Lab Terminal

Group Members

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Subject

Compiler Construction

Instructor

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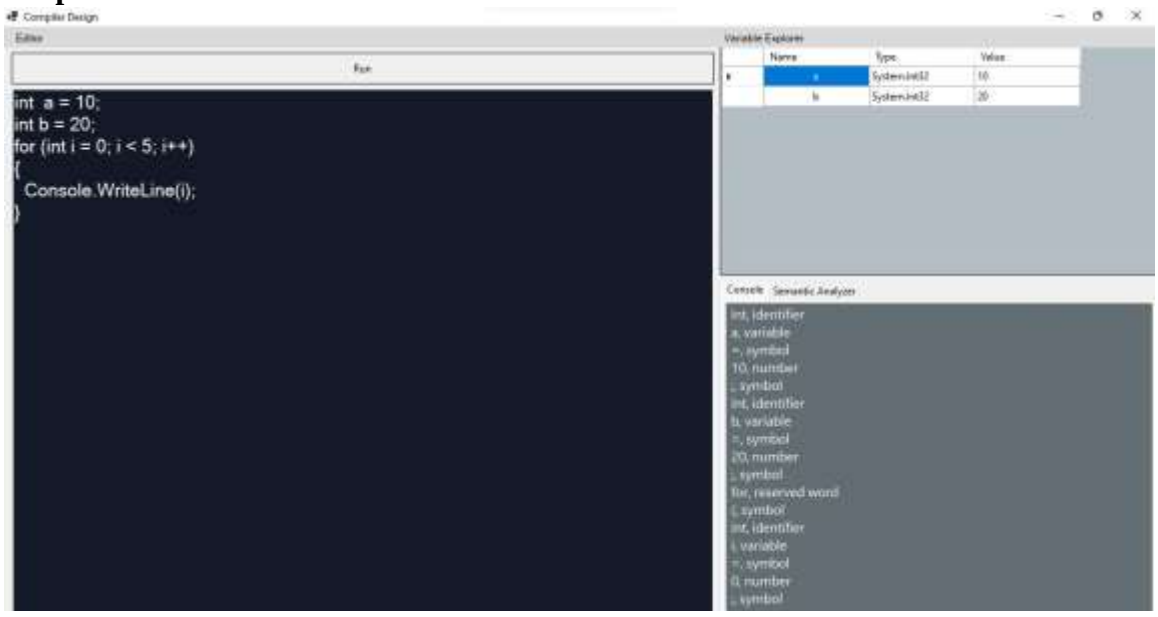
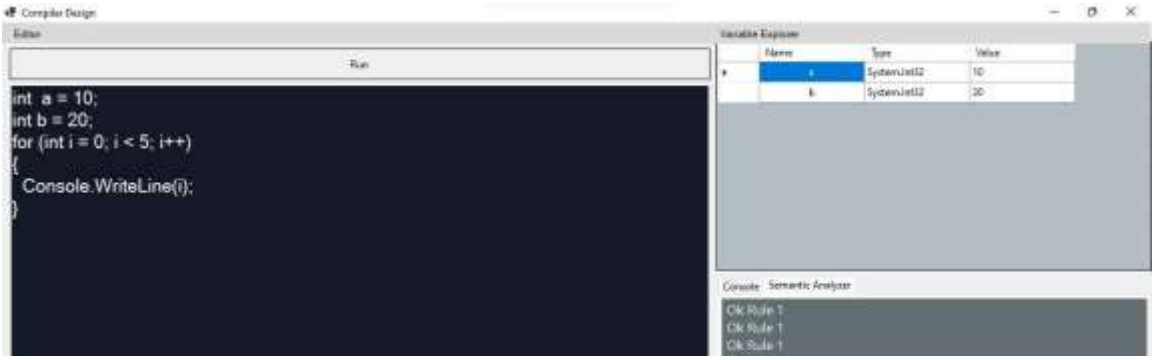
Question #3

Input

```
int a = 10; int
b = 20;
for (int i = 0; i < 5; i++)
{
  Console.WriteLine(i);
}
```

Output





Code which is responsible for lexical analsis

```
bool isPunctuator(char ch)    //check if the given character is a punctuator or not
{
    if (ch == ' ' || ch == '+' || ch == '-' || ch == '*' ||
        ch == '/' || ch == ',' || ch == ';' || ch == '>' ||
        ch == '<' || ch == '=' || ch == '(' || ch == ')' ||
        ch == '[' || ch == ']' || ch == '{' || ch == '}' ||
        ch == '&' || ch == '|')
        { return true;
        } return
    false;
}
bool validIdentifier(char* str)      //check if the given identifier is valid or not
{
    if (str[0] == '0' || str[0] == '1' || str[0] == '2' ||
        str[0] == '3' || str[0] == '4' || str[0] == '5' ||
        str[0] == '6' || str[0] == '7' || str[0] == '8' ||
        str[0] == '9' || isPunctuator(str[0]) == true)
        { return false;
        }      //if first character of string is a digit or a special character,
identifier is not valid int i,len = strlen(str);
    if (len == 1)
    { return true;
    }  //if length is one, validation is already completed, hence return true else
    {
    for (i = 1 ; i < len ; i++)       //identifier cannot contain special characters
    { if (isPunctuator(str[i]) == true)
        { return false;
        }
    }
    }
    return true;
}
bool isOperator(char ch)      //check if the given character is an operator or not
{
    if (ch == '+' || ch == '-' || ch == '*' ||
        ch == '/' || ch == '>' || ch == '<' ||
        ch == '=' || ch == '|' || ch == '&')
    { return true;
    }
    return false;
}
bool isKeyword(char *str)     //check if the given substring is a keyword or not
{ if (!strcmp(str, "if") || !strcmp(str, "else") ||
        !strcmp(str, "while") || !strcmp(str, "do") ||
        !strcmp(str, "break") || !strcmp(str, "continue")
        || !strcmp(str, "int") || !strcmp(str, "double")
        || !strcmp(str, "float") || !strcmp(str, "return")
        || !strcmp(str, "char") || !strcmp(str, "case")
```

```
        || !strcmp(str, "long") || !strcmp(str, "short")
        || !strcmp(str, "typedef") || !strcmp(str, "switch")
        || !strcmp(str, "unsigned") || !strcmp(str, "void")
        || !strcmp(str, "static") || !strcmp(str, "struct")
        || !strcmp(str, "sizeof") || !strcmp(str,"long")
        || !strcmp(str, "volatile") || !strcmp(str, "typedef")
        || !strcmp(str, "enum") || !strcmp(str, "const")
        || !strcmp(str, "union") || !strcmp(str, "extern")
        || !strcmp(str,"bool"))
        { return true;
        }
    else
    { return false;
    }
}
bool isNumber(char* str)      //check if the given substring is a number or not
{ int i, len = strlen(str),numOfDecimal = 0;
    if (len == 0)
    { return false;
    }
    for (i = 0 ; i < len ; i++)
    { if (numOfDecimal > 1 && str[i] == '.')
        { return false;
        } else if (numOfDecimal <= 1)
        { numOfDecimal++;
        }
        if (str[i] != '0' && str[i] != '1' && str[i] != '2'
            && str[i] != '3' && str[i] != '4' && str[i] != '5'
            && str[i] != '6' && str[i] != '7' && str[i] != '8'
            && str[i] != '9' || (str[i] == '-' && i > 0))
            { return false;
            }
    }
    return true;
}

char* subString(char* realStr, int l, int r) //extract the required substring from the
main string
{ int i; char* str = (char*) malloc(sizeof(char) * (r - l +
    2));

    for (i = l; i <= r; i++)
    { str[i - l] = realStr[i];
        str[r - l + 1] = '¥0';
    }
    return str;
}


void parse(char* str)                                    //parse the expression
{
```

```
    int left = 0, right = 0;
    int len = strlen(str);
    while (right <= len && left <= right) { if (isPunctuator(str[right]) == false) //if
character is a digit or an alphabet { right++; }

        if (isPunctuator(str[right]) == true && left == right)      //if character is a
punctuator {
            if (isOperator(str[right]) == true)
            { std::cout<< str[right] <<" IS AN OPERATOR¥n";
            } right++;
            left = right;
            } else if (isPunctuator(str[right]) == true && left != right
                  || (right == len && left != right))                    //check if
parsed substring is a keyword or identifier or number
            { char* sub = subString(str, left, right - 1); //extract
            substring

            if (isKeyword(sub) == true) { cout<< sub <<" IS
                        A KEYWORD¥n"; }
            else if (isNumber(sub) == true) { cout<< sub
                        <<" IS A NUMBER¥n"; }
            else if (validIdentifier(sub) == true
                     && isPunctuator(str[right - 1]) == false)
                     { cout<< sub <<" IS A VALID IDENTIFIER¥n";
                     }
            else if (validIdentifier(sub) == false
                     && isPunctuator(str[right - 1]) == false)
                     { cout<< sub <<" IS NOT A VALID IDENTIFIER¥n"; }

            left = right;
            }
    }
    return;
}
```