Compilation part 1:

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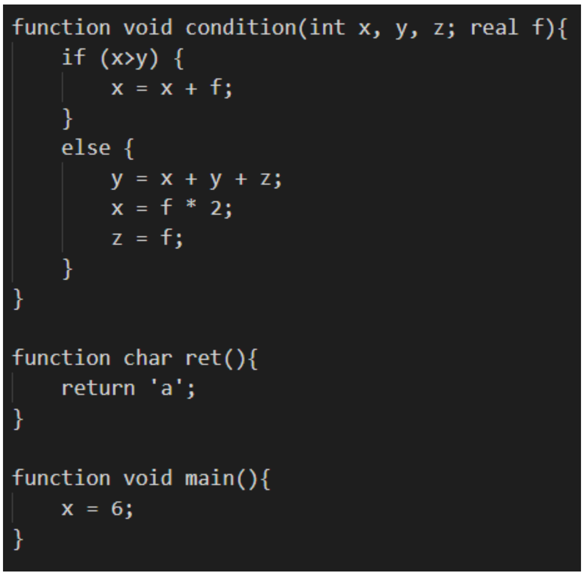
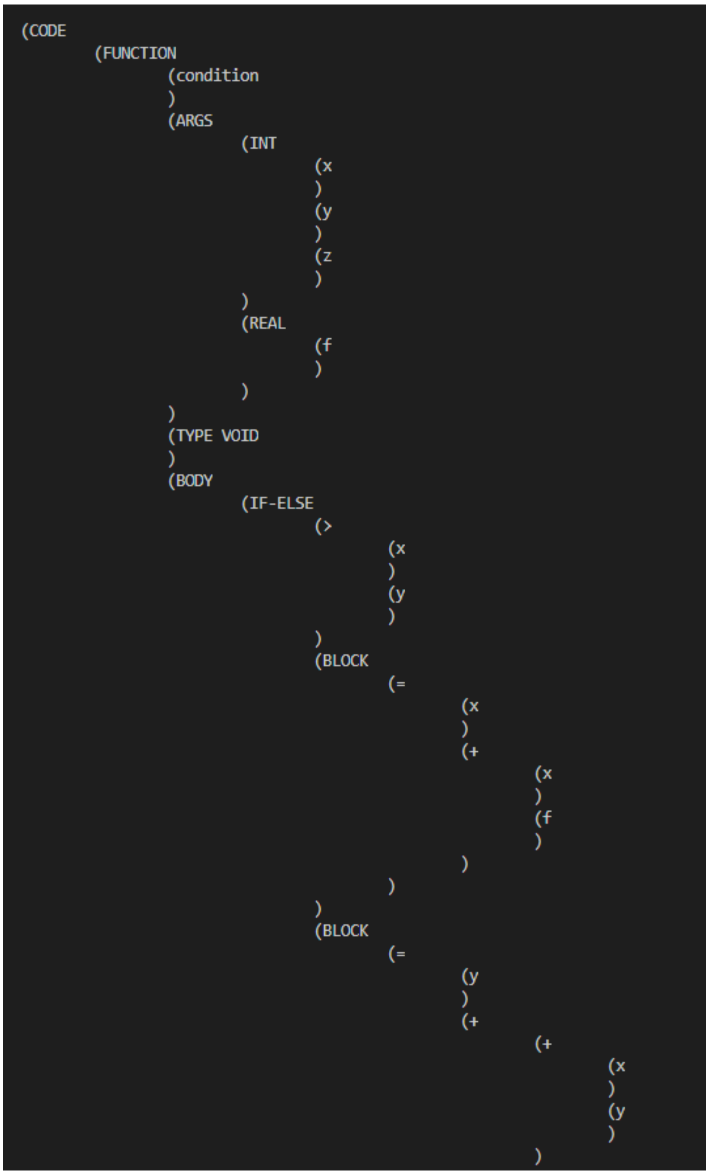
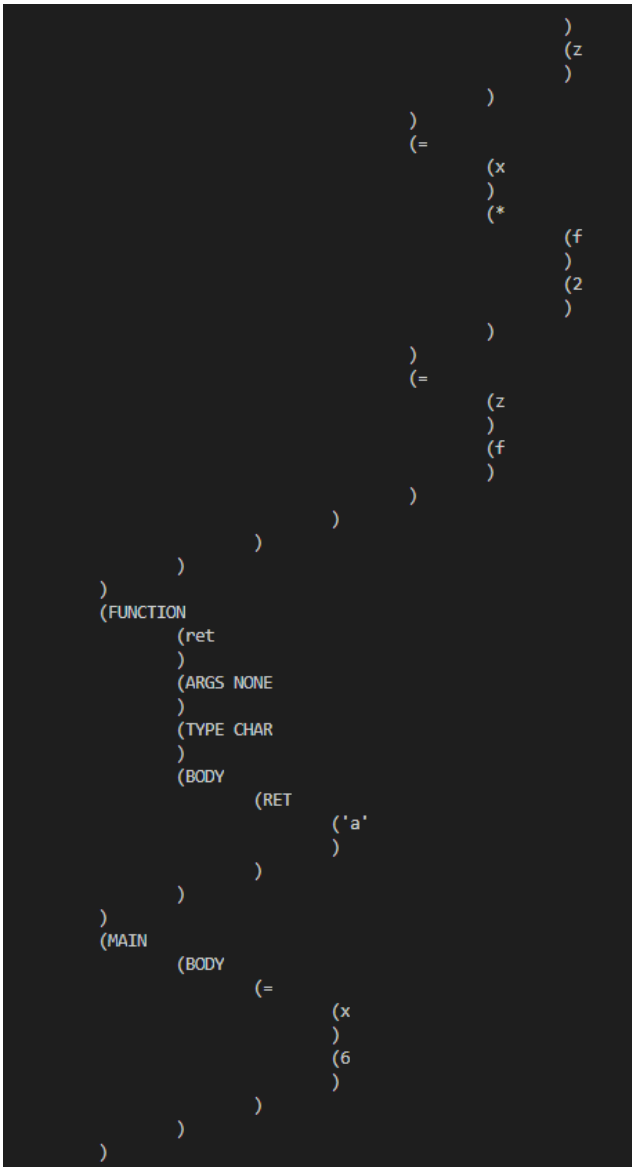
Example 1:



```
function void condition(int x, y, z; real f){
    if (x>y) {
        x = x + f;
    }
    else {
        y = x + y + z;
        x = f * 2;
        z = f;
    }
}

function char ret(){
    return 'a';
}

function void main(){
    x = 6;
}
```

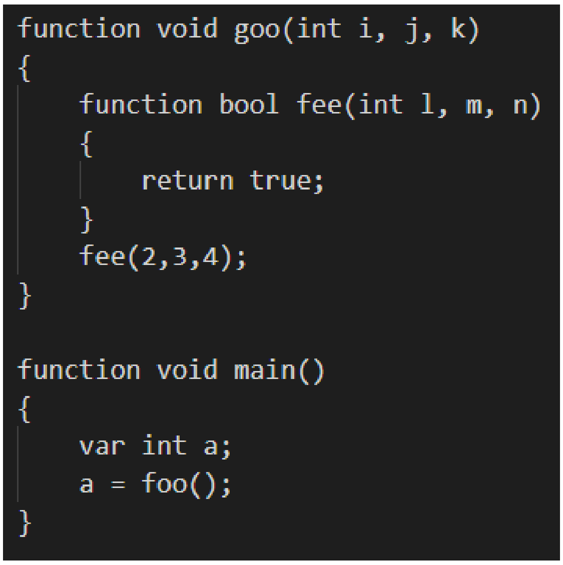


```
(CODE
        (FUNCTION
                (condition
                )
                (ARGS
                        (INT
                                (x
                                )
                                (y
                                )
                                (z
                                )
                        )
                        (REAL
                                (f
                                )
                        )
                )
                (TYPE VOID
                )
                (BODY
                        (IF-ELSE
                                (>
                                        (x
                                        )
                                        (y
                                        )
                                )
                                (BLOCK
                                        (=
                                                (x
                                                )
                                                (+
                                                        (x
                                                        )
                                                        (f
                                                        )
                                                )
                                        )
                                )
                                (BLOCK
                                        (=
                                                (y
                                                )
                                                (+
                                                        (+
                                                                (x
                                                                )
                                                                (y
                                                                )
                                                        )
```

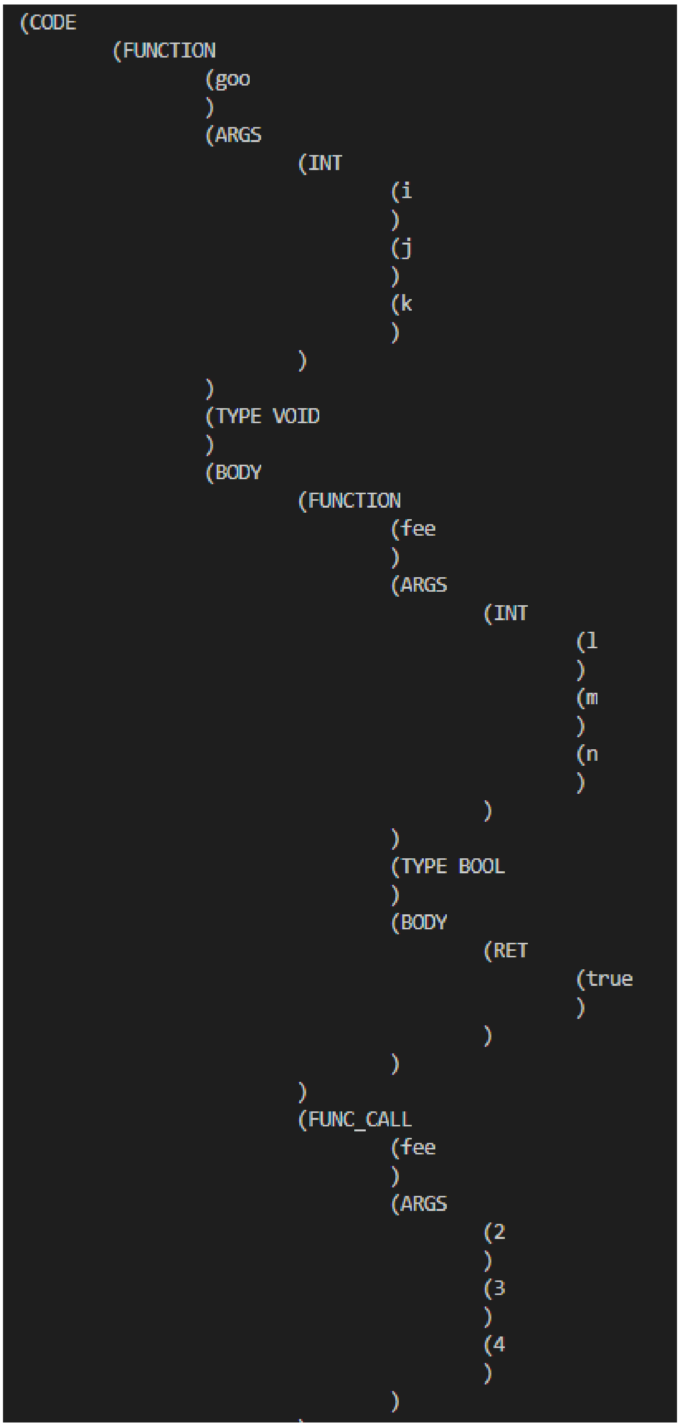


```
                                                        )
                                                        (z
                                                        )
                                                )
                                        )
                                        (=
                                                (x
                                                )
                                                (*
                                                        (f
                                                        )
                                                        (2
                                                        )
                                                )
                                        )
                                        (=
                                                (z
                                                )
                                                (f
                                                )
                                        )
                                )
                        )
                )
        )
        (FUNCTION
                (ret
                )
                (ARGS NONE
                )
                (TYPE CHAR
                )
                (BODY
                        (RET
                                ('a'
                                )
                        )
                )
        )
        (MAIN
                (BODY
                        (=
                                (x
                                )
                                (6
                                )
                        )
                )
        )
```

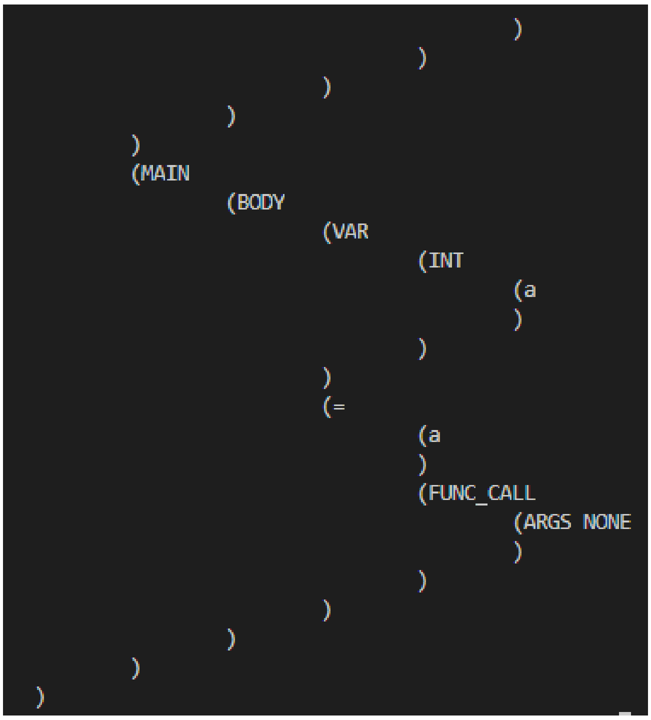
Example 2:



```
function void goo(int i, j, k)
{
    function bool fee(int l, m, n)
    {
        return true;
    }
    fee(2,3,4);
}

function void main()
{
    var int a;
    a = foo();
}
```

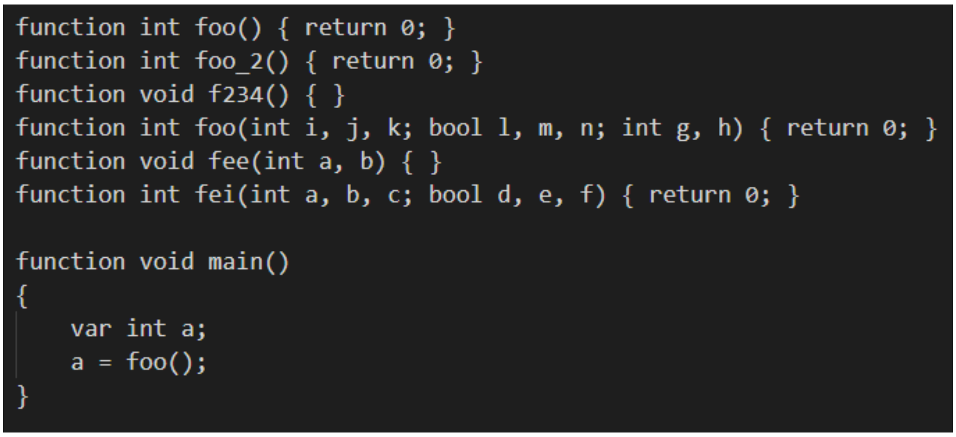


```
(CODE
        (FUNCTION
                (goo
                )
                (ARGS
                        (INT
                                (i
                                )
                                (j
                                )
                                (k
                                )
                        )
                )
                (TYPE VOID
                )
                (BODY
                        (FUNCTION
                                (fee
                                )
                                (ARGS
                                        (INT
                                                (l
                                                )
                                                (m
                                                )
                                                (n
                                                )
                                        )
                                )
                                (TYPE BOOL
                                )
                                (BODY
                                        (RET
                                                (true
                                                )
                                        )
                                )
                        )
                        (FUNC_CALL
                                (fee
                                )
                                (ARGS
                                        (2
                                        )
                                        (3
                                        )
                                        (4
                                        )
                                )
```

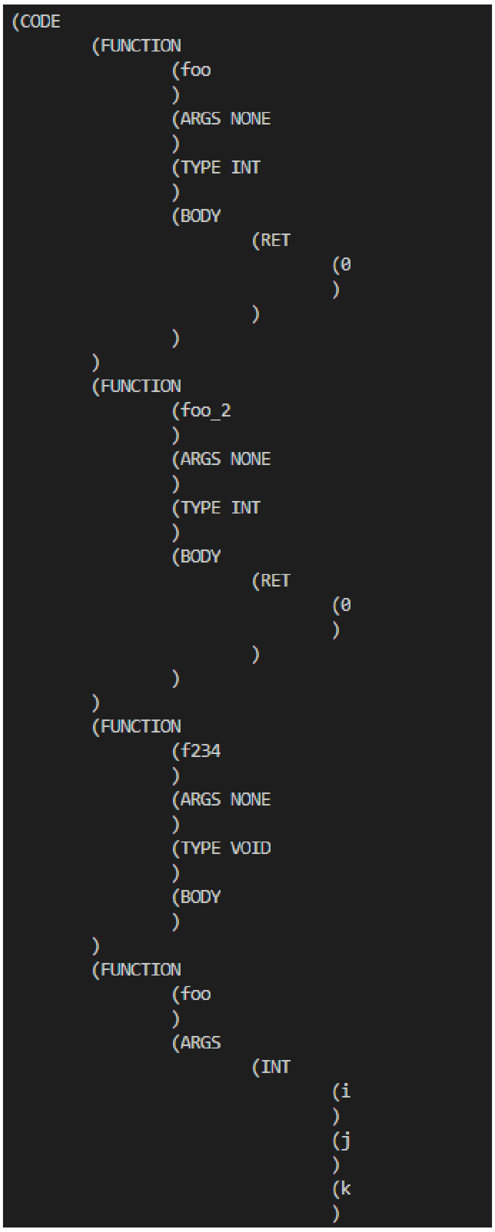


```
                                        )
                                )
                        )
                )
        )
        (MAIN
                (BODY
                        (VAR
                                (INT
                                        (a
                                        )
                                )
                        )
                        (=
                                (a
                                )
                                (FUNC_CALL
                                        (ARGS NONE
                                        )
                                )
                        )
                )
        )
)
```

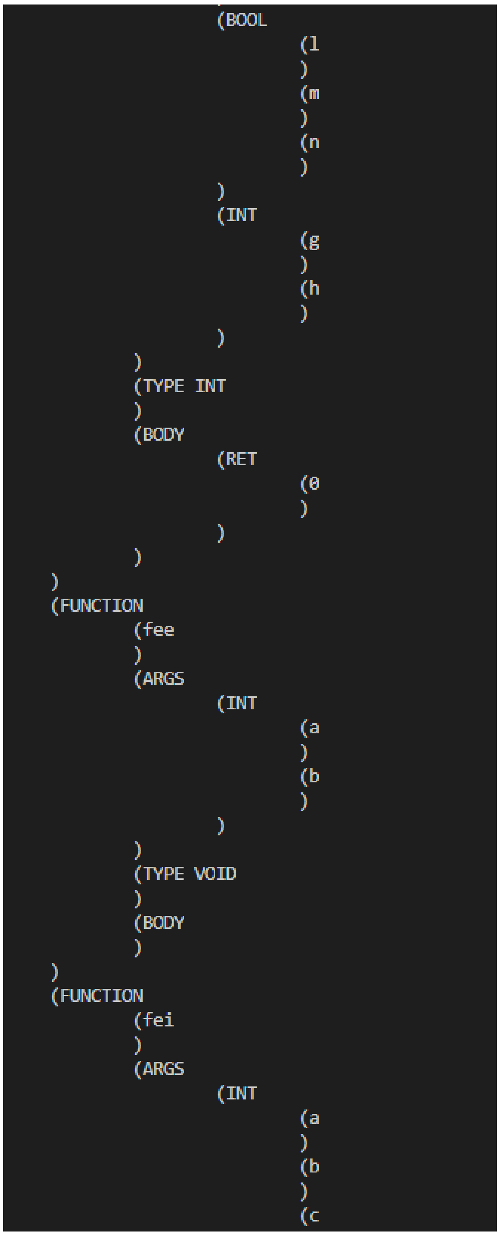
Example 3:



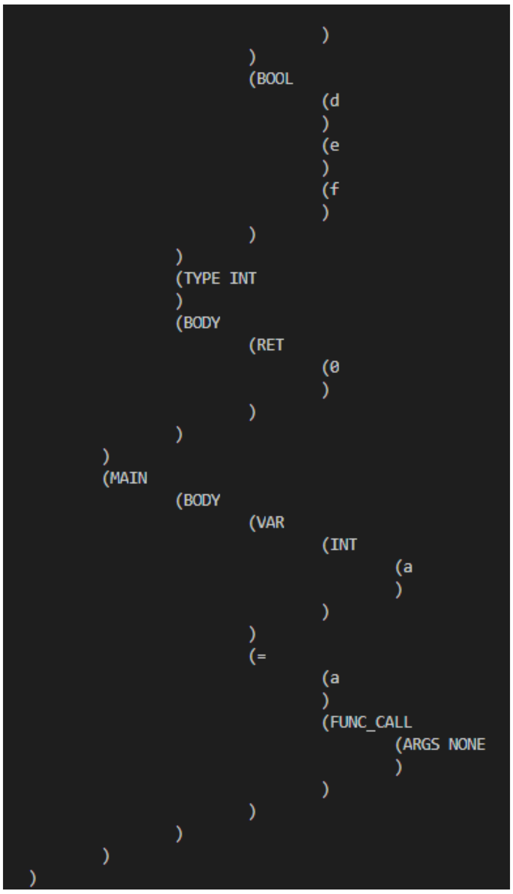
```
function int foo() { return 0; }
function int foo_2() { return 0; }
function void f234() { }
function int foo(int i, j, k; bool l, m, n; int g, h) { return 0; }
function void fee(int a, b) { }
function int fei(int a, b, c; bool d, e, f) { return 0; }

function void main()
{
    var int a;
    a = foo();
}
```



```
(CODE
    (FUNCTION
        (foo
        )
        (ARGS NONE
        )
        (TYPE INT
        )
        (BODY
            (RET
                (0
                )
            )
        )
    )
    (FUNCTION
        (foo_2
        )
        (ARGS NONE
        )
        (TYPE INT
        )
        (BODY
            (RET
                (0
                )
            )
        )
    )
    (FUNCTION
        (f234
        )
        (ARGS NONE
        )
        (TYPE VOID
        )
        (BODY
        )
    )
    (FUNCTION
        (foo
        )
        (ARGS
            (INT
                (i
                )
                (j
                )
                (k
                )
```

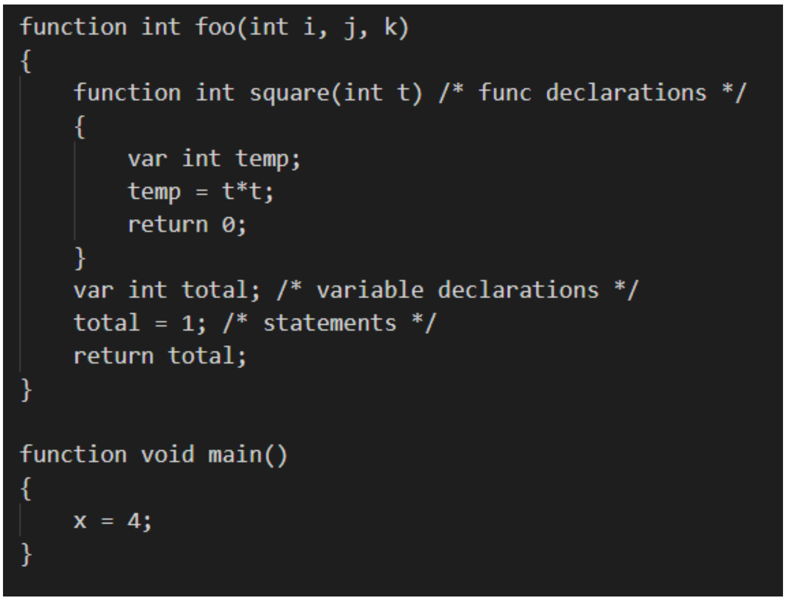


```
            (BOOL
                (l
                )
                (m
                )
                (n
                )
            )
            (INT
                (g
                )
                (h
                )
            )
        )
        (TYPE INT
        )
        (BODY
            (RET
                (0
                )
            )
        )
    )
    (FUNCTION
        (fee
        )
        (ARGS
            (INT
                (a
                )
                (b
                )
            )
        )
        (TYPE VOID
        )
        (BODY
        )
    )
    (FUNCTION
        (fei
        )
        (ARGS
            (INT
                (a
                )
                (b
                )
                (c
```

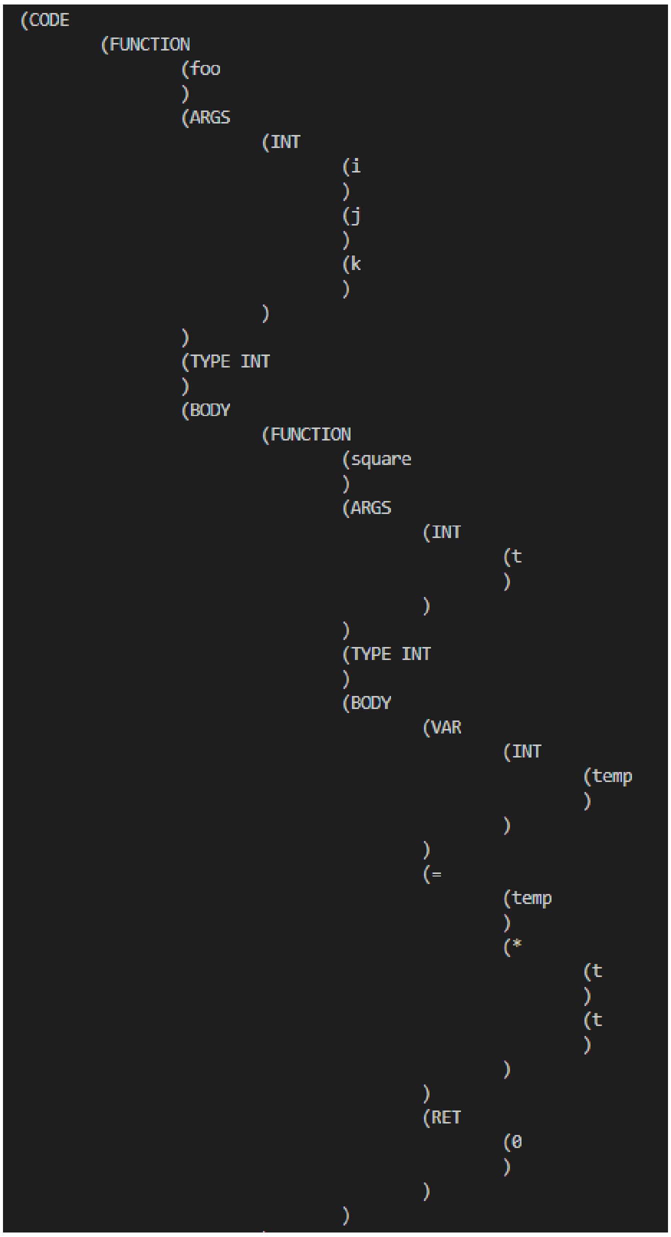


```
                )
            )
            (BOOL
                (d
                )
                (e
                )
                (f
                )
            )
        )
        (TYPE INT
        )
        (BODY
            (RET
                (0
                )
            )
        )
    )
    (MAIN
        (BODY
            (VAR
                (INT
                    (a
                    )
                )
            )
            (=
                (a
                )
                (FUNC_CALL
                    (ARGS NONE
                    )
                )
            )
        )
    )
)
```

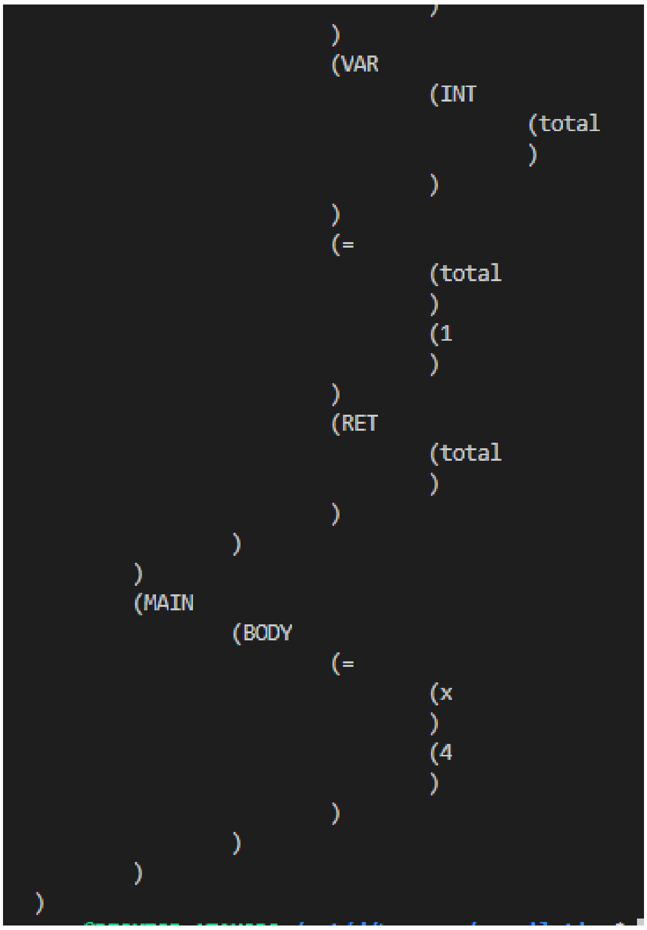
Example 4:



```
function int foo(int i, j, k)
{
    function int square(int t) /* func declarations */
    {
        var int temp;
        temp = t*t;
        return 0;
    }
    var int total; /* variable declarations */
    total = 1; /* statements */
    return total;
}

function void main()
{
    x = 4;
}
```

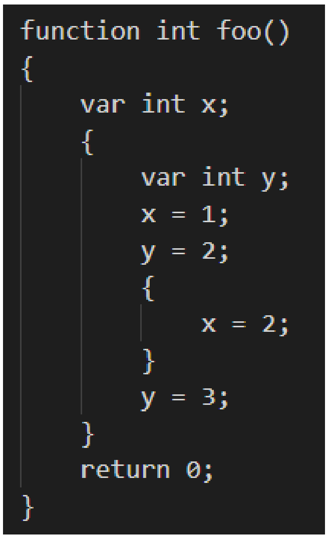


```
(CODE
        (FUNCTION
                (foo
                )
                (ARGS
                        (INT
                                (i
                                )
                                (j
                                )
                                (k
                                )
                        )
                )
                (TYPE INT
                )
                (BODY
                        (FUNCTION
                                (square
                                )
                                (ARGS
                                        (INT
                                                (t
                                                )
                                        )
                                )
                                (TYPE INT
                                )
                                (BODY
                                        (VAR
                                                (INT
                                                        (temp
                                                        )
                                                )
                                        )
                                        (=
                                                (temp
                                                )
                                                (*
                                                        (t
                                                        )
                                                        (t
                                                        )
                                                )
                                        )
                                        (RET
                                                (0
                                                )
                                        )
                                )
```

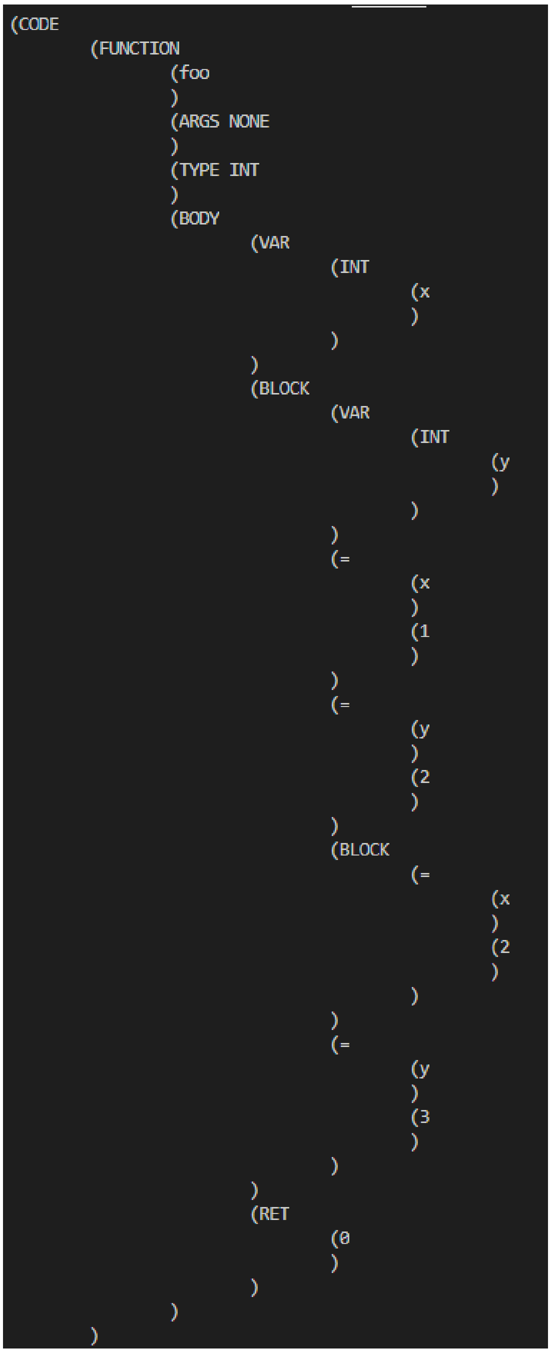


```
                                )
                        )
                        (VAR
                                (INT
                                        (total
                                        )
                                )
                        )
                        (=
                                (total
                                )
                                (1
                                )
                        )
                        (RET
                                (total
                                )
                        )
                )
        )
        (MAIN
                (BODY
                        (=
                                (x
                                )
                                (4
                                )
                        )
                )
        )
)
```

Example 5:

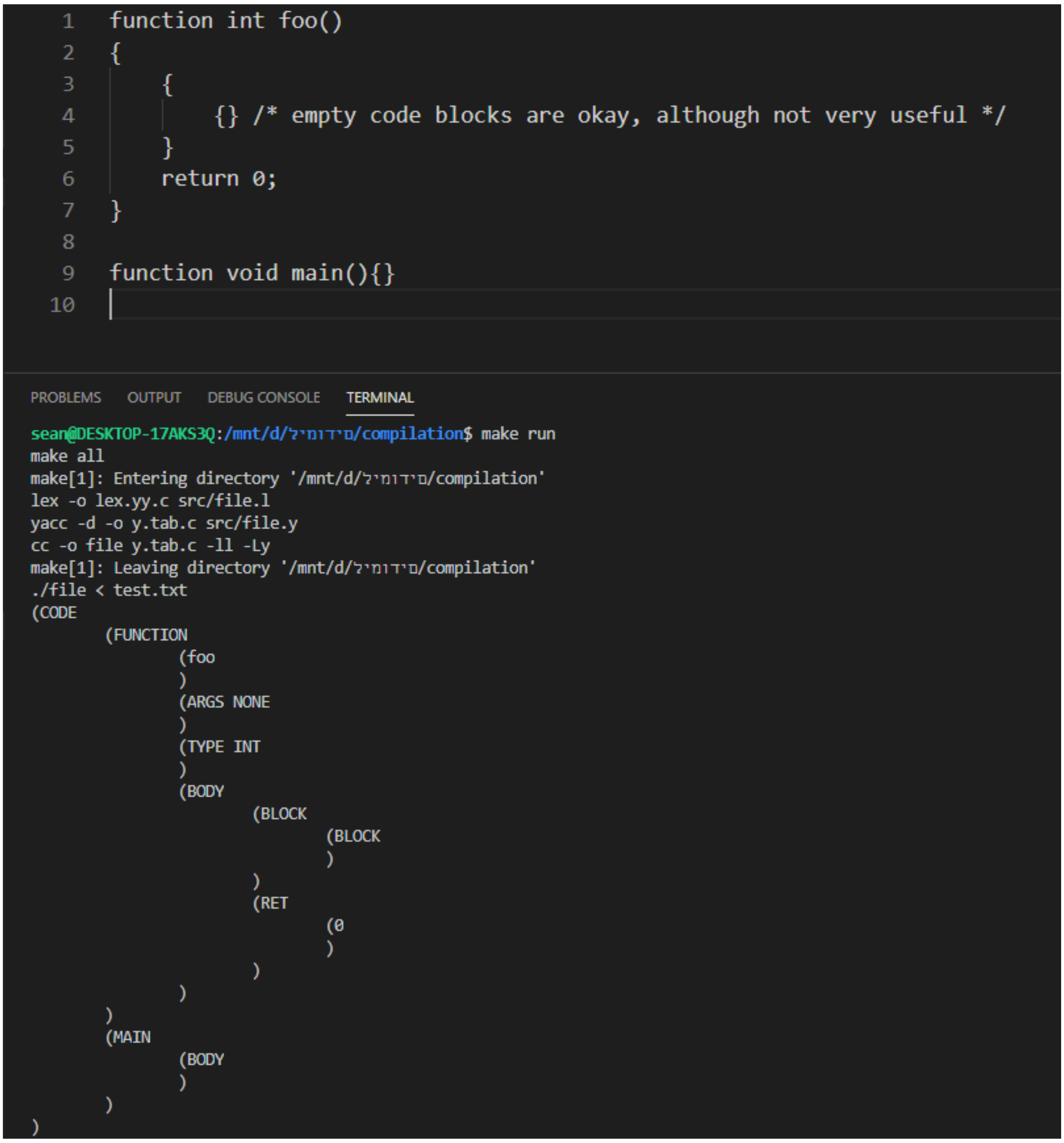


```
function int foo()
{
    var int x;
    {
        var int y;
        x = 1;
        y = 2;
        {
            x = 2;
        }
        y = 3;
    }
    return 0;
}
```



```
(CODE
        (FUNCTION
                (foo
                )
                (ARGS NONE
                )
                (TYPE INT
                )
                (BODY
                        (VAR
                                (INT
                                        (x
                                        )
                                )
                        )
                        (BLOCK
                                (VAR
                                        (INT
                                                (y
                                                )
                                        )
                                )
                                (=
                                        (x
                                        )
                                        (1
                                        )
                                )
                                (=
                                        (y
                                        )
                                        (2
                                        )
                                )
                                (BLOCK
                                        (=
                                                (x
                                                )
                                                (2
                                                )
                                        )
                                )
                                (=
                                        (y
                                        )
                                        (3
                                        )
                                )
                        )
                        (RET
                                (0
                                )
                        )
                )
        )
```

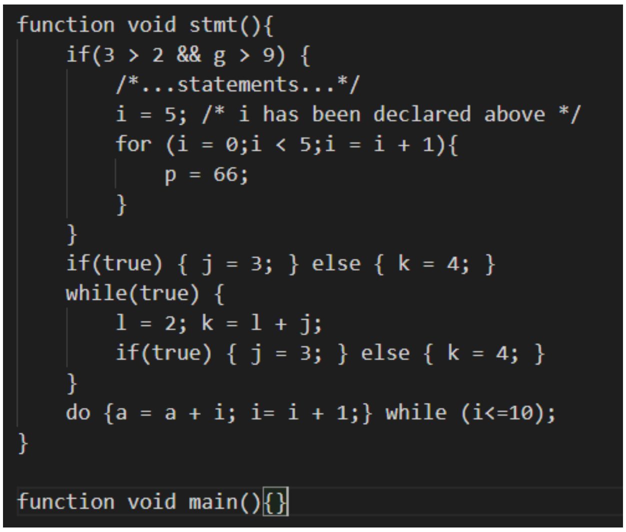
Example 6:



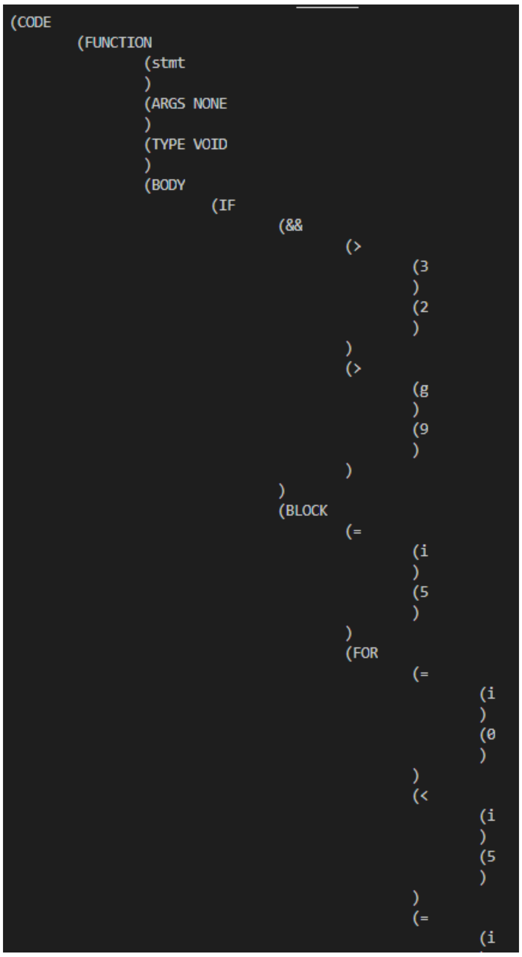
```
function int foo()
{
    {
        {} /* empty code blocks are okay, although not very useful */
    }
    return 0;
}

function void main(){}

```

```
sean@DESKTOP-17AKS3Q:/mnt/d/לימודים/compilation$ make run
make all
make[1]: Entering directory '/mnt/d/לימודים/compilation'
lex -o lex.yy.c src/file.l
yacc -d -o y.tab.c src/file.y
cc -o file y.tab.c -ll -Ly
make[1]: Leaving directory '/mnt/d/לימודים/compilation'
./file < test.txt
(CODE
        (FUNCTION
                (foo
                )
                (ARGS NONE
                )
                (TYPE INT
                )
                (BODY
                        (BLOCK
                                (BLOCK
                                )
                        )
                        (RET
                                (0
                                )
                        )
                )
        )
        (MAIN
                (BODY
                )
        )
)
```

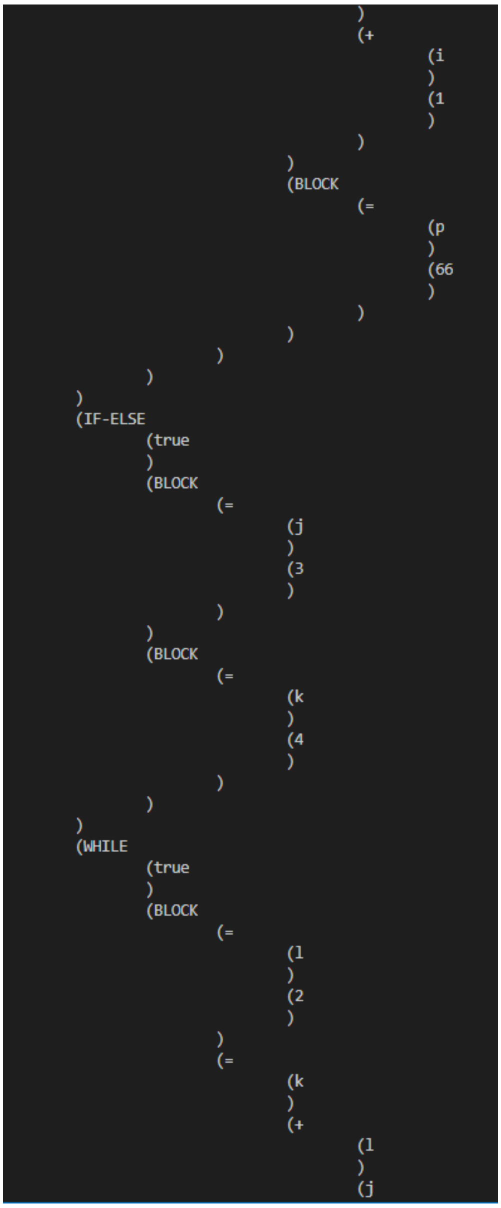
Example 7:



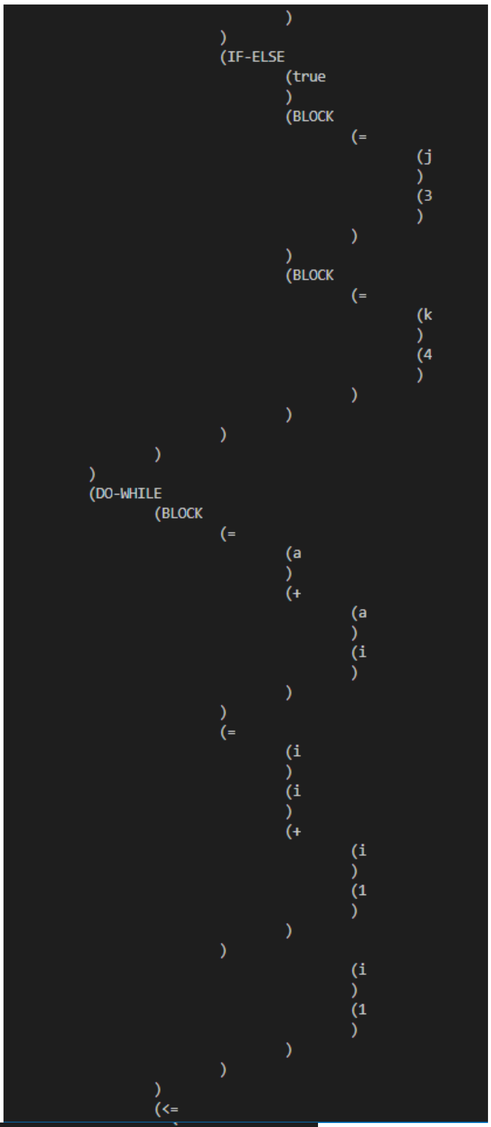
```
function void stmt(){
    if(3 > 2 && g > 9) {
        /*...statements...*/
        i = 5; /* i has been declared above */
        for (i = 0;i < 5;i = i + 1){
            p = 66;
        }
    }
    if(true) { j = 3; } else { k = 4; }
    while(true) {
        l = 2; k = l + j;
        if(true) { j = 3; } else { k = 4; }
    }
    do {a = a + i; i= i + 1;} while (i<=10);
}

function void main(){}
```



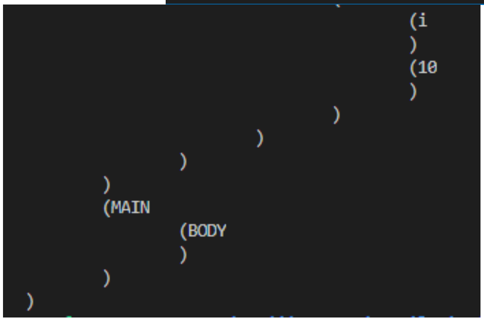
```
(CODE
    (FUNCTION
        (stmt
        )
        (ARGS NONE
        )
        (TYPE VOID
        )
        (BODY
            (IF
                (&&
                    (>
                        (3
                        )
                        (2
                        )
                    )
                    (>
                        (g
                        )
                        (9
                        )
                    )
                )
                (BLOCK
                    (=
                        (i
                        )
                        (5
                        )
                    )
                    (FOR
                        (=
                            (i
                            )
                            (0
                            )
                        )
                        (<
                            (i
                            )
                            (5
                            )
                        )
                        (=
                            (i
```



```
                            )
                            (+
                                (i
                                )
                                (1
                                )
                            )
                        )
                        (BLOCK
                            (=
                                (p
                                )
                                (66
                                )
                            )
                        )
                    )
                )
            )
            (IF-ELSE
                (true
                )
                (BLOCK
                    (=
                        (j
                        )
                        (3
                        )
                    )
                )
                (BLOCK
                    (=
                        (k
                        )
                        (4
                        )
                    )
                )
            )
            (WHILE
                (true
                )
                (BLOCK
                    (=
                        (l
                        )
                        (2
                        )
                    )
                    (=
                        (k
                        )
                        (+
                            (l
                            )
                            (j
```

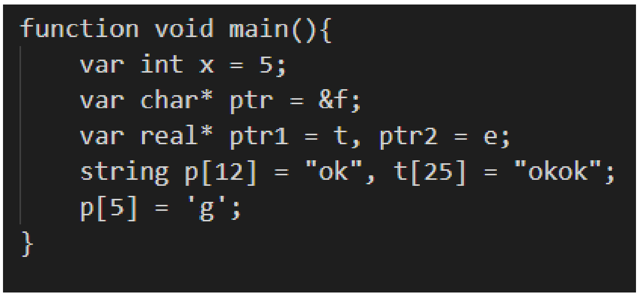


```
                        )
                    )
                    (IF-ELSE
                        (true
                        )
                        (BLOCK
                            (=
                                (j
                                )
                                (3
                                )
                            )
                        )
                        (BLOCK
                            (=
                                (k
                                )
                                (4
                                )
                            )
                        )
                    )
                )
            )
            (DO-WHILE
                (BLOCK
                    (=
                        (a
                        )
                        (+
                            (a
                            )
                            (i
                            )
                        )
                    )
                    (=
                        (i
                        )
                        (i
                        )
                        (+
                            (i
                            )
                            (1
                            )
                        )
                    )
                            (i
                            )
                            (1
                            )
                        )
                    )
                )
                (<=
```

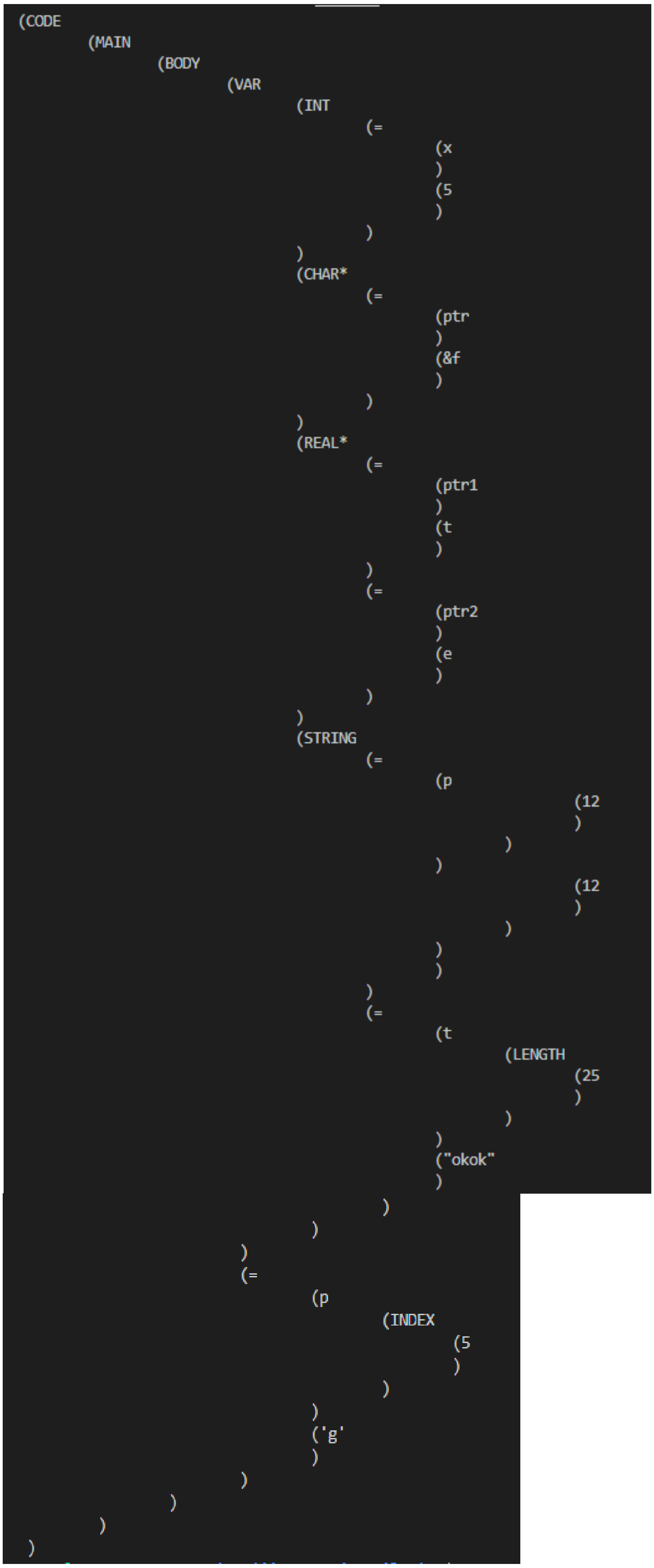


```
                    (i
                    )
                    (10
                    )
                )
            )
        )
    )
    (MAIN
        (BODY
        )
    )
)
```

Example 8:

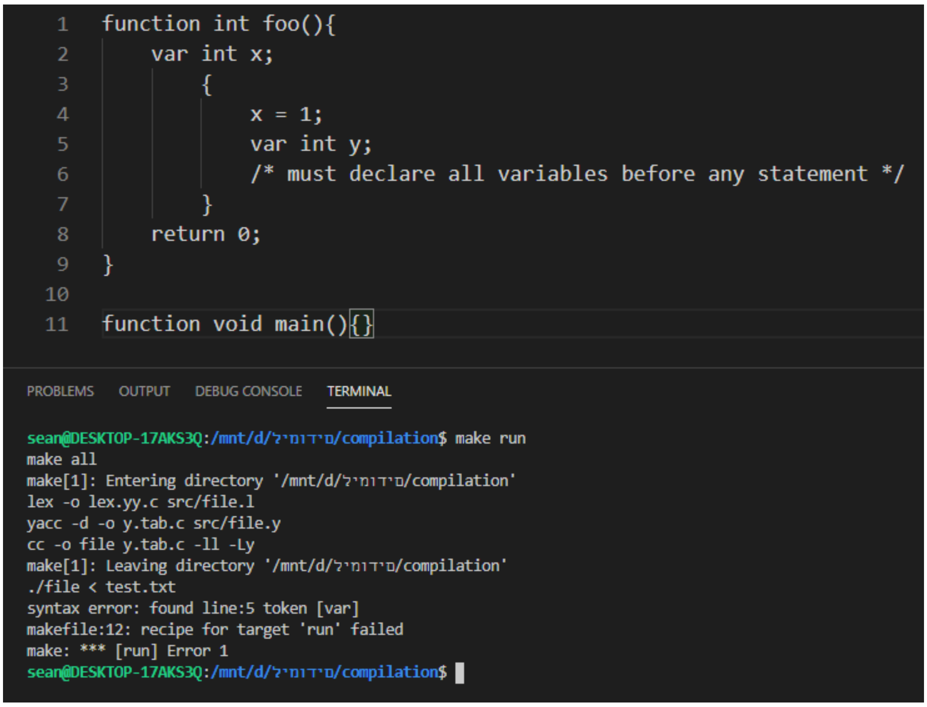


```
function void main(){
    var int x = 5;
    var char* ptr = &f;
    var real* ptr1 = t, ptr2 = e;
    string p[12] = "ok", t[25] = "okok";
    p[5] = 'g';
}
```



```
(CODE
    (MAIN
        (BODY
            (VAR
                (INT
                    (=
                        (x
                        )
                        (5
                        )
                    )
                )
                (CHAR*
                    (=
                        (ptr
                        )
                        (&f
                        )
                    )
                )
                (REAL*
                    (=
                        (ptr1
                        )
                        (t
                        )
                    )
                    (=
                        (ptr2
                        )
                        (e
                        )
                    )
                )
                (STRING
                    (=
                        (p
                                (12
                                )
                            )
                        )
                                (12
                                )
                            )
                        )
                        )
                    )
                    (=
                        (t
                            (LENGTH
                                (25
                                )
                            )
                        )
                        ("okok"
                        )
                    )
                )
            )
            (=
                (p
                    (INDEX
                        (5
                        )
                    )
                )
                ('g'
                )
            )
        )
    )
)
```

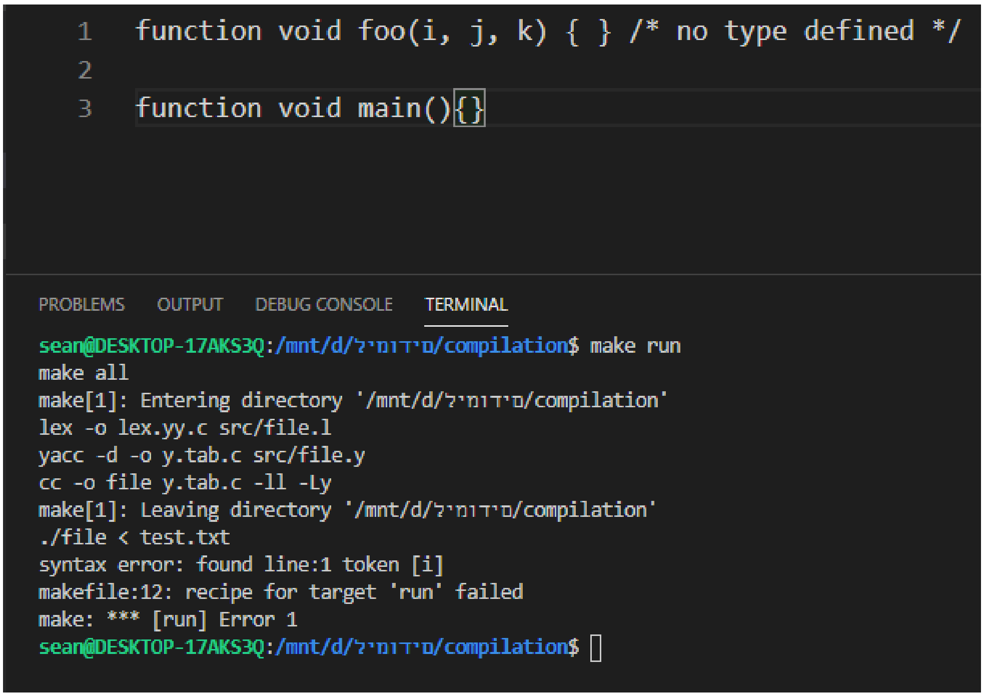
Example 9: ERROR!



```
function int foo(){
    var int x;
        {
            x = 1;
            var int y;
            /* must declare all variables before any statement */
        }
    return 0;
}

function void main(){}
```

```
sean@DESKTOP-17AKS3Q:/mnt/d/לימודים/compilation$ make run
make all
make[1]: Entering directory '/mnt/d/לימודים/compilation'
lex -o lex.yy.c src/file.l
yacc -d -o y.tab.c src/file.y
cc -o file y.tab.c -ll -Ly
make[1]: Leaving directory '/mnt/d/לימודים/compilation'
./file < test.txt
syntax error: found line:5 token [var]
makefile:12: recipe for target 'run' failed
make: *** [run] Error 1
sean@DESKTOP-17AKS3Q:/mnt/d/לימודים/compilation$
```

Example 10: ERROR!



```
function void foo(i, j, k) { } /* no type defined */

function void main(){}
```

```
sean@DESKTOP-17AKS3Q:/mnt/d/לימודים/compilation$ make run
make all
make[1]: Entering directory '/mnt/d/לימודים/compilation'
lex -o lex.yy.c src/file.l
yacc -d -o y.tab.c src/file.y
cc -o file y.tab.c -ll -Ly
make[1]: Leaving directory '/mnt/d/לימודים/compilation'
./file < test.txt
syntax error: found line:1 token [i]
makefile:12: recipe for target 'run' failed
make: *** [run] Error 1
sean@DESKTOP-17AKS3Q:/mnt/d/לימודים/compilation$
```