



Go-, Hack-, Er-, the hidden treasures in a jungle of lang

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ABSTRACT

This essay contains information about the three big IT companies programming languages that they have created. The companies and their languages are Google that have created Golang, Facebook that have created Hacklang and Ericsson that have created Erlang. The aim is to compare the different languages and see which languages is the easiest and the most efficient to learn and use. This essay contains the differences in syntax for the languages, how to execute the languages and how to import the languages into already existing code.

This essay is written with the help from books and internet. Google is used to find relevant sources and information about the languages.

As the result of this essay Golang has the easiest syntax and the most effective procedure to build applications. The hardest and most complex language is Erlang, with an outdated and difficult syntax Erlang is a hard language to learn.

Keywords: Google, Facebook, Ericsson, programming languages, Golang, Hacklang, Erlang

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1. INTRODUCTION

Many people do not know that three of the world's biggest IT companies Google Inc., Facebook Inc. and Ericsson have created and are running their own custom made programming language that are available as open source.

Our task is to collect knowledge based on other studies, articles, documentation and from that, turn these three languages against each other to compare them with advantages and disadvantages. After reading this study you will have enough knowledge to decide what programming language is best matched for you and your projects. To complete and fully understand this essay it is recommend to have an overall basic knowledge in programming and to understand programming terms.

2. RESEARCH QUESTIONS

1. Do the languages have differences?
2. Do the languages work with frameworks?
3. How and why were the programming languages created?
4. Are the languages common in companies?
5. Are the languages recommended to learn without pre-knowledge?

3. METHOD

The method that is used was an inductive approach. Information was gathered and analysed to answer the research questions. That method was chosen because it was the one that felt most comfortable with this essay. None of the other methods would have satisfied the needs to complete this essay.

The first step to start this essay was to brainstorm what the goals of this essay would be. When done there was 15 potential question to be answered and written about. The questions were divided and information about the different languages starting take shape. Throughout the week's questions got removed because they did not feel relevant for this essay. At the end of the study only five questions remained.

Before this essay was being created the authors had programming knowledge such as PHP, C++ and other programming languages.

4. LITERATURE REVIEW

To start this essay we need to have an overall knowledge about how Golang execute program and how the syntax is defined, [1] it covers everything we need to know and as a complement tool, [2] to verify facts. We found that Ravel and Martini is compatible frameworks to Golang [3]. To get more information about Ravel and Martini [4, 5, 6] give us detailed information about the frameworks. While searching for frameworks we found Gin Gonic and need detailed information [7]. We found out that Gorilla is a toolkit and needs detailed information [8]. [9] provide us that Go is used in popular websites, when finding information about how and why Go was created [10]. To have information from another perspective we use an interview [11] As an last resource of overall information [12].

To collect an overall knowledge about Hack and how the syntax is defined [13]. We found out HHVM and needed more information [14, 15, 16] it covers all we need to know about HHVM works and its purpose. We found out that Titon is a compatible framework and [17] gives us a detailed information about the framework. To answer the question why Facebook created hack [18] give us a detailed and perfect explanation.

To be able to answer and write this essay we need to collect overall information about Erlang [19, 20, 21, 22, 23] provide us with all necessary information we need to answer the question about Erlang. When searching about compatible frameworks we found plenty of them and choose the most popular frameworks [24, 25, 26, 27, 28] this provide us with all necessary and detailed information about the popular compatible frameworks for Erlang.

5. ANALYSIS AND DISCUSSION

5.1. GOLANG

5.1.1. EXECUTING

To executing a Golang files use the command `go run <file>.go`, now the command execute and compiles the file.¹

5.1.2. SYNTAX

5.1.2.1. Variables

Declaring variables in Golang is an easy and flexible procedure, the syntax Golang has presented declaring variables is unique and effective. When declaring a variable, a data type is often needed, but not in Golang. Golang's compiler recognises and declares the datatype is self, it means as a user of Golang, declare a variable's can be done with only two characters, *variableName := value*. The syntax `:=` replaces *datatype var variableName = value*. The syntax still compiles in Golang but is not recommended.

When declaring several variables at the same time Golang has an easy syntax:

```
var (  
a = 5  
b = 10  
c = 15  
)
```

This is an effective way of declaring several variables instead of each variable by them self.

5.1.2.2. Functions

Declaring functions in Golang follow the syntax *func functionName() {}*. According to the syntax the user doesn't have to declare the datatype of the function, it is similar with the variables that Golang recognizes the data type automatically. When returning function data Golang provide the user with an extra unique feature. A function has the ability to return multiple values, the syntax could be as followed: *return 5, 6*. When calling a function and storing the data the following syntax is used: *x, y := f()*.

To create a function where the number of parameters varies. Use the syntax `"..."` after the parameters and before the typename to inform Golang that the function may have different amount of parameters.

```
The function func multiply(amount ...int){  
}
```

takes zero or more parameters.²

¹ <https://www.golang-book.com/books/intro>

² IBID

5.1.2.3. Loop

In Golang there is only one type of loop, for loop. The for loop system in Golang can be used in different ways and no other type of loop is then needed. The typical for loop syntax is:

```
for i := 1; i <= 10; i++ {  
    fmt.Println(i)  
}
```

Golang for loop has the similar syntax as other programming languages for example C++ and PHP.³

5.1.3. FRAMEWORKS

GCCGO is a compiler that make it possible to create webpages with Golang. GCCGO is used in a terminal (either Cygwin or the built in terminal in Mac.) to compile the files. Then the web page is displayed in the browser. The command to execute and compile the framework is:⁴

```
$ go build wiki.go  
$ ./wiki
```

Golang has a couple of frameworks and toolkits that are comparable with the Go language.⁵ One of them is Revel and is a framework that is quick to get started with.⁶ It does not take long time to set up. Download it through the terminal from GitHub and type “revel new myapp”. Open the revel folder in an editor and a fresh project has been created.⁷

One thing that is different from Revel compared to a MVC framework is that the models directory is missing. Revel does not have that because it does not have an integrated ORM tool. So if you need database access you can include any type of ORM library. An example is to use gorp with MySQL.⁸

Another framework that exist is Martini.⁹ Martini is a quickly writing modular web applications and service in Golang. It works great with Golang libraries. Martini is not big framework but is still recommend to try it. Otherwise there is Gin Gonic which is an improved Martini framework. It is up to 40 times faster than Martini.¹⁰ To use the Gin Gonic download it from GitHub. It is possible to import Gin Gonic into the code and use some of its functions.

Gorilla is a toolkit that helps to create a webpage. It has function as web socket, session, context and much more.¹¹

³ <https://www.golang-book.com/books/intro>

⁴ <https://golang.org/doc/articles/wiki/>

⁵ <https://medium.com/square-corner-blog/a-comparison-of-go-web-frameworks-f47804cf86f6#.x500ulveo>

⁶ <http://codecondo.com/4-minimal-web-frameworks-go-golang/>

⁷ <https://revel.github.io>

⁸ <http://xferion.com/golang-web-application-with-revel/>

⁹ <https://github.com/go-martini/martini>

¹⁰ <https://gin-gonic.github.io/gin/>

¹¹ <http://www.gorillatoolkit.org>

5.1.4. CREATION

Golang was created and born because the three creators (Robert Griesemer, Rob Pike, Ken Thompson) ¹² had frustration towards the existing languages. The programming and the languages had also become too difficult and it was the languages that were on the markets fault. One programming language did not have all the three important; efficient compilation, efficient execution, or ease of programming. So Golang was created to try to combine all of those qualities. The Golangs aims and goals is to be a modern language that has the support for networked and multi core computing. The goal with Golang is to build a large executable line on a single computer in a few seconds, so it is intended to be fast. ¹³

Ken Thompson said in an interview with Andrew Binstock in 2014 that he and the other three founders of the language created it because they hated C++. They thought C++ was a complexed languages and they wanted to create an easier language. ¹⁴

5.1.5. PROJECTS AND COMPANIES

Google and YouTube are the most popular page with over 1,100,000,000 visitors per month each. These are owned by Google and Golang is a part of both Google's and YouTube's back-end. ¹⁵

Two examples of projects that use Gin Gonic is Drone which is a Continuous Delivery platform built on Docker. Another one is gorush which is a notification server. ¹⁶

¹² [https://en.wikipedia.org/wiki/Go_\(programming_language\)](https://en.wikipedia.org/wiki/Go_(programming_language))

¹³ https://golang.org/doc/faq#creating_a_new_language

¹⁴ <http://www.drdobbs.com/open-source/interview-with-ken-thompson/229502480>

¹⁵ https://en.wikipedia.org/wiki/Programming_languages_used_in_most_popular_websites

¹⁶ <https://github.com/gin-gonic/gin>

5.2. HACKLANG

5.2.1. EXECUTING

When executing a program based on Hacklang the executing engine is called HHVM and stands for HipHop Virtual Machine and is right now the only engine supporting to compile and run Hacklang programs. HHVM will compile and execute code that has error in it, to prevent that there is highly recommended to use typechecker. The typechecker has control and an overview over the code, it is basically telling the programmer about syntax problem and is a second eye.¹⁷

5.2.2. SYNTAX

5.2.2.1. Variables

Hacklang is based on the programming language PHP and has a lot of PHP syntax that is valid in Hacklang. When declaring a variable in Hacklang the user does not to declare a data type before assign the value, for example $\$a = 10$ and change the value of variable $\$a$ which right now is an integer to a string, assign the new value to the variable $\$a = \text{"String"}$. This is available because of the typechecker that always has control, and if the typechecker notices that variable $\$a$ has changed from integer to string the typechecker will update and now know that $\$a$ is a string.¹⁸

5.2.2.2. Functions

The syntax for returning data type in function is simple, after the parameters the code starts with a `:` and define what kind of type to return. When defining parameters and what data type they will be assigned to, Hacklang is following the basic syntax for assigning parameters, *datatype \$variableName*. By using these two facts together a function can be created as followed:

```
function sum(int $x, int $y): int {  
    return $x + $y  
}
```

¹⁹

This function has two parameters and returns the sum of the parameters which is a *integers*.

5.2.2.3. Loop

Hacklang provide the user with only one type of loop, for loop. The for loop can be defined in many various ways and covers all necessary scenarios when a loop is needed so there is no need for other type of loops beside for loop. The basis syntax to define a for loop is *foreach (\$v as \$value){ }*.²⁰

¹⁷ Yamauchi, Owen, Hack & HHVM

¹⁸ IBID

¹⁹ IBID

²⁰ IBID

5.2.3. FRAMEWORKS

HHVM (HipHop Virtual Machine) is a virtual machine that uses the JIT (Just-In-Time) compilation. And the JIT is an execution engine for the PHP and Hack languages. The code is then transformed into HHBC (HipHop ByteCode) and is dynamically translated into x86-64 bytes' code, then the webpage can be shown.²¹

HHVM supports Hacklang and PHP5 and some of the features in PHP7. HHVM also supports many extensions as well.²² And every 8 weeks a new stable release of HHVM is released.²³

Titon is a web framework that uses Hacklang and runs in HHVM. Titon takes advantage of Hacks strict mode, type system, generics, collections and much more.²⁴

5.2.4. CREATION

Facebook was first written in PHP, at that moment it was the hottest language on the web. PHP had then just passed Perl as hottest language. Ruby on rails was to be released a few months later and Django was released a year later. A decade later, PHP was widely derided. So Facebook decided to create Hacklang that is a PHP-derived language. Facebook did not abandon PHP because if they did, there would be lot of code to rewrite.²⁵

*"It has been specifically designed to interoperate seamlessly with PHP"
said Julien Verlaquet, the technical lead on the Hack project.*

5.2.5. PROJECTS AND COMPANIES

Facebook is one of the world's most popular web application and is owned by Facebook Inc. Which also is the founder of Hacklang. Facebook is the reason why Hacklang was created.²⁶

²¹ https://en.wikipedia.org/wiki/HipHop_Virtual_Machine

²² <http://hhvm.com>

²³ <https://docs.hhvm.com/hhvm/installation/introduction>

²⁴ <https://github.com/titon/framework>

²⁵ <https://www.fastcompany.com/3028778/why-facebook-invented-a-new-php-derived-language-called-hack>

²⁶ https://en.wikipedia.org/wiki/Programming_languages_used_in_most_popular_websites

5.3. ERLANG

5.3.1. EXECUTING

To execute a program files in Erlang use the syntax *c(filename)*, if the compiling is successful it shall be printed out: *{ok,filename}* otherwise if any errors occurs error message will be *filename.elr line number: error message* and can then easily be fixed by line number identify the error.

Erlang provide the users with the feature to run functions from command line, by entering *filename.function(parameters)* it is possible to execute the function. ²⁷

5.3.2. SYNTAX

5.3.2.1. Variables

Declaring variables in Erlang is following a simple syntax. In Erlang all variables has to begin with an uppercase letter and datatype does not need to be declared. To declare a variable called 'A' and assign it to the value 13 the syntax is, *A = 13*. It is not possible to assign a new value to variable A, In Erlang the code has to have an endmark and that is a dot (.).

In Erlang there is nothing called string, every string is a list of integers that a number indicate a character. The string "hello" is after its been compiled a list *[72,101, 108, 108, 111]*. ²⁸

5.3.2.2. Functions

In Erlang syntax and terms from declaring function sticks out. A whole function is called a clause and it consists of a head and body section. The head consists of the name of the function and the body consists of a pattern also known as parameters in other languages. A function called *sum* follows the pattern as 2 (parameters) that will return the sum of the 2 parameters will be defined as:

sum(x, y) -> return x + y. ²⁹

5.3.2.3. Loop

Defining loops in Erlang is a complex syntax therefore an image is used as reference.

While-loop

```
1 -module(helloworld).
2 -export([while/1,while/2, start/0])
3
4 while(L) -> while(L,0).
5 while([], Acc) -> Acc;
6
7 while([_|T], Acc) ->
8     io:fwrite("~w~n",[Acc]),
9     while(T,Acc+1).
10
11 start() ->
12     X = [1,2,3,4],
13     while(X).
```

While loop [27]

²⁷ http://erlang.org/documentation/doc-5.3/doc/getting_started/getting_started.html

²⁸ <https://learnxinyminutes.com/docs/erlang/>

²⁹ <http://learnyousomeerlang.com/>

First there is a *start()* function at line 13, this one has an array *x* and the length of this array is the amount of loops that will happen. Then the function *while(x)* is called and the variable *x* is passed in. At line 4 *L* will assign *X* value then the function *While(L, 0)* function is called at line 5. This one will set *Acc* to the start value. Now the actual loop starts at line 7 where *Acc* is write out which will be 0 at the first loop and then increment *Acc* so that next loop *Acc* will be 1 and so on.³⁰

For-loop

```
1  -module(helloworld).
2  -export([for/2,start/0]).
3
4  for(0,_) ->
5  |   [];
6
7  for(N,Term) when N > 0 ->
8  |   io:fwrite("Hello~n"),
9  |   [Term|for(N-1,Term)].
10
11 start() ->
12 |   for(5,1)
```

For loop [27]

At line 2, two functions are exported. First is a for-loop and the second is the start-loop. The start loop is the one loop that run first and in the start loop the for-loop is given variables and values. Then first after that the for-loop runs. In the for-loop hello is print out one time and then in line 9 the for-loop is given new values and is runned again. And it run as many times as *L* was gave the first value to the for-loop on line 12. So in this case the output is Hello 5 times.³¹

5.3.3. FRAMEWORKS

For Erlang there is a lot of different frameworks that works. One of them is Chicago Boss. The developers of Chicago Boss loved Ruby on Rails but they believe that Ruby on Rails was not a platform that was meant to build simple, fast and reliable websites. But both Ruby on Rails, python and Perl are dog-slow server side templates.³²

BeepBeep is a simpler web framework than Chicago Boss. The developers got their inspiration from Ruby on Rails and Merb. BeepBeep is built that if a developer follows the code structure, layout and a few rules, the views and controllers will build it them self. BeepBeep is also built on MochiWeb and ErlyDTL and is then a super-fast web server and will define the templates with Django.³³

³⁰ <https://www.tutorialspoint.com/erlang/>

³¹ IBID

³² <http://chicagoboss.org>

³³ <https://github.com/davebryson/beepbeep/>

Nitrogen is also a web framework that is developed for Erlang. It uses a pure Erlang technology to create its web applications.³⁴

Erlang Web is yet another framework built for Erlang. It is based on HTTP protocol and can be used to build dynamic websites and web services. Erlang web provides the developers using it with all the functions that are needed to create a Golang website. The developer behind Erlang Web got the inspiration from other dynamical framework such as Ruby on Rails and Django.³⁵

5.3.3.1. Compare different Erlang frameworks

	Chicago Boss	Erlang Web	Nitrogen
UTF-8 in Erlang code	yes	-	-
Error logging	yes	yes	yes
MySQL	yes	-	n/a
JS form validation	-	-	yes
code commits	~1900	~720	~2300
First release	2010	2008	2008
Latest release	2015	2013	2015

Table: Compare Erlang frameworks³⁶

5.3.4. CREATION

In the mid -80s Ericsson's Computer Science Laboratory got the task to create a programming language that would fit the programming of telecom products future. The creators were Joe Armstrong, Robert Virding and Mike Williams that were supervised by Bjarne Däcker. They spent two years creating projects with the existing programming languages. After the two years their conclusion was that the existing programming languages were interesting and had relevant features but not one of the programming languages encompassed them all.³⁷

5.3.5. PROJECTS AND COMPANIES

There are a lot of famous companies that use Erlang. Some of big projects and companies are: Amazon.com, Bet365, Facebook, Yahoo and the founder them self Ericsson. Amazon uses Erlang to implement SimpleDB. Bet365 uses it to push out notifications to the users. Facebook uses it in the backend of the chat service. Yahoo uses Erlang for their bookmarking service, Delicious. And Ericsson uses it in their 3G and LTE mobile networks worldwide.³⁸

³⁴ <https://github.com/nitrogen/nitrogen>

³⁵ <https://github.com/esl/erlang-web>

³⁶ <https://github.com/ChicagoBoss/ChicagoBoss/wiki/comparison-of-erlang-web-frameworks>

³⁷ <https://www.safaribooksonline.com/library/view/erlang-programming/9780596803940/ch01s02.html>

³⁸ [https://en.wikipedia.org/wiki/Erlang_\(programming_language\)#Erlang_in_Industry](https://en.wikipedia.org/wiki/Erlang_(programming_language)#Erlang_in_Industry)

6. RESULT

Do the languages have differences? Do they execute differently?

One way to see differences in languages is by basic and overall syntax. Therefore the following is listed. Common used syntax is displayed, to easily see differences between them.

Task	Golang	Hacklang	Erlang
Define a variable	<code>name := "John"</code> *	<code>\$name = "John"</code> *	<code>Name = "John"</code> **
Create a function	<code>func sum(x int, y int) int { return x + y }</code>	<code>function sum(int \$x, int \$y): int { return \$x + \$y }</code>	<code>sum(x, y) -> return x + y.</code>
Create a for-loop	<code>for i := 1; i <= 10; i++ { fmt.Println(i) }</code>	<code>foreach (\$v as \$value){ var_dump(\$value)</code>	<code>for(0,_) -> []; for(N,Term) when N > 0 -> io:fwrite(N), [Term for (N-1,Term)]. start() -> for(5,1).</code>
Create a while-loop			<code>while(L) -> while(L,0). while([], Acc) -> Acc; while([_]T], Acc) -> io:fwrite("~w~n",[Acc]) while(T,Acc+1). start() -> X = [1,2,3,4], while(X).</code>

Table: Showing differences in syntax

* It is possible to assign a new value to the existing variable

** It is not possible to assign a new value to the existing variable

According to the diagram which is a summary of syntax, there is a difference between the languages. The most noticeable difference is that Golang and Hacklang does not support While loops, the answer is that there is no need to have more than one type of loop.

(Read more about this in the different chapters for the different languages: Golang: 5.1.2 Hacklang: 5.2.2 Erlang: 5.3.2)

Executing program files

Execute and run program files has different procedures in different programming languages, to run and execute a programming file in our three languages:

- For Golang enter the command `go run main.go` in the terminal.
- For Hacklang the executing engine is called HHVM and stands for HipHop Virtual Machine.
- For Erlang enter `c(filename)` in the terminal.

(Read more about this in the different chapter for the different languages: Golang: 5.1.1 Hacklang: 5.2.1 Erlang: 5.3.1)

Do the languages work with frameworks?

Yes, they do. Some of the languages have more frameworks than the others. The languages and the frameworks in the table below are the ones that are the most used on the market.

	Golang	Hacklang	Erlang
Frameworks	Revel Martini Gin Gonic	HHVM Titon	Chicago Boss BeepBeep Nitrogen Erlang Web
Tool kits	Gorilla		

Table: List of compatible frameworks

The reason why there are not that many frameworks for Hacklang is because it is such a new language. It was release in 2014. As for Erlang there were several more but these were the most common ones. For Golang these are the one that are open source right now.

(Read more about the different frameworks in the different chapters: Golang: 5.1.3, Hacklang: 5.2.3, Erlang:5.3.3)

How and why were the programming languages created?

Golang was created by Google. The reason why the three creators decided to create a new language was because the existing programming languages such as C++ was hated by the three creatures.

(Read more about how go where created in chapter 5.1.4)

Hacklang was created by Facebook because under that period PHP was widely derided. Facebook did not totally leave PHP they built Hacklang which was a helping tool.

(Read more about how Hacklang was created in chapter 5.4.2)

Erlang was created by Ericsson. And the goal was to create a language that would be the future of the telecom products.

(Read more about how Erlang was created in chapter 5.3.4)

Are the languages common in companies?

YouTube and Google is one of the most popular web application existing at world wide web, Golang is a part of the backend. Golang is used due to its effectiveness and that Google Inc. have created Golang which also owns YouTube and Google.

(Read more about companies that use Golang in chapter 5.1.5)

Facebook Inc. is the creator of the giant social web application Facebook. Facebook is known for its social platform and for that Hacklang was developed and currently using.

(Read more about companies that use Hacklang in chapter 5.2.5)

Erlang known for its effectiveness and consists of several popular websites among them YouTube and Facebook uses Erlang, but also Bet365, Amazon, Yahoo consists of Erlang.

(Read more about companies that use Erlang in chapter 5.3.5)

7. CONCLUSION

When reading about Golang we get the impression that the language is extremely effective and easy to learn. “But is it good to start programming with Golang as first programming language?”, there is different thoughts about this. Some school believe that it's better to learn the student a hard language first so that the next language they will learn is a bit easier. While some other schools think it is better to start at an easy language and increase when the experience has increased. So everything has to do with your goals, is Golang the only programming language you want to learn? Then we strongly recommend starting with Golang immediately, but if you know you are going for example learn C++ in a few months then starting with Golang is not the best choice, because Golang has so many shortcuts and its syntax is made to be easy and effective. You might have problem to step up from easy syntax to an actually hard syntax.

If you have decided to learn Golang and understand its syntax we strongly recommend reading Go's documentation in terminal or visit their documentation online at golang.org/doc/.

Hacklang is a very effective programming language with huge potential, PHP is a language that many recommend as a good starting language, as we all know Hacklang is based on PHP and have almost the same syntax. Both Filip and Emma has learned PHP as our first language and we can only talk from that, from what we have seen Hacklang and PHP is very similar and we recommend starting with Hacklang as the first programming language to learn. Hacklang has a very good documentation and is compatible with PHP, so if you having problem with a Hacklang syntax you can as well write that one in PHP and continue with Hacklang after.

Erlang is an effective complex language, Erlang provide us with usable features but that has a price of hard and complex syntax. Erlang is one of the oldest languages out there and we having the feeling that the syntax still is not updated to match the newer and more popular languages. We strongly recommend to not start with this language if you don't have much experience from programming.

Our thoughts about the different languages were that Erlang was a hard languages to learn to code. We got the impression and believe it's syntax is hard to understand and learn, from our perspective Erlang feels old, outdated and needs to be updated especially within the syntax area. The one that is one step better than Erlang is Hack. Its syntax was easier and the documentation on the programming languages was well documented. The one that caught our eye and was sticking out where Golang, it had a very easy syntax and a good reason why Golang was created. The reason why Golang was created is that they wanted a programming language with a much easier syntax than C++, while Hacklang was created because PHP at the time did not have all the functions that Facebook needed.

Are the languages recommended to start without knowledge?

This is a personal question that is answered from our knowledge and perspective during this study.

- Golang have the benefit that it has an easy and very effective syntax, it is easy to learn and recommended as a first starting language.
- Hacklang is based on PHP which is an easy syntax language and perfect to start with it is the first programming language for someone.
- Erlang has been around for over 35 years, this provide Erlang with a hard and complex syntax. Erlang is an effective language but not recommended as the first programming language to learn due to its complex syntax.

The hidden treasures among the big IT companies is Google's programming languages Golang. For a beginner this is the best programming languages to begin with. It also has a syntax that is easy to dive into.

8. FUTURE WORK

For future work it would be a good idea to look even deeper into the languages, like try to use the languages ourselves, see how the languages actually work.

It would also be a good idea to find out what other programmers think about the languages. First of all, it would be smart to have one survey for programmers which have seen the languages before and one survey that is for programmers which has not seen it before. In that case we can get input on the first expression on the language for the programmer.

Our work could have been even better if we followed the method that we first planned to do. And that was that we would answer a question and then after we were done with a language that we would change questions. But we realized that after we were done with the first language that it we took the same questions we would find the same information about each languages.

The planning would have been better. We planned to go through a language a week, but it did not take that much time. In one week we did more than one and a half language. It was positive to the work but we should have known it would go faster.

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