1. Grammar symbols: Used cross reference.
Reference of each grammar's symbol used within each rule's productions. The index uses the tripple: rule name, its subrule no, and the symbol's position within the symbol string.

2. # constructor:.
Rmust_directive 5.2 Rdirective 5.2

3. # destructor:.
Rmust_directive 6.2 Rdirective 6.2

4. # failed:.
Rmust_directive 8.2 Rdirective 8.2

5. # op:.
Rmust_directive 7.2 Rdirective 7.2

6. # user-declaration:.
Rmust_directive 1.2 Rdirective 1.2

7. # user-imp-sym:.
Rmust_directive 10.2 Rdirective 10.2

8. # user-imp-tbl:.
Rmust_directive 9.2 Rdirective 9.2

9. # user-implementation:.
Rmust_directive 2.2 Rdirective 2.2

10. # user-prefix-declaration:.
Rmust_directive 3.2 Rdirective 3.2

11. # user-suffix-declaration:.
Rmust_directive 4.2 Rdirective 4.2

12. NS_cweb_or_c_k::TH_cweb_or_c_k:.
Rdirective_cweb_k 2.3 Rcweb_k 1.3

13. NS_identifier::TH_identifier:.
Rid 1.3 Rmust_directive 1.3 Rdirective 1.3

14. NS_lint_balls::TH_lint_balls:.
Rlint 1.3

15. NS_o2_sdc::TH_o2_sdc:.
Rsyntax_code 1.3

16. NULL thread:.
Rid 2.3 Rmust_directive 2.3 Rmust_directive 3.3 Rmust_directive 4.3 Rmust_directive 5.3 Rmust_directive 6.3 Rmust_directive 7.3 Rmust_directive 8.3 Rmust_directive 9.3 Rmust_directive 10.3 Rmust_directive 11.3 Rdirective 2.3 Rdirective 3.3 Rdirective 4.3 Rdirective 5.3 Rdirective 6.3 Rdirective 7.3 Rdirective 8.3 Rdirective 9.3 Rdirective 10.3 Rdirective 11.3 Rsyntax_code 2.3 Rdirective_cweb_k 3.3 Rcweb_k 2.3

17. Rclosing_brace:.
Rpotential_directives 2.5

18. Rcweb_k:.
Rmaybe_directive_phrase 1.1

19. Rdirective:.
Rmaybe_directive_phrase 1.3 Rmaybe_directive_phrase 2.1

20. Rdirective_cweb_k:.
Rmust_directive_phrase 1.1

21. Rid:.
Rfsm_class_phrase_th 1.1

22. Rlint:.
Rfsm_class_phrase_th 1.2 Rpotential_directives 2.2 Rpotential_directives 2.6 Rmust_directive_phrase 1.2 Rmust_directive_phrase 1.5 Rmaybe_directive_phrase 1.2 Rmaybe_directive_phrase 1.5 Rmaybe_directive_phrase 2.3

23. Rmaybe_directive_phrase:.
Rmaybe_directive_phrases 1.1 Rmaybe_directive_phrases 2.2

24. Rmaybe_directive_phrases:.
Rmaybe_more_directives 2.1 Rmaybe_directive_phrases 2.1

25. Rmaybe_more_directives:.
Rpotential_directives 2.4

26. Rmust_directive:.
Rmust_directive_phrase 1.3

27. Rmust_directive_phrase:.
Rpotential_directives 2.3

28. Rpotential_code_blk:.
Rfsm_class_phrase_th 1.3

29. Rpotential_directives:.
Rpotential_code_blk 1.1

30. Rsyntax_code:.
Rmust_directive_phrase 1.4 Rmaybe_directive_phrase 1.4 Rmaybe_directive_phrase 2.2

31. ϵ :.
Rmaybe_more_directives 1.1 Rlint 2.1 Rdirective_cweb_k 1.1

32. comment-overrun:.
Rdirective_cweb_k 3.2 Rcweb_k 2.2

33. cweb-comment:.
Rdirective_cweb_k 2.2 Rcweb_k 1.2

34. identifier:.
Rid 1.2

35. lint:.
Rlint 1.2

36. syntax-code:.
Rsyntax_code 1.2

37. {:.
Rpotential_directives 2.1

38. |.|:.
Rpotential_directives 1.1

39. `|?|:`.
Rid 2.2 Rid 3.1 Rmust_directive 11.2 Rmust_directive 12.1 Rdirective 11.2 Rclosing_brace 1.1 Rsyntax_code 2.2

40. `|||:`.
Rid 1.1 Rid 2.1 Rmust_directive 1.1 Rmust_directive 2.1 Rmust_directive 3.1 Rmust_directive 4.1 Rmust_directive 5.1 Rmust_directive 6.1 Rmust_directive 7.1 Rmust_directive 8.1 Rmust_directive 9.1 Rmust_directive 10.1 Rmust_directive 11.1 Rdirective 1.1 Rdirective 2.1 Rdirective 3.1 Rdirective 4.1 Rdirective 5.1 Rdirective 6.1 Rdirective 7.1 Rdirective 8.1 Rdirective 9.1 Rdirective 10.1 Rdirective 11.1 Rsyntax_code 1.1 Rsyntax_code 2.1 Rlint 1.1 Rdirective_cweb_k 2.1 Rdirective_cweb_k 3.1 Rcweb_k 1.1 Rcweb_k 2.1

41. `}:.`
Rclosing_brace 2.1

42. Grammar Rules's First Sets.

43. *Rfsm_class_phrase_th* # **in set: 2.**
|?| |||

44. *Rid* # **in set: 2.**
|?| |||

45. *Rpotential_code_blk* # **in set: 2.**
{ |.|

46. *Rpotential_directives* # **in set: 2.**
{ |.|

47. *Rmust_directive_phrase* # **in set: 2.**
|?| |||

48. *Rmust_directive* # **in set: 2.**
|?| |||

49. *Rmaybe_more_directives*$^{\epsilon}$ # **in set: 1.**
|||

50. *Rmaybe_directive_phrases* # **in set: 1.**
|||

51. *Rmaybe_directive_phrase* # **in set: 1.**
|||

52. *Rdirective* # **in set: 1.**
|||

53. *Rclosing_brace* # **in set: 2.**
|?| }

54. *Rsyntax_code* # **in set: 1.**
|||

55. *Rlint*$^{\epsilon}$ # **in set: 1.**
|||

56. *Rdirective_cweb_k*$^{\epsilon}$ # **in set: 1.**
|||

57. *Rcweb_k* # **in set: 1.**
|||

58. LR State Network.
List of productions with their derived LR state lists. Their subrule number and symbol string indicates the specific production being derived. The ‘‘▷’’ symbol indicates the production’s list of derived states from its closured state. Multiple lists within a production indicate 1 of 2 things:

1) derived string that could not be merged due to a lr(1) conflict
2) partially derived string merged into another derived lr states

A partially derived string is indicated by the ‘‘merged into’’ symbol ↗used as a superscript along with the merged into state number.

59. Rfsm_class_phrase_th.

```
1 Rid  Rlint  Rpotential_code_blk
  ▷ 1  6  7  19
```

60. Rid.

```
1 |||  identifier  NS_identifier::TH_identifier
  ▷ 1  3  5
2 |||  |?|  NULL
  ▷ 1  3  4
3 |?|
  ▷ 1  2
```

61. Rpotential_code_blk.

```
1 Rpotential_directives
  ▷ 7  20
```

62. Rpotential_directives.

```
1 |.|
  ▷ 7  8
2 {  Rlint  Rmust_directive_phrase  Rmaybe_more_directives  Rclosing_brace  Rlint
  ▷ 7  9  10  11  12  15  18
```

63. Rmust_directive_phrase.

```
1 Rdirective_cweb_k  Rlint  Rmust_directive  Rsyntax_code  Rlint
  ▷ 10  24  25  26  30  31
```

64. Rmust_directive.

```
1 |||   # user-declaration  NS_identifier::TH_identifier
  ▷ 25  58  60
2 |||   # user-implementation  NULL
  ▷ 25  58  67
3 |||   # user-prefix-declaration  NULL
  ▷ 25  58  61
4 |||   # user-suffix-declaration  NULL
  ▷ 25  58  62
5 |||   # constructor  NULL
  ▷ 25  58  63
6 |||   # destructor  NULL
  ▷ 25  58  64
7 |||   # op  NULL
  ▷ 25  58  65
8 |||   # failed  NULL
  ▷ 25  58  66
9 |||   # user-imp-tbl  NULL
  ▷ 25  58  68
10 |||   # user-imp-sym  NULL
   ▷ 25  58  69
11 |||  |?|  NULL
   ▷ 25  58  59
12 |?|
   ▷ 25  57
```

65. Rmaybe_more_directives.

```
1 ϵ
  ▷ 11
2 Rmaybe_directive_phrases
  ▷ 11  46
```

66. Rmaybe_directive_phrases.

```
1 Rmaybe_directive_phrase
  ▷ 11  56
2 Rmaybe_directive_phrases  Rmaybe_directive_phrase
  ▷ 11  46  47
```

67. Rmaybe_directive_phrase.

```
1 Rcweb_k  Rlint  Rdirective  Rsyntax_code  Rlint
  ▷ 11  51  52  53  54  55
  ▷ 46↗51
2 Rdirective  Rsyntax_code  Rlint
  ▷ 11  48  49  50
  ▷ 46↗48
```

68. Rdirective.

```
 1 |||   # user-declaration  NS_identifier::TH_identifier
   ▷ 11  32  34
   ▷ 46↗32
   ▷ 52  70↗34
 2 |||   # user-implementation  NULL
   ▷ 11  32  41
   ▷ 46↗32
   ▷ 52  70↗41
 3 |||   # user-prefix-declaration  NULL
   ▷ 11  32  35
   ▷ 46↗32
   ▷ 52  70↗35
 4 |||   # user-suffix-declaration  NULL
   ▷ 11  32  36
   ▷ 46↗32
   ▷ 52  70↗36
 5 |||   # constructor  NULL
   ▷ 11  32  37
   ▷ 46↗32
   ▷ 52  70↗37
 6 |||   # destructor  NULL
   ▷ 11  32  38
   ▷ 46↗32
   ▷ 52  70↗38
 7 |||   # op  NULL
   ▷ 11  32  39
   ▷ 46↗32
   ▷ 52  70↗39
 8 |||   # failed  NULL
   ▷ 11  32  40
   ▷ 46↗32
   ▷ 52  70↗40
 9 |||   # user-imp-tbl  NULL
   ▷ 11  32  42
   ▷ 46↗32
   ▷ 52  70↗42
10 |||   # user-imp-sym  NULL
   ▷ 11  32  43
   ▷ 46↗32
   ▷ 52  70↗43
11 |||  |?|  NULL
   ▷ 11  32  33
   ▷ 46↗32
   ▷ 52  70↗33
```

69. Rclosing_brace.

```
1 |?|
  ▷ 12  13
2 }
  ▷ 12  14
```

70. Rsyntax_code.

```
1 |||  syntax-code  NS_o2_sdc::TH_o2_sdc
  ▷ 26  27  29
  ▷ 48↗27
  ▷ 53↗27
2 |||  |?|  NULL
  ▷ 26  27  28
  ▷ 48↗27
  ▷ 53↗27
```

71. Rlint.

```
1 |||  lint  NS_lint_balls::TH_lint_balls
  ▷ 6  16  17
  ▷ 9↗16
  ▷ 15↗16
  ▷ 24↗16
  ▷ 30↗16
  ▷ 49↗16
  ▷ 51↗16
  ▷ 54↗16
2 ϵ
  ▷ 6
  ▷ 9
  ▷ 15
  ▷ 24
  ▷ 30
  ▷ 49
  ▷ 51
  ▷ 54
```

72. Rdirective_cweb_k.

```
1 ϵ
  ▷ 10
2 |||  cweb-comment  NS_cweb_or_c_k::TH_cweb_or_c_k
  ▷ 10  21  22
3 |||  comment-overrun  NULL
  ▷ 10  21  23
```

73. Rcweb_k.

```
1 |||  cweb-comment  NS_cweb_or_c_k::TH_cweb_or_c_k
  ▷ 11  32  44
  ▷ 46↗32
2 |||  comment-overrun  NULL
  ▷ 11  32  45
  ▷ 46↗32
```

74. List of reducing states.

The following legend indicates the type of reducing state.
Points 2--4 are states that must meet the lr(1) condition:

1) r --- only 1 production reducing
2) r^2 --- 2 or more reducing productions
3) s/r --- shift and 1 reducing production
4) s/r^2 --- shift and multiple reducing productions

$\subset$ 2^r 4^r 5^r $6^{s/r}$ 8^r $9^{s/r}$ $10^{s/r}$ $11^{s/r}$ 13^r 14^r $15^{s/r}$ 17^r 18^r 19^r
20^r 22^r 23^r $24^{s/r}$ 28^r 29^r $30^{s/r}$ 31^r 33^r 34^r 35^r 36^r 37^r 38^r
39^r 40^r 41^r 42^r 43^r 44^r 45^r $46^{s/r}$ 47^r $49^{s/r}$ 50^r $51^{s/r}$ $54^{s/r}$ 55^r
56^r 57^r 59^r 60^r 61^r 62^r 63^r 64^r 65^r 66^r 67^r 68^r 69^r

75. Lr1 State's Follow sets and reducing lookahead sets.
Notes on Follow set expressions:
1) The ''follow set'' for rule uses its literal name and tags its grammar rule rank number as a superscript. Due to space limitations, part of the follow set information uses the rule's literal name while the follow set expressions refers to the rule's rank number. This $<$ rule name, rule rank number $>$ tupple allows you the reader to decifer the expressions. Transitions are represented by S_xR_z whereby S is the LR1 state identified by its ''x'' subscript where other transient calculations occur within the LR1 state network. R indicates the follow set rule with the subscript ''z'' as its grammar rank number that contributes to the follow set.

The $\nearrow^x$ symbol indicates that a merge into state ''x'' has taken place. That is, the reduced subrule that depends on this follow set finds its follow set in 2 places: its birthing state that generated the sequence up to the merged into state, and the birthing state that generated the ''merged into'' state. So the rule's ''follow set'' calculation must also continue its calculation within the birth state generating the ''x merged into'' state.

State: 1 Follow Set contributors, merges, and transitions
← Follow set Rule → ← follow set symbols contributors →
Rfsm_class_phrase_th[1]
Local follow set yield:
eolr.
← Follow set Rule → ← follow set symbols contributors →
Rid[2] $R_{1\cdot1\cdot1}$ $R_{1\cdot1\cdot2}$
Local follow set yield:
|||, |.|, {.

State: 6 Follow Set contributors, merges, and transitions
← Follow set Rule → ← follow set symbols contributors →
Rlint[13] $R_{1\cdot1\cdot2}$
Local follow set yield:
|.|, {.

State: 7 Follow Set contributors, merges, and transitions
← Follow set Rule → ← follow set symbols contributors →
Rpotential_code_blk[3] $R_{1\cdot1\cdot3}$ S_1R_1
Local follow set yield:

← Follow set Rule → ← follow set symbols contributors →
Rpotential_directives[4] $R_{3\cdot1\cdot1}$ S_7R_3
Local follow set yield:

State: 9 Follow Set contributors, merges, and transitions
← Follow set Rule → ← follow set symbols contributors →
Rlint[13] $R_{4\cdot2\cdot2}$
Local follow set yield:
|?|, |||.

State: 10 Follow Set contributors, merges, and transitions

```
← Follow set Rule → ←          follow set symbols contributors          →
Rmust_directive_phrase[5] R4·2·3 R4·2·4
Local follow set yield:
  |?|, |||, }.
← Follow set Rule → ←          follow set symbols contributors          →
Rdirective_cweb_k[14]    R5·1·1 R5·1·2
Local follow set yield:
  |?|, |||.

State: 11  Follow Set contributors, merges, and transitions
← Follow set Rule → ←          follow set symbols contributors          →
Rmaybe_more_directives[7] R4·2·4
Local follow set yield:
  |?|, }.
← Follow set Rule →  ←           follow set symbols contributors           →
Rmaybe_directive_phrases[8] R7·2·1 R8·2·1 S11R7
Local follow set yield:
  |||.
← Follow set Rule → ←           follow set symbols contributors           →
Rmaybe_directive_phrase[9] R8·1·1 S11R8
Local follow set yield:

← Follow set Rule → ←          follow set symbols contributors          →
Rdirective[10]           R9·2·1 ↗52 ↗46
Local follow set yield:
  |||.
← Follow set Rule → ←          follow set symbols contributors          →
Rcweb_k[15]              R9·1·1 R9·1·2 ↗46
Local follow set yield:
  |||.

State: 12  Follow Set contributors, merges, and transitions
← Follow set Rule → ←          follow set symbols contributors          →
Rclosing_brace[11]       R4·2·5 R4·2·6 S7R4
Local follow set yield:
  |||.

State: 15  Follow Set contributors, merges, and transitions
← Follow set Rule → ←          follow set symbols contributors          →
Rlint[13]                R4·2·6 ↗51 ↗24 ↗54 ↗49 ↗30 ↗9 ↗6 S7R4
Local follow set yield:


State: 24  Follow Set contributors, merges, and transitions
← Follow set Rule → ←          follow set symbols contributors          →
Rlint[13]                R5·1·2
Local follow set yield:
  |?|, |||.

State: 25  Follow Set contributors, merges, and transitions
← Follow set Rule → ←          follow set symbols contributors          →
Rmust_directive[6]       R5·1·3
```

```
Local follow set yield:
  |||.

State: 26  Follow Set contributors, merges, and transitions
← Follow set Rule  → ←              follow set symbols contributors              →
Rsyntax_code[12]          R5·1·4 R5·1·5 ↗53 ↗48 S10R5
Local follow set yield:
  |||.

State: 30  Follow Set contributors, merges, and transitions
← Follow set Rule  → ←              follow set symbols contributors              →
Rlint[13]                 R5·1·5 S10R5
Local follow set yield:


State: 46  Follow Set contributors, merges, and transitions
← Follow set Rule  →  ←              follow set symbols contributors              →
Rmaybe_directive_phrase[9] R8·2·2 ↗11 S11R8
Local follow set yield:

← Follow set Rule  → ←              follow set symbols contributors              →
Rdirective[10]            R9·2·1
Local follow set yield:
  |||.
← Follow set Rule  → ←              follow set symbols contributors              →
Rcweb_k[15]               R9·1·1 R9·1·2
Local follow set yield:
  |||.

State: 48  Follow Set contributors, merges, and transitions
← Follow set Rule  → ←              follow set symbols contributors              →
Rsyntax_code[12]          R9·2·2 R9·2·3 S46R9
Local follow set yield:
  |||.

State: 49  Follow Set contributors, merges, and transitions
← Follow set Rule  → ←              follow set symbols contributors              →
Rlint[13]                 R9·2·3 S46R9
Local follow set yield:


State: 51  Follow Set contributors, merges, and transitions
← Follow set Rule  → ←              follow set symbols contributors              →
Rlint[13]                 R9·1·2
Local follow set yield:
  |||.

State: 52  Follow Set contributors, merges, and transitions
← Follow set Rule  → ←              follow set symbols contributors              →
Rdirective[10]            R9·1·3
Local follow set yield:
  |||.
```

```
State: 53  Follow Set contributors, merges, and transitions
← Follow set Rule  → ←              follow set symbols contributors              →
Rsyntax_code[12]          R9·1·4 R9·1·5 S46R9
Local follow set yield:
  |||.

State: 54  Follow Set contributors, merges, and transitions
← Follow set Rule  → ←              follow set symbols contributors              →
Rlint[13]                 R9·1·5 S46R9
Local follow set yield:
```

76. Common Follow sets.

77. LA set: 1.

`|r|`, `|.|`, `{.`

78. LA set: 2.

`|.|`, `{.`

79. LA set: 3.

`eolr.`

80. LA set: 4.

`|?|`, `|r|.`

81. LA set: 5.

`|?|`, `}.`

82. LA set: 6.

`|?|`, `|r|`, `}.`

83. LA set: 7.

`|r|.`

84. Index.

fsm_class_phrase_th_idx.w

Date: January 14, 2015 at 15:38

File: fsm_class_phrase_th_idx.w