

Shift-Reduce Parsers

Shift-Reduce Table, which has 4 different entries:

- s for "shift", meaning to shift the current symbol onto the top of the stack and let the next input symbol become the new current symbol.
- r for "reduce", meaning to find the right side of a grammar rule on the top of the stack and replace (reduce) it with the left side.
- acc for "accept", meaning to accept the input.
- a blank, which means an error has occurred.

Shift-Reduce Parsers

Grammar: Arithmetic Expressions

| | | | |
|---|-----|-------|----|
| P | --> | E | |
| E | --> | E + T | T |
| T | --> | T * F | F |
| F | --> | (E) | id |

Input Sentence

(id + id) * id

Shift-Reduce Parsers

Shift-Reduce Actions

| Stack (top at right) | Curr Sym | Rest of Input | Action |
|-------------------------|-------------|-------------------|---------------------|
| \$ | (| id + id) * id \$ | shift |
| \$ (| id | + id) * id \$ | shift |
| \$ (id | + | id) * id \$ | reduce: F --> id |
| \$ (F | + | id) * id \$ | reduce: T --> F |
| \$ (T | + | id) * id \$ | reduce: E --> T |
| \$ (E | + | id) * id \$ | shift |
| \$ (E + | id |) * id \$ | shift |
| \$ (E + id |) | * id \$ | reduce: F --> id |
| \$ (E + F |) | * id \$ | reduce: T --> F |
| \$ (E + T |) | * id \$ | reduce: E --> E + T |
| \$ (E) | * | id \$ | shift |
| \$ F | * | id \$ | reduce: F --> (E) |
| \$ T | * | id \$ | reduce: T --> F |
| \$ T * | id | \$ | shift |
| \$ T * id | \$ | | shift |
| \$ T * F | \$ | | reduce: F --> id |
| \$ T | \$ | | reduce: T --> T * F |
| \$ E | \$ | | reduce: E --> T |
| \$ P | \$ | | reduce: P --> E |
| | | | accept |

Shift-Reduce Parsers

Bài tập

| Grammar: Arithmetic Expressions | | | | |
|------------------------------------|-------|-------|--|-----------|
| P | ----> | E | | |
| E | ----> | E + T | | E - T T |
| T | ----> | T * S | | T / S S |
| S | ----> | F ^ S | | F |
| F | ----> | (E) | | id |

| Input sentence |
|------------------------------|
| \$ id + id * id ^ id + id \$ |

2. Shift-Reduce parse of \$ id + id * id ^ id + id \$

| Stack (top at right) | Curr Sym | Rest of Input | Action | Reduction Number |
|-------------------------|-------------|------------------------|---------------------|---------------------|
| \$ | id | + id * id ^ id + id \$ | Shift | |
| \$ id | + | id * id ^ id + id \$ | Reduce: F --> id | 1 |
| \$ F | + | id * id ^ id + id \$ | Reduce: S --> F | 2 |
| \$ S | + | id * id ^ id + id \$ | Reduce: T --> S | 3 |
| \$ T | + | id * id ^ id + id \$ | Reduce: E --> T | 4 |
| \$ E | + | id * id ^ id + id \$ | Shift | |
| \$ E + | id | * id ^ id + id \$ | Shift | |
| \$ E + id | * | id ^ id + id \$ | Reduce: F --> id | 5 |
| \$ E + F | * | id ^ id + id \$ | Reduce: S --> F | 6 |
| \$ E + S | * | id ^ id + id \$ | Reduce: T --> S | 7 |
| \$ E + T | * | id ^ id + id \$ | Shift | |
| \$ E + T * | id | ^ id + id \$ | Shift | |
| \$ E + T * id | ^ | id + id \$ | Reduce: F --> id | 8 |
| \$ E + T * F | ^ | id + id \$ | Shift | |
| \$ E + T * F ^ | id | + id \$ | Shift | |
| \$ E + T * F ^ id | + | id \$ | Reduce: F --> id | 9 |
| \$ E + T * F ^ F | + | id \$ | Reduce: S --> F | 10 |
| \$ E + T * F ^ S | + | id \$ | Reduce: S --> F ^ S | 11 |
| \$ E + T * S | + | id \$ | Reduce: T --> T * S | 12 |
| \$ E + T | + | id \$ | Reduce: E --> E + T | 13 |
| \$ E | + | id \$ | Shift | |
| \$ E + | id | \$ | Shift | |
| \$ E + id | \$ | | Reduce: F --> id | 14 |
| \$ E + F | \$ | | Reduce: S --> F | 15 |
| \$ E + S | \$ | | Reduce: T --> S | 16 |
| \$ E + T | \$ | | Reduce: E --> E + T | 17 |
| \$ E | \$ | | Reduce: P --> E | 18 |
| \$ P | \$ | | Acc | |