Activity based

Project Report on

Artificial Intelligence

Lab CIE

Submitted to Vishwakarma University, Pune

Under the Initiative of

By

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Problem Statement:

Generate Lexical and Semantic analyser for Protocol Specification Language using Flex and Bison

CODE:

Lexical:

```
%{
#include "parser.tab.h"
%}

%%
"Protocol"          { return PROTOCOL; }
"REQUEST"           { return REQUEST; }
"RESPONSE"          { return RESPONSE; }
"INT"               { return INT_TYPE; }
"BOOL"              { return BOOL_TYPE; }
"STRING"            { return STRING_TYPE; }
[a-zA-Z]+           { yylval.str = strdup(yytext); return IDENTIFIER; }
[0-9]+              { yylval.num = atoi(yytext); return NUMBER; }
"{"                 { return OPEN_BRACE; }
"}"                 { return CLOSE_BRACE; }
";"                 { return SEMICOLON; }
"("                 { return OPEN_PAREN; }
")"                 { return CLOSE_PAREN; }
[ \t\n]             ; // skip whitespace
.                   { printf("Unexpected character '%s'\n", yytext); }
%%

int yywrap() {
    return 1;
}

```

Semantic:

```
%{
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

extern int yylex();
extern FILE* yyin;

void yyerror(const char* msg) {
   // Do nothing for syntax errors
}


%}

%union {
   int num;
   char* str;
}

%token <num> NUMBER
%token <str> IDENTIFIER
%token PROTOCOL REQUEST RESPONSE INT_TYPE BOOL_TYPE STRING_TYPE
OPEN_BRACE CLOSE_BRACE SEMICOLON OPEN_PAREN CLOSE_PAREN

%%

Protocol : PROTOCOL IDENTIFIER OPEN_BRACE ProtocolBody CLOSE_BRACE;

ProtocolBody : RequestResponseList;

RequestResponseList : RequestResponse | RequestResponseList RequestResponse;

RequestResponse : Request | Response;

Request : REQUEST IDENTIFIER OPEN_BRACE RequestBody CLOSE_BRACE
SEMICOLON;

RequestBody : INT_TYPE IDENTIFIER SEMICOLON STRING_TYPE IDENTIFIER
SEMICOLON;

Response : RESPONSE IDENTIFIER OPEN_BRACE ResponseBody CLOSE_BRACE
SEMICOLON;
```

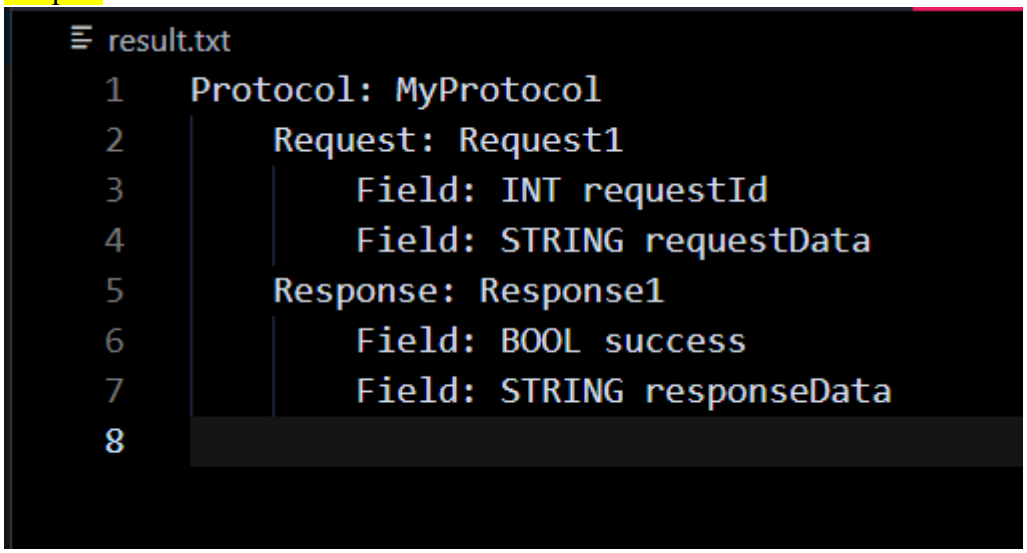
```
ResponseBody : BOOL_TYPE IDENTIFIER SEMICOLON STRING_TYPE IDENTIFIER
SEMICOLON;

%%

int main(int argc, char** argv) {
    if (argc < 2) {
        fprintf(stderr, "Usage: %s input_file\n", argv[0]);
        return 1;
    }
    FILE* input = fopen(argv[1], "r");
    if (!input) {
        perror("fopen");
        return 1;
    }
    yyin = input;
    yyparse();
    fclose(input);
    printf("Lexical and Semantic Analysis completed, Result.txt file formed!");
    return 0;
}
```

Input:

input.txt

```
Protocol MyProtocol {
    REQUEST Request1 {
        INT requestId;
        STRING requestData;
    }
    RESPONSE Response1 {
        BOOL success;
        STRING responseData;
    }
}
```

Output:


result.txt
1 Protocol: MyProtocol
2 Request: Request1
3 Field: INT requestId
4 Field: STRING requestData
5 Response: Response1
6 Field: BOOL success
7 Field: STRING responseData
8