

SICPy §4

Khooi Xin Zhe, Ang Jun Jie

19 April, 2021

A SICPy¹ program is a *module*, defined using Backus-Naur Form² as follows:

SICPy §4

<i>module</i> ::= <i>statement</i> ...	statement sequence
<i>statement</i> ::= <i>name</i> = <i>expression</i>	single assignment
<i>name</i> [, <i>name</i>] ... = <i>expression</i>	tuple assignment
<i>function</i>	function declaration
<u>return</u> <i>expression</i>	return statement
<i>if-statement</i>	conditional statement
<i>while-statement</i>	while statement
<i>for-statement</i>	for statement
<i>try-statement</i>	try statement
<i>expression</i>	expression statement
<u>break</u> <u>pass</u> <u>continue</u>	
<i>function</i> ::= <u>def</u> <i>name</i> (<i>parameters</i>) :	function declaration
<i>statement</i> ...	function parameters
<i>parameters</i> ::= ϵ <i>name</i> [, <i>name</i>] ...	
<i>if-statement</i> ::= <u>if</u> <i>expression</i> :	
<i>statement</i> ...	
[[<u>elif</u> <i>expression</i> :	
<i>statement</i> ...] ...	
<u>else</u> :	
<i>statement</i> ...]	conditional statement
<i>while-statement</i> ::= <u>while</u> <i>expression</i> :	
<i>statement</i> ...	while statement
<i>for-statement</i> ::= <u>for</u> <i>expression</i> <u>in</u> <i>expression</i> :	
<i>statement</i> ...	for statement
<i>try-statement</i> ::= <u>try</u> :	
<i>statement</i> ...	
<u>except</u> <i>expression</i> :	
<i>statement</i> ...	
[<u>except</u> <i>expression</i> :	
<i>statement</i> ...] ...	try statement
<i>expression</i> ::= <i>number</i>	primitive number expression

¹SICPy is an adaptation of Source - the official language of the textbook Structure and Interpretation of Computer Programs, JavaScript Adaptation.

²We adopt Henry Ledgard's BNF variant that he described in A human engineered variant of BNF, ACM SIGPLAN Notices, Volume 15 Issue 10, October 1980, Pages 57-62. In our grammars, we bold and underline keywords, [] for optional syntaxes, italics for syntactic variables, ϵ for nothing, *x*|*y* for *x* or *y*, and *x*... for zero or more repetitions of *x*.

	<u>True</u> <u>False</u>	primitive boolean expression
	<u>None</u>	primitive list expression
	<i>string</i>	primitive string expression
	<i>name</i>	name expression
	<i>expression</i> <i>binary-operator</i> <i>expression</i>	binary operator combination
	<i>unary-operator</i> <i>expression</i>	unary operator combination
	<i>expression</i> (<i>expressions</i>)	function application
	<u>lambda</u> <i>name</i> [, <i>name</i>] ... : <i>expression</i>	lambda expression
	<i>expression</i> <u>if</u> <i>expression</i> <u>else</u> <i>expression</i>	conditional expression
	<i>list-expression</i>	list expression
	{ <i>expression</i> : <i>expression</i> [, <i>expression</i> : <i>expression</i>] ... }	literal dict expression
	(<i>tuple-expression</i>)	tuple expression
	<i>expression</i> [<i>expression</i>]	list/ dictionary access
	(<i>expression</i>)	parenthesised expression
<i>list-expression</i>	::= [<i>expressions</i>]	literal list expression
	[<i>expression</i> <u>for</u> <i>expression</i> <u>in</u> <i>expression</i> [<u>if</u> <i>expression</i>]]	list comprehension expression
<i>tuple-expression</i>	::= ϵ <i>expression</i> , <i>expressions</i>	<i>tuple expression</i>
<i>binary-operator</i>	::= + - * / % ==	
	> < >= <= and or	
<i>unary-operator</i>	::= not + -	
<i>expressions</i>	::= ϵ <i>expression</i> [, <i>expression</i>] ...	argument expressions