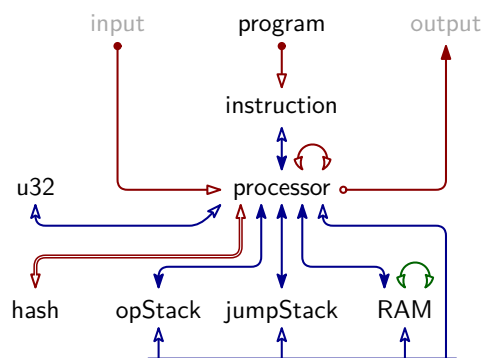




2	$\ominus$	pop	- st <sub>0</sub>	-
1	$\oplus$	push + a	-	- a
8	$\oplus$	divine	-	- a
9	$\oplus$	dup + i	- st <sub>15</sub> ... st <sub>0</sub>	- st <sub>15</sub> ... st <sub>0</sub> st <sub>i</sub>
17	$\bigcirc^{16}$	swap + i	- ... st <sub>i</sub> ... st <sub>0</sub>	- ... st <sub>0</sub> ... st <sub>i</sub>
16	$\bigcirc$	nop	-	-
10	$\ominus$	skiz	- st <sub>0</sub>	-
25	$\bigcirc$	call + d	-	-
24	$\bigcirc$	return	-	-
32	$\bigcirc$	recurse	-	-
18	$\ominus$	assert	- st <sub>0</sub>	-
0	$\bigcirc$	halt	-	-
40	$\bigcirc^1$	read_mem	- addr st <sub>0</sub>	- addr val
48	$\bigcirc$	write_mem	- addr val	- addr val
56	$\bigcirc^{10}$	hash	- st <sub>9</sub> ... st <sub>0</sub>	- d <sub>4</sub> ... d <sub>0</sub> 0 ... 0
64	$\bigcirc^{11}$	divine_sibling	- idx st <sub>9</sub> ... st <sub>5</sub> d <sub>4</sub> ... d <sub>0</sub>	- idx>>1 r <sub>4</sub> ... r <sub>0</sub> l <sub>4</sub> ... l <sub>0</sub>
72	$\bigcirc^{10}$	swap_digest	- dl <sub>4</sub> ... dl <sub>0</sub> dt <sub>4</sub> ... dt <sub>0</sub>	- dt <sub>4</sub> ... dt <sub>0</sub> dl <sub>4</sub> ... dl <sub>0</sub>
80	$\bigcirc$	assert_vector	-	-
88	$\bigcirc$	absorb_init	-	-
96	$\bigcirc$	absorb	-	-
104	$\bigcirc^{10}$	squeeze	- st <sub>9</sub> ... st <sub>0</sub>	- sq <sub>9</sub> ... sq <sub>0</sub>
26	$\ominus^1$	add	- st <sub>1</sub> st <sub>0</sub>	- sum
34	$\ominus^1$	mul	- st <sub>1</sub> st <sub>0</sub>	- prod
112	$\bigcirc^1$	invert	- st <sub>0</sub>	- st <sub>0</sub> <sup>-1</sup>
42	$\ominus^1$	eq	- st <sub>1</sub> st <sub>0</sub>	- (st <sub>0</sub> ==st <sub>1</sub> )
4	$\oplus^2$	split	- st <sub>0</sub>	- hi lo
12	$\ominus^1$	lt	- st <sub>1</sub> st <sub>0</sub>	- (st <sub>0</sub> <st <sub>1</sub> )
20	$\ominus^1$	and	- st <sub>1</sub> st <sub>0</sub>	- (st <sub>0</sub> &st <sub>1</sub> )
28	$\ominus^1$	xor	- st <sub>1</sub> st <sub>0</sub>	- (st <sub>0</sub> ^st <sub>1</sub> )
36	$\bigcirc^1$	log_2_floor	- st <sub>0</sub>	- $\lfloor \log_2(st_0) \rfloor$
44	$\ominus^1$	pow	- e b	- b <sup>e</sup>
52	$\bigcirc^2$	div	- denom num	- quot rem
120	$\bigcirc^3$	xxadd	- y <sub>2</sub> y <sub>1</sub> y <sub>0</sub> x <sub>2</sub> x <sub>1</sub> x <sub>0</sub>	- y <sub>2</sub> y <sub>1</sub> y <sub>0</sub> z <sub>2</sub> z <sub>1</sub> z <sub>0</sub>
128	$\bigcirc^3$	xxmul	- y <sub>2</sub> y <sub>1</sub> y <sub>0</sub> x <sub>2</sub> x <sub>1</sub> x <sub>0</sub>	- y <sub>2</sub> y <sub>1</sub> y <sub>0</sub> z <sub>2</sub> z <sub>1</sub> z <sub>0</sub>
136	$\bigcirc^3$	xinvert	- x <sub>2</sub> x <sub>1</sub> x <sub>0</sub>	- y <sub>2</sub> y <sub>1</sub> y <sub>0</sub>
50	$\ominus^3$	xbmul	- x <sub>2</sub> x <sub>1</sub> x <sub>0</sub> b	- y <sub>2</sub> y <sub>1</sub> y <sub>0</sub>
144	$\oplus$	read_io	-	- a
58	$\ominus$	write_io	- st <sub>0</sub>	-

Table	Base Columns																									
Program	Address				Instruction		IsPadding																			
Instruction	Address				CI	NIA	IsPadding																			
Processor	CLK	IsPadding	IP	PI	CI	NIA	IB0	...	IB7	JSP	JS0	JSD	ST0	...	ST15	OSP	OSV	HV0	...	HV3	RAMP	RAMV				
OpStack	CLK	clk_di	IB1 ( $\hat{=}$ shrink stack)														OSP	OSV								
RAM	CLK	clk_di	PI		bcp0		bcp1																RAMPDiffInv		RAMP	RAMV
JumpStack	CLK	clk_di	CI													JSP	JS0	JSD								
Hash	RoundNumber				CI										ST0	...	ST15	CONSTANT0A		...	CONSTANT15B					
U32	CF	Bits	Bits-33_inv	CI	LHS	RHS	LT	AND	XOR	Log2Floor	Pow	LHS_inv	RHS_inv													

#clk	instruction
2	neg
4	sub
7	is_u32
3	lsb


$$p = 18446744069414584321$$

$i$	$\mathbb{F}_p(1/i)$	$-\mathbb{F}_p(1/i)$
2	092...161	922...160
3	122...881	614...440
4	138...241	461...080
5	147...457	368...864
6	153...601	307...720

	base	ext	$\Sigma$
Program	3	1	4
Instruction	4	2	6
Processor	44	13	57
OpStack	5	2	7
RAM	8	6	14
JumpStack	6	2	8
Hash	50	3	53
U32	14	1	15
$\Sigma$	134	30	164

	init	cons	trans	term	$\Sigma$
Program	2	1	3	0	6
Instruction	3	1	5	0	9
Processor	39	12	77	2	130
OpStack	5	0	6	0	11
Ram	8	0	14	1	23
JumpStack	6	0	8	0	14
Hash	5	40	26	0	71
U32	2	14	22	2	40
Cross-Table	0	0	0	1	1
$\Sigma$	70	68	161	6	305