CSE 309: Compiler

Tanvir Ahmed Khan
takhandipu@gmail.com

Department of Computer Science and Engineering
Bangladesh University of Engineering and Technology.

April 12, 2015

Recap

Syntax-Directed Translation

```
207 subprogram_declaration: subprogram_head declarations compound_statement
208             {
209                 printf("\nsubprogram_declaration -> subprogram_head declarations
    compound_statement\n");
210                 char *temp=new char[50];
211                 getTemp(temp);
212                 st.insert(temp,"temp");
213                 SymbolInfo *n=st.uplook(temp);
214                 n->code+="\n";
215                 n->code+=$1->symbol;
216                 n->code+=" proc\npush ax\npush bx\npush cx\npush dx\n";
217                 n->code+=$3->code;
218                 n->code+="\npop dx\npop cx\npop bx\npop ax\nret\n";
219                 n->code+=$1->symbol;
220                 n->code+=" endp\n";
221                 $$=n;
222                 delete [] temp;
223             }
224             ;
225 subprogram_head:     FUNCTION ID arguments COLON standard_type SEMICOLON
```

Syntax-Directed Translation

- source language translation is completely driven by Syntax analyzer or, Parser
- grammar written for parsing is augmented with information to control,
  - Semantic analysis
  - Translation

  attribute grammar

Attribute Grammar

- each grammar symbol is associated with attributes,
  - value
  - type
  - memory location

Today's Topic

Syntax-Directed Translation, Contd.

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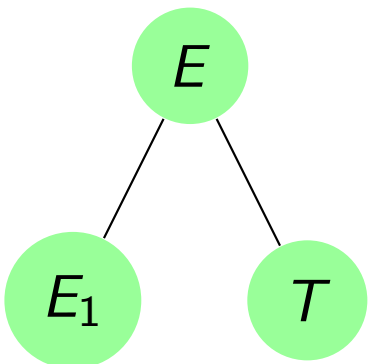

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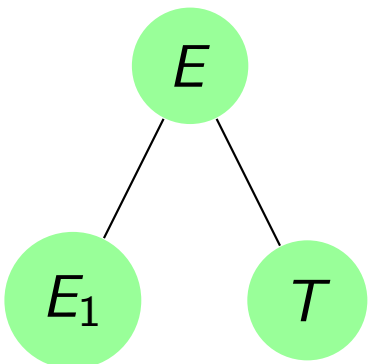

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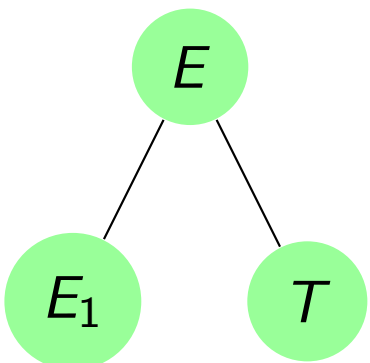

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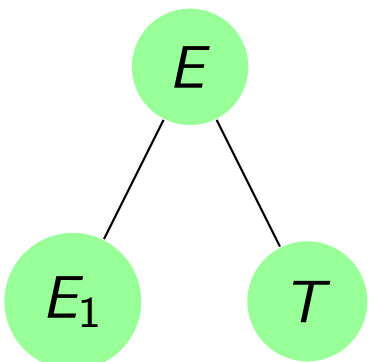

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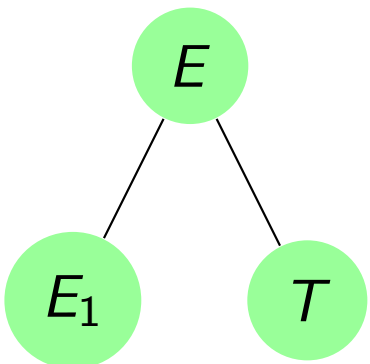

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  - siblings, $T.type = E_1.type$
  - parent node above, $E_1.scope = E.scope$

Attribute Types

Based on how attributes are computed, two types of attributes,

- synthesized attributes
- inherited attributes

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- attributes that are passed *up* a parse tree

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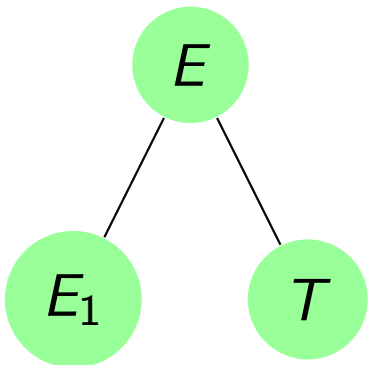

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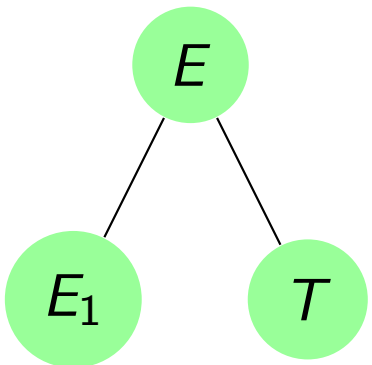

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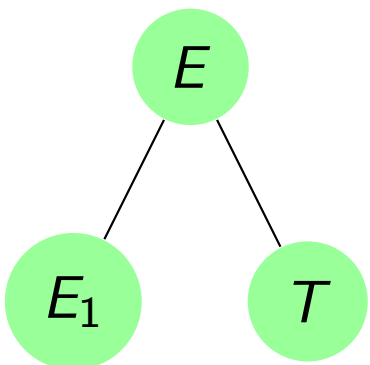

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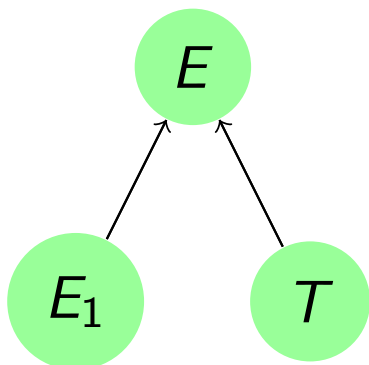

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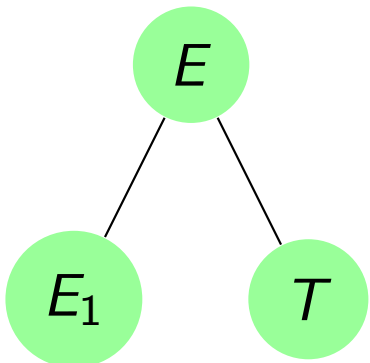

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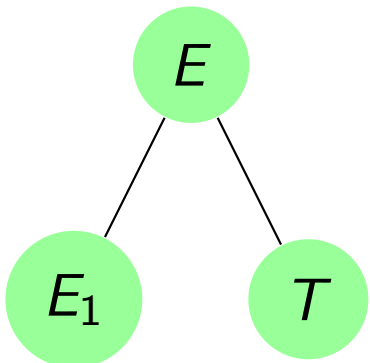

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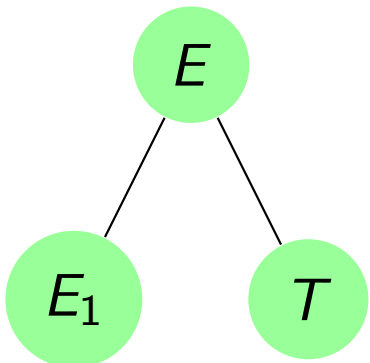

- $E_1.type = T.type$
- $E_1.scope = E.scope$

Attribute Grammar Example

Parsing Grammar,

$$
\begin{array}{lcl}
P & \rightarrow & DS \\
D & \rightarrow & \mathit{var}\ V;\ D \\
D & \rightarrow & \epsilon \\
S & \rightarrow & V\ :=\ E;\ S \\
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Reference

- 16: Syntax-Directed Translation
  From CS 143 Compilers Course