Compiler Design

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Unit 3: Syntax Directed Definitions

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Lecture Overview

In this lecture, you will learn about -

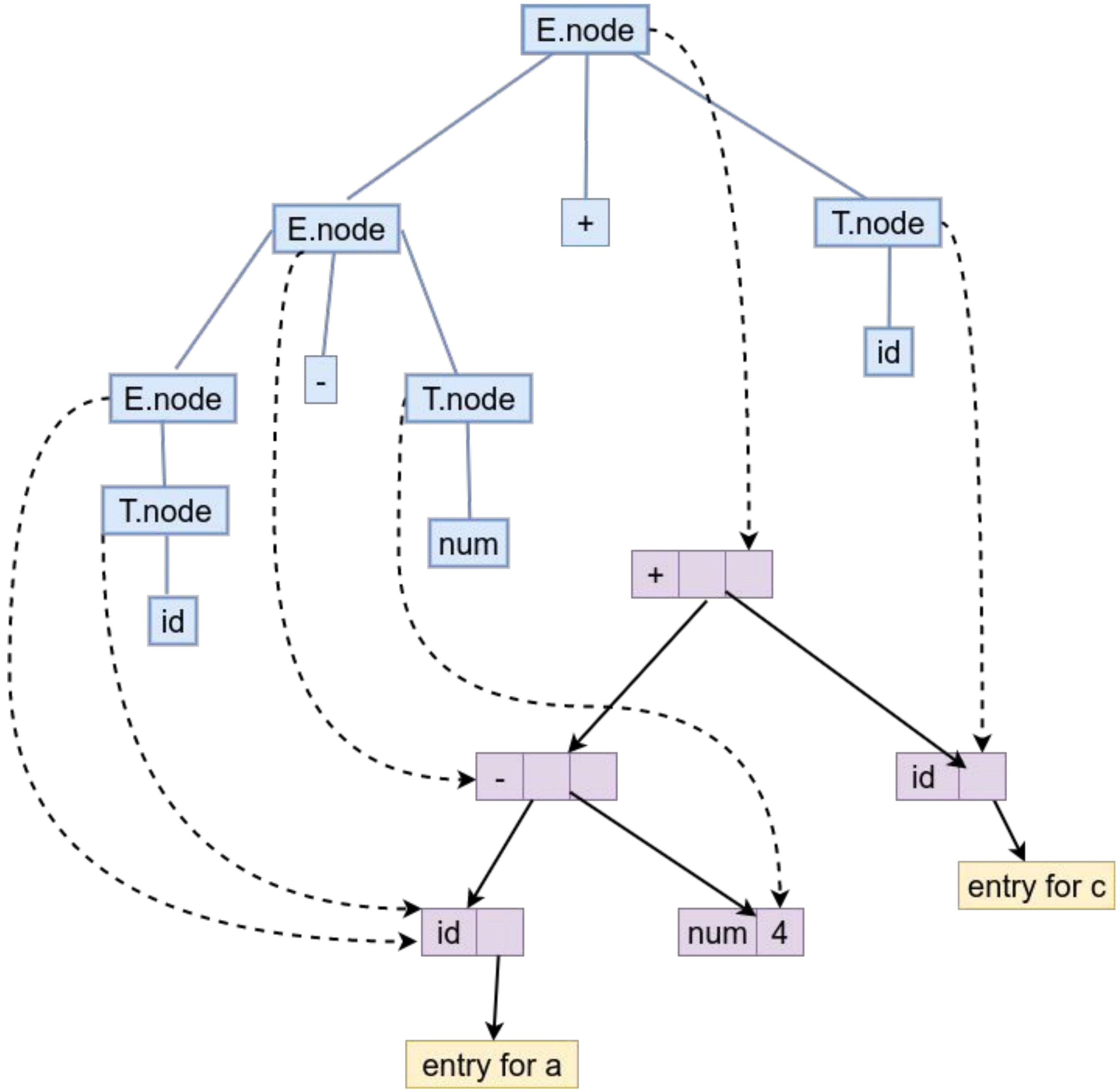
- S–Attributed SDD Examples :
  - To generate Syntax tree for Expressions
  - To generate Syntax tree for Statements

Example 1 - SDD to generate Syntax tree for Expressions

Production	Semantic Rule
E -> E_1 + T	*{ E.node = new Node('+' , E_1.node, T.node); }*
E -> E_1 - T	*{ E.node = new Node('-' , E_1.node, T.node); }*
E -> T	*{ E.node = T.node ; }*
T -> (E)	*{ T.node = E.node ; }*
T -> id	*{ T.node = new Leaf(id , id.entry); }*
T -> num	*{ T.node = new Leaf(num , num.lexval); }*

Example 1 - SDD to generate Syntax tree for Expressions

Use the previous grammar to construct the syntax tree for the input a - 4 + c



Example 2 - SDD to generate Syntax tree for Statements

Production	Semantic Rule
Stmt -> S Stmt	*{ Stmt.node = new Node(Seq, S.node, Stmt.node); }*
Stmt -> S	*{ Stmt.node = S.node; }*
S -> if (cond) { Stmt }	*{ S.node = new Node(if, Cond.node, Stmt.node); }*
S -> while (cond) { Stmt }	*{ S.node = new Node(while, Cond.node, Stmt.node); }*
S -> AssignExpr	*{ S.node = AssignExpr.node ; }*
Cond -> $E_1 > E_2$	*{ Cond.node = new Node(>, E_1.node, E_2.node); }*
Cond -> $E_1 < E_2$	*{ Cond.node = new Node(<, E_1.node, E_2.node); }*
Cond -> E_1 || E_2	*{ Cond.node = new Node(||, E_1.node, E_2.node); }*
Cond -> E_1 && E_2	*{ Cond.node = new Node(&&, E_1.node, E_2.node); }*
AssignExpr -> id = E;	*{ AssignExpr.node =* *new Node(=, new Leaf(id,id.entry), E.node); }*

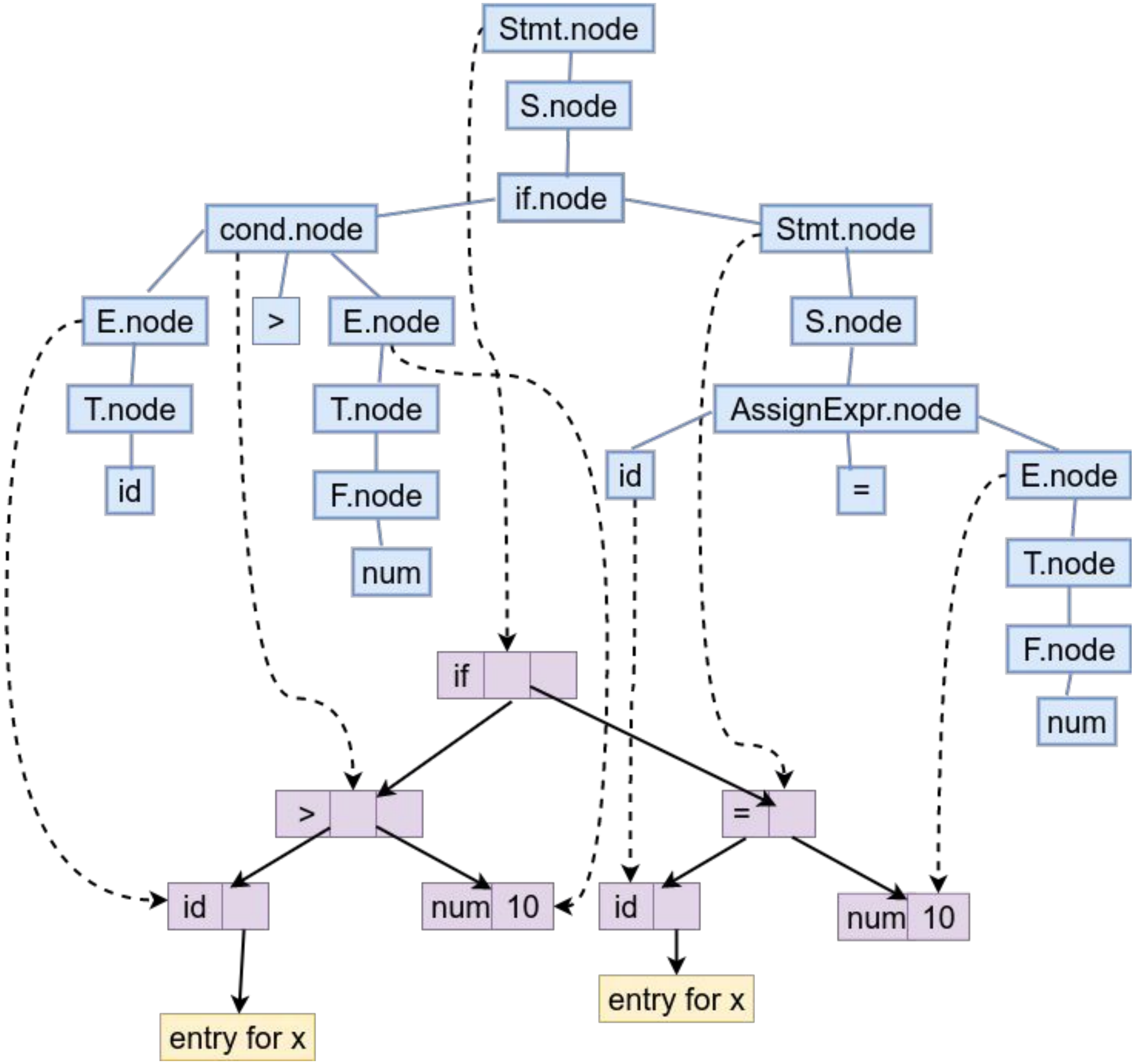
Example 2 - SDD to generate Syntax tree for Statements

Production	Semantic Rule
…	…
$E \rightarrow E_1 + T$	*{ E.node = new Node(‘+’ , E_1.node, T.node); }*
$E \rightarrow T$	*{ E.node = T.node; }*
$T \rightarrow T_1 * F$	*{ T.node = new Node(‘*’ , T_1.node, F.node); }*
$T \rightarrow F$	*{ T.node = F.node; }*
$F \rightarrow$ id	*{ F.node = new Leaf(id , id.entry); }*
$F \rightarrow$ num	*{ F.node = new Leaf(num , num.lexval); }*

Example 2 - SDD to generate Syntax tree for Statements

Use the previous grammar to construct the syntax tree for the input

```
if ( x > 10 )
{
    x = 10;
}
```



THANK YOU

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