```
Miraç Cumbur B1705.010031 Compiler
public class main {
    public static void main(String[] args) {
        ProgramText programText = new ProgramText();
        OurScanner scanner = new OurScanner(programText);
        Token token = new Token(programText);
        Parser parser = new Parser(scanner, programText, token);
        parser.parse();
    }
}
```

```
public enum TokenType {
    LEFT_CURLY("{"), RIGHT_CURLY("}"), LEFT_PAR("("), RIGHT_PAR(")"),
    EQUAL("="), SEMI_COLON(";"), LESS_THAN("<"),GRATER_THAN(">"),
    MINUS("-"), MULTIPLY("*"), DIVIDE("/"), PLUS("+"),NOT("!"),

    WHILE("while"), IF("if"), OUT("out"), IN("in"),
    IDENITIFIER, NUMBER, END_OF_FILE;

    public String getText() {
        return text;
    }

    private final String text;

    TokenType(String text) {
        this.text = text;
    }

    TokenType() {
        this.text = this.toString();
    }
}
```

```
public enum BooleanOperationType {

EQUAL_AND_EQUAL("=="),NOT_EQUAL("!="),LESS_AND_EQUAL("<="),GRATER_AND_EQUAL
(">="),
    LESS("<"),GRATER(">");

    public String getText() {
        return text;
    }

    private final String text;

    BooleanOperationType(String text) {
        this.text = text;
    }

    BooleanOperationType() {
        this.text = this.toString();
    }
}
```

```
public class Token {

   public TokenType type;
   public String text;
   private final ProgramText source;
```

```
   Token(ProgramText source){
      this.source = source;
   }
   public TokenType getTokenType() {
      return type;
   }
   public String getText() {
      return text;
   }
}
```

```
public class EOFToken extends Token {

    EOFToken(ProgramText source) {
        super(source);
        type = TokenType.END_OF_FILE;

    }

}
```

```
public class IdentifierToken extends Token{

   IdentifierToken(ProgramText source,String text, TokenType type) {
      super(source);
      this.text=text;
      this.type=type;


   }



}
```

```
public class KeywordToken extends Token {
    KeywordToken(ProgramText source,String text, TokenType type) {
        super(source);
        this.text=text;
        this.type=type;
    }
}
```

```
public class NumberToken extends Token{

   NumberToken(ProgramText source,String text,TokenType type) {
      super(source);
      this.text=text;
      this.type=type;
   }
}
```

```
public class SpecialToken extends Token {

    SpecialToken(ProgramText source, String text, TokenType Specialtype) {
        super(source);
        this.text = text;
        this.type = Specialtype;
        // TODO Auto-generated constructor stub
```

```
    }

}
```

```
//is responsible for scanning for tokens (it will return tokens)
//to the parser.
public class OurScanner {
    private final ProgramText source;
    public String string = "";
    public char chNext, chCur;

    OurScanner(ProgramText source) {
        this.source = source;
    }

    boolean isSpecial(char chNext) {
        boolean control = false;
        if (!Character.isWhitespace(chNext)) {
            for (TokenType type : TokenType.values()) {
                if (String.valueOf(chNext).equals(type.getText())) {
                    control = true;
                    break;
                }
            }
        }
        return control;
    }

    //Scanner will ask the Source for characters and one a sequence of
    //characters form a token it will return immediately.
    //Scanner needs to know some of rules (for example, what constitutes
    //a number, what constitutes an identifier and so forth)
    Token nextToken() {
        Token token;

        chCur = source.curChar();
        chNext = source.nextChar();
        while (Character.isWhitespace(chCur)) {
            chCur = source.curChar();
            chNext = source.nextChar();
        }
        if (!Character.isWhitespace(chCur)) {
            for (TokenType type : TokenType.values()) {
                if (String.valueOf(chCur).equals(type.getText())) {
                    token = new SpecialToken(source, String.valueOf(chCur),
type);
                    return token;
                }
            }
            if (Character.isDigit(chCur)) {
                //number token
                //System.out.println(chCur);
                string += chCur;
                if (isSpecial(chNext)) {
                    token = new NumberToken(source, string,
TokenType.NUMBER);
                    string = "";
                    return token;
                }

            } else if (Character.isLetter(chCur)) {
```

```
                //identifier token
                string += chCur;
                if (isSpecial(chNext)) {
                    if (string.equals(TokenType.WHILE.getText())) {
                        //System.out.println(TokenType.WHILE.getText());
                        token = new KeywordToken(source, string,
TokenType.WHILE);
                        string = "";
                        return token;
                    } else if (string.equals(TokenType.IF.getText())) {
                        token = new KeywordToken(source, string,
TokenType.IF);
                        string = "";
                        return token;
                    } else if (string.equals((TokenType.OUT.getText()))) {
                        token = new KeywordToken(source, string,
TokenType.OUT);
                        string = "";
                        return token;
                    } else if (string.equals((TokenType.IN.getText()))) {
                        token = new KeywordToken(source, string,
TokenType.OUT);
                        string = "";
                        return token;
                    } else {
                        token = new IdentifierToken(source, string,
TokenType.IDENITIFIER);
                        string = "";
                        return token;
                    }


                }

            } else {
                token = new EOFToken(source);
                return token;
            }
        }

        return null;


    }


}
```

```
import java.io.IOException;
import java.nio.file.Files;
import java.nio.file.Paths;

//the purpose of the ProgramText class is to abstract away
//from where the program is coming. ProgramText provides a
//single character to the Scanner class when asked for.
//it reads the program (from a file or as String) line by line
//from top to bottom
public class ProgramText {

    //private BufferedReader reader;
    public String progText;
```

```
    private int curPos, rez = 0;
    public static char EOF = 'Ł';

    ProgramText() {

        curPos = -1;

        try {
            progText = readWholeProgram();

        } catch (IOException e) {
            // TODO Auto-generated catch block
            e.printStackTrace();
        }

    }

    private String readWholeProgram() throws IOException {
        return new String(Files.readAllBytes(Paths.get("program2.txt")));

    }

    char curChar() {
        if (curPos == -1)
            curPos++;

        if (curPos == progText.length())
            return EOF;
        if (rez <= progText.length()) {
            return progText.charAt(curPos);
        }
        return EOF;
    }

    char nextChar() {
        curPos++;
        rez = curPos;
        if (rez == progText.length())
            return EOF;

        for (int i = rez; i < progText.length(); i++) {
            if (Character.isWhitespace(progText.charAt(rez))) {
                rez++;
                if (rez == progText.length()) {
                    return EOF;
                }

            }
        }

        if (rez == progText.length()) {
            return EOF;
        }
        if (rez <= progText.length()) {
            return progText.charAt(rez);
        }


        return EOF;

    }
```

```
}
```

```
import javax.script.ScriptEngine;
import javax.script.ScriptEngineManager;
import javax.script.ScriptException;
import java.util.*;
import java.util.stream.Collectors;

public class Parser {

    private final OurScanner scanner;
    public ProgramText programText;
    private Token curToken,nextToken;
    private int rightCurly = 0, leftCurly = 0;
    public Node node = new Node("Program"),nodeEXP=new Node("EXP");
    public Node curNode;
    public String curParentLeftChild;
    public ArrayList<String> arrayListControl = new ArrayList<String>();
    public HashMap<String,String> map = new HashMap<String,String>();
    public Scanner scan=new Scanner(System.in);

    // eğer parantez kapanırsa current nodeyi parent yap

    Parser(OurScanner scanner, ProgramText programText, Token token) {

        this.scanner = scanner;
        this.programText = programText;
        this.curToken = token;
    }

    void parse() {
        curToken = scanner.nextToken();
        while (!(curToken instanceof EOFToken)) {
            if (!(curToken instanceof EOFToken)) {

                if (curToken != null) {
                    //System.out.println(curToken.getText());
                    curNode=node;
                    if(arrayListControl.size()>0){
                        for(int i=0;i<arrayListControl.size();i++){
                            for(Node s : curNode.children){
                                if(s.data.equals(arrayListControl.get(i))){
                                    curNode=s.children.get(1);

                                }
                            }

                        }
                    }
                    //System.out.printf("Type: %s, text: %s\n",
curToken.getTokenType(), curToken.getText())
                    S();
                }
            }
            curToken = scanner.nextToken();
        }
        if (!curlyController()) {
            //System.out.println("1Something is wrong.. " +
curToken.getTokenType());
```

```
            System.exit(0);
        }
        Treversal treversal = new Treversal();
        ArrayList<String>  treePreOrder=treversal.preorder(node);
        ArrayList<String> treePostOrder=treversal.postorder(node);
        System.out.println("Preorder: "+treePreOrder);
        System.out.println("Postorder: "+treePostOrder);
        eval(treePreOrder);




    }

    void S() {
        if (curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
            if (curlyController()) {
                return;
            } else {
                System.out.println("2Something is wrong.. " +
curToken.getTokenType());
                System.exit(0);
            }
        }

        S1();
    }
    // bi değişken belirleriz adı while olursa while içinde if olursa if
içinde
    //bu sayede onu kontrol ederken ne içinde anlarız
    //hatta bunu arraylist yaparız sonuncuyu sileriz en sonuncu içinde
olduğumuz olur
    //ya da map te tutarız konumunu while mı if mi olduğunu daha iyi olur

    void S1() {
        curParentLeftChild=curToken.getText();
        if (curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
            System.out.println("end of file");
            if (curlyController()) {
                System.exit(0);
            } else {
                System.out.println("3Something is wrong.. " +
curToken.getTokenType());
                System.exit(0);
            }
            return;
        } else if (curToken.getTokenType().equals(TokenType.RIGHT_CURLY)) {
            arrayListControl.remove(arrayListControl.size()-1);
            rightCurly++;
        } else if (curToken.getTokenType().equals(TokenType.LEFT_CURLY)) {
            leftCurly++;
        }

        //WHILE

        else if (curToken.getTokenType().equals(TokenType.WHILE)) {
            childAdder(curNode,curToken.getText());
            for(Node s : curNode.children){
                if(s.data.equals(curToken.getText())){
                    curNode=s;
                }
```

```
            }
            curToken = scanner.nextToken();
            while (curToken == null) {
                curToken = scanner.nextToken();
            }
            if (curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                if (curlyController()) {
                    System.exit(0);
                } else {
                    System.out.println("4Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else if (curToken.getTokenType().equals(TokenType.LEFT_PAR))
{
                //System.out.println(curNode.children.stream().filter(f->
f.data.equals(curToken.getText())).collect(Collectors.toList()));

                String s=Boolean();
                childAdder(curNode,s);
                childAdder(curNode,"body");
                curToken = scanner.nextToken();
                while (curToken == null) {
                    curToken = scanner.nextToken();
                }

                if (curToken.getTokenType().equals(TokenType.END_OF_FILE))
{
                    if (curlyController()) {
                        System.exit(0);
                    } else {
                        System.out.println("5Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                    System.exit(0);
                } else if
(curToken.getTokenType().equals(TokenType.RIGHT_PAR)) {

                    curToken = scanner.nextToken();
                    while (curToken == null) {
                        curToken = scanner.nextToken();
                    }
                    if
(curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                        if (curlyController()) {
                            System.exit(0);
                        } else {
                            System.out.println("6Something is wrong.. " +
curToken.getTokenType());
                            System.exit(0);
                        }
                        System.exit(0);
                    } else if
(curToken.getTokenType().equals(TokenType.LEFT_CURLY)) {
                        arrayListControl.add("while");
                        leftCurly++;
                    } else {
                        System.out.println("7Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
```

```
                    }
                } else {
                    System.out.println("8Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else {
                System.out.println("9Something is wrong.. " +
curToken.getTokenType());
                System.exit(0);
            }
        }

        //IF

        else if (curToken.getTokenType().equals(TokenType.IF)) {
            childAdder(curNode,curToken.getText());
            for(Node s : curNode.children){
                if(s.data.equals(curToken.getText())){
                    curNode=s;
                }
            }
            curToken = scanner.nextToken();
            while (curToken == null) {
                curToken = scanner.nextToken();
            }

            if (curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                if (curlyController()) {
                    System.exit(0);
                } else {
                    System.out.println("10Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else if (curToken.getTokenType().equals(TokenType.LEFT_PAR))
{
                String s=Boolean();
                childAdder(curNode,s);
                childAdder(curNode,"body");
                //Exp();
                curToken = scanner.nextToken();
                while (curToken == null) {
                    curToken = scanner.nextToken();
                }

                if (curToken.getTokenType().equals(TokenType.END_OF_FILE))
{
                    if (curlyController()) {
                        System.exit(0);
                    } else {
                        System.out.println("11Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                    System.exit(0);
                } else if
(curToken.getTokenType().equals(TokenType.RIGHT_PAR)) {

                    curToken = scanner.nextToken();
                    while (curToken == null) {
```

```
                        curToken = scanner.nextToken();
                    }
                    if
(curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                        if (curlyController()) {
                            System.exit(0);
                        } else {
                            System.out.println("12Something is wrong.. " +
curToken.getTokenType());
                            System.exit(0);
                        }
                        System.exit(0);
                    } else if
(curToken.getTokenType().equals(TokenType.LEFT_CURLY)) {
                        arrayListControl.add("if");
                        leftCurly++;
                    } else {
                        System.out.println("13Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                } else {
                    System.out.println("14Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else {
                System.out.println("15Something is wrong.. " +
curToken.getTokenType());
                System.exit(0);
            }
        }

        //IDENITIFIER

        else if (curToken.getTokenType().equals(TokenType.IDENITIFIER)) {
            curParentLeftChild=curToken.getText();
            curToken = scanner.nextToken();
            while (curToken == null) {
                curToken = scanner.nextToken();
            }
            if (curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                if (curlyController()) {
                    System.exit(0);
                } else {
                    System.out.println("16Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
                System.exit(0);
            } else if (curToken.getTokenType().equals(TokenType.EQUAL)) {
                childAdder(curNode,TokenType.EQUAL.getText());
                for(Node s : curNode.children){
                    if(s.data.equals(TokenType.EQUAL.getText())){
                        curNode=s;
                    }
                }
                childAdder(curNode,curParentLeftChild);
                String s=Exp();
                childAdder(curNode,s);
                curToken = scanner.nextToken();
```

```
                while (curToken == null) {
                    curToken = scanner.nextToken();
                }
                if (curToken.getTokenType().equals(TokenType.END_OF_FILE))
{
                    if (curlyController()) {
                        System.exit(0);
                    } else {
                        System.out.println("17Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                    System.exit(0);
                } else if
(curToken.getTokenType().equals(TokenType.SEMI_COLON)) {

                } else {
                    System.out.println("18Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else {
                System.out.println("19Something is wrong.. " +
curToken.getTokenType());
                System.exit(0);
            }
        }

        //OUT

        else if (curToken.getTokenType().equals(TokenType.OUT)) {
            childAdder(curNode,curToken.getText());
            for(Node s : curNode.children){
                if(s.data.equals(curToken.getText())){
                    curNode=s;
                }
            }
            curToken = scanner.nextToken();
            while (curToken == null) {
                curToken = scanner.nextToken();
            }
            if (curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                if (curlyController()) {
                    System.exit(0);
                } else {
                    System.out.println("20Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else if (curToken.getTokenType().equals(TokenType.LEFT_PAR))
{
                String s=Exp();
                childAdder(curNode,s);
                curToken = scanner.nextToken();
                while (curToken == null) {
                    curToken = scanner.nextToken();
                }

                if (curToken.getTokenType().equals(TokenType.END_OF_FILE))
{
                    if (curlyController()) {
```

```
                        System.exit(0);
                    } else {
                        System.out.println("21Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                    System.exit(0);
                } else if
(curToken.getTokenType().equals(TokenType.RIGHT_PAR)) {

                    curToken = scanner.nextToken();
                    while (curToken == null) {
                        curToken = scanner.nextToken();
                    }

                    if
(curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                        if (curlyController()) {
                            System.exit(0);
                        } else {
                            System.out.println("22Something is wrong.. " +
curToken.getTokenType());
                            System.exit(0);
                        }
                        System.exit(0);
                    } else if
(curToken.getTokenType().equals(TokenType.SEMI_COLON)) {

                    } else {
                        System.out.println("25Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                } else {
                    System.out.println("26Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else {
                System.out.println("27Something is wrong.. " +
curToken.getTokenType());
                System.exit(0);
            }
        }

        //IN

        else if (curToken.getTokenType().equals(TokenType.IN)) {
            childAdder(curNode,curToken.getText());
            for(Node s : curNode.children){
                if(s.data.equals(curToken.getText())){
                    curNode=s;
                }
            }
            curToken = scanner.nextToken();
            while (curToken == null) {
                curToken = scanner.nextToken();
            }
            if (curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                if (curlyController()) {
                    System.exit(0);
```

```
                } else {
                    System.out.println("20Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else if (curToken.getTokenType().equals(TokenType.LEFT_PAR))
{
                String s=Exp();
                childAdder(curNode,s);
                curToken = scanner.nextToken();
                while (curToken == null) {
                    curToken = scanner.nextToken();
                }

                if (curToken.getTokenType().equals(TokenType.END_OF_FILE))
{
                    if (curlyController()) {
                        System.exit(0);
                    } else {
                        System.out.println("21Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                    System.exit(0);
                } else if
(curToken.getTokenType().equals(TokenType.RIGHT_PAR)) {

                    curToken = scanner.nextToken();
                    while (curToken == null) {
                        curToken = scanner.nextToken();
                    }

                    if
(curToken.getTokenType().equals(TokenType.END_OF_FILE)) {
                        if (curlyController()) {
                            System.exit(0);
                        } else {
                            System.out.println("22Something is wrong.. " +
curToken.getTokenType());
                            System.exit(0);
                        }
                        System.exit(0);
                    } else if
(curToken.getTokenType().equals(TokenType.SEMI_COLON)) {

                    } else {
                        System.out.println("25Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                } else {
                    System.out.println("26Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            } else {
                System.out.println("27Something is wrong.. " +
curToken.getTokenType());
                System.exit(0);
            }
        }
```

```
    }

    //EXPRESSION

    String Exp() {
        String rezerve = "";
        boolean control = true;
        while (control) {
            if
(String.valueOf(scanner.chNext).equals(TokenType.RIGHT_PAR.getText()) ||

String.valueOf(scanner.chNext).equals(TokenType.SEMI_COLON.getText())) {

                control = false;

            }else{
                curToken = scanner.nextToken();
                while (curToken == null) {
                    curToken = scanner.nextToken();
                }

                if (curToken.getTokenType().equals(TokenType.END_OF_FILE))
{
                    if (curlyController()) {
                        System.exit(0);
                    } else {
                        System.out.println("36Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);
                    }
                    System.exit(0);
                } else if
(!(String.valueOf(scanner.chNext).equals(TokenType.RIGHT_PAR.getText()) ||

String.valueOf(scanner.chNext).equals(TokenType.SEMI_COLON.getText()))) {
                    rezerve += curToken.getText();
                } else if
((String.valueOf(scanner.chNext).equals(TokenType.RIGHT_PAR.getText()) ||

String.valueOf(scanner.chNext).equals(TokenType.SEMI_COLON.getText()))) {
                    rezerve += curToken.getText();
                    //System.out.println(rezerve);
                    break;
                } else {
                    System.out.println(rezerve + " 37Something is wrong.. "
+ curToken.getTokenType());
                    System.exit(0);
                }

            }

        }
        return rezerve;
    }



    //curlyController
```

```
    boolean curlyController() {
        boolean control = false;
        if (rightCurly == leftCurly) {
            control = true;
        }
        return control;
    }

    void childAdder (Node node,String value){
        node.addChild(new Node(value));
    }
    void ExpTail(){
    }

    void Term() {
    }

    void TermTail() {
    }
    void Factor() {
    }

    void FactorTail() {
    }

    void Id() {
    }

    void Char() {
    }

    void Num() {
    }

    String Boolean() {
        boolean control = true,control2=true;
        String booleanValue = "",rezerve="";
        curToken = scanner.nextToken();
        while (curToken == null) {
            curToken = scanner.nextToken();
        }
        if (!(curToken.getTokenType().equals(TokenType.NUMBER) ||
curToken.getTokenType().equals(TokenType.IDENITIFIER))) {

            System.out.println(" 38Something is wrong.. " +
curToken.getTokenType());
            System.exit(0);

        } else {
            if (curToken.getTokenType().equals(TokenType.NUMBER) ||
curToken.getTokenType().equals(TokenType.IDENITIFIER)) {
                rezerve+=curToken.getText();
                curToken = scanner.nextToken();
                while (curToken == null) {
                    curToken = scanner.nextToken();
                }
                nextToken=scanner.nextToken();
                while (nextToken == null) {
                    nextToken = scanner.nextToken();
                }
```

```
                    if
(nextToken.getTokenType().equals(TokenType.IDENITIFIER)||
nextToken.getTokenType().equals(TokenType.NUMBER)) {
                        booleanValue+=curToken.getText();

rezerve=rezerve+curToken.getText()+nextToken.getText();
                        for (BooleanOperationType type :
BooleanOperationType.values()) {
                            if (booleanValue.equals(type.getText())) {
                                //System.out.println(rezerve+"
"+type.getText()+" "+type);
                                control2=false;
                            }
                        }
                        if(control2){
                            System.out.println(" 39Something is wrong.. " +
curToken.getTokenType());
                            System.exit(0);
                        }
                    } else
if(nextToken.getTokenType().equals(TokenType.WHILE)||
nextToken.getTokenType().equals(TokenType.IF)||

nextToken.getTokenType().equals(TokenType.OUT)||
nextToken.getTokenType().equals(TokenType.IN)){
                        System.out.println(" 40Something is wrong.. " +
curToken.getTokenType());
                        System.exit(0);

                    } else {

booleanValue=booleanValue+curToken.getText()+nextToken.getText();

rezerve=rezerve+curToken.getText()+nextToken.getText();
                        for (BooleanOperationType type :
BooleanOperationType.values()) {
                            if (booleanValue.equals(type.getText())) {
                                curToken= scanner.nextToken();
                                while (curToken == null) {
                                    curToken = scanner.nextToken();
                                }
                                rezerve+=curToken.getText();
                                //System.out.println(rezerve+"
"+type.getText()+" "+type);
                                control2=false;
                            }
                        }
                        if(control2){
                            System.out.println(" 41Something is wrong.. " +
curToken.getTokenType());
                            System.exit(0);
                        }
                    }
                } else {
                    System.out.println(" 42Something is wrong.. " +
curToken.getTokenType());
                    System.exit(0);
                }
            }

        return rezerve;
```

```
    }

    void eval(ArrayList<String> tree){
        for(int i=0;i<tree.size();i++){
            //System.out.println(tree.get(i));
            if(tree.get(i).equals("Program")){

            }else if(tree.get(i).equals(TokenType.EQUAL.getText())){
                i++;
                String rez,rez1;
                rez=tree.get(i);
                i++;
                rez1=tree.get(i);
                //System.out.println(rez+" "+rez1);
                expressionSolver(rez1);
            }else if(tree.get(i).equals(TokenType.WHILE.getText())){
                i++;
                booleanSolver(tree.get(i));
            }else if(tree.get(i).equals(TokenType.IF.getText())){
                i++;
                booleanSolver(tree.get(i));
            }else if(tree.get(i).equals(TokenType.IN.getText())){
                i++;
                String valueName=tree.get(i);
                String value=scan.nextLine();
                map.put(valueName,value);
            }else if(tree.get(i).equals(TokenType.OUT.getText())){
                i++;
                System.out.println(map.get(tree.get(i)));

            }
        }

    }
    String expressionSolver(String expression){
        ScriptEngineManager mgr = new ScriptEngineManager();
        ScriptEngine engine = mgr.getEngineByName("JavaScript");
        String rez="";
        String rezMain="";
        for (int i=0;i<expression.length();i++) {
            //System.out.println(foo.charAt(i));
            if(Character.isWhitespace(expression.charAt(i))){

            }
            else
if(Character.isLetter(expression.charAt(i))||Character.isDigit(expression.c
harAt(i))){
                rez+=expression.charAt(i);
                rezMain+=expression.charAt(i);
            }
            else if(String.valueOf(expression.charAt(i)).equals("+")||
                    String.valueOf(expression.charAt(i)).equals("-")||
                    String.valueOf(expression.charAt(i)).equals("*")||
                    String.valueOf(expression.charAt(i)).equals("/")){
                rezMain+=expression.charAt(i);
                //System.out.println(rez);
                boolean ctrl=false;
                for(int l=0;l<rez.length();l++){
                    if(Character.isLetter(rez.charAt(l))){
                        ctrl=true;
                    }
```

```
                }



                if(ctrl){
                    String value=map.get(rez);/*
                    if(value.isEmpty()){
                        System.out.println("error");
                        System.exit(0);
                    }*/

                    rezMain+=value;
                }else{
                    rezMain+=rez;
                }
                rez="";
                /*
                for (Map.Entry<String,String> entry: map.entrySet()){
                    String key = entry.getKey();
                    if(key.equals(rez)){

                        rez+=map.get(key);
                    }
                    else{
                        System.out.println("error");
                    }
                }
                */



            }

        }//System.out.println(rezMain);
        /*try {

            System.out.println(engine.eval(rezMain));
        } catch (ScriptException e) {
            e.printStackTrace();
        }*/
        return null;
    }

    Boolean booleanSolver(String expression){
        return null;
    }
}
```

```
import java.util.ArrayList;
import java.util.List;

public class Node {
    public String data; //data for storage
    public List<Node> children;//array will keep children
    public Node parent;//parent to start the tree

    public Node(String data) {
        children = new ArrayList<>();
        this.data = data;
    }
```

```
    public Node addChild(Node node) {
        children.add(node);
        node.parent = this;
        return this;
    }
}
```

```
public class Pair {
    public Node node;
    public int childrenIndex;

    public Pair(Node _node, int _childrenIndex) {
        node = _node;
        childrenIndex = _childrenIndex;
    }
}
```

```
import java.util.ArrayList;
import java.util.Stack;

public class Treversal {


    int currentRootIndex = 0;
    Stack<Pair> stack = new Stack<Pair>();
    ArrayList<String> postorderTraversal = new ArrayList<String>();
    ArrayList<String> preorderTraversal = new ArrayList<String>();
    // Function to perform iterative postorder traversal
    public ArrayList<String> postorder(Node root) {
        while (root != null || !stack.isEmpty()) {
            if (root != null) {

                // Push the root and it's index
                // into the stack
                stack.push(new Pair(root, currentRootIndex));
                currentRootIndex = 0;

                // If root don't have any children's that
                // means we are already at the left most
                // node, so we will mark root as null
                if (root.children.size() >= 1) {
                    root = root.children.get(0);
                } else {
                    root = null;
                }
                continue;
            }

            // We will pop the top of the stack and
            // add it to our answer
            Pair temp = stack.pop();
            postorderTraversal.add(temp.node.data);

            // Repeatedly we will the pop all the
```

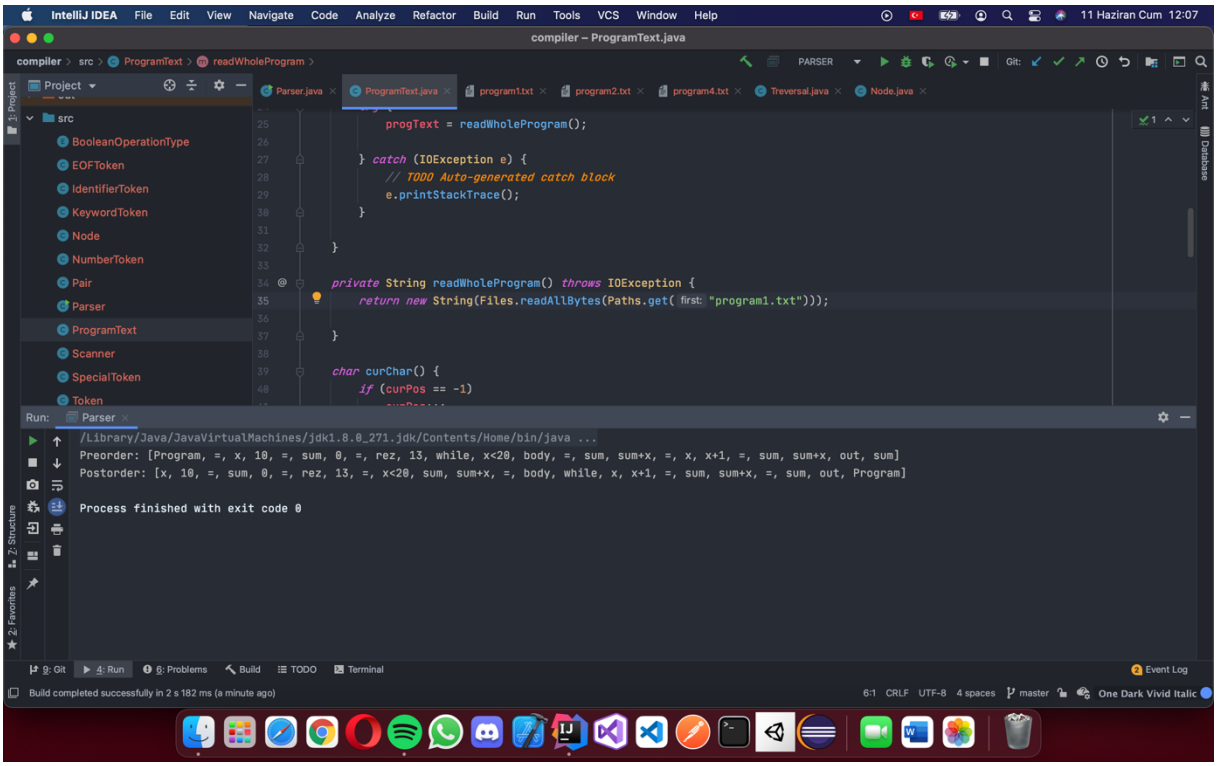
```
            // elements from the stack till popped
            // element is last children of top of
            // the stack
            while (!stack.isEmpty() && temp.childrenIndex ==
                    stack.peek().node.children.size() - 1) {
                temp = stack.pop();

                postorderTraversal.add(temp.node.data);
            }

            // If stack is not empty, then simply assign
            // the root to the next children of top
            // of stack's node
            if (!stack.isEmpty()) {
                root = stack.peek().node.children.get(
                        temp.childrenIndex + 1);
                currentRootIndex = temp.childrenIndex + 1;
            }


        }

        return postorderTraversal;
    }




    public ArrayList<String> preorder(Node root) {
        Stack<Node> stackNode = new Stack<>();
        stackNode.push(root);
        while (!stackNode.isEmpty()) {
            // Store the current node and pop
            // it from the stack
            Node curr = stackNode.pop();

            // Current node has been travarsed
            if (curr != null)
            {
                //System.out.print(curr.data + " ");
                preorderTraversal.add(curr.data);
                // Store all the childrent of
                // current node from right to left.
                for(int i = curr.children.size() - 1; i >= 0; i--)
                {
                    stackNode.add(curr.children.get(i));
                }


            }
        }


        return preorderTraversal;
    }

}
```

Outputs;

Only dft outputs are available in these outputs. I tried to print out the program's output. I've written some codes. But I didn't have enough time to solve the problems. I couldn't get the rest of my code. For this reason, I could not add outputs that show the results of the program. In the parse class of the code, you can see the codes I wrote for this part. In readme.txt file, i explained the code.

Program1.txt

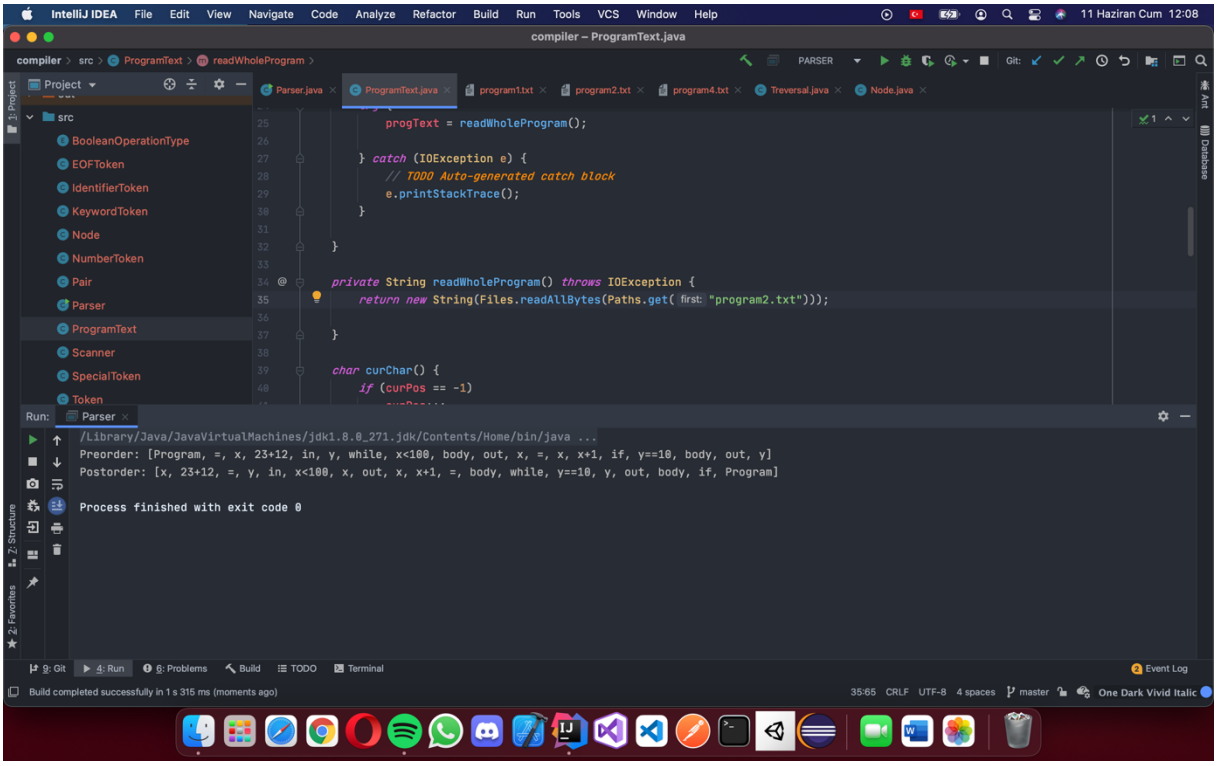
```
x = 10;
sum=0;
rez=13;
while(x<20){
sum=sum+x;
}
x = x + 1 ;
sum=sum+x;
out(sum);
```



Other program example in other page.

Program2.txt

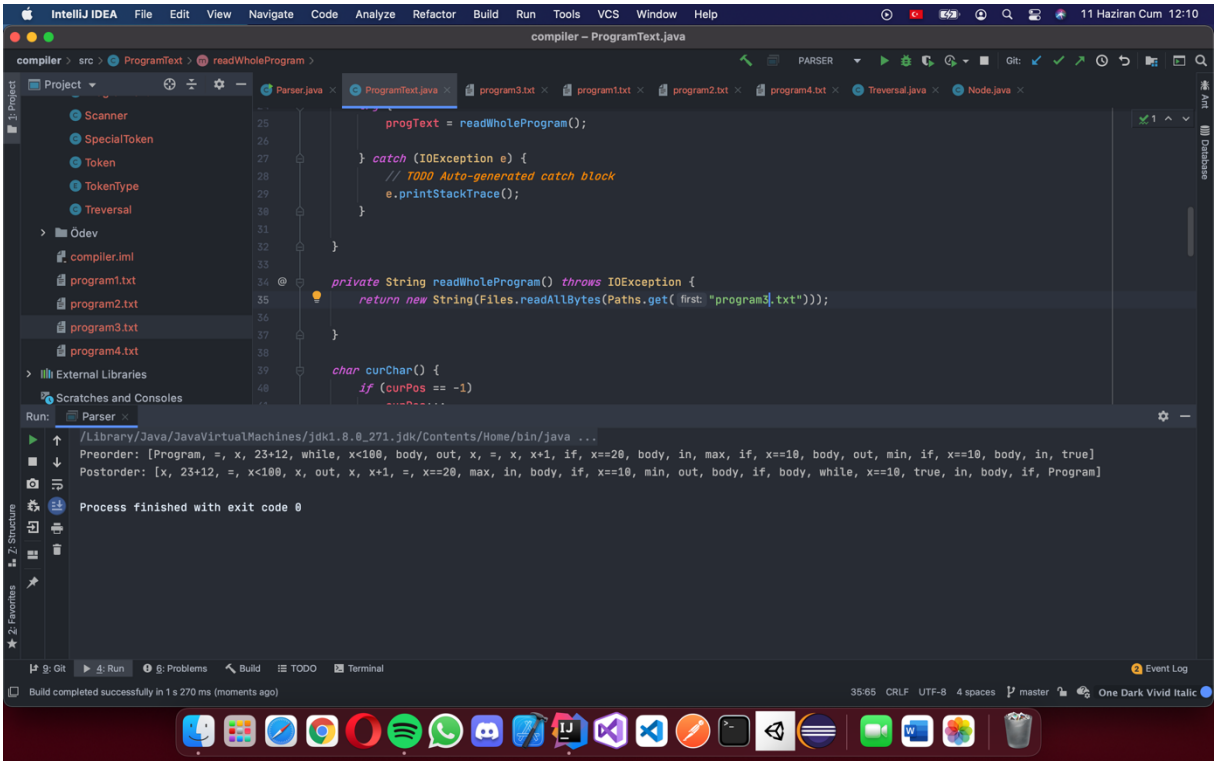
```
x = 23 + 12 ;
in(y);
while ( x<100 ) {
    out (x);

    x = x + 1 ;
    }

if ( y == 10) {
    out (y);
    }
```



Other program example in other page.

Program3.txt

```
x = 23+12 ;

while ( x<100 ) {

    out (x);

    x = x + 1 ;

    if ( x == 20) {
        in (max);
    }

    if ( x == 10) {
        out (min);
    }

}

if ( x == 10) {
        in (true);
}
```



Other program example in other page.

Program4.txt

```
x=7;
y=10+2*6;
while(x<y){
out(x);
x=x+1;
}
```