

# CKY Parser

<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>

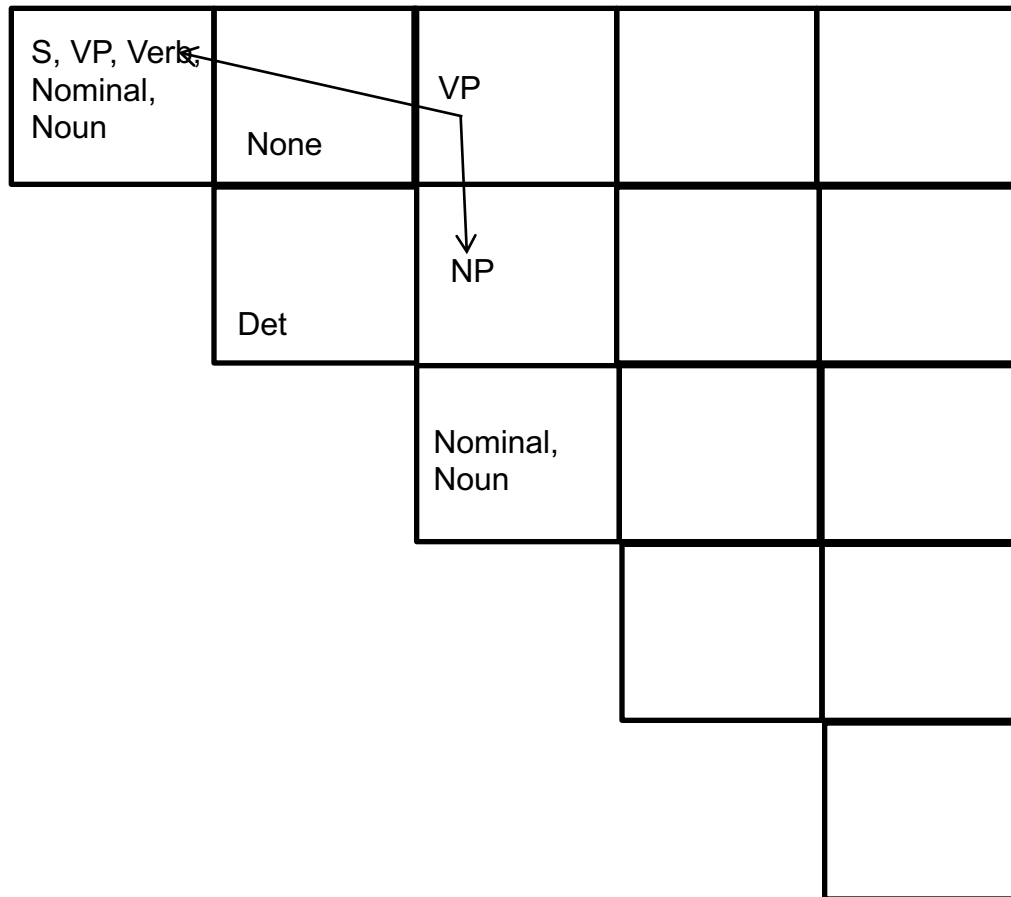
S, VP, Verb, Nominal, Noun	None			
		NP		
	Det←			
		Nominal, Noun		

# CNF Conversion

$\mathcal{L}_1$ Grammar	$\mathcal{L}_1$ in CNF
$S \rightarrow NP VP$	$S \rightarrow NP VP$
$S \rightarrow Aux NP VP$	$S \rightarrow X1 VP$
	$X1 \rightarrow Aux NP$
$S \rightarrow VP$	$S \rightarrow book \mid include \mid prefer$
	$S \rightarrow Verb NP$
	$S \rightarrow X2 PP$
	$S \rightarrow Verb PP$
	$S \rightarrow VP PP$
$NP \rightarrow Pronoun$	$NP \rightarrow I \mid she \mid me$
$NP \rightarrow Proper-Noun$	$NP \rightarrow TWA \mid Houston$
$NP \rightarrow Det Nominal$	$NP \rightarrow Det Nominal$
$Nominal \rightarrow Noun$	$Nominal \rightarrow book \mid flight \mid meal \mid money$
$Nominal \rightarrow Nominal Noun$	$Nominal \rightarrow Nominal Noun$
$Nominal \rightarrow Nominal PP$	$Nominal \rightarrow Nominal PP$
$VP \rightarrow Verb$	$VP \rightarrow book \mid include \mid prefer$
$VP \rightarrow Verb NP$	$VP \rightarrow Verb NP$
$VP \rightarrow Verb NP PP$	$VP \rightarrow X2 PP$
	$X2 \rightarrow Verb NP$
$VP \rightarrow Verb PP$	$VP \rightarrow Verb PP$
$VP \rightarrow VP PP$	$VP \rightarrow VP PP$
$PP \rightarrow Preposition NP$	$PP \rightarrow Preposition NP$

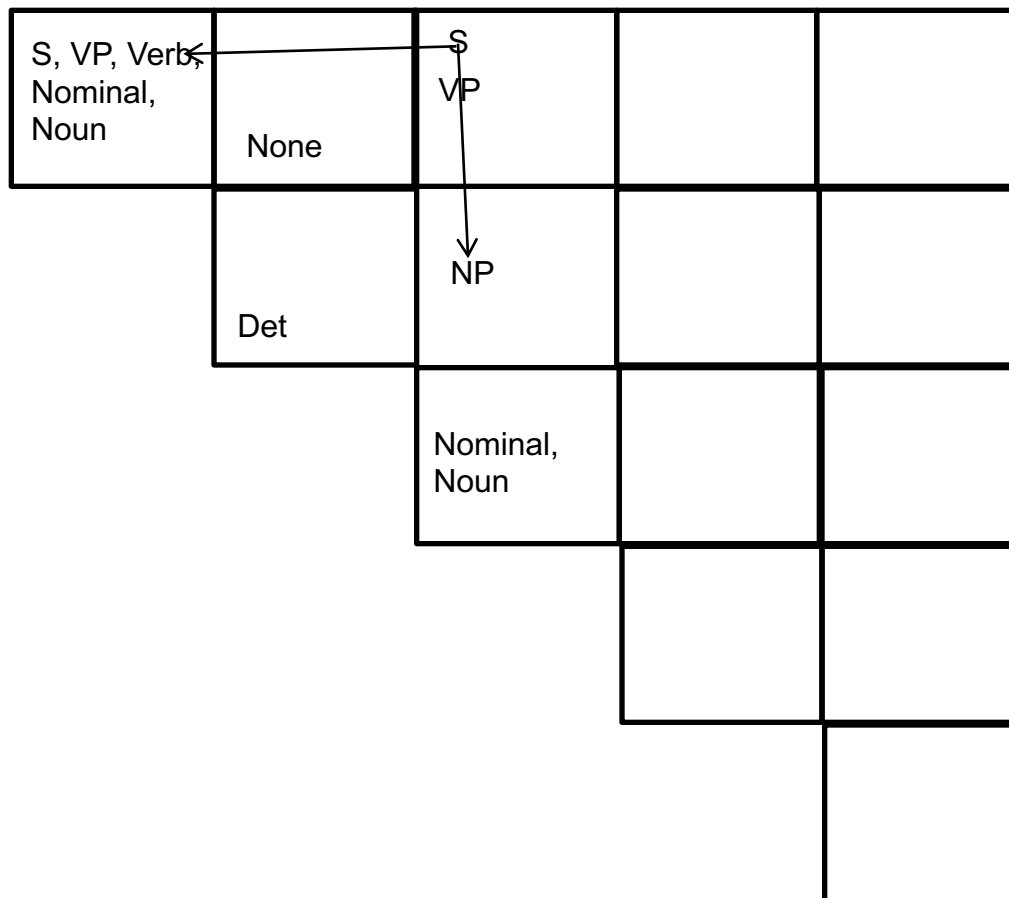
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**Book** <sub>0</sub>    <sub>1</sub> the    <sub>2</sub> flight    <sub>3</sub> through    <sub>4</sub> Houston<sub>5</sub>



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<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>

S, VP, Verb, Nominal, Noun	None	S VP		
	Det	NP		
		Nominal, Noun		

# CKY Parser

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S, VP, Verb, Nominal, Noun	None	S VP	None	
	Det	NP	None	
		Nominal, Noun	None	
			Prep	

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S, VP, Verb, Nominal, Noun	None	S VP	None	
	Det	NP	None	
		Nominal, Noun	None	
			Prep ← PP	
				NP ProperNoun

# CKY Parser

<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>

S, VP, Verb, Nominal, Noun	None	S VP	None	
	Det	NP	None	
		Nominal, Noun	None	Nominal
			Prep	PP
				NP ProperNoun



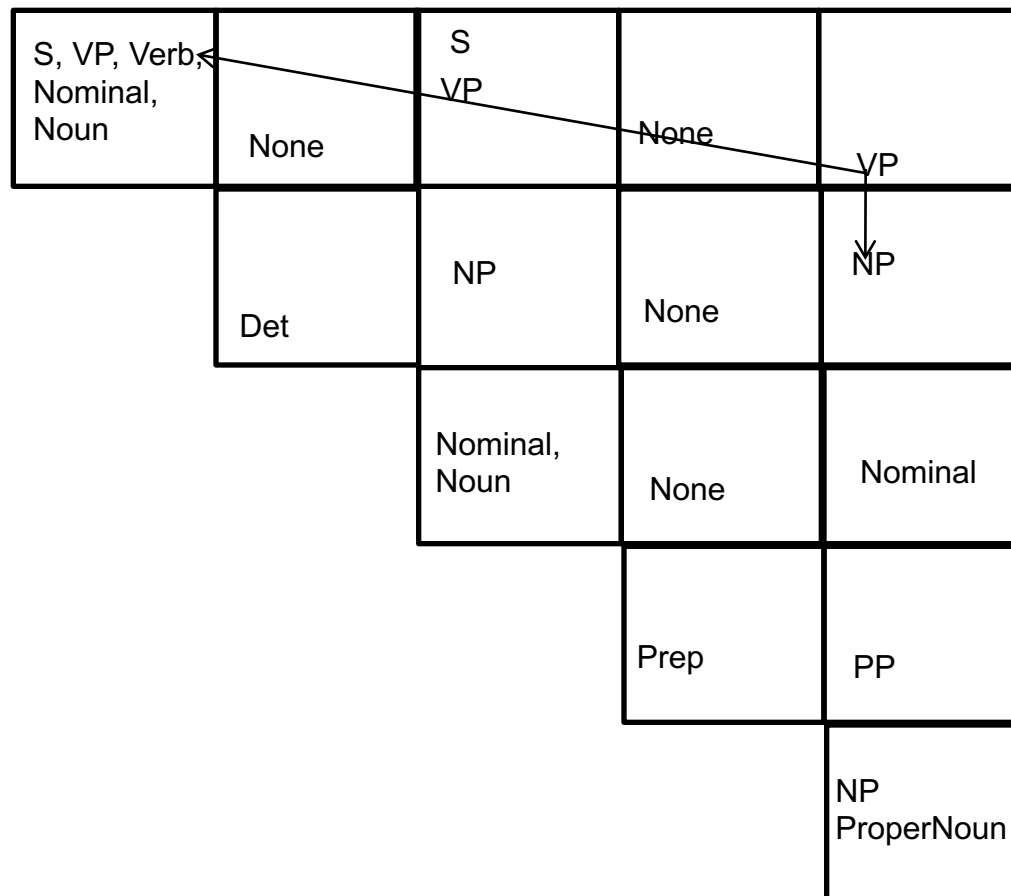
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<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>

S, VP, Verb, Nominal, Noun	None	S VP	None	
	Det ←	NP	None	NP
		Nominal, Noun	None	↓ Nominal
			Prep	PP
				NP ProperNoun

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<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>



# CKY Parser

<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>

S, VP, Verb, Nominal, Noun	None	S VP	None	S VP
	Det	NP	None	NP
		Nominal, Noun	None	Nominal
			Prep	PP
				NP ProperNoun

The diagram shows a CKY Parser parse tree for the sentence "Book the flight through Houston". The root node is "S, VP, Verb, Nominal, Noun". It branches into "None" and "S VP". The "S VP" node branches into "Det" and "NP". The "NP" node branches into "Nominal, Noun" and "None". The "None" node branches into "Prep" and "PP". The "PP" node branches into "NP ProperNoun".

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<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>

S, VP, Verb, Nominal, Noun	None	S VP←	None	VP \$ VP
	Det	NP	None	NP
		Nominal, Noun	None	Nominal
			Prep	↓ PP
				NP ProperNoun

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	$S \rightarrow Verb PP$
	$S \rightarrow VP PP$
$NP \rightarrow Pronoun$	$NP \rightarrow I \mid she \mid me$
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$NP \rightarrow Det Nominal$	$NP \rightarrow Det Nominal$
$Nominal \rightarrow Noun$	$Nominal \rightarrow book \mid flight \mid meal \mid money$
$Nominal \rightarrow Nominal Noun$	$Nominal \rightarrow Nominal Noun$
$Nominal \rightarrow Nominal PP$	$Nominal \rightarrow Nominal PP$
$VP \rightarrow Verb$	$VP \rightarrow book \mid include \mid prefer$
$VP \rightarrow Verb NP$	$VP \rightarrow Verb NP$
$VP \rightarrow Verb NP PP$	$VP \rightarrow X2 PP$
	$X2 \rightarrow Verb NP$
$VP \rightarrow Verb PP$	$VP \rightarrow Verb PP$
$VP \rightarrow VP PP$	$VP \rightarrow VP PP$
$PP \rightarrow Preposition NP$	$PP \rightarrow Preposition NP$

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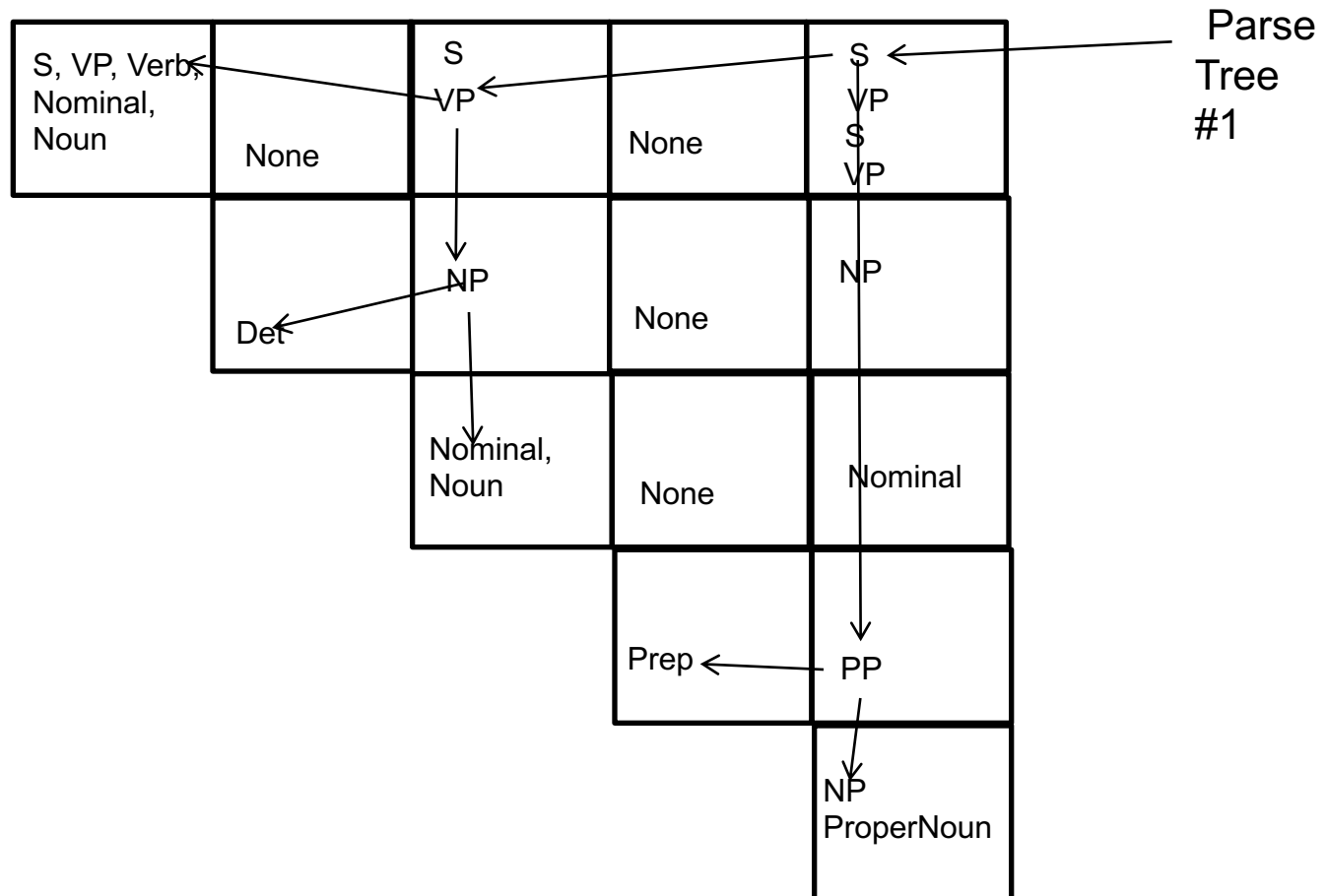
S, VP, Verb, Nominal, Noun	None	S VP ←	None	S VP S VP
	Det	NP	None	NP
		Nominal, Noun	None	Nominal
			Prep	↓ PP
				NP ProperNoun

# CKY Parsing

- Is that really a parser?

# CKY Parser

<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>





# CKY Parser

<sub>0</sub>Book <sub>1</sub> the <sub>2</sub> flight <sub>3</sub> through <sub>4</sub> Houston<sub>5</sub>

