EXPERIMENT NO 1-ASSEMBLER

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TE COMPS BATCH E

Program:

```
#include<stdio.h>
#include<string.h>
#include<stdlib.h>
#define RX 1
struct MOT{
        char op[4];
        int frmt;
        int len;
}m[10];
struct SYM{
        char sym[20];
        int add;
        int len;
        char rel;
        int val;
}s[20];
struct LIT{
        char sym[20];
        int add;
        int len;
        char rel;
}l[20];
struct BT{
      int bit;
      int value;
}b[20];

void initMOT(){
        strcpy(m[0].op,"L");
        m[0].frmt=RX;
        m[0].len=4;

        strcpy(m[1].op,"A");
        m[1].frmt=RX;
        m[1].len=4;

        strcpy(m[2].op,"ST");
        m[2].frmt=RX;
        m[2].len=4;
}
```

```
int main(){

	char *POT[6]={"USING","START","EQU","DS","END\n","DC"};
	initMOT();
	int sCount=0,lCount=0,number=0,location=0,nextline=0,slen=0,x=0;

	size_t len = 0;
	ssize_t read;

	char * str;
	char * str1;
	char *line;
	int i,flag=0;
	FILE *file;

	file = fopen( "Code.asm" , "r");
	if(file){
		printf("\n---------PASS 1----------\n");
		while ((read = getline(&line, &len, file)) != -1){
			nextline=0;
			str=strtok(line," ");
			while(str!=NULL){
				flag=0;

					for(i=0;i<6 && flag!=1;i++)
					{
						if(strcmp(str,POT[i])==0)
						{
							flag=1;
							if(strcmp(str,"START")==0){
								str=strtok(NULL," ");
								location=atoi(str);
								nextline=1;
							}
							else if(strcmp(str,"USING")==0){
								nextline=1;
							}
							else if(strcmp(str,"EQU")==0){
								nextline=1;
								str=strtok(NULL," ");
								number=atoi(str);
								s[sCount-1].val=number;
								s[sCount-1].rel='A';
							}
							else if(strcmp(str,"DC")==0){
								nextline=1;
								str=strtok(NULL," ");
								if(str[0]=='F')
								{
									location=location+4;
									s[sCount-1].len=4;
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                }
                else if(str[0]=='l')
                {
                        location=location+2;
                        s[sCount-1].len=2;
                }
                number=atoi(&str[2]);
                s[sCount-1].val=number;
                s[sCount-1].rel='A';
        }
        else if(strcmp(str,"DS")==0){
                nextline=1;
                str=strtok(NULL," ");
                slen=strlen(str);
                if(str[len-1]=='F')
                {
                        number=0;
                        for(i=0;i<len-1;i++)
                number=number*10+ atoi(&str[i]);
                }
                else
                        number=atoi(str);

                s[sCount-1].val=number;
                s[sCount-1].rel='A';
        }

    }
}

for(i=0;i<3 && flag!=1;i++)
{
        if(strcmp(str,m[i].op)==0)
        {
                flag=1;
                location=location+m[i].len;
            str=strtok(NULL," ");  //r1
            str=strtok(NULL," ");       //,
            str=strtok(NULL," ");
            if(str[0]=='='){
            x=0;
            number=strlen(str);
                for(i=1;i<strlen(str);i++){
                 strcpy(&l[lCount].sym[x++],&str[i]);
                }
                        l[lCount].sym[number-2]='\0';
                        l[lCount].len=4;
                        l[lCount].rel='R';
                        lCount++;
                }
            nextline=1;
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                        }
                    }
                    if(strcmp(str,"LTORG\n")==0){
                        flag=1;
                            for(i=0;i<lCount;i++)
                            {
                              l[i].add=location;
                              location=location+l[i].len;
                            }
                            nextline=1;
                        }
                    if(flag==0)
                    {
                        strcpy(s[sCount].sym,str);
                        s[sCount].add=location;
                        s[sCount].val=location;
                        s[sCount].len=1;
                        s[sCount].rel='R';
                        sCount++;
                    }

                if(nextline==1)
                    break;
                else
                    str = strtok (NULL, " ");
            }
        }
}
fclose(file);
printf(" SYMBOL TABLE\n");
printf("\nADDRESS\tSYMBOL\tVALUE\tLENGTH\tRELOCATION\n");
for(i=0;i<sCount;i++)
        printf("\n%d\t%s\t%d\t%d\t%c\n",s[i].add,s[i].sym,s[i].val,s[i].len,s[i].rel);
        printf("\n LITERAL TABLE\n");
printf("\nADDRESS\tSYMBOL\tLENGTH\tRELOCATION\n");
for(i=0;i<lCount;i++)
        printf("\n%s\t%d\t%d\t%c\n",l[i].sym,l[i].add,l[i].len,l[i].rel);

printf("\n--------PASS 2-----------\n");

int motfind=0;
int k,ltrange,lflag,dis,d;
int strange,sflag;
number=0;location=0;nextline=0;slen=0;x=0;
char strc[20],prestr[20];
file = fopen( "Code.asm" , "r");
if(file){

        while ((read = getline(&line, &len, file)) != -1){
                nextline=0;
                str=strtok(line," ");
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```
for(i=0;i<strlen(str);i++){
        strcpy(&prestr[i],&str[i]);
        }
while(str!=NULL){
        flag=0;

                for(i=0;i<6 && flag!=1;i++)
                {
                        if(strcmp(str,POT[i])==0)
                        {
                                flag=1;
                                if(strcmp(str,"START")==0){
                                        str=strtok(NULL," ");
                                        location=atoi(str);
                                        nextline=1;
                                }
                                else if(strcmp(str,"USING")==0){
                                  str=strtok(NULL," ");
                                  if(strcmp(str,"*")==0){
                                        str=strtok(NULL," ");
                                        str=strtok(NULL," ");
                                        number = atoi(str);
                                        b[number].bit=1;
                                        b[number].value=location;
                                  }
                                        nextline=1;
                                }
                                else if(strcmp(str,"DC")==0){
                                                strange=sCount;
                                                sflag=0;
                                                x=0;
                                                number=strlen(prestr);
                                                  for(i=0;i<strlen(prestr);i++){
                                                strcpy(&strc[x++],&prestr[i]);
                                                  }
                                                for(k=0;k<=strange;k++){
                                                if(strcmp(strc,s[k].sym)==0){
                                                        sflag=1;
                                        printf("    %d\n",s[k].val);
                                        location=location+s[k].len;
                                                        }
                                                }
                                        nextline=1;
                                }
                                else if(strcmp(str,"DS")==0){
                                        printf("   -\n");

                                }
                        }
                }
```

```
for(i=0;i<3 && flag!=1;i++)
{
        if(strcmp(str,m[i].op)==0)
        {
                flag=1;
                location=location+m[i].len;
                 printf("\n%s",str);
                 str=strtok(NULL," ");  //r1
                 printf("   %s",str);
                str=strtok(NULL," ");    //,
                 printf("   %s",str);
                str=strtok(NULL," ");
                 if(str[0]=='='){
                x=0;
                number=strlen(str);
                          for(i=1;i<strlen(str);i++){
                                   strcpy(&strc[x++],&str[i]);
                           }
                        strc[number-2]='\0';
                        ltrange=lCount;
                        lflag=0;
                        for(k=0;k<ltrange && lflag!=1 ;k++){
                                if(strcmp(strc,l[k].sym)==0){
                                lflag=1;
                                   for(d=0;d<16;d++){
                                           if(b[d].bit==1){
                                dis=l[k].add - 0 – b[d].value;
                                           }
                                    }
                printf("  %d(%d,%d)\n",dis,0,--d);
                                }
                        }
                        nextline=1;
                 }
                else
                        {
                                strange=sCount;
                                sflag=0;
                                x=0;
                                number=strlen(str);
                                  for(i=0;i<strlen(str);i++){
                                 strcpy(&strc[x++],&str[i]);
                                  }
                                strc[number-1]='\0';
                           for(k=0;k<=strange;k++){
                                if(strcmp(strc,s[k].sym)==0){
                                        //printf("hello %s",str);
                                        sflag=1;
                                           for(d=0;d<16;d++){
                                                   if(b[d].bit==1){
                                dis=s[k].add - 0 - b[d].value;
```

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                                                                }
                                                        }
                                                printf("  %d(%d,%d)\n",dis,0,--d);
                                                        }

                                                   }
                                                nextline=1;
                                                }

                                        }


                                }
                                if(flag==0)
                                {
                                        //printf("\nSYMBOL:%s\n",str);
                                }

                        if(nextline==1)
                                break;
                        else
                                str = strtok (NULL, " ");
                }
}               }


        fclose(file);
printf("%d",location);
        return 0;
}
```
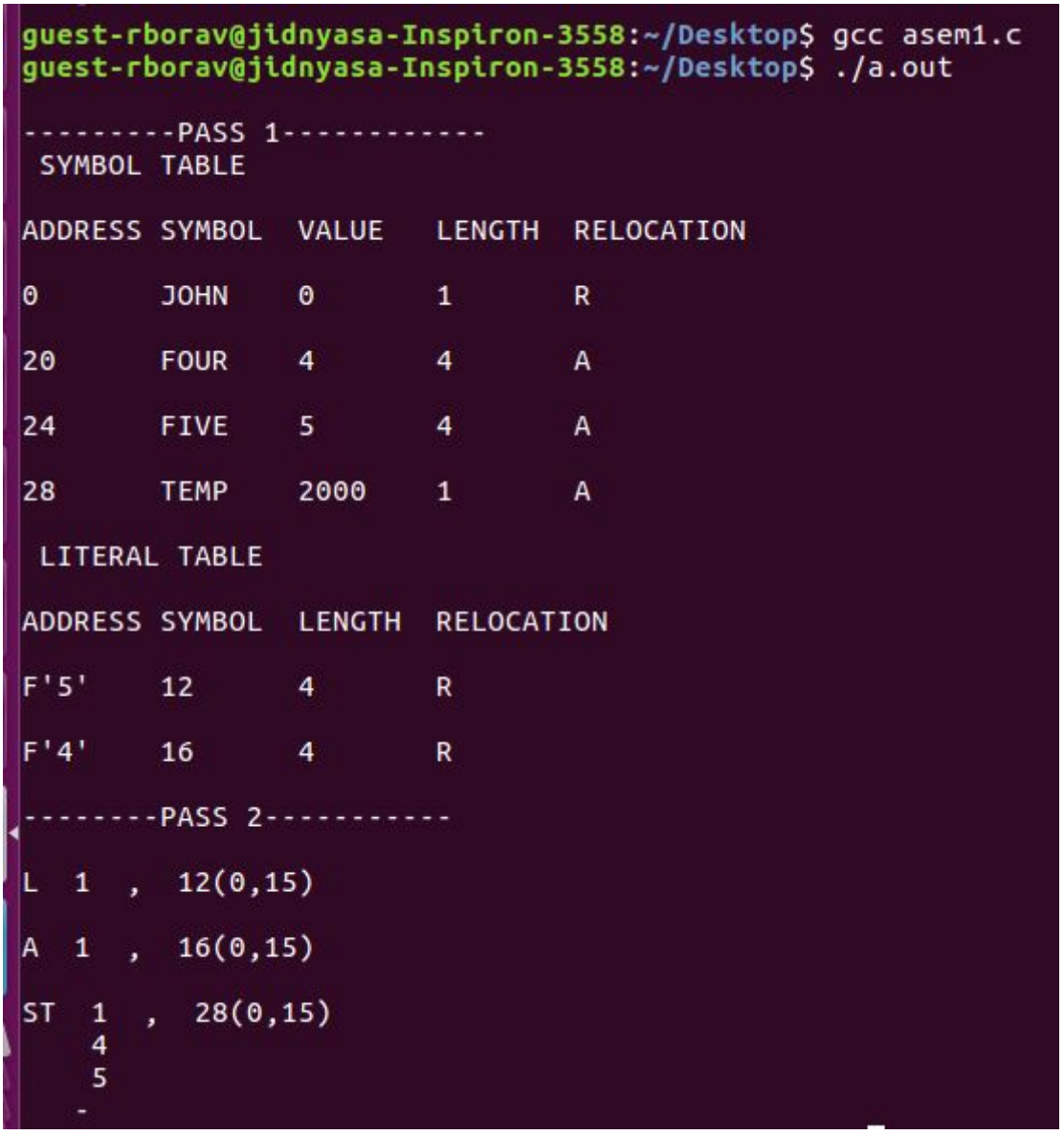

OUTPUT:


guest-rborav@jidnyasa-Inspiron-3558:~/Desktop$ gcc asem1.c
guest-rborav@jidnyasa-Inspiron-3558:~/Desktop$ ./a.out
---------PASS 1-----------
SYMBOL TABLE
ADDRESS SYMBOL VALUE LENGTH RELOCATION
0 JOHN 0 1 R
20 FOUR 4 4 A
24 FIVE 5 4 A
28 TEMP 2000 1 A
LITERAL TABLE
ADDRESS SYMBOL LENGTH RELOCATION
F'5' 12 4 R
F'4' 16 4 R
--------PASS 2----------
L 1 , 12(0,15)
A 1 , 16(0,15)
ST 1 , 28(0,15)
4
5
-