ALGONQUIN COLLEGE

SCHOOL OF ADVANCED TECHNOLOGY

ICT - Applications & Programming
Computer Engineering Technology – Computing Science

A11

Language Specification

Team:
[Savas Erturk] - Id: **[040919022]**

Language Name [mamba]

This template is suggested (not mandatory) to answer A11 Specification.

Part 1

Language User Reference

EXPLANATION

The purpose of this assignment is to invent a new computer language.

- *This language can have the syntax and structure of your choosing.*
- *Option 1: Adapt the 'BOA' language to be Python compatible.*
- *Option 2: Define a DSL – Proper to solve specific problems (ex: science, economy, music, etc.)..*
- *This is going to be a fairly basic language. There's a lot of functionality that we'll be skipping over, while we implement the basics. You will need to tell me those basics, of course. In this document, I'm going to explain the steps of what to do with a bit of detail.*

1.1. User Manual

Element 1: Name / Extension

[Name your language! Name it after a city that means something to you. We suggest you use one "word" for the name.]

*[What is the filename extension of your language? For example, for C it is .c, and for Professor Paulo's **Boa language** it is ".**boa**".]*

[What is your language patterned after, or what is it similar to? What languages are inspiring your choice? It's okay if you're following Python closely.]

This programming language name called "**MAMBA**" and it's inspired by a **black mamba**. 

Until the finish of the development of the programming language's logo color will stay brown which is the most common color of the species is brown. Then black mamba will release on market.

Mamba language extension is " **.mamba** ".

Element 2 – Comments

[Comments: I want to do comments in your language. How do I write them?]

To add or mark a line as a comment, start with a hash sign (#).

Element 3 – Keywords

[Keywords: List the sequence of reserved / key words from your language]

There are thirty-six keywords in Mamba. These are;

```
False               class               from                or
None                continue            global              pass
True                def                 if                  raise
and                 del                 import              return
as                  elif                in                  try
assert              else                is                  while
async               except              lambda              with
await               finally             nonlocal            yield
break               for                 not                 sapla
```

Just in case if user stuck or need help, can see these keywords with "/help" command.

Element 4 – Variables and Datatypes

[Datatypes: Define integers, real numbers (float points) and strings]

- *How many bytes are you needing for your variables? This determines their ranges. (Chambly, for instance, has a special 64-byte integer. This is ridiculously huge for most purposes.)*

[Remember to define the number of bytes – and, if possible, range]

Text Type:	`Str(per characters up to 1-4 bytes)`
Numeric Types:	`Int(4 bytes or 32 bits)`, `float(8 bytes)`, `complex`
Sequence Types:	`list`, `tuple`, `range`
Mapping Type:	`dict`
Set Types:	`set`, `frozenset`
Boolean Type:	`bool`

Binary Types: `bytes`, `bytearray`, `memoryview`

None Type: `NoneType`

Element 5 – Variables and Datatypes

[Variables: How would a programmer define variables that can hold integer numbers (numbers with no decimal point), floating point numbers (numbers with a decimal point) or text (ie: strings in Java). This is element 1. Consider if you want to flag the variables in a special way, like SOFIA or BASIC, or not, like C or Java.]

"variable_name = data values"

In Mamba, user does not need to specify the data type for variable, For instance;

```
mambaNumber = 66
mambaList = [1,2,3,4,5,6]
mambaName = "Mamba"
```

NOTE: Mamba is a case-sensitive programming language.

Element 6 - Commands

- ***Attribution****: How does your language let a programmer assign a value to a variable? (Will you allow casting? If so, how will it work?) How will your language handle math, and will it allow strings to be concatenated (merged)?*

  In mamba assigning value; "variable_name = data values",

  Concatenated string and integers using "+" operator;

  "print("Name: " + "Mamba"+str(mambaNumber))"

  NOTE: Only string can concatenated. Other numeric variables have to be casting to string using "str()";

- ***Selection**: How does your language do if-style logic? (Optional: Do you want to do some kind of switch/case as well?). You will need to explain how "conditionals" work in your language. How do you write Boolean operations, such as "or", "and", "not", and other conditions, such as less than, greater than, etc?*

  Boolean operations returns true or false.

```
>>> 5 > 3 and 5 == 3 + 2
True
>>> 5 < 3 and 5 == 5
False
>>> 5 == 5 and 5 != 5
False
>>> 5 < 3 and 5 != 5
```

- ***Interaction**: How will your code handle looping? (You can do one or more of a for-style loop, a while/do loop, etc.)*

  snakes = [“python”, “mamba”, “cobra”]

  for x in snakes:

  print(x)

- ***Input**: How does your program get input from the keyboard? (Strings are easiest.)*

  input() function allows user input;

  variableName=input()

- ***Output**: What would a programmer type to put output on the screen? What sort of variables or data will your code take?*

  print() function allows to display data. You can use numbers and strings.

  print(variableName)

- ***Functions**: [Function definition: parameters and returning types]*
  - *What will be the syntax for making a function or subroutine?*

  . def command allows to create function. def = funtionName + (Arguments if needs)

  def mambaFunction():

  print(“Mamba”)
  - *How will it take parameters?*

  def mambaFunction(name):

  print(“Hello” + name)

- *How will it return results?*

```
def mambaFunction(x):
    return 5 * 6
```

Element 7 – Proper elements

[Include specific features / elements to be included in your language]

- *What you could include / modify? Think about new datatypes / structures / commands, etc.*
- *Note: Do not share this info (it is supposed to be your proper elements in the language.*

"Sapla" function is the new feature of the mamba. Sapla, is it same with do-while function.

Part 2 Examples

Option 1: Python-like

Hello World

```
print(“Hello World!”)
```

Sphere Volume Expression (or any other example)

```
pi = 3.1415926535897931
r= 6.0
V= 4.0/3.0*pi* r**3
print('The volume of the sphere is: ',V)
```

*[TIP: See examples in the Lecture Notes – **Appendix 1**]*

Option 2: DSL

[Your example here]

```
[Your Code here]
```

Part 3 Architectural Aspects

Advantages

[What's the goal of your language? Are you trying to make something simple, fun, complicated? My personal language, Chambly, is based around being useful to scientists. (You can just make something up here, honestly. Think about it a little bit, have a little fun.)]

Mamba is an interpreted, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together.

Strategy: C Implementation

[How your language can be implemented in C – ex: datatypes]

- *In plain English, or maybe even some high level pseudocode, how are you going to parse your language? You will be writing a compiler for your language, so these are some things you need to think about.*

Mamba using a top-down parsing technique parses the input and starts reading from left to right.

[Your ideas about how to identify elements from language]

- *Consider your "write to the console" command as an example. How will your compiler detect it?*

Mamba compiler detects using keyword reserved. When developer use one of the 36 reserved keyword, the compiler detect then run the function.

[Your ideas about how to identify scope (ex: blocks between conditionals or functions)]

- *How do you mark a block of code? If I use your loop logic, how do I control what portion of code gets looped through? In C, you might use { and }. In Python, the indentation is what matters. How does it work in your language?*

The compiler first detects the reserved keyword and then looks up " : ". Then it checks which line has a blank space.

```
for x in mambaList:
 print(x)
```

Basic ideas about C implementation

[Which structures or datatypes you imagine to use in your language implementation]

- *What do you think is going to be really hard about this? What would be, in your opinion, the hardest part of parsing your own new language? You don't have to write an essay, a paragraph or two will be fine.*

Hardest part for me using complex logical operations, memory allocation and datatypes range. Also datatypes biggest problem. There is will be signed types and unsigned types. Also, each datatype will have own minimum maximum value. Floating number logical operations should be limited.

Note 1: C Datatypes

Remember that you are implementing your language in ANSI C. For this reason, you cannot create arbitrarily your language (from scratch). You need to use what is already provided by C Compiler. For this reason, think about using and defining the language obeying the datatypes.

Problems when using C implementation

[Your vision about main problems / difficulties when implementing a new language (ex: memory allocation, range of datatypes]

FINAL SUGGESTIONS

Here some ideas to think about your language....

- *Don't make this assignment harder than it needs to be on yourself. Focus on making the syntax for your language that meets our requirements. Worry about extra features later.*
- *Don't worry if your new language winds up having really difficult parts. You'll be allowed to change your language as you go along, as long as you make "patch notes" to explain those changes. We'll tell you about this later.*
- *There's a marking key at the end of **CST8152_Compilers_F22-A11-Specification** that should steer you along for grades. Focus your efforts on where you'll get the best results.*
- *Finally, think about creating an "master-piece": until now, you have used several languages. And if you have conditions to define yours, how it could be?*

References

https://realpython.com/python-keywords/

http://projectpython.net/chapter02/#:~:text=To%20be%20safe%2C%20Python%20allocates,four%20bytes%2C%20or%2032%20bits.

https://www.toppr.com/guides/python/python-introduction/variables-constants-literals/python-variables-constants-and-literals/#:~:text=Literals%20are%20raw%20values%20or,the%20type%20of%20literal%20used.

https://realpython.com/python-and-operator/

https://w3schools.com/

https://stackoverflow.com/

https://www.python.org/doc/essays/blurb/

[Include eventual references used here]

Algonquin College
Fall, 2022