GO runtime. [2]. Goroutines are described as being cheaper to create and lighter than normal operating system threads because stacks are small, segmented and sized on demand [1]. Like many threading models, goroutines run on the same address space and therefore must be synchronized [2]. This, however, is easily accomplished by the use of channels. Channels are what connects goroutines and allow for communication and synchronization between them. Sends and receives will block goroutines until both the sender and receiver are ready, which eliminates the use of mutexes [3]. Channels can be either unbuffered (by default) or buffered [2]. With goroutines and channels combined, concurrent programs are easy and efficient to write and are highly scalable.

3 PROGRAM TO BUILD

TODO

4 SKETCH/PLAN OF HOW TO ACHIEVE MILESTONES

4.1 80% Research Report

In order to write up a background research report for this milestone, we will spend appropriate time into the following tasks: 1. researching about language we chose (Go) 2. familiarizing ourselves with the language and concurrency features 3. compiling our research results into a report. Research topics will include, but are not limited to language specification, other applications written in different languages and how they exploit concurrency, and similar programs implemented using channels and goroutines. To familiarize ourselves with the language, we will read blog posts, tutorials, and actually play with the language. In our report, we will emphasize the value and importance of using channels and goroutines in the program we plan on implementing.

4.2 90% Research Report

By this milestone, we will be familiar with Go, and will have enough knowledge to create a simple application that uses concurrency by following a tutorial. First, we will create and document plan on how to achieve the 100% level by breaking up our goal into core goals. Then we can further expand on these core goals into a fuller, extended goals. Lastly, we will create a simple application that demonstrates the technical skills needed for completion of project, and document the implementation performed.

4.3 100% Research Report

In order to achieve the 100% mark, we will first create a poster explaining the importance and neat features of our project, and then divide up core goals and start implementing features associated with our program. Then, once the core goals have been implemented, we can start diving up full goals laid out for the project plan and implement these features. Once program functionalities are in place, we can create project description that illustrates what we had accomplished in completing the project.

5 STARTING DOCUMENTS

As a general overview to the Go language, we will use the following, which consists of many slides and videos that introduce the language:

* https://github.com/golang/go/wiki/GoTalks

As a general guide to Go syntax and language specifications we will use the following:

* https://golangbot.com/learn-golang-series/

As an intro to concurrency using goroutines and channels, we will use the following:

* https://www.golang-book.com/books/intro/10

REFERENCES

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| [1] | Rob Pike. 2010. Another Go at Language Design [pdf slides]. Retrieved from GoTalks: https://github.com/golang/go/wiki/GoTalks |
| [2] | Matt Aimonetti. 2016. Chapter 8 Concurrency. Retrieved from Go Bootcamp: http://www.golangbootcamp.com/book/concurrency |
| [3] | Mark McGranaghan. 2013. Go by Example: Channels. Retrieved from Go by Example: https://gobyexample.com/channels |