CS480
Translators

What is Bottom-Up Parsing?

Chap. 4

Odds and Ends

- Milestone 3 due tonight!
  - Are you allowed to change the grammar?
  - … the language?
- Make sure you have enough test cases, i.e. programs.
- Milestone 4…

yes

no

constants

Convince me that you did this

Quiz #5

- Eliminate left recursion from the S production in IBTL.
- For each grammar below, calculate First and Follow sets for each nonterminal and construct a parsing table.

  (a) *S* -> 0 *S'*

  S' -> S 1 | 1

  (b) *S* -> (*S*) *S* | ε

- What do we need to do to our grammar to use top-down parsing? Is it LL(1), LL(2), etc.?

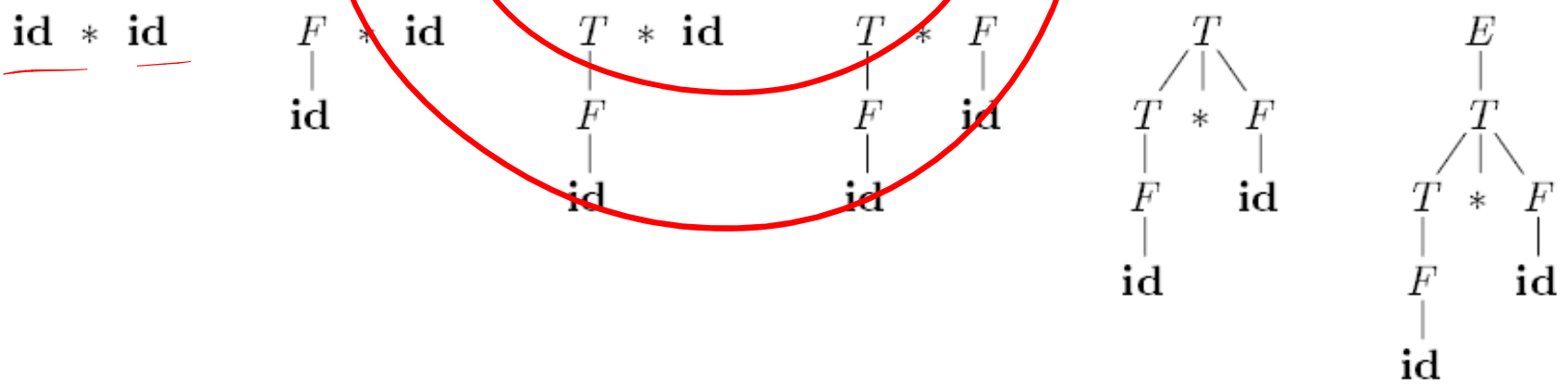
Bottom-Up Parsing

- What is it? and How is it useful?

E->E+T | T

T->T*F | F

F-> (E) | **id**



Reductions

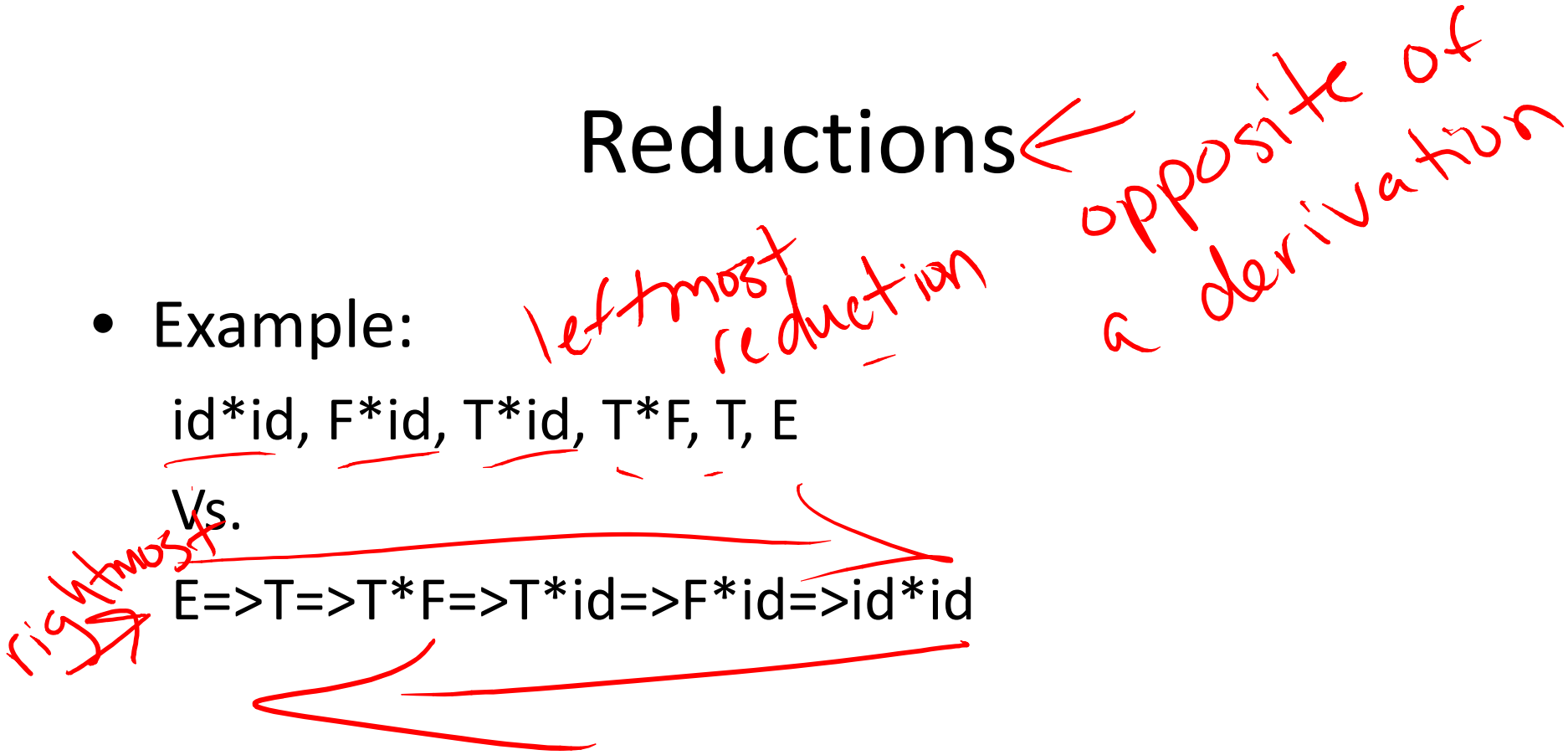
- Example:

  id*id, F*id, T*id, T*F, T, E

  Vs.

  E=>T=>T*F=>T*id=>F*id=>id*id

- What do you notice?



Handles

- What is the Right Sentential Form?
- What is the handle ?

Right Sentential Form	Handle	Reducing Production
$\mathbf{id}_1 * \mathbf{id}_2$	$\mathbf{id}_1$	$F \to \mathbf{id}$
$F * \mathbf{id}_2$	F	$T \to F$
$T * \mathbf{id}_2$	$\mathbf{id}_2$	$F \to \mathbf{id}$
$T * F$	$T * F$	$T \to T * F$
T	T	$E \to T$

Figure 4.26: Handles during a parse of $\mathbf{id}_1 * \mathbf{id}_2$

Shift/Reduce Parser

- Stack – track position in parse
- Table – what to do
  - Shift – Put next input on stack.
  - Reduce – If the handle is on the stack, then reduce.
  - Accept – Successful completion.
  - Error – Discover Syntax error.

Shift/Reduce Parser cont…

- Stack, input, and action

STACK	INPUT	ACTION
$	$\mathbf{id}_1 * \mathbf{id}_2$ $	shift
$ $\mathbf{id}_1$	$* \mathbf{id}_2$ $	reduce by $F \rightarrow \mathbf{id}$
$ F	$* \mathbf{id}_2$ $	reduce by $T \rightarrow F$
$ T	$* \mathbf{id}_2$ $	shift
$ $T *$	$\mathbf{id}_2$ $	shift
$ $T * \mathbf{id}_2$	$	reduce by $F \rightarrow \mathbf{id}$
$ $T * F$	$	reduce by $T \rightarrow T * F$
$ T	$	reduce by $E \rightarrow T$
$ E	$	accept