TWT Programming Language

(Talagang Walang Tulog)

Language Design and Functionalities

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Chapter 1

Introduction

1.1 The TWT programming language

TWT is simply a programming language designed out of curiosity. There were really many challenges of deciding on which fits best on the category of a usable language, which the designers took so much time for considering and creating such.

1.1.1 Language Name

Halfway before the appropriate parser was created for the language, there was no appropriate meaning that the programmers can imply on the initials TWT, except that it was Twitter-inspired. However, since they were inspired by the countless nights that they weren't of good sleep, they made a way for the meaning of the name. TWT refers to "Talagang Walang Tulog", or "really no sleep", the phenomenon that happened to them during the creation of the language.

1.1.2 Paradigm

The TWT programming language is imperative and functional. The programming language works in a fashion nearly similar to C, Python, and Pascal. Function declarations are C-styled. Also, keywords that begin and end a program are used in the language, which seems to be like Pascal.

The language also borrows features from Python, which was the language used to create the new language.

1.1.3 Inspiration

Twitter, a social networking site, was the main inspiration on creating the language. As seen on the next chapter, the keywords and reserved words of the language mostly came from the jargons seen on the website.

Other than Twitter, the programmers also made the intricacy of programming an inspiration to create the language. Syntaxes on the language are simpler compared to other languages, which makes new programmers learn the language easily.

Chapter 2

Grammar Definition

In this chapter, we get to learn about the grammar of the language using its Backus-Naur form (BNF). By this, we can get a hint of what the language looks like on encoding.

2.1 Identifiers

The following conventions apply to variables and values entered in the programming language:

```
<INT> ->          <Digit><INT> | <Digit>
<Digit> ->        "0" | "1" | "2" | "3" | "4" | "5" | "6"
                  | "7" | "8" | "9"

<CHAR> ->         "'"<ASCII>"'"

<FLOAT> ->        <Digit>"."<Digit>
                  (Note: Strictly followed)

<STRING> ->       """<STRINGEXT>"""

<STRINGEXT> ->    <CHAR><STRINGEXT> | <CHAR> | EPSILON

<VARIABLE> ->     <ALPHABET><VARIABLEEXT>

<VARIABLEEXT> -> <ALPHANUMERIC><VARIABLEEXT>
                  | <ALPHANUMERIC> | EPSILON
```

Note that the grammar for float type values is strict in the programming language, so it will not accept an integer as float. The data must explicitly indicate that it is indeed a floating-point value.

2.2 Data Types

The TWT language is statically-typed. The programmer should explicitly state the data type he is to use.

Data types were defined in the language grammar as follows:

```
<Dtype> -> "@INT" | "@CHIRP" | "@COKE" | "@MSG" | "@TRALSE"
```

Data types are as follows:

- **@INT:** integer
- **@CHIRP:** character (ASCII)
- **@COKE:** float
- **@MSG:** string
- **@TRALSE:** boolean

The '@' symbol is used to easily identify words as types. By inspiration, it takes the @-mention paradigm of Twitter as its data type recognition mechanism.

2.3 Expressions and Assignment Statements

The following rules apply to expressions and assignments:

```
<Assignment> ->  <DType> VARIABLE "=" VARIABLE
                | <DType> VARIABLE "=" <Reading>
                | "@INT" VARIABLE "=" INT
                | "@CHIRP" VARIABLE "=" CHAR
                | "@COKE" VARIABLE "=" FLOAT
                | "@MSG" VARIABLE "=" STRING
                | "@TRALSE" VARIABLE "=" "YES"
                | "@TRALSE" VARIABLE "=" "NO"
```

```
                | <DType> VARIABLE "=" "(" <Exp> ")"

<Reading> ->    "REPLY" VARIABLE

<Exp> ->        <Term> <ExpPrime>

<ExpPrime> ->   "+" <Term> <EspPrime>
                | "-" <Term> <ExpPrime>

<Term> ->       <Fact> <TermPrime>

<TermPrime> ->  "*" <Fact> <TermPrime>
                | "/" <Fact> <TermPrime>

<Fact> ->       INT | CHAR | FLOAT | VARIABLE | "(" <Exp> ")"
```

2.4 Statement Level Control Structures

The following rules apply to control structures available in the language:

```
<State> ->      <Loop> "#" <StatePrime>
                | <If> "#" <StatePrime>
                | <Assignment> "#" <StatePrime>
                | <Call> "#" <StatePrime>
                | <Printing> "#" <StatePrime>
                | <Control> "#" <StatePrime>

<StatePrime> ->  <Loop> "#" <StatePrime>
                | <If> "#" <StatePrime>
                | <Assignment> "#" <StatePrime>
                | <Call> "#" <StatePrime>
                | <Printing> "#" <StatePrime>
                | <Read> "#" <StatePrime>
                | <Control> "#" <StatePrime>

<Loop> ->       "RT" <Condition> {" <Block> "}"

<If> ->         "IF" <Condition> "FOLLOW" "{" <Block> "}"
                <ElseIf>
                <Else>
                | "IF" <Condition> "FOLLOW" "{" <Block> "}"
                <Else>
                | "IF" <Condition> "FOLLOW" "{" <Block> "}"

<ElseIf> ->     "ELSEIF" <Condition> "FOLLOW" "{" <Block> "}"
```

```
                <Elseif>

<Else> ->       "ELSE" <Condition> "FOLLOW" "{" <Block> "}"
```

2.5 Subprograms

This is how functions or subprograms are declared in the language:

```
<Declaration> -> <Dtype> VARIABLE "(" <Args> ")"
                "{" <Block> <Return> "}"
                | <Dtype> VARIABLE "(" <Args> ")" "{" <Block> "}"
```

2.6 Other syntaxes not listed on previous sections

```
<Program> ->    <Declaration> <Main>
                | <Main>

<Main> ->       "LOGIN" <Block> "LOGOUT"
                | "LOGIN" "LOGOUT"

<Block> ->      <State>

<Call> ->       "HOOT "VARIABLE "(" <Args> ")"

<Printing> ->   "TWEET" VARIABLE
                | "TWEET" "(" <EXP> ")"
                | "TWEET" INT
                | "TWEET" FLOAT
                | "TWEET" CHAR
                | "TWEET" STRING
                | "TWEET" TRUE
                | "TWEET" FALSE
<Reading> ->    "REPLY" VARIABLE

<Control> ->    "UNFOLLOW" | "LIKE" | "BLOCK"

<Condition> ->  "(" <Conditional> ")" | "~" <Condition>

<Conditional> -> VARIABLE <Conditional> VARIABLE
                | { VARIABLE | INT | CHAR | FLOAT } <CondOp>
                    <Condition>
```

```
                | <Conditional> <CondOp> <Conditional>
                | <Condition> <CondOp> { VARIABLE | INT | CHAR |
                    FLOAT }
                | { VARIABLE | INT | CHAR | FLOAT } <CondOp>
                { VARIABLE | INT | CHAR | FLOAT }

<CondOp> ->     ">=" | "<=" | "==" | ">" | "<"

<Args> ->       <Dtype> <Vname> "," <Args>

<Return> ->     "REPORT" { INT | CHAR | FLOAT | STRING | VARIABLE }
                | "REPORT" <Exp>
```

Chapter 3

Lexical and Syntax Analysis

3.1 Parser

The parser for the language uses LR parsing, so no parse tables were used to parse the strings for the language. By that, it is obvious in the grammar that revisions for left recursion were done, so that no conflict will happen on the parsing process.

Chapter 4

Names, Binding, and Scoping

4.1 Case sensitivity

The TWT programming language was designed in a way that the user must exactly write the language in whichever case it is. By that, TWT is case-sensitive. For example, **@int** is not the same with **@INT**.

4.2 Reserved words

The following is a list of the reserved words in the language:

LOGIN	LOGOUT	REPORT	TWEET	IF
ELSEIF	ELSE	HOOT	REPLY	UNFOLLOW
@INT	@CHIRP	@COKE	@MSG	@TRALSE
LIKE	BLOCK	YES	NO	

4.3 Name form

By convention, as explained in the grammar, the names must be alphabetic at the start of each string, for variables. The language follows C-style rules.

4.4 Binding

The language follows Python-based binding, but on the programming language scope, it was designed to be statically bound. As noticed, Python does dynamic binding, however, the programmers chose to require having types specified before each run.

4.5 Lifetime and scope

Conventions were also followed on variable lifetime and scope. That is, what Python generally has on variable lifetime and scope applies to TWT as well.

4.6 Blocks

In TWT, blocks can be determined by curly braces, as what C has. Note the following code example:

```
RT ( X < 4 ) {
     X = ( X + 1 ) #
     Y = ( Y + 2 ) #
     TWEET X #
 } #
```

The example above is a loop. It has the three statements ”X = (X + 1) #”, ”Y = (Y + 2) #”, and ”TWEET X #” in the block example.

Chapter 5

Data types

5.1 Primitive data types

As referenced to the grammar in Chapter 2, these are the data types available in the language:

- **@INT:** integer
- **@CHIRP:** character (ASCII)
- **@COKE:** float
- **@MSG:** string
- **@TRALSE:** boolean

5.2 Strings

The programming language supports strings, and is a primitive data type. Like C, the strings are determined by double quotation marks.

There are no limitations on string declarations, and everything that applies to every other language also applies to TWT.

5.3 Note on user-defined types and type-checking

As of writing, user-defined typing is not available in the language. The user must strictly use the available data types.

On type-checking and coercion, Python conventions are used, that is, the features that Python has are used in the language.

Chapter 6

Expression and Assignment Statements