# Scanning

1. Identify lexical tokens of a language. Start from an example:

**for in n //python : for in n**

for(i=0; i<n; i++) //C

for

(

i

=

0

;

i

<

n

;

i

++

)

1. Write a small program in the minilanguage specified in document LanguageSpecification.txt and build the PIF and the ST.

VAR

D, B, T:INTEGER;

BEGIN

READ(D);

READ(B);

READ(MAX);

IF OK=TRUE THEN BEGIN

WRITE(B);

WRITE(T);

END

ELSE BEGIN

READ(Z);

WRITE(Z);

END

END.

## Symbol Table represented as **sorted table** (identifiers+constants)

|  |  |
| --- | --- |
| **Position** | **Token** |
| 1 | B |
| 2 | D |
| 3 | MAX |
| 4 | OK |
| 5 | T |
| 6 | TRUE |
| 7 | Z |

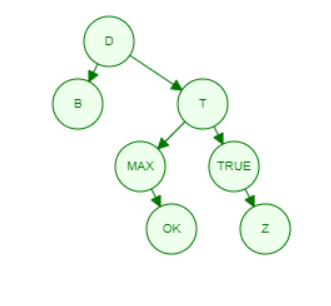
## Program Internal Form (PIF)

|  |  |
| --- | --- |
| **Code** | **Position in Symbol Table** |
| 5 | -1 |
| 0 | 2 |
| 24 | -1 |
| 0 | 1 |
| 24 | -1 |
| 0 | 5 |
| 22 | -1 |
| 6 | -1 |
| 23 | -1 |
| 9 | -1 |
| 11 | -1 |
| 28 | -1 |
| 0 | 2 |
| 29 | -1 |
| 23 | -1 |
| 11 | -1 |
| 28 | -1 |
| 0 | 1 |
| 29 | -1 |
| 23 | -1 |
| 11 | -1 |
| 28 | -1 |
| 0 | 3 |
| 29  23 | -1  -1 |
| 16 | -1 |
| 0 | 4 |
| 35 | -1 |
| 1 | 6 |
| 17 | -1 |
| 9 | -1 |
| 12 | -1 |
| 28 | -1 |
| 0 | 1 |
| 29 | -1 |
| 23 | -1 |
| 12 | -1 |
| 28 | -1 |
| 0 | 5 |
| 29 | -1 |
| 23 | -1 |
| 10 | -1 |
| 18 | -1 |
| 9 | -1 |
| 11 | -1 |
| 28 | -1 |
| 0 | 7 |
| 29 | -1 |
| 23 | -1 |
| 12 | -1 |
| 28 | -1 |
| 0 | 7 |
| 29 | -1 |
| 23 | -1 |
| 10 | -1 |
| 10 | -1 |
| 25 | -1 |

# Symbol Table represented as a hashtable – hash function

|  |  |
| --- | --- |
| Position (hash function) | Token |
| **1** | MAX |
| **2** | B |
| **3** | D Z |
| **4** |  |
| **...** |  |
| **….** |  |
| **15** | T |
| **...** |  |
| **….** |  |
| **34** | OK |
| **….** |  |
| **56** | TRUE |

# Symbol Table represented as a BST



|  |  |  |  |
| --- | --- | --- | --- |
| **Position (to be used in PIF)** | Token | Father | Sibling |
| **1** | D | -1 | -1 |
| **2** | B | 1 | 3 |
| **3** | T | 1 | 2 |
| **4** | MAX | 3 | 6 |
| **5** | OK | 4 | -1 |
| **6** | TRUE | 3 | 4 |
| **7** | Z | 6 | -1 |

## Lexical Errors

VAR

D, 7B, T:INTEGER;

BEGIN

READ(D);

READ(B);

READ(MAX);

IFTHEN BEGIN

WRITE(B);

WRITE(T);

END

‘’

‘#’

A:=-0;

ELSE BEGIN

READ(Z);

WRITE(Z);

END

END.