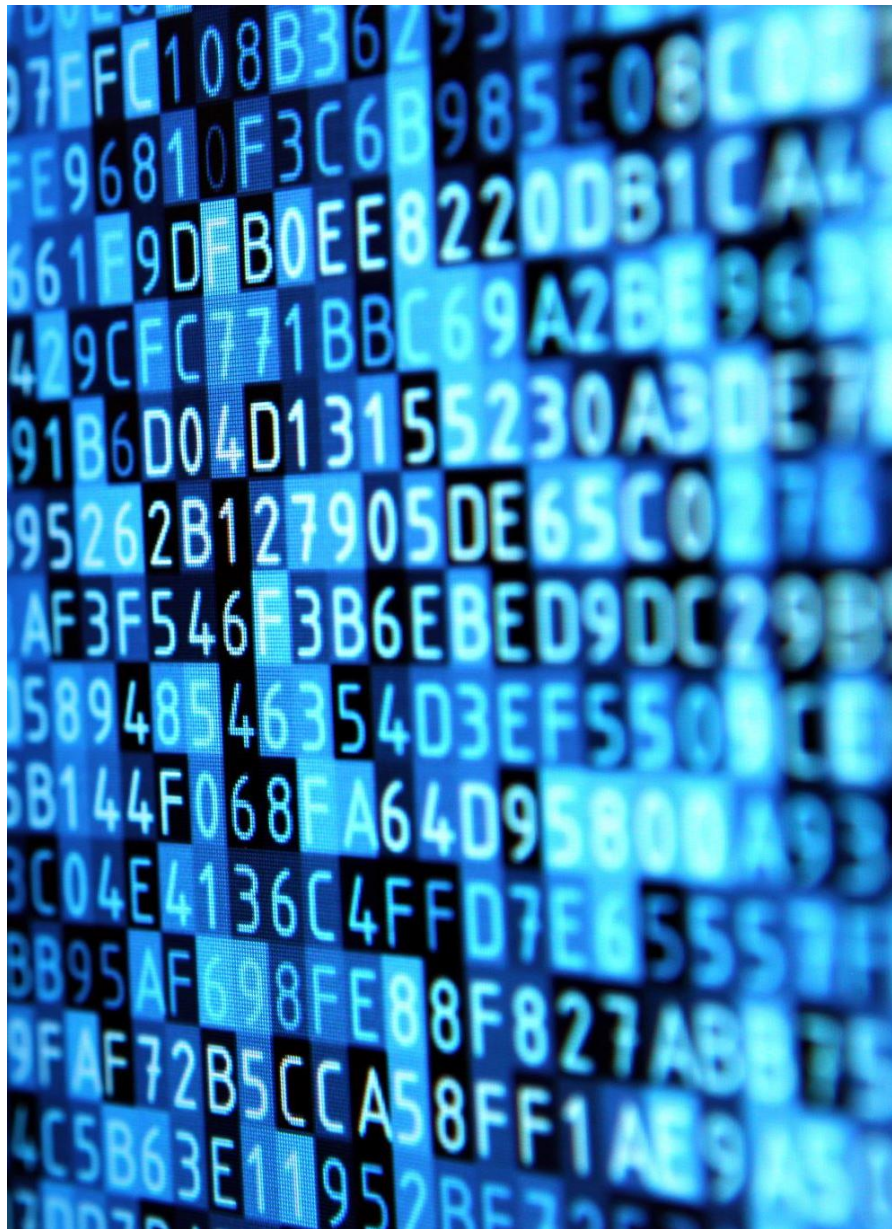

CFG Design Python-like program language

By Tanaka Chingonzo

*In fullfillment of CISC 603-90 Theory
of computation*



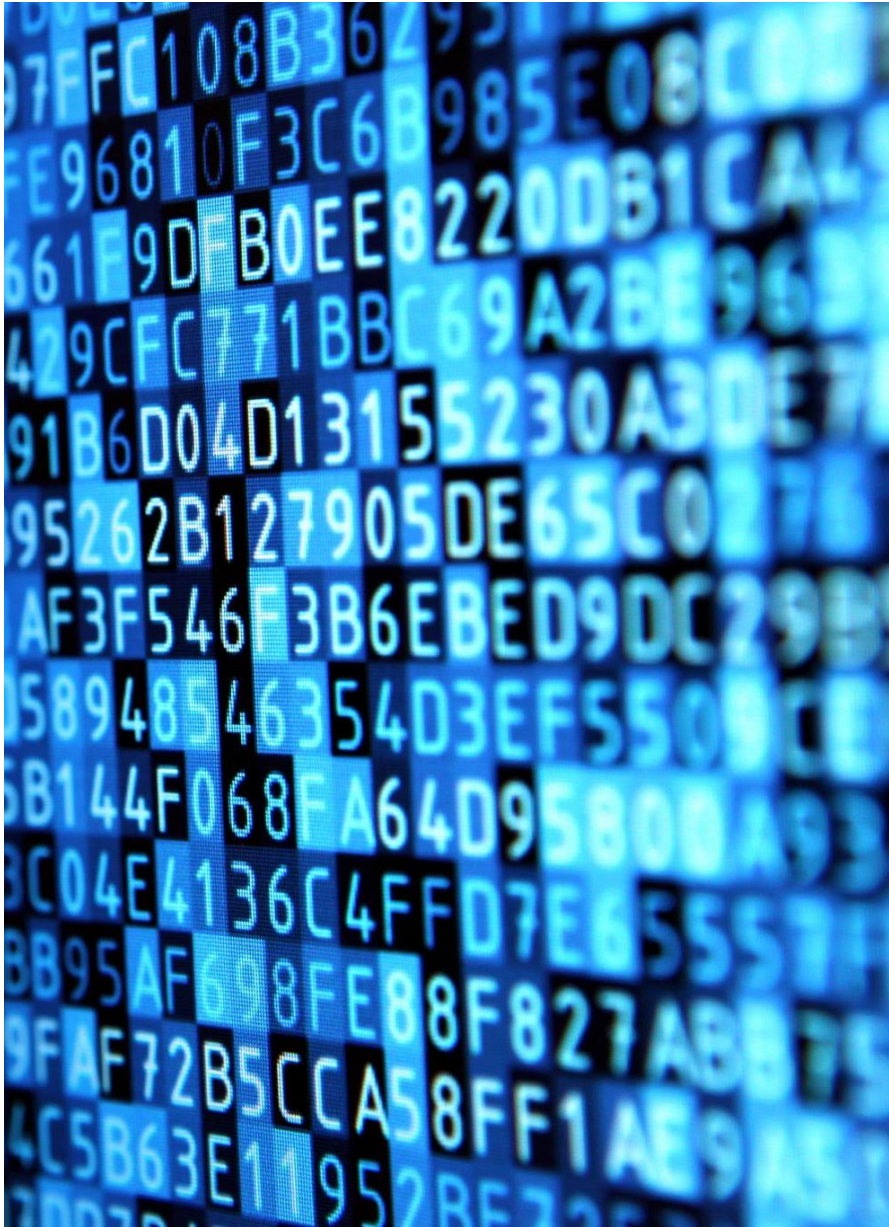
Intro to the ToyPython Programming Language

Name: ToyPython

- Purpose: A simple, educational programming language designed to teach basic concepts of programming and parsing.

Features

- Python-like syntax.
- Support for variables, arithmetic, conditionals, and loops.



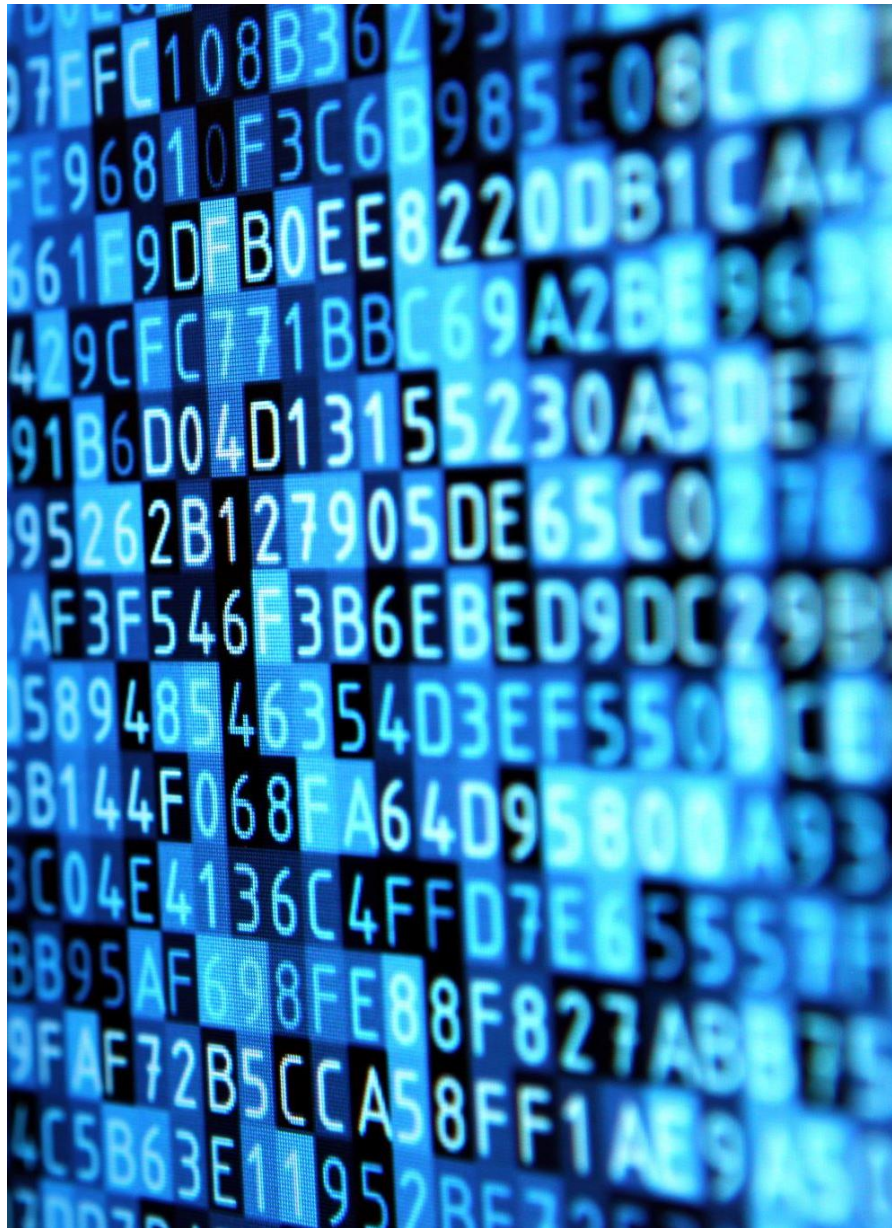
Keywords

Reserved Keywords:

- if: Start of a conditional statement.
- else: Optional branch for conditional statements.
- while: Start of a loop.
- def: Define a function.
- return: Return a value from a function.
- print: Output a value to the console.

Explanation:

- These keywords cannot be used as variable names.
- Case-sensitive (e.g., If is not the same as if).



Variables and Data Types

Variables:

Assigned using the = operator.

Example: `x = 5`

Supported Data Types:

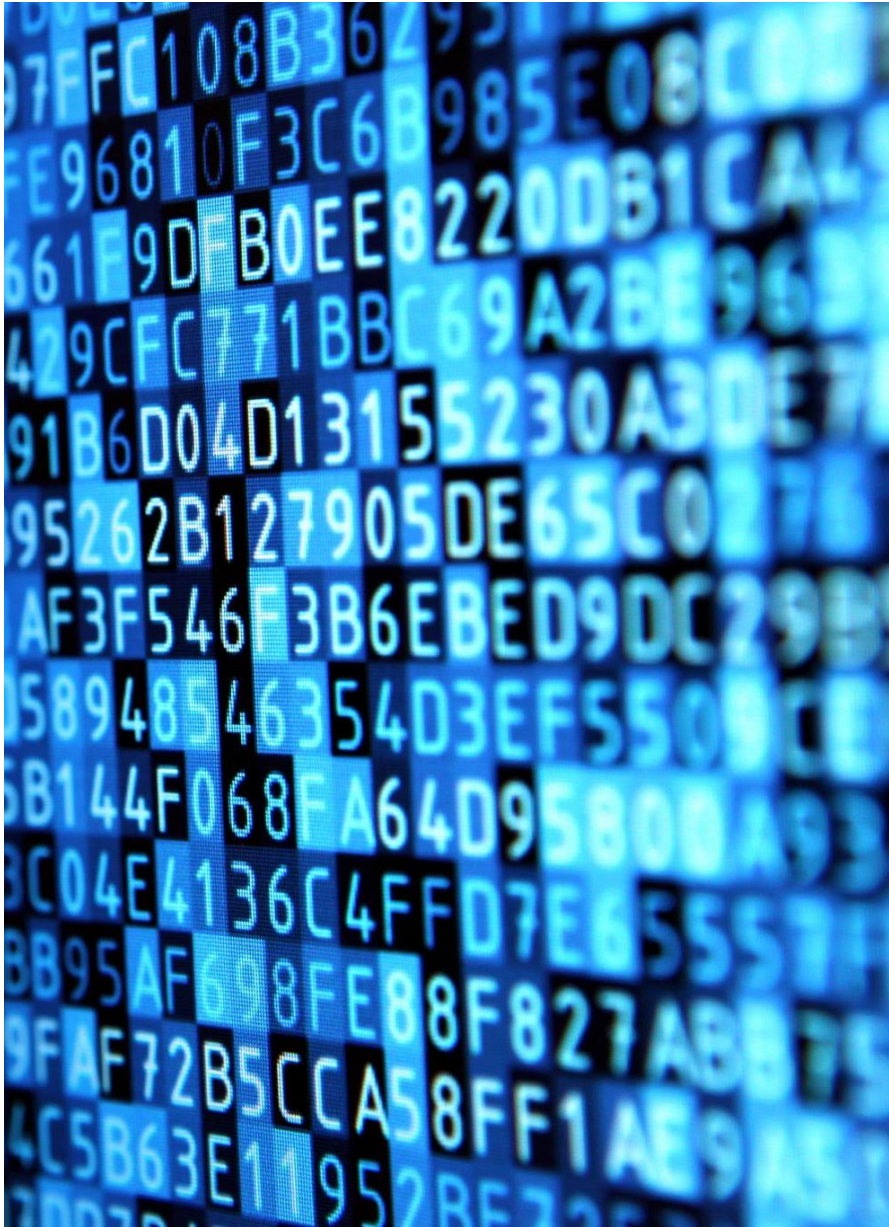
Numbers: Integer literals (e.g., 5).

Strings: Double-quoted text (e.g., "Hello").

Rules:

Variable names must start with a letter or underscore (`_`).

Variable names can include letters, numbers, and underscores but cannot match keywords.



Operators

+: Addition.

-: Subtraction.

*: Multiplication.

/: Division.

<: Less than.

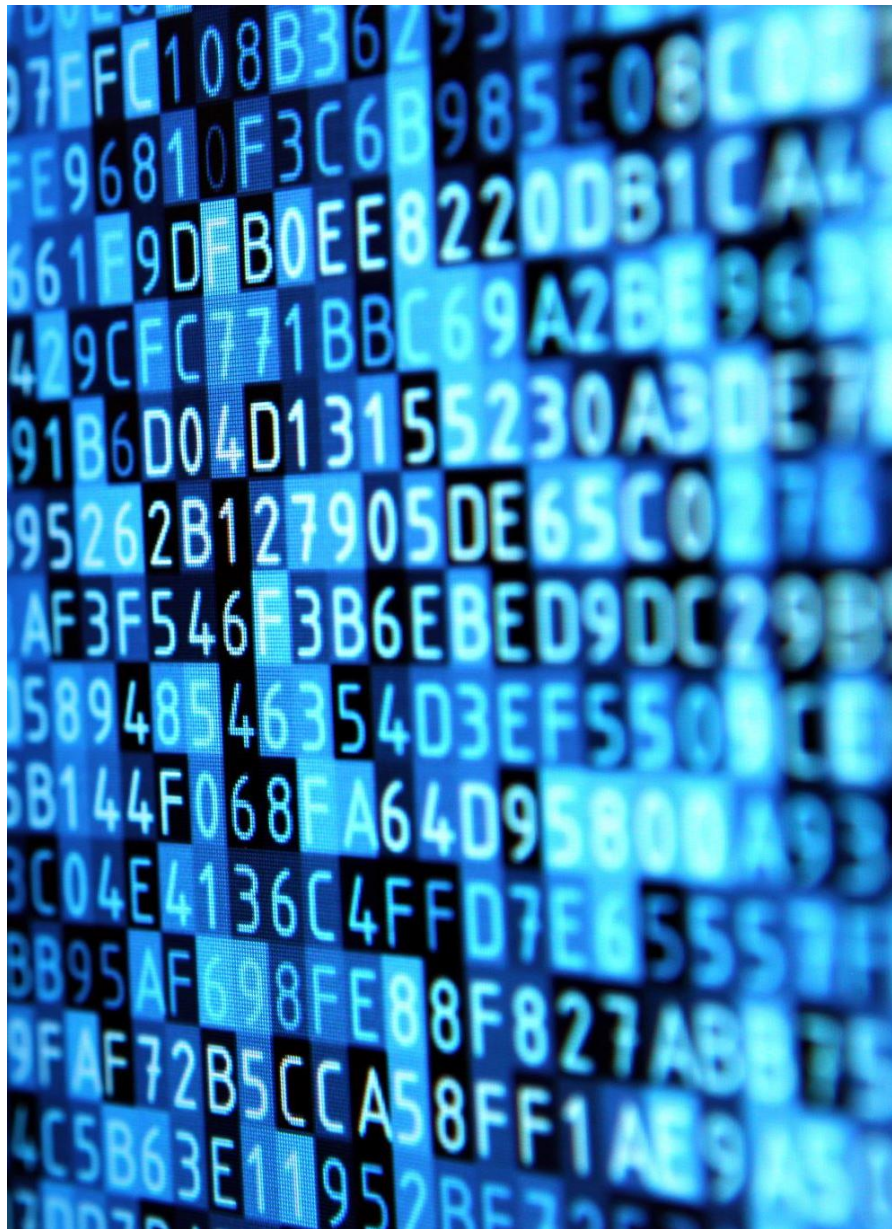
>: Greater than.

==: Equal to.

!=: Not equal to.

<=: Less than or equal to.

>=: Greater than or equal to.



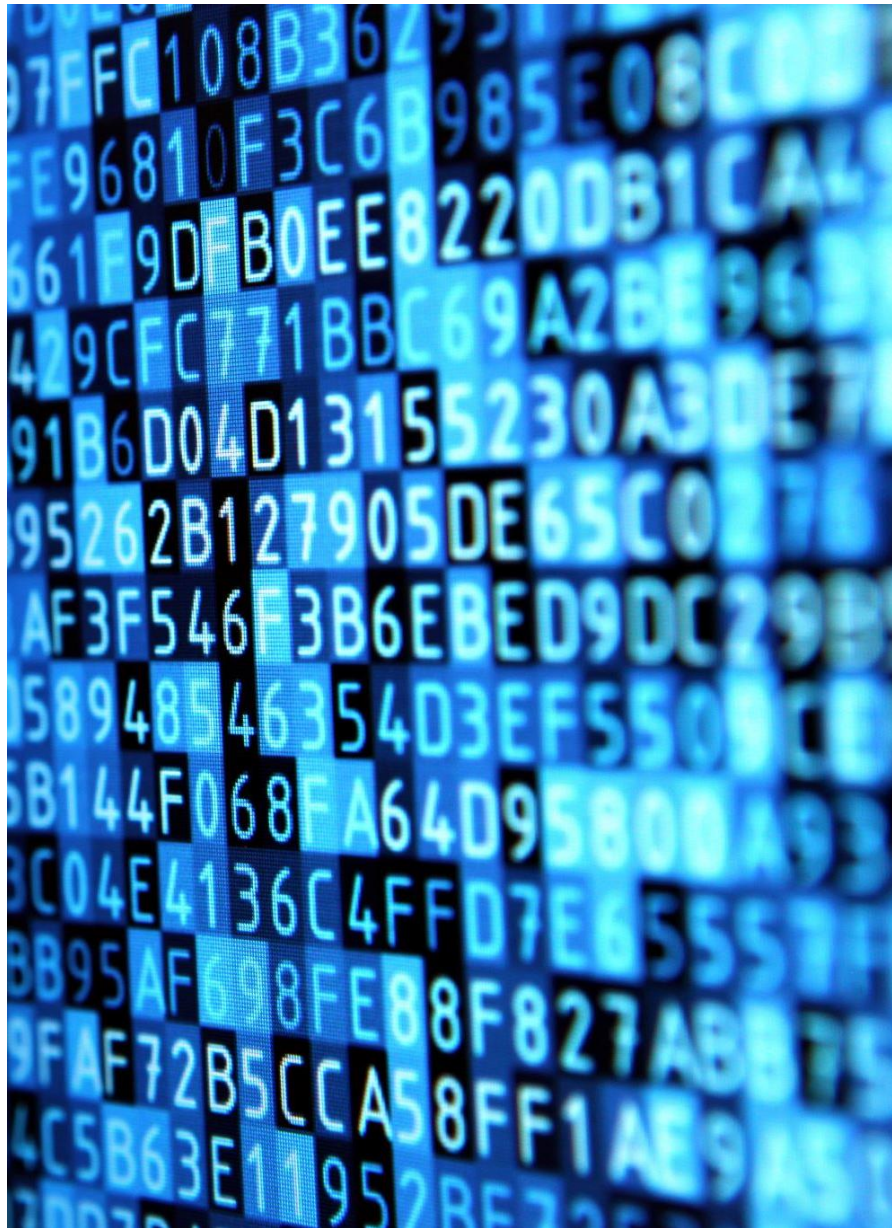
Statements

```
print("Hello World")
```

```
x = 5
```

```
if x > 0:  
    print("Positive")
```

```
while x > 0:  
    print(x)  
    x = x - 1
```



Production rules

Parser Rules:

- program: A sequence of statements ending with EOF.
- statement: A simple or compound statement.
- simpleStatement: Includes print, assignment, or return.
- compoundStatement: Includes if, while, or def.

• *Lexer Rules:*

- NEWLINE: Recognizes line breaks.
- INDENT / DEDENT: Handles Python-like indentation.
- NUMBER, STRING, IDENTIFIER: Tokenize literals and variable names.



Indentation handling

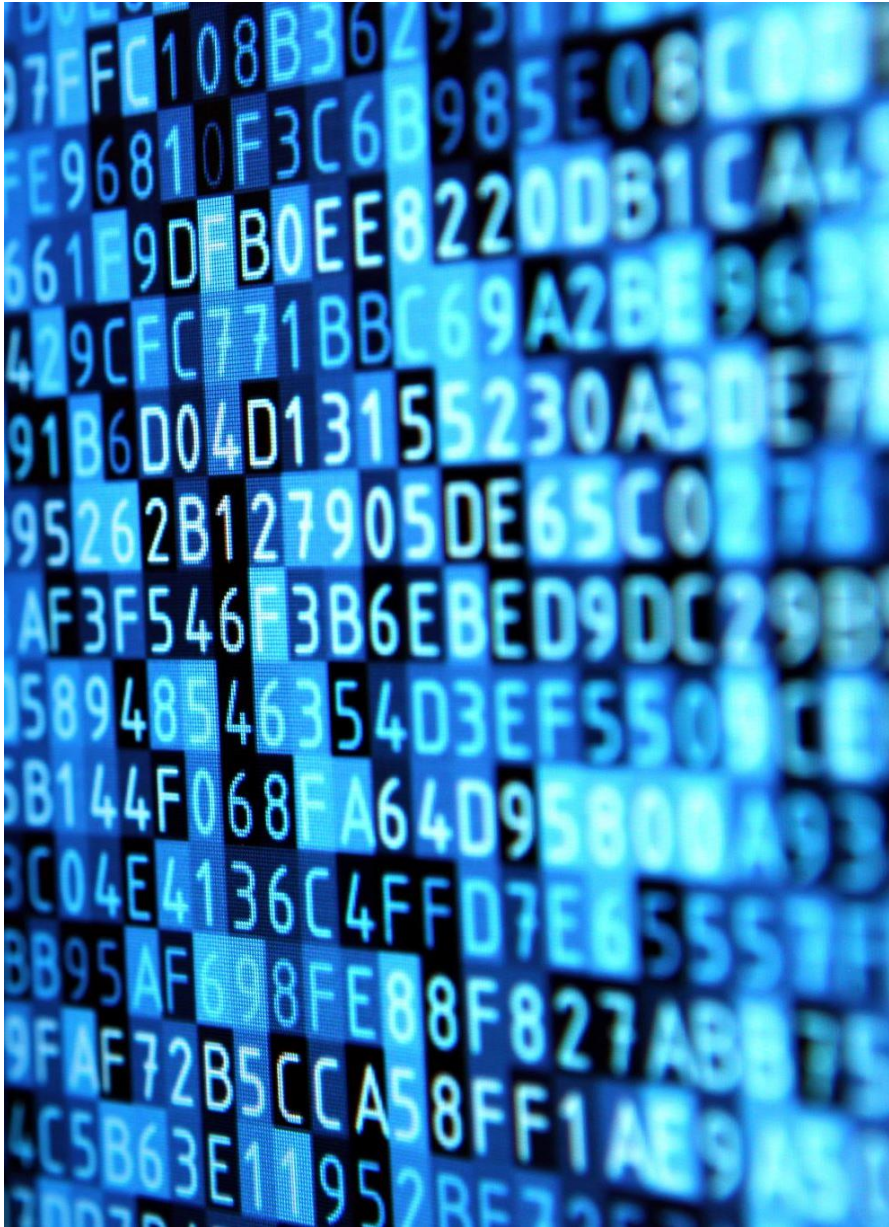
Python-like Indentation:

- Blocks are defined by indentation levels.
- Automatic handling of INDENT and DEDENT tokens.

```
x = 5
if x > 0:
    print("Positive")
    print("Still Positive")
```

Grammar Rules:

- INDENT: Generated when the indentation level increases.
- DEDENT: Generated when the indentation level decreases.



Key features

- Python-like syntax for familiarity.
- Support for basic programming constructs (variables, conditionals, loops, functions).
- Simple and intuitive for educational purposes.

Future work

- Add support for more data types (e.g., lists).
- Extend grammar for additional control flow constructs (e.g., for loops).
- Implement error handling