

Example

XL grammar

$T = \{ \text{ID}, \text{PLUS}, \text{TIMES}, \text{LP}, \text{RP} \};$

$N = \{ \text{exp}, \text{term}, \text{fac} \};$

$S = \text{exp};$

P:

1/ $\text{exp} \rightarrow \text{exp} \text{ PLUS } \text{term}$

2 | term

3/ $\text{term} \rightarrow \text{term} \text{ TIMES } \text{fac}$

4/ | fac

5/ $\text{fac} \rightarrow \text{ID}$

6/ | LP exp RP

最左归约

		<u>ID</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS <u>term</u> TIMES <u>ID</u>	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term</u> TIMES <u>fac</u>	ID PLUS ID TIMES ID
7	← rm	<u>exp</u> PLUS <u>term</u>	ID PLUS ID TIMES ID
8	← rm	<u>exp</u>	ID PLUS ID TIMES ID

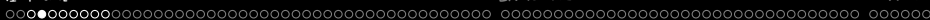
问题

- 在第⑤如果用以下方式归约将出错:

5 ←
rm exp PLUS term TIMES ID

6' ←
rm exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

$T = \{ \text{ID}, \text{PLUS}, \text{TIMES}, \text{LP}, \text{RP} \};$

$N = \{ \text{exp}, \text{term}, \text{fac} \};$

$S = \text{exp};$

$P:$

1/ $\text{exp} \rightarrow \text{exp} \text{ PLUS term}$

2 | term

3/ $\text{term} \rightarrow \text{term} \text{ TIMES fac}$

4/ | fac

5/ $\text{fac} \rightarrow \text{ID}$

6/ | LP exp RP

最左归约

	<u>ID PLUS ID TIMES ID</u>	ID PLUS ID TIMES ID
1 ← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2 ← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3 ← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4 ← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5 ← rm	exp PLUS <u>term</u> TIMES ID	ID PLUS ID TIMES ID
6 ← rm	exp PLUS <u>term TIMES fac</u>	ID PLUS ID TIMES ID
7 ← rm	<u>exp PLUS term</u>	ID PLUS ID TIMES ID
8 ← rm	<u>exp</u>	ID PLUS ID TIMES ID

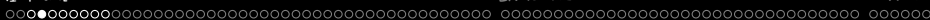
问题

- 在第⑤如果用以下方式归约将出错:

5 ←
rm exp PLUS term TIMES ID

6' ←
rm exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

$T = \{ \text{ID}, \text{PLUS}, \text{TIMES}, \text{LP}, \text{RP} \};$

$N = \{ \text{exp}, \text{term}, \text{fac} \};$

$S = \text{exp};$

P:

1/ $\text{exp} \rightarrow \text{exp} \text{ PLUS } \text{term}$

2 | term

3/ $\text{term} \rightarrow \text{term} \text{ TIMES } \text{fac}$

4/ | fac

5/ $\text{fac} \rightarrow \text{ID}$

6/ | LP exp RP

最左归约

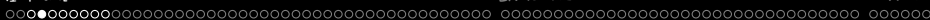
		<u>ID PLUS ID TIMES ID</u>	ID PLUS ID TIMES ID
1	\leftarrow rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	\leftarrow rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	\leftarrow rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	\leftarrow rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	\leftarrow rm	exp PLUS <u>term</u> TIMES <u>ID</u>	ID PLUS ID TIMES ID
6	\leftarrow rm	exp PLUS <u>term TIMES fac</u>	ID PLUS ID TIMES ID
7	\leftarrow rm	<u>exp PLUS term</u>	ID PLUS ID TIMES ID
8	\leftarrow rm	<u>exp</u>	ID PLUS ID TIMES ID

问题

- 在第⑤如果用以下方式归约将出错:

5 \leftarrow exp PLUS term TIMES ID
 6' \leftarrow exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

T = { ID, PLUS, TIMES,
LP, RP};

N = {exp, term, fac};

S = exp;

P:

1/ exp → exp PLUS term

2 | term

3/ term → term TIMES fac

4 | fac

5/ fac → ID

6 | LP exp RP

最左归约

		<u>ID PLUS ID TIMES ID</u>	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS term <u>TIMES ID</u>	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term TIMES fac</u>	ID PLUS ID TIMES ID
7	← rm	<u>exp PLUS term</u>	ID PLUS ID TIMES ID
8	← rm	<u>exp</u>	ID PLUS ID TIMES ID

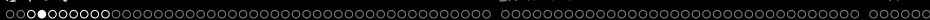
问题

- 在第⑤如果用以下方式归约将出错:

5 ← exp PLUS term TIMES ID

6' ← exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

T = { ID, PLUS, TIMES,
LP, RP};

N = {exp, term, fac};

S = exp;

P:

1/ exp → exp PLUS term

2 | term

3/ term → term TIMES fac

4 | fac

5/ fac → ID

6 | LP exp RP

最左归约

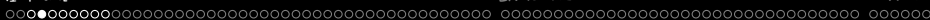
		ID PLUS ID TIMES ID	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS <u>term</u> TIMES ID	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term</u> TIMES fac	ID PLUS ID TIMES ID
7	← rm	<u>exp</u> PLUS term	ID PLUS ID TIMES ID
8	← rm	<u>exp</u>	ID PLUS ID TIMES ID

问题

- 在第⑤如果用以下方式归约将出错:

5 ← exp PLUS term TIMES ID
6' ← exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

T = { ID, PLUS, TIMES,
LP, RP};

N = {exp, term, fac};

S = exp;

P:

1/ exp → exp PLUS term
2 | term

3/ term → term TIMES fac
4 | fac

5/ fac → ID

6/ | LP exp RP

最左归约

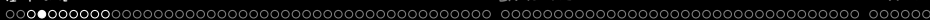
		ID PLUS ID TIMES ID	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS term <u>TIMES ID</u>	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term TIMES fac</u>	ID PLUS ID TIMES ID
7	← rm	<u>exp PLUS term</u>	ID PLUS ID TIMES ID
8	← rm	<u>exp</u>	ID PLUS ID TIMES ID

问题

- 在第⑤如果用以下方式归约将出错:

5 ←
rm exp PLUS term TIMES ID
6' ←
rm exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

$T = \{ \text{ID}, \text{PLUS}, \text{TIMES}, \text{LP}, \text{RP} \};$
 $N = \{ \text{exp}, \text{term}, \text{fac} \};$
 $S = \text{exp};$
 $P:$
 1/ $\text{exp} \rightarrow \text{exp PLUS term}$
 | term
 3/ $\text{term} \rightarrow \text{term TIMES fac}$
 | fac
 5/ $\text{fac} \rightarrow \text{ID}$
 6/ | LP exp RP

最左归约

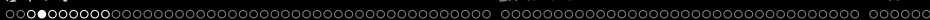
		<u>ID PLUS ID TIMES ID</u>	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS <u>term</u> TIMES <u>ID</u>	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term</u> TIMES <u>fac</u>	ID PLUS ID TIMES ID
7	← rm	exp PLUS <u>term</u>	ID PLUS ID TIMES ID
8	← rm	exp	ID PLUS ID TIMES ID

问题

- 在第⑤如果用以下方式归约将出错:

5 ←
 rm exp PLUS term TIMES ID
 6' ←
 rm exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

$T = \{ \text{ID}, \text{PLUS}, \text{TIMES}, \text{LP}, \text{RP} \};$

$N = \{ \text{exp}, \text{term}, \text{fac} \};$

$S = \text{exp};$

P:

1/ $\text{exp} \rightarrow \text{exp} \text{ PLUS } \text{term}$

2 | term

3/ $\text{term} \rightarrow \text{term} \text{ TIMES } \text{fac}$

4/ | fac

5/ $\text{fac} \rightarrow \text{ID}$

6/ | LP exp RP

最左归约

		<u>ID PLUS ID TIMES ID</u>	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS <u>term</u> TIMES <u>ID</u>	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term TIMES fac</u>	ID PLUS ID TIMES ID
7	← rm	exp PLUS <u>term</u>	ID PLUS ID TIMES ID
8	← rm	<u>exp</u>	ID PLUS ID TIMES ID

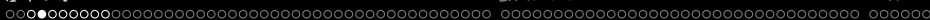
问题

- 在第⑤如果用以下方式归约将出错:

5 ←
rm exp PLUS term TIMES ID

6' ←
rm exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

$T = \{ \text{ID}, \text{PLUS}, \text{TIMES}, \text{LP}, \text{RP} \};$

$N = \{ \text{exp}, \text{term}, \text{fac} \};$

$S = \text{exp};$

P:

1/ $\text{exp} \rightarrow \text{exp} \text{ PLUS } \text{term}$

2 | term

3/ $\text{term} \rightarrow \text{term} \text{ TIMES } \text{fac}$

4/ | fac

5/ $\text{fac} \rightarrow \text{ID}$

6/ | LP exp RP

最左归约

		<u>ID PLUS ID TIMES ID</u>	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS <u>term</u> TIMES <u>ID</u>	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term</u> TIMES <u>fac</u>	ID PLUS ID TIMES ID
7	← rm	<u>exp</u> PLUS <u>term</u>	ID PLUS ID TIMES ID
8	← rm	<u>exp</u>	ID PLUS ID TIMES ID

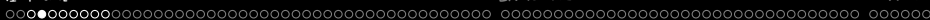
问题

- 在第⑤如果用以下方式归约将出错:

5 ←
rm exp PLUS term TIMES ID

6' ←
rm exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

$T = \{ \text{ID}, \text{PLUS}, \text{TIMES}, \text{LP}, \text{RP} \};$

$N = \{ \text{exp}, \text{term}, \text{fac} \};$

$S = \text{exp};$

P:

1/ $\text{exp} \rightarrow \text{exp} \text{ PLUS } \text{term}$

2 | term

3/ $\text{term} \rightarrow \text{term} \text{ TIMES } \text{fac}$

4/ | fac

5/ $\text{fac} \rightarrow \text{ID}$

6/ | LP exp RP

最左归约

		<u>ID PLUS ID TIMES ID</u>	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS <u>term</u> TIMES <u>ID</u>	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term</u> TIMES <u>fac</u>	ID PLUS ID TIMES ID
7	← rm	<u>exp</u> PLUS <u>term</u>	ID PLUS ID TIMES ID
8	← rm	<u>exp</u>	ID PLUS ID TIMES ID

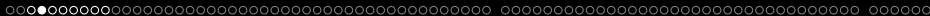
问题

- 在第⑤如果用以下方式归约将出错:

5 ←
 rm exp PLUS term TIMES ID

6' ←
 rm exp TIMES ID

Not match any RHS of productions!



Example

XL grammar

$T = \{ \text{ID, PLUS, TIMES, LP, RP} \};$

$N = \{ \text{exp, term, fac} \};$

$S = \text{exp};$

P:

1/ $\text{exp} \rightarrow \text{exp PLUS term}$

2 | term

3/ $\text{term} \rightarrow \text{term TIMES fac}$

4/ | fac

5/ $\text{fac} \rightarrow \text{ID}$

6/ | LP exp RP

最左归约

		<u>ID PLUS ID TIMES ID</u>	ID PLUS ID TIMES ID
1	← rm	<u>fac</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
2	← rm	<u>term</u> PLUS ID TIMES ID	ID PLUS ID TIMES ID
3	← rm	exp PLUS <u>ID</u> TIMES ID	ID PLUS ID TIMES ID
4	← rm	exp PLUS <u>fac</u> TIMES ID	ID PLUS ID TIMES ID
5	← rm	exp PLUS <u>term</u> TIMES <u>ID</u>	ID PLUS ID TIMES ID
6	← rm	exp PLUS <u>term</u> TIMES <u>fac</u>	ID PLUS ID TIMES ID
7	← rm	<u>exp</u> PLUS <u>term</u>	ID PLUS ID TIMES ID
8	← rm	<u>exp</u>	ID PLUS ID TIMES ID

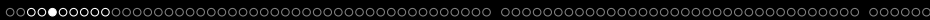
问题

- 在第⑤如果用以下方式归约将出错:

5 ←
 rm exp PLUS term TIMES ID

6' ←
 rm exp TIMES ID

Not match any RHS of productions!



Example --- 归约与语法树的建立的关系。

最左归约: $\overset{*}{\leftarrow}$ ID PLUS ID TIMES ID
rm

ID

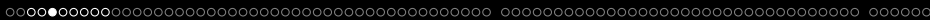
PLUS

ID

TIMES

ID

句柄



Example --- 归约与语法树的建立的关系。

最左归约: $\xleftarrow{*}_{rm}$ term PLUS ID TIMES ID

term

fac

ID

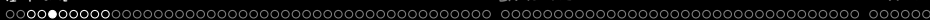
PLUS

ID

TIMES

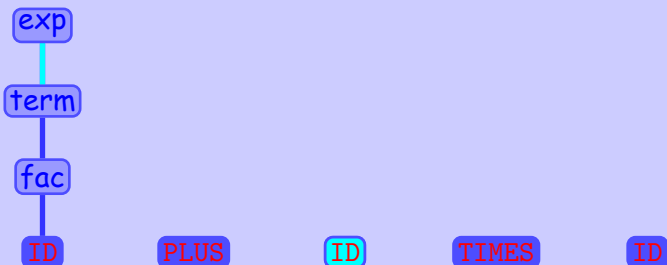
ID

句柄

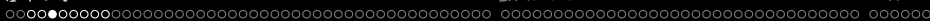


Example --- 归约与语法树的建立的关系。

最左归约: $\xleftarrow{*}_{rm}$ exp PLUS ID TIMES ID

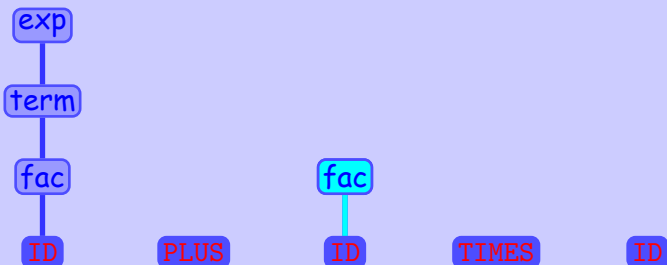


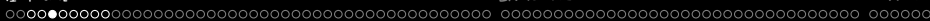
句柄



Example --- 归约与语法树的建立的关系。

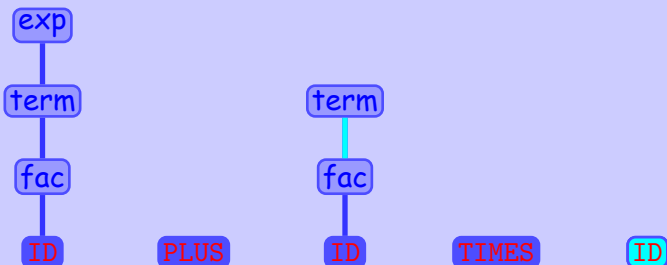
最左归约: $\xleftarrow{*}_{rm}$ exp PLUS fac TIMES ID

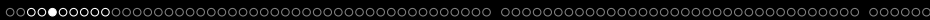




Example --- 归约与语法树的建立的关系。

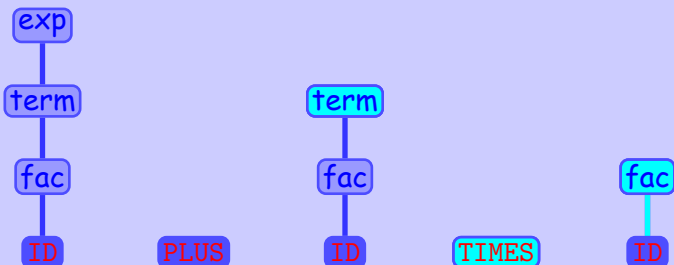
最左归约: $\xleftarrow{*}_{rm}$ exp PLUS term TIMES ID

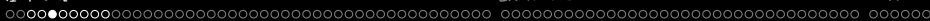




Example --- 归约与语法树的建立的关系。

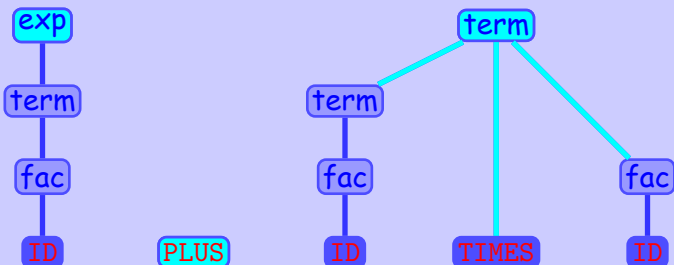
最左归约: $\xleftarrow{*}_{rm}$ exp PLUS term TIMES fac

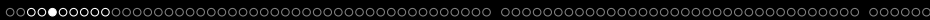




Example --- 归约与语法树的建立的关系。

最左归约: $\xleftarrow{*}_{rm}$ exp PLUS term





Example --- 归约与语法树的建立的关系。

最左归约: $\xleftarrow{rm} \text{exp}$

