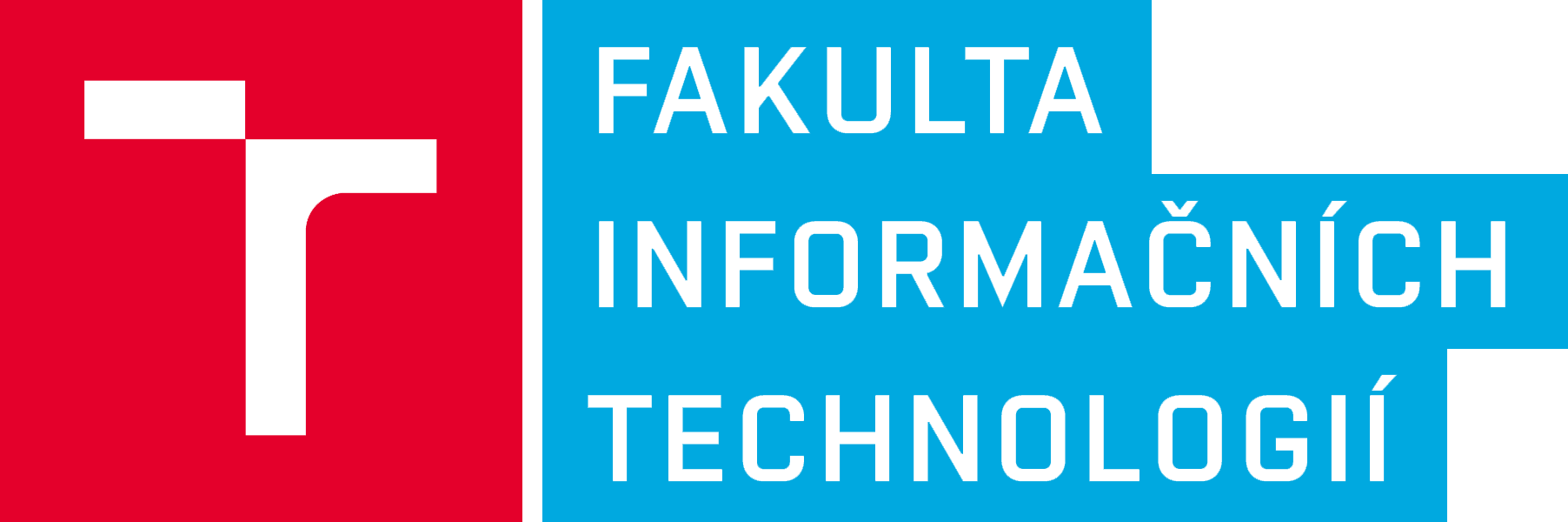
Faculty of information technology

Brno University of Technology



Documentation to the project for the IFJ and IAL courses

**Implementation of the compiler of the IFJ18 programming language**

Team 037, variant I.

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# **Teamwork**

* 1. **Work division**
  2. **Communication**
  3. **Use of IDEs**

# **Implementation**

* 1. **Scanner**

The scanner was implemented as a finite-state automaton (att. 1). It has two final states, one being the error state and the other is a success final state. It also utilizes the epsilon routes, mostly to reach the success final state. The token is a structure that encapsulates its size (allocated memory), type and the content. The type of a token is a structure on its own. It states which state the token reaches after it is fully read. The content is simply the string that is read. We use one global token that is declared in the header file of the scanner.

* 1. **Parser**
  2. **Code generation**
  3. **Testing**

# **Conclusion**

# **Sources**

# **Attachments**

**Attachment 1: Finite-state automaton**

**Obrázok, na ktorom je text, mapa

Popis sa automaticky vygeneroval**

**Attachment 2: LL grammar**

1. <start> → <function> <st-list>
2. <function> → ‘def’ <function-head> <st-list> <function-tail> <function>
3. <function> → ε
4. <function-head> → <function-id> ‘(’ <par> ‘)’ ‘EOL’
5. <function-tail> → ‘end’ ‘EOL’
6. <par> → <id> <next-par>
7. <par> → ε
8. <next-par> → ‘,’ <par>
9. <next-par> → ε
10. <st-list> → <stat> ‘EOL’ <st-list>
11. <st-list> → ‘EOL’<st-list>
12. <st-list> → ε
13. <stat> → <id> <eval>
14. <eval> → ε
15. <eval> → ‘=’ <assign>
16. <assign> → <expr>
17. <assign> → <function-id> <f-params>
18. <stat> → ‘if’ <expr> ‘then’ ‘EOL’ <st-list> ‘else’ ‘EOL’ <st-list> ‘end’
19. <stat> → ‘while’ <expr> ‘do’ ‘EOL’ <st-list> ‘end’
20. <stat> → ‘print’ <print-expr>
21. <print-expr> → ‘(‘ <print-expr>‘)’
22. <print-expr> → <id> <next-print-expr>
23. <print-expr> → ε
24. <next-print-expr> → ‘,’ <print-expr>
25. <stat> → <function-id> <f-params>
26. <f-params> → ‘(‘ <f-param> ‘)’
27. <f-params> → <id> <next-f-param>
28. <f-params> → ε
29. <next-f-params> → ‘,’ <f-params>
30. <next-f-params> → ε

**Attachment 3: LL parsing table**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **<start>** | **<function>** | **<function-head>** | **<function-tail>** | **<par>** | **<next-par>** | **<st-list>** | **<stat>** | **<eval>** | **<assign>** | **<print-expr>** | **<next-print-expr>** | **<f-params>** | **<next-f-params>** |
| **def** | 1 | 2 |  |  |  |  | 1 |  |  |  |  |  |  |  |
| **EOL** | 1 | 3 |  |  |  | 9 | 11 |  | 14 |  | 23 | 23 | 28 | 28 |
| **end** |  |  |  | 5 |  |  | 12 |  |  |  |  |  |  |  |
| **,** |  |  |  |  |  | 8 |  |  |  |  | 24 | 24 | 29 | 29 |
| **'=’** |  |  |  |  |  |  |  |  | 15 |  |  |  |  |  |
| **id** | 1 | 3 | 4 |  | 6 |  | 10 | 13 |  | 16 | 22 | 22 | 27 | 27 |
| **expr** |  |  |  |  |  |  |  |  |  | 16 | 22 | 22 | 27 | 27 |
| **(** |  |  |  |  |  |  |  |  |  | 16 | 21 |  | 26 |  |
| **)** |  |  |  |  | 7 | 7 |  |  |  |  | 23 | 23 | 28 | 30 |
| **if** | 1 | 3 |  |  |  |  | 10 | 18 |  |  |  |  |  |  |
| **then** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **else** |  |  |  |  |  |  | 12 |  |  |  |  |  |  |  |
| **while** | 1 | 3 |  |  |  |  | 10 | 19 |  |  |  |  |  |  |
| **do** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Function-id** | 1 | 3 | 4 |  |  |  | 10 | 25 |  | 17 |  |  |  |  |
| **$** |  | 3 |  |  |  | 9 | 12 |  | 14 |  | 23 | 23 | 28 | 28 |
| **print** |  |  |  |  |  |  | 10 | 20 |  | 17 |  |  |  |  |

**Attachment 4: Precedence table**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **+** | **-** | **\*** | **/** | **<** | **<=** | **>** | **>=** | **'==’** | **!=** | **(** | **)** | **I** | **$** |
| **+** | > | > | < | < | > | > | > | > | > | > | < | > | < | > |
| **-** | > | > | < | < | > | > | > | > | > | > | < | > | < | > |
| **\*** | > | > | > | > | > | > | > | > | > | > | < | > | < | > |
| **/** | > | > | > | > | > | > | > | > | > | > | < | > | < | > |
| **<** | < | < | < | < | '=’ | '=’ | '=’ | '=’ | > | > | < | > | < | > |
| **<=** | < | < | < | < | '=’ | '=’ | '=’ | '=’ | > | > | < | > | < | > |
| **>** | < | < | < | < | '=’ | '=’ | '=’ | '=’ | > | > | < | > | < | > |
| **>=** | < | < | < | < | '=’ | '=’ | '=’ | '=’ | > | > | < | > | < | > |
| **'==’** | < | < | < | < | < | < | < | < | '=’ | '=’ | < | > | < | > |
| **!=** | < | < | < | < | < | < | < | < | '=’ | '=’ | < | > | < | > |
| **(** | < | < | < | < | < | < | < | < | < | < | < | '=’ | < | E |
| **)** | > | > | > | > | > | > | > | > | > | > | E | > | E | > |
| **I** | > | > | > | > | > | > | > | > | > | > | E | > | E | > |
| **$** | < | < | < | < | < | < | < | < | < | < | < | E | < | E |