

# Contents

<b>1</b>	<b>Notions used in this textbook</b>	<b>9</b>
<b>2</b>	<b>LR grammars and languages</b>	<b>13</b>
2.1	Strong $LR$ grammars . . . . .	15
2.2	Weak LR grammars . . . . .	18
2.2.1	LR(0) grammars . . . . .	19
2.2.2	Simple $LR(k)$ grammars . . . . .	27
2.2.3	LALR grammars . . . . .	30
2.2.4	$LR(k)$ grammars . . . . .	36
2.3	Properties of $LR$ grammars an languages . . . . .	39
<b>3</b>	<b>Formal translation and <math>LR</math> parsing</b>	<b>43</b>
3.1	Pushdown translation automata and postfix grammars . . . . .	43
3.2	Formal translation directed by $LR$ parsing . . . . .	46
3.2.1	Postfix translation grammars with $LR(k)$ input grammars . . . . .	46
3.2.2	$LR(k)$ translation grammars . . . . .	48
3.2.3	Translation grammars with $LR(k)$ input grammars . . . . .	54
<b>4</b>	<b>Attributed translation directed by <math>LR</math> parser</b>	<b>63</b>
4.1	$S$ -attributed grammars . . . . .	63
4.2	$LR$ -attributed translation grammars . . . . .	66
<b>5</b>	<b>Parallel parsing</b>	<b>79</b>
5.1	Fundamental parallel algorithms . . . . .	79
5.1.1	Parallel algorithm performance evaluation . . . . .	79
5.1.2	Parallel reduction . . . . .	80
5.1.3	Parallel prefix sum . . . . .	81
5.1.4	Parallel parentheses matching . . . . .	82
5.2	Parallel finite automaton . . . . .	84
5.3	Parallel $LL$ parsing . . . . .	86
5.3.1	Parallel parser structure . . . . .	86
5.3.2	Nondeterministic parallel $LL$ parsing . . . . .	89
5.3.3	Deterministic parallel $LL$ parsing . . . . .	93
5.3.4	$LLP(1, k)$ grammars . . . . .	97
5.3.5	$LLP(q, k)$ grammars . . . . .	100
5.3.6	Performance analysis . . . . .	105
5.3.7	An optimal EREW PRAM algorithm . . . . .	105
5.3.8	$LLP$ grammars and languages . . . . .	107

5.4	Parallel <i>LR</i> parsing . . . . .	109
5.4.1	Sequential <i>LR</i> parsing . . . . .	109
5.4.2	Ideal parallel <i>LR</i> parsing . . . . .	111
5.4.3	Deterministic parallel <i>LR</i> parsing . . . . .	113
5.4.4	Gluing processes . . . . .	116
<b>6</b>	<b>Parsing with Reduced Pushdown Store Activity</b>	<b>119</b>
6.0.5	Reductions between Shifts of Two Adjacent Symbols . . . . .	119
6.0.6	Faster GLR Parsing . . . . .	121
6.0.7	Some Empirical Results . . . . .	126
	<b>Bibliography</b>	<b>126</b>