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Practical No. 10

Title :- Write a C program to generate machine code form abstract syntax tree generated by the parser.

Theory :- Code generator convert the intermediate representation of source code into a form that can be readily executed by the machine A code generator a correct code Designing of code generator should be done in such a way that it can be implemented

1. Input to code generator :-
The input to code generator is the intermediate code generated by the front end, along with information in the symbol table that determines run-time address of the data object denoted by the names in the intermidiate representation.

2. Target program :-
Target program is the output of the code generator the output may be absolute machine language relocatable. machine language, asembly language absolute machine language as an output has advantage that it can be placed in a fixed memory location and can be immediately executed.

3. Memory Management :-
Mapping the names in the source program to address of the data object is done by the front end and code

generator a name in the three address statement refers to the symbols table entry for name then from the symbol table entry a relatives address can be determined for the name.

4. Instruction selection :-
Selecting best instruction will improve the efficiency of the program. It include the instruction that should be complete and uniform.

for ex. the respective three address statement can be transfer into latter code sequence.

```
P := Q + R
S := P + T
MOV Q, R0
ADD R, R0
MOV R0, P
MOV P, R0
ADD T, R0
MOV R0, S
```

Here the fourth statement is redundent as the value of the P is loaded again in that statement that just has been stored in the previous statement It leads to an inefficient code sequence

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Register allocation issues:-

Use of register means the computation faster in comparison to that memory so efficiency utilization of registers is important the use of register are subdivided into two subproblems

Certain machine requires register pair consist of an even and next odd number register for ex.

M a,b.

These types of multiplicative instruction involve register pair where a the multiplication is uneven register and b the multiplier is the odd register of the even/odd register pair.

Evaluation order:-

The code generator decides the order in which instruction will be executed.

Approaches to code against issues

Code generator must always generate the correct code It is essential because of the number of special cases that a code generator might fail

- ~~Convert~~ Correct
- Easily maintainable
- Testable
- Maintainable