

```

1: #ifndef LEXER_H
2: #define LEXER_H
3:
4: #include <sstream>
5: #include <vector>
6: #include <iostream>
7: #include <unordered_set>
8: #include <iomanip>
9:
10: class Lexer
11: {
12: public:
13:     enum State
14:     {
15:         NS = 0, // NULL STATE
16:         S01, // ACCEPTABLE ID
17:         S02, // ACCEPTABLE ID
18:         S03,
19:         S04, // ACCEPTABLE INT
20:         S05,
21:         S06, // ACCEPTABLE REAL
22:         S07,
23:         S08,
24:         S09,
25:         S10,
26:         S11, // ACCEPTABLE '$$'
27:         S12,
28:         S13,
29:         S14,
30:         TRM // TERMINATING
31:     };
32:
33:     enum TransitionType
34:     {
35:         IDENTIFIER = 0,
36:         INTEGER,
37:         REAL,
38:         CARROT,
39:         EQUALS,
40:         GREATERTHAN,
41:         LESSTHAN,
42:         PLUS,
43:         MINUS,
44:         MULTIPLY,
45:         DIVIDE,
46:         SEPARATOR,
47:         FUNC_SEPARATOR,
48:         REJECT
49:     };
50:
51:     // State table
52:     int stateTable[18][14] = { {S01, S04, TRM, S10, S12, S14, S14, S14, S14, S14, S14, S07, S08, TRM}, // INITIAL STATE
53:                                {S02, S03, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE ID
54:                                {S02, S03, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE ID
55:                                {S02, S03, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE ID
56:                                {TRM, S04, S05, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE INT
57:                                {TRM, S06, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE REAL
58:                                {TRM, S06, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE REAL
59:                                {TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE SEPA
60:                                {TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE SEPA
61:                                {TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE '$$'
62:                                {TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE '$$'
63:                                {TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE '^='
64:                                {TRM, TRM, TRM, TRM, S13, S13, S13, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE '='
65:                                {TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE DOUB
66:                                {TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM}, // ACCEPTABLE SING
67:                                {TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM, TRM} }; // TERMINATING
68:
69:     std::unordered_set<std::string> keywords = { "while", "whileend", "int", "function", "if", "ifend", "return", "get",
"put", "true", "false", "boolean", "real", "else" };
70:     std::unordered_set<char> separators = { '(', ')', '{', '}', ',', '.', ':', ';' };
71:
72:     struct Token
73:     {
74:         Token() : token("nil"), lexeme("nil"), lineNumber(-1) {};
75:         Token(std::string token, std::string lexeme, int lineNumber)
76:         {
77:             this->token = token;
78:             this->lexeme = lexeme;
79:             this->lineNumber = lineNumber;
80:         }
81:
82:         std::string token;
83:         std::string lexeme;
84:         int lineNumber;
85:     };
86:
87:     // Constructor
88:     Lexer();
89:
90:     // Destructor
91:     ~Lexer();

```

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92:
93:     std::vector<Token> lex(std::stringstream &buffer, int lineNumber);
94:
95: private:
96:     bool comment;
97:
98:     int getTransition(char tokenChar) const;
99:
100:    std::string stateToString(int state) const;
101:
102:    bool isValidSeparator(char c) const;
103:
104:    bool isKeyword(std::string token) const;
105: };
106:
107: #endif // LEXER_H
```