

Documentation

Project - Milestone 1 (Team 16)

Team members:

1. Venkat Gandharv Thanniru (ASU ID:1220213670)
2. Aum Bhanderi (ASU ID: 122010422)
3. Swati Sahu (ASU ID: 1219477727)
4. Aishwarya Prabha Ramakrishnan (ASU ID: 1217204807)

Language Name: SYNC

Design:

- SYNC is an **imperative** language.
- **Data Types:** SYNC uses val as data type which supports int, bool and string values.
- **Conditional Statements:** SYNC supports both traditional if and else statements and ternary operators.
- **Operators:** SYNC supports following operators
 - Arithmetic operators(+,-,*,/)
 - Relational operators (>,<,<=,>=,==,!=)
 - Unary operators (++ , --)
- **Loops:** supports the following loops
 - while loop
 - while(BOOLEAN)

{ BLOCK }

- for loop

- for(INITIALIZATION ; BOOLEAN ; UNARY)

- { BLOCK }

- for loops with range

- For IDENTIFIER in range (EXPRESSION,EXPRESSION)

- {BLOCK}

- If loop

- if(BOOLEAN)

- { BLOCK }

- else if(BOOLEAN)

- { BLOCK }

- **Print statements:** The print statement in SYNC is “print ”.

ex: print(“Tom Brady is the GOAT”)

- The lexer converts the input program into tokens. These tokens are parsed by parser and a parse tree is generated. This parse tree is then interpreted to give expected output.
- Like in Python, there is no need to declare the variable.

GRAMMAR:

P --> PROGRAM

K --> BLOCK

Id --> IDENTIFIER

D --> DECLARATION

I --> INITIALIZATION

E --> EXPRESSION

B --> BOOLEAN EXPRESSION

U --> UNARY

T --> TERNARY

A--> ASSIGN

P ::= K

K ::= Statements K | Statements

Statements ::= D \$ | I \$ | A \$ | IF | while B { K } | FOR | Print \$ | U \$

D ::= val Id

I ::= val Id = E | val Id = S

A ::= Id = E | Id = B | Id = S

U ::= Id++ | Id--

IF ::= if B { K } ELSE_CASE | if E { K } ELSE_IF_CASE

ELSE_IF_CASE ::= else if B { K } ELSE_IF_CASE

$\text{ELSE_CASE} ::= \text{else } \{ K \} \mid \text{empty}$

$\text{FOR} ::= \text{for } (I ; B ; U) \{ K \} \mid \text{for Id in range } (E , E) \{ K \}$

$\text{print} ::= \text{print}(\text{"S"}) \mid \text{print}(\text{Id}) \mid \text{print}(\text{"S"}, \text{Id})$

$B ::= \text{true} \mid \text{false} \mid \text{not } B \mid B \text{ or } B \mid B \text{ and } B \mid E$

$C ::= E < E \mid E > E \mid E \leq E \mid E \geq E \mid E == E$

$E ::= E + E \mid E - E \mid E * E \mid E / E \mid \text{Id} \mid N \mid T$

$\text{Id} ::= [\text{a-z}] \text{Id}^* \mid [\text{A-Z}] \text{Id}^*$

$\text{Id}^* ::= [\text{a-z}] \mid [\text{A-Z}] \mid 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9 \mid \text{empty}$

$N ::= 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9$

$T ::= (B) ? (E : E)$

Sample SYNC Code

```
val x = 45 $
```

```
print(" value of x = ", x)$
```

OUTPUT

```
value of x = 45
```