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System Softwares
Tutorial 13

Ans 1:- Given

$E \rightarrow E A E \mid id$

$A \rightarrow + \mid x$

First Convert Given grammar into Operator Precedence Grammar

$E \rightarrow E+E \mid E x E \mid id$

Terminal Symbols are :- $\{id, +, x, \$\}$

Precedence of Operators is :-

$id > x > +$

Parsing the string $id + id x id$,

Now, using precedence operator :-

$\$ < id > + < id > x < id > \$$

Now,

$\$ < id > + < id > x < id > \$$

$\$ E + < id > x < id > \$$

$\$ E + E x < id > \$$

$\$ E + E x E \$$

$\$ + x \$$

$\$ < + < x > \$$

$\$ < + > \$$

$\$\$$

Ans 2:- Machine
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Ans 3:- Flow
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Ans 2: Machine Dependent Optimization is done after the target code has been generated and when the code is transformed according to the target machine architecture.

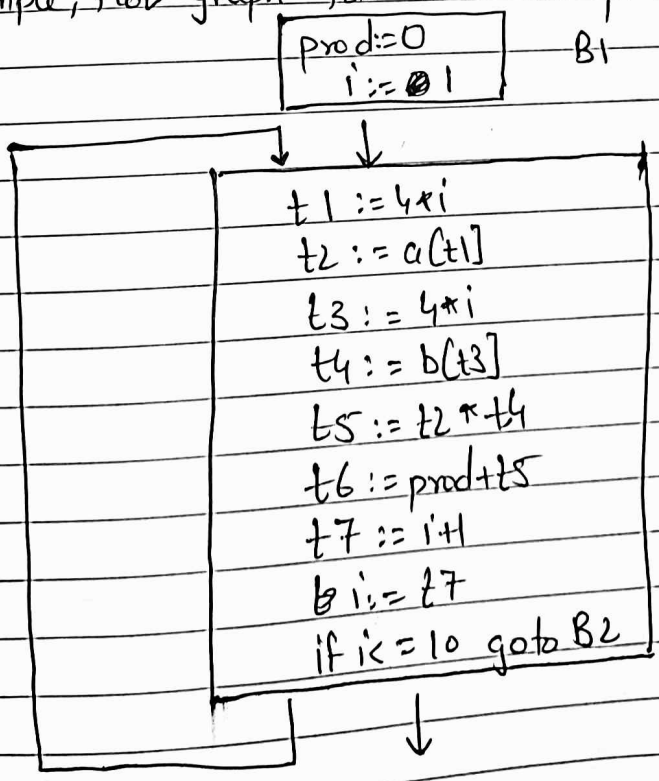
- It involves CPU registers and may have absolute memory references rather than relative references.
- Machine dependent optimizers put efforts to take maximum advantage of memory hierarchy.

Grammar

Ans 3: Flow graph is a directed graph that contains the flow of control information for the set of basic block.

- A control flow graph is used to depict that how the program control is being passed among the block. It is useful in loop optimization.

For example, flow graph for vector dot product is as follows:



Ans 4:- Common Subexpression Elimination is an optimization that searches for instances of identical expressions and replaces them with a single variable holding the computed value.

For instance, consider the following code:-

```
a ← -1 / (8+8+1+9*1^8)
b ← (8+8+1+9*1^8)*2
```

The code computes 8+8+1+9*1^8 twice, which could be evaluated once and assigned to a new variable & used twice. Like:-

```
cs_1 ← (8+8+1+9*1^8)
a ← -1/cs_1
b ← (cs_1)*2
```