

I understand you want the LL(1) parsing steps (stack, input, actions) for the expression $y = a + b * c ;$, with the input formatted as $y = a + b (*) c ; \$$, where $(*)$ likely indicates a multiplication operation, possibly with parentheses in the intended expression, but based on your previous examples, I'll assume you mean $y = a + b * c ;$ with $\$$ as the end-of-input marker. The $(*)$ seems to be a typo or emphasis for the $*$ operator, so I'll parse $y = a + b * c ;$ using the LL(1) grammar from the previous response. If you meant something else (e.g., actual parentheses like $y = a + b * (c) ;$), please clarify.

I'll provide only the stack, input, and actions for LL(1) parsing, as requested, using the same grammar as before for consistency. The grammar is:

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```
S → id = E ;  
E → T E'  
E' → + T E' | ε  
T → F T'  
T' → * F T' | ε  
F → id | ( F )
```

- **Terminals:** id (identifier, e.g., y, a, b, c), $=$, $+$, $*$, $(,)$, $;$, $\$$ (end of input).
- **Non-terminals:** S (statement), E (expression), E' (expression tail), T (term), T' (term tail), F (factor).

Parsing $y = a + b * c ;$

- **Input tokens:** $y, =, a, +, b, *, c, ;, \$$
- **Parsing steps:** Start with stack $S \$$.

Step	Stack	Input	Action 
1	S \$	y = a + b * c ; \$	S → id = E ;
2	id = E ; \$	y = a + b * c ; \$	Match id (y)
3	= E ; \$	= a + b * c ; \$	Match =
4	E ; \$	a + b * c ; \$	E → T E'
5	T E' ; \$	a + b * c ; \$	T → F T'
6	F T' E' ; \$	a + b * c ; \$	F → id
7	id T' E' ; \$	a + b * c ; \$	Match id (a)
8	T' E' ; \$	+ b * c ; \$	T' → ε
9	E' ; \$	+ b * c ; \$	E' → + T E'
10	+ T E' ; \$	+ b * c ; \$	Match +
11	T E' ; \$	b * c ; \$	T → F T'
12	F T' E' ; \$	b * c ; \$	F → id
13	id T' E' ; \$	b * c ; \$	Match id (b)
14	T' E' ; \$	* c ; \$	T' → * F T'
15	* F T' E' ; \$	* c ; \$	Match *
16	F T' E' ; \$	c ; \$	F → id
17	id T' E' ; \$	c ; \$	Match id (c)
18	T' E' ; \$; \$	T' → ε
19	E' ; \$; \$	E' → ε
20	; \$; \$	Match ;
21	\$	\$	Accept

Notes

- **Input Format:** I assumed $(*)$ in $y = a + b (*) c ;$; \$ emphasizes the $*$ operator, so I parsed $y = a + b * c ;$. If you meant $y = a + b * (c) ;$, the grammar supports it, but the parsing steps would differ slightly due to the parentheses. Let me know if you want that version.
- **Grammar:** The LL(1) grammar handles $+$ and $*$ with proper precedence ($*$ binds tighter than $+$). The ϵ productions allow the parser to terminate expression tails when no further operators are present.
- **AST:** If you want the abstract syntax tree (as requested earlier), it's:

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Assignment (=)

├── Left: Identifier (y)

└── Right: Addition (+)

├── Left: Identifier (a)

└── Right: Multiplication (*)

├── Left: Identifier (b)

└── Right: Identifier (c)

- **Clarification:** If you want another example with different operators, parentheses, or the full original expression $x = (a + b) * (c - d) / 2.5 + e \% f ;$, I can provide it, but it requires a more complex grammar to handle $/$, $\%$, and 2.5 . Let me know your preference!

If you need more examples or a specific variation (e.g., with parentheses or other operators), please specify!