_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	reporter	comments	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	vendor	SOC	src code	#src files	top file	doc	tool chain	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pipe line	start year	last revis	secondary web link	note worthy	comments
Small soft core uP Inventory				©2021 James Brakefield																																		
Opencore and other soft core processors																																						
1410	https://github.com/cube1		Jay Jaeger	1401	6	6x																vhdl	700		Y		N		16K	16K	Y				2019	2021	https://www.com	superset of IBM1401, gate level vhdl, was student at UW	
8051	https://opencor	alpha	Simon Teran, Jakas	8051	8	8	**zu-2e**	James	area o	1482	6			242	##	v20.1	0.33	4.0	13.4	ILX		verilog	32	oc8051_to	Y	yes	N		64K	64K	Y				2001	2016		8051 core includes several on-chip peripherals, like timers and counters	
8051	https://opencor	alpha	Simon Teran, Jakas	8051	8	8	kintex-7-3	James	tunrec	1744	6	1		111	##	14.7	0.33	4.0	5.3	ILX		verilog	32	oc8051_to	Y	yes	N		64K	64K	Y				2001	2016		8051 core includes several on-chip peripherals, like timers and counters	
16bit_processo	https://github.com/prant		Md Badiuzzaman Pran	MIPS	16	16																													2018	2018	https://prantoam	course project, schematics only	simple up with well done schematics
1802-pico-basi	https://github.c	beta	Steve Teal	1802	8	8	**zu-2e**	James	area o	241	6		2	427	##	v20.1	0.33	12.0	48.8	LX		vhdl	6	pico_basic	Y	yes	N		64K	64K	Y	52		16		2016	2016	https://wiki.forth-	VHDL 1802 Core with TinyBASIC	tiny Basic in ROM, Interrupts & DMA not imple
24bit_up	https://github.c	alpha	Harshal Mittal	RISC	24	24	**zu-2e**	James	area o	3453	6	1		187	##	v20.1	0.80	1.0	43.2	X		verilog	17	processor			N		16M	16M	N	17		32		2019	2019		basic 24-bit RISC, course work	big Dff count, multiple writes to register file
32-bit_MIPS			Cairo University	MIPS	32	32	zu-2e	James	very very slow		6	1			##	v20.1	1.00	1.0				vhdl	18	mips_mod	Y	yes	N		4G	4G	Y			32		2011	2018		ISE runs out of memory (6GB)	
6809_6309	https://opencor	beta	Alejandro Paz Schmidt	6809	8	8	zynq+	James	fmax s	1676	6			323	##	v18.2	0.33	3.0	21.2	AILX	B	verilog	5	MC6809_c	Y	yes	N	N	64K	64K	Y					2012	2015		6309 op-codes not implemented	
6809_6309	https://opencor	beta	Alejandro Paz Schmidt	6809	8	8	**zu-2e**	James	area o	1624	6			282	##	v20.1	0.33	3.0	19.1	AILX	B	verilog	5	MC6809_c	Y	yes	N	N	64K	64K	Y					2012	2015		6309 op-codes not implemented	does not match timing results of zynq+
6809_6309	https://opencor	beta	Alejandro Paz Schmidt	6809	8	8	stratix-5	James	Brakef	1711	A			223	##	q14.0	0.33	3.0	14.3	AILX	B	verilog	5	MC6809_c	Y	yes	N	N	64K	64K	Y					2012	2015		6309 op-codes not implemented	
6809_6309	https://opencor	beta	Alejandro Paz Schmidt	6809	8	8	kintex-7-3	James	Brakef	1997	6			175	##	14.7	0.33	3.0	9.7	AILX	B	verilog	5	MC6809_c	Y	yes	N	N	64K	64K	Y					2012	2015		6309 op-codes not implemented	
6809_6309	https://opencor	beta	Alejandro Paz Schmidt	6809	8	8	arria-2	James	Brakef	1680	A			145	##	q18.0	0.33	3.0	9.5	AILX	B	verilog	5	MC6809_c	Y	yes	N	N	64K	64K	Y					2012	2015		6309 op-codes not implemented	
68hc05	https://opencor	stable	Ulrich Riedel	6805	8	8	**zu-2e**	James	area o	1096	6			485	##	v20.1	0.33	4.0	36.5	X		vhdl	1	6805		yes	N	N	64K	64K	Y					2007	2009			room for still better fmax
68hc05	https://opencor	stable	Ulrich Riedel	6805	8	8	kintex-7-3	James	Brakef	1112	6			300	##	14.7	0.33	4.0	22.2	X		vhdl	1	6805		yes	N	N	64K	64K	Y					2007	2009			
68hc08	https://opencor	stable	Ulrich Riedel	6808	8	8	**zu-2e**	James	area o	1796	6			143	##	v20.1	0.33	4.0	6.5	X		vhdl	1	x68ur08		yes	N	N	64K	64K	Y					2007	2009			
68hc08	https://opencor	stable	Ulrich Riedel	6808	8	8	kintex-7-3	James	Brakef	2290	6			101	##	14.7	0.33	4.0	3.6	X		vhdl	1	x68ur08		yes	N	N	64K	64K	Y					2007	2009			
8bit_chapman	http://www.ece	beta	Rob Chapman, Steven	forth	8	8	**zu-2e**	James	area o	122	6			305	##	v20.1	0.33	1.0	824.7	ILX		vhdl	10	stack_pro	Y		N		256	256	Y	24				1998	1998		course work	
8bit_chapman	http://www.ece	beta	Rob Chapman, Steven	forth	8	8	kintex-7-3	James	Brakef	176	6			131	##	14.7	0.33	1.0	245.5	ILX		vhdl	10	stack_pro	Y		N		256	256	Y	24				1998	1998		course work	
8bit_piped_pr	https://opencor	stable	Mahesh Sukhdeo Palv	RISC	8	16	kintex-7-3	James	swapp	1049	6		1	370	##	14.7	0.33	1.0	116.4	X		verilog	28	top	Y							20		16		2013	2017	https://github.cor	uses Perl as assembler	use Perl to generate ROM file
8bit_piped_pr	https://opencor	stable	Mahesh Sukhdeo Palv	RISC	8	16	**zu-2e**	James	area o	1227	6		1	410	##	v20.1	0.33	1.0	110.2	X		verilog	28	top	Y							20		16		2013	2017	https://github.cor	uses Perl as assembler	use Perl to generate ROM file
8bit-verilog_mcu		stable	Josh Friend	accum	8	8	**zu-2e**	James	timing	392	6		1	500	##	v20.1	0.33	2.0	210.5	X		verilog	11	cpu					512	512	Y	16				2012	2012		for class project, small data stack	PB clock, students to add features
a_tiny_up	https://www.quora.com/		Simon Moore, Frankie	RISC	32	32	arria-5	James	tiny LU	35	A				##	q18.0	0.67	1.0				system v	1	TinyComp	Y	asm	N	Y	1K	1K	N	13		128		2007	2011	https://www.cl.ca	from Thacker's version, Un Cambridge course	
a_tiny_up	https://www.qu	errors	Chuck Thacker	RISC	32	32	arria-5	James	no output regis		A				##	q18.0	0.67	1.0				verilog	1	TinyComp	Y	asm	N	Y	1K	1K	N	13		128		2007	2007	https://www.cl.ca	104 lines of verilog, Thacker (wikipedia) deceased	
a2z	https://hackada	errors		RISC	16	24	kintex-7-3	James	replace Altera I		6					14.7	0.67	1.0		I		verilog													2016	2018		runs on Cyclone IV	
a2z	https://hackada	errors		RISC	16	24	**zu-2e**	James	area opt		6				##	v20.1	0.67	1.0		I		verilog													2016	2018		runs on Cyclone IV	
a2z	https://hackada	stable		RISC	16	24	cyclone-4	James	Brakef	1524	4	1	12	62	##	q17.0	0.67	1.0	27.4	I		verilog		top_a2z											2016	2018			
aap	https://github.c	stable	Simon Cook	RISC	16	16	arria-2	James	Brakef	7193	A			393	##	q18.0	0.67	1.0	36.6	I		verilog	7	de0_nano	Y	yes		Y	64K	16M	Y			64		2015	2016	http://www.embe	includes Altera project	4 to 64 reg, 24-bit pc, no status reg
aap	https://github.c	stable	Simon Cook	RISC	16	16	cyclone-4	James	Brakef	10630	4			306	##	q18.0	0.67	1.0	19.3	I		verilog	7	de0_nano	Y	yes		Y	64K	16M	Y			64		2015	2016	http://www.embe	includes Altera project	4 to 64 reg, 24-bit pc, no status reg
acc	https://github.c	stable	Juan Gonzalez-Gomez	accum	15	15	kintex-7-3	James	rom &	88	6		1	227	##	14.7	0.67	2.0	865.2	IX		verilog	1	acc2	Y	yes	N			4K						2016	2016	https://github.cor	26 chptr course using Apollo Commar	??why LUT count different from agcnorm
ae18	https://opencor	beta	Shawn Tan	PIC18	8	16	arria-2	James	Brakef	1084	A	1		207	##	q13.1	0.33	1.0	63.1	ILX		verilog	1	ae18_core		yes	N	Y	4K	1M						2003	2009	https://hackaday.	not 100% compatable	negative edge reset "clock"
aeMB	https://opencor	beta	Shawn Tan	uBlaze	32	32	kintex-7-3	James	Brakef	1018	6	3		131	##	14.7	1.00	1.0	128.5	ILX		verilog	7	aeMB_cor	Y	yes	N		4G	4G	Y					2004	2009		not 100% compatable	
af65k	https://github.c	alpha	Andre Fachat	6502	32	8	kintex-7-3	James	Brakef	4424	6			69	##	14.7	1.00	4.0	3.9	X		vhdl	13	gecko65k	Y		N	N								2011	2019	http://www.6502	extended 6502 AKA 65K with 16, 32 or 64 bit data	
ag_6502	https://opencor	beta	Oleg Odintsov	6502	8	8	kintex-7-3	James	Brakef	824	6			176	##	14.7	0.33	4.0	17.7	ILX		verilog	2	ag_6502		yes	N	N	64K	64K	Y					2012	2012		verilog code generation, "phase level accurate"	
agcnorm	https://opencor	beta	Dave Roberts	accum	15	15	spartan-3a-	James	Brakef	3732	4		2	20	##	14.7	0.66	1.0	3.5	X		vhdl	5	AGC	Y		N	Y	4K	72K	N	11		1		1962	2012	http://klabs.org/h	Apollo Guidance Computer via 3-input NOR gate emulation	
ahmes	https://github.c	stable	Fabio Pereira	accum	8	8	kintex-7-3	James	Brakef	186	6			476	##	14.7	0.33	3.0	281.6	X	B	vhdl	3	ahmes			N	N	256	256	Y	15	1			2016	2017	http://embeddedsystems.io/ahmes-a-simple-8-bit-cpu-i	bare CPU with no RAM	
aizup/aizup_m	instruct1.cit.cor	stable	Yamin Li, Wanming Ch	RISC	8	16	arria-2	James	Brakef	121	A			298	##	q13.1	0.17	2.0	205.4	IX		vhdl	1	cpu			N	N	64K	64K		16		4		1996	1998		used in Cornell EE475 course	MIPS/inst reduced due to few inst
aizup/aizup_ov	instruct1.cit.cor	stable	Yamin Li, Wanming Ch	RISC	8	16	kintex-7-3	James	Brakef	138	6			318	##	14.7	0.17	3.0	128.3	IX		vhdl	1	cpu		asm	N	N	64K	64K	Y	16		4		1996	1998		used in Cornell EE475 course	MIPS/inst reduced due to few inst
aizup/aizup_pi	instruct1.cit.cor	stable	Yamin Li, Wanming Ch	RISC	8	16	kintex-7-3	James	Brakef	198	6			375	##	14.7	0.17	2.0	157.9	IX		vhdl	1	cpu		asm	N	N	64K	64K	Y	16		4		1996	1998		used in Cornell EE475 course	MIPS/inst reduced due to few inst
aizup/aizup_se	instruct1.cit.cor	stable	Yamin Li, Wanming Ch	RISC	8	16	kintex-7-3	James	Brakef	136	6			313	##	14.7	0.17	8.0	48.1	IX		vhdl	1	cpu		asm	N	N	64K	64K	Y	16		4		1996	1998		used in Cornell EE475 course	MIPS/inst reduced due to few inst
altium/TSK165	http://techdocs.p	proprietar	Altium	PIC16	8	12	spartan-3-5	Altium		416	4			50			0.33	2.0	19.8	AILX		proprietary				Y	yes	N	Y	256	4K	Y					2004	2017	CR0140.pdf, CR01	frozen, asm, C, C++, schem, VHDL & V	default clock speed is 50MHz
altium/TSK300	http://techdocs.p	proprietar	Altium	RISC	32	32	spartan-3-5	Altium		2426	4		4	50			1.00	1.0	20.6	AILX		proprietary				Y	yes	N	N	4G	4G	Y					2004	2017	CR0140.pdf, http:,	frozen, asm, C, C++, schem, VHDL & V	default clock: 50MHz, opt mult/div
altium/TSK51A	http://techdocs.p	proprietar	Altium	8051	8	8	spartan-3-5	Altium		1890	4		1	50			0.33	6.0	1.5	AILX		proprietary				Y	yes	N	N	64K	64K	Y					2004	2017	CR0140.pdf, CR01	frozen, asm, C, C++, schem, VHDL & V	default clock speed is 50MHz
altium/TSK80x	http://techdocs.p	proprietar	Altium	Z80	8	8	spartan-3-5	Altium		2558	4			50			0.33	3.0	2.2	AILX		proprietary				Y	yes	N	N	64K	64K	Y					2004	2017	CR0140.pdf, CR01	frozen, asm, C, C++, schem, VHDL & V	default clock speed is 50MHz
altor32	https://opencor	stable	Ultra Embedded	OpenRISC	32	32	kintex-7-3	James	Brakef	2505	6		5	192	##	14.7	1.00	1.0	76.8	ILX		verilog	16	altor32	Y	yes	N	Y	4G	4G	Y					2012	2015	https://openrisc.io	simplified OpenRISC 1000	xilinx S3 primitives
altor32_lite	https://opencor	stable	Ultra Embedded	OpenRISC	32	32	kintex-7-3	James	Brakef	1928	6			236	##	14.7	1.00	2.0	61.3	ILX		verilog	7	altor32	Y	yes	N	Y	4G	4G	Y					2012	2014	https://openrisc.io	simplified OpenRISC 1000, no pipeline	xilinx S3 primitives
alwcpu	https://opencor	alpha	Andreas Hilvarsson	RISC	16	16	kintex-7-3	James	Brakef	377	6			194	##	14.7	0.67	1.0	345.5	ILX		vhdl	7	top		me	N	N	64K	64K	Y			16		2009	2010		lightweight CPU	maximal features
am9080	https://opencor	beta	Moshe Shavit	8080	8	8	kintex-7-3	James	hung in synthes		6				##	14.7	0.33	9.0		X		vhdl	31	cpu	Y	yes	N	N	64K	64K	Y					2917	2018	https://en.wikichi	emulation of AM9080 using bit-slice 8	has VHDL for AMD bit-slice chips
am9080	https://opencor	beta	Moshe Shavit	8080	8	8	kintex-7-3	James	hung in synthes		6				##	14.7	0.33	9.0		X	Y	vhdl	31	sys9080	Y	yes	N	N	64K	64K	Y					2917	2018	https://en.wikichi	emulation of AM9080 using bit-slice 8	has VHDL for AMD bit-slice chips
amber	https://opencor	stable	Conor Santifort	ARM7	32	32	**zu-2e**	James	area o	3145	6		10	175	##	v20.1	0.75	1.0	41.8	ILX		verilog	25	a23_core	Y	yes	N		4G	4G	Y	80		16	3	2010	2017	https://en.wikipe	no MMU, shared cache	
amber	https://opencor	stable	Conor Santifort	ARM7	32	32	**zu-2e**	James	area o	5102	6		20	169	##	v20.1	1.05	1.0	34.7	ILX		verilog	25	a25_core	Y	yes	N		4G	4G	Y	80		16	5	2010	2017	https://en.wikipe	no MMU	
amber	https://opencor	stable	Conor Santifort	ARM7	32	32	kintex-7-3	James	Brakef	6103	6		18	127	##	v18.2	1.05	1.0	21.8	ILX		verilog	25	a25_core	Y	yes	N		4G	4G	Y	80		16	3	2010	2017	https://en.wikipe	no MMU	
amber	https://opencor	stable	Conor Santifort	ARM7	32	32	kintex-7-3	James	Brakef	6409	6		2	82	##	14.7	0.75	1.0	9.6	ILX		verilog	25	a23_core	Y	yes	N		4G	4G	Y	80		16	3	2010	2017	https://en.wikipe	no MMU, shared cache	2048 LUTs used as single port RAM
amic-0	https://github.com/albmc		Alberto Moriconi	RISC	32	32																vhdl	8	processor													https://en.wikipe	based on mic-1 by Andrew Tanenbaum	
an-noc-mpsoc	https://opencor	mature	Alireza Monemi	uBlaze	32	32	**zu-2e**	James	area o	968	6	3		284	##	v20.1	1.00	1.0	293.5	X	Y	verilog	90	aeMB_cor	Y	yes	N		4G	4G	Y					2014	2019		choice of lm32, aeMB, mor1kx or or1	full system has network of cores
an-noc-mpsoc	https://opencor	mature	Alireza Monemi	uBlaze	32	32	**zu-2e**	James	area o	1073	6	3	1	299	##	v20.1	1.00	1.0	278.2	X	Y	verilog	90	aeMB_top	Y	yes	N		4G	4G	Y					2014	2019		choice of lm32, aeMB, mor1kx or or1	full system has network of cores
an-noc-mpsoc	https://opencor	mature	Alireza Monemi	uBlaze	32	32	kintex-7-3	James	Brakef	1164	6	3	1	192	##	i14.7	1.00	1.0	165.2	X	Y	verilog	90	aeMB	Y	yes	N		4G	4G	Y					2014	2017		choice of lm32, aeMB, mor1kx or or1	full system has network of cores
any-1	https://github.c	defined	Robert Finch	RISC	64	32																system verilog				Y		Y				128		64		2021	2021	http://anycpu.org	Cray-1 like with full set of vector instr	v1 version had 48 bit inst
ao486	https://opencor	beta	Aleksander Osman	x86	32	8	**zu-2e**	James	Brakef	altera av	6				##	v20.1	1.00	1.0		I	Y	system v	85	ao486	Y	yes			4G	4G	Y					2014	2014		complete 486, SoC configuration	non-SoC, no MMU
ao486	https://opencor	beta	Aleksander Osman	x86	32	8	cyclone-4-7	James	Brakef	36094	4	4	47	46	##	q13.1	1.00	1.0	1.3	I	Y	system v	85	ao486	Y	yes			4G	4G	Y					2014	2014		complete 486, SoC configuration	non-SoC, no MMU
ao486_mister	https://github.c	beta	Sorgelig	x86	32	8					A						1.00	1.0		I	Y	system v	85	ao486	Y	yes			4G	4G	Y						2020		complete 486, SoC configuration	mister version of ao486: reworked with many
ao68000	https://opencor	beta	Aleksander Osman	68000	16	16	arria-2	James	Brakef	3479	A		6	169	##	q13.1	0.67	4.0	8.1	I	Y	verilog	1	ao68000	pm	yes	N		4G	4G	Y					2010	2012		uses microcode, instruction prefetch buffer	
aoocs	https://github.c	beta	Aleksander Osman	68000	16	16	cyclone-2	Aleksander O		26227	4	2	65		##	q10.1	0.67	4.0		I	Y	verilog	22	aoOCS	pm	yes	N		4G	4G	Y					2010	2011		uses ao68000 core, Amiga chip set en	Wishbone Amiga OCS SoC
aoocs	https://github.c	beta	Aleksander Osman	68000	16	16	kintex-7-3	James	altera pimitives		6				##	14.7	1.00	1.0		I	Y	verilog	22	aoOCS	pm	yes	N		4G	4G	Y					2010	2011		uses ao68000 core, Amiga chip set en	Wishbone Amiga OCS SoC
aoocs	https://github.c	beta	Aleksander Osman	68000	16	16	arria-2	James	Brakef	17852	A	2	43	57	##	q18.0	0.67	4.0	0.5	I	Y	verilog	22	aoOCS	pm	yes	N		4G	4G	Y					2010	2011		uses ao68000 core, Amiga chip set en	Wishbone Amiga OCS SoC
aoocs	https://github.c	beta	Aleksander Osman	68000	16	16	cyclone-10	James	Brakef	26009	4	2	67	45	##	q18.0	0.67	4.0	0.3	I	Y	verilog	22	aoOCS	pm	yes	N		4G	4G	Y					2010	2011		uses ao68000 core, Amiga chip set en	Wishbone Amiga OCS SoC
aor3000	https://opencor	beta	Aleksander Osman	MIPS	32	32	**zu-2e**	James	area o	4259	6	4	8	167	##	v20.1	1.00	1.0	39.1	IX		verilog	19	aoR3000	Y	yes	N		4G	4G	Y			32	5	2014	2015		MIPS R3000A compatible, has MMU	moved declarations forward
aor3000	https://opencor	beta	Aleksander Osman	MIPS	32	32	kintex-7-3	James	Brakef	5307	6	4	9	129	##	14.7	1.00	1.0	24.2	IX		verilog	19	aoR3000	Y	yes	N		4G	4G	Y			32	5	2014	2015		MIPS R3000A compatible, has MMU	moved declarations forward
apollo_acceler	http://www.apo	proprieta	Gunnar von Boehn	68000	8	16	cyclone-V	Gunnar von Boehn			6							1.0				vhdl				Y	yes	N		4G	4G	Y		32			2020	http://www.apollo	sells Amiga card, "68080" with 64-bit	claims very fast FPGA versions
apple2fpga	https://www.cs.c	stable	Stephen A Edwards	6502	8	8	**zu-2e**	James	area o	1095	6		8	195	##	v20.1	0.33	4.0	14.7	IX	Y	vhdl	19	de2_top	Y	yes	N	Y	64K	64K	Y					2007	2009		emulation of Apple II computer	replaced Altera PLL with stub
apple2fpga	http://www.cs.c	stable	Stephen A Edwards	6502	8	8	kintex-7-3	James	uncon	1417	6		9	159	##	14.7	0.33	4.0	9.2	IX	Y	vhdl	19	de2_top	Y	yes	N	Y	64K	64K	Y					2007	2009		emulation of Apple II computer	replaced Altera PLL with stub
aquarius	https://opencor	stable	Thorn Aitch	SuperH-2	32	16	**zu-2e**	James	area o	2975	6	2	16	122	##	v20.1	1.00	1.0	41.0	ILX		verilog	21	top	Y	yes	N		4G	4G	Y					2003	2015	http://0pf.org/j-cc	clone of Hitachi SH-2	project seems to have stalled
aquarius	https://opencor	stable	Thorn Aitch	SuperH-2	32	16	kintex-7-3	James	Brakef	4071	6	2	10	97	##	14.7	1.00	1.0	23.7	ILX		verilog	21	top	Y	yes	N		4G	4G	Y					2003	2015	http://0pf.org/j-cc	clone of Hitachi SH-2	project seems to have stalled
ARC	https://www.sy	proprietar	Synopsys	ARC	32	16	porprietary											1.0				proprietary				Y	yes			4G	4G							https://www.sync	several families each with options	for ASIC use, FPGA versions avail
ARM_Cortex_A	https://develope	ASIC	ARM	ARM A53	64	32	asic	Xilinx		6000	A			1500			2.00	0.5	1000.0			asic				Y	yes	Y									2017	https://en.wikipe	uses pro-rated LC area	dual issue, includes fltg-pt & MMU & caches
ARM_Cortex_A	https://develope	ASIC	ARM	ARM A9	32	16	arrira V	altera		4500	A			1050			2.50	1.0	583.3			asic				Y	yes	Y		4G	4G	Y	80		16	10		2012	https://en.wikipe	uses pro-rated LC area	dual issue, includes fltg-pt & MMU & caches
ARM_Cortex_M	https://www.arr	proprietar	ARM	ARM M1	32	16					A						1.00	1.0		X		encrypted				Y	yes	N		4G	4G	Y			16	3		2019	https://www.arm	free use on Xilinx Vivado, encrypted RTL, uses Digilent A7 or S7 board, AIX bus interfa	
ARM_Cortex_M	http://www.arm	proprietar	ARM	ARM M1	32	16	virtex-5	ARM	65nm	1900	6			200			1.00	1.0	105.3	AIX		proprietary				Y	yes	N		4G	4G	Y			16	3	2007		https://en.wikipe	ARM Cortex M0, M1 & M3 avail for FI	see xilinx Xcell64
ARM_Cortex_R	https://develope	ASIC	ARM	ARM R5	32	16	asic	Xilinx			A			600				1.0				asic				Y	yes	Y		4G	4G	Y	80		16				https://en.wikipe	uses pro-rated LC area	real-time interrupt handling

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	reporter	comments	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	vendor	SOC	src code	#src files	top file	doc	tool chain	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pipe line	start year	last revis	secondary web link	note worthy	comments
arm4u	https://opencor	stable	Joanathan Masur, Xav	ARM7	32	32	aria-2	James Brakef		1668	A	4	8	66	##	q13.1	0.75	1.0	29.5	I		vhdl	12	cpu	Y	yes	N		4G	4G	Y	80		16	5	2013	2014		university project	altera memory
arm9-soft-cpu	https://github.com/riscliti		Li Xinbing	ARM9	32	32																verilog	2	arm9_cor	Y	yes	Y		4G	4G	Y					2020		ARMv4-compatible CPU core	Dhrystone value: 1.2 DMIPS/MHz
artemis	https://github.c	simulatio	Sudharshan Sundaram	RISC	16	16																verilog	9	main_test	Y	asm	N				N	18		8		2018	2020	https://www.yout	simple, educational uP with decent vi	vivado project
aspida	https://opencor	stable	Sotiriou	DLX	32	32	zu-2e	James	dated xilinx pri	6					##	v20.1	1.00	1.0		X		verilog	10	DLX_top	Y	yes			4G	4G						2002	2009		DLX	compiled sync version
aspida	https://opencor	stable	Sotiriou	DLX	32	32	kintex-7-3	James	dated	3586	6			257	##	14.7	1.00	1.0	71.7	X		verilog	10	DLX_top	Y	yes			4G	4G						2002	2009		DLX	compiled sync version
atlas_2K	https://opencor	beta	Stephan Nolting	RISC	16	16	zu-2e	James	area o	1169	6	1	5	252	##	v20.1	0.80	1.0	172.2	ILX		vhdl	19	ATLAS_2K	Y	asm	N	Y	64K	64K	M	80		8		2013	2015		ARM thumb like inst set	has MMU & full SOC features
atlas_2K	https://opencor	beta	Stephan Nolting	RISC	16	16	kintex-7-3	James	Brakef	1595	6	1	5	151	##	14.7	0.80	1.0	75.9	ILX		vhdl	19	ATLAS_2K	Y	asm	N	Y	64K	64K	M	80		8		2013	2015		ARM thumb like inst set	has MMU & full SOC features
atlas_core	https://opencor	beta	Stephan Nolting	RISC	16	16	zu-2e	James	area o	588	6	1		314	##	v20.1	0.80	1.0	427.3	IX		vhdl	8	ATLAS_CP	Y	asm	N	Y	64K	64K	Y	80		8		2013	2015		ARM thumb like inst set	non-MMU version
atlas_core	https://opencor	beta	Stephan Nolting	RISC	16	16	kintex-7-3	James	Brakef	559	6	1		200	##	v14.1	0.80	1.0	286.2	IX		vhdl	8	ATLAS_CP	Y	asm	N	Y	64K	64K	Y	80		8		2013	2015		ARM thumb like inst set	non-MMU version
atmega8_pong	https://fr.wikive	stable	Juergen Sauermann	AVR	8	16	spartan-3-5	James	clock c	2767	4	1	10	53	##	14.7	0.33	1.0	6.3	X	Y	vhdl	37	avr_fpga_	Y	yes	N		64K	64K	Y	17		4		2017	2017		several projects using avr core	uses Sauermann core
atmega8_pong	https://fr.wikive	stable	Juergen Sauermann	AVR	8	16	spartan-3-5	James	clock c	2898	4	1	11	53	##	14.7	0.33	1.0	6.0	X	Y	vhdl	37	pacman_N	Y	yes	N		64K	64K	Y	17		4		2017	2017		several projects using avr core	uses Sauermann atmega16 core
attiny_atmega	https://opencor	beta	Gheorghiu Iulian	AVR	8	16											0.33	1.0				verilog			Y	yes	N		64K	128K	Y	72		32		2018	2019	https://git.morgot	configurable AVR processor w/8 configurations	
avr_core	https://opencor	stable	Rusian Lepetenok	AVR	8	16	kintex-7-3	James	Brakef	2135	6			127	##	14.7	0.33	1.0	19.7	X		verilog	15	avr_core	Y	yes	N		64K	128K	Y	72		32		2002	2017		VHDL core also	
avr_fpga	https://opencor	stable	Juergen Sauermann	AVR	8	16	kintex-7-3	James	Brakef	1606	6	1	6	120	##	14.7	0.33	1.0	24.7	X		vhdl	20	cpu_core	Y	yes	N		64K	128K	Y	72		32		2009	2010		extended lecture on FPGA uP design	
avr_fpga	https://opencor	stable	Juergen Sauermann	AVR	8	16	kintex-7-3	James	Brakef	1877	6	1	6	115	##	14.7	0.33	1.0	20.2	X	Y	vhdl	20	avr_fpga	Y	yes	N		64K	128K	Y	72		32		2009	2010	https://fr.wikivers	extended lecture on FPGA uP design	missing module in atmega8_pong_vga
avr_hp	https://opencor	stable	Strauch Tobias	AVR	8	16	kintex-7-3	James	2 slot	1554	6			223	##	14.7	0.33	1.0	47.4	X		vhdl	10	avr_core_pr	Y	yes	N		64K	128K	Y	72		32		2010	2012		hyper pipelined (eg barrel) AVR	
avr8	https://opencor	beta	Nick Kovach	AVR	8	16	kintex-7-3	James	Brakef	174	6			418	##	14.7	0.33	1.0	792.2	X		verilog	1	rAVR	Y	yes	N		64K	64K	Y	17		4		2010	2010		Reduced AVR Core for CPLD	not a full clone, doc is opencores page
avr-cpu	https://github.c	stable	Sung Hoon Choi	AVR	8	16																														2019			
avrtinyx61core	https://opencor	beta	Andreas Hilvarsson	AVR	8	16	kintex-7-3	James	Brakef	1243	6			194	##	14.7	0.33	1.0	51.5	X		vhdl	1	mcu_core		yes	N		64K	128K	Y	72		32		2008	2009			
ax8	https://opencor	stable	Daniel Wallner	AVR	8	16	spartan-6-3	James	missin	1549	6		1	213	##	14.7	0.33	1.0	45.3	X		vhdl	14	A90S1200		yes	N		64K	128K	Y	72		32		2002	2010		both A90S1200 & A90S2313	inserted fake inst ROM
a-z80	https://opencor	stable	Goran Devic	Z80	8	8	spartan-6	Goran Devic		1819	6		8		##	14.7	0.33	1.0		IX		verilog	24	z80_top_d	Y	yes	N	N	64K	64K	Y					2014	2020	https://github.cor	gate level reverse eng'd Z80	Complete implementation of a Sinclair ZX Spec
a-z80	https://opencor	stable	Goran Devic	Z80	8	8	kintex-7-3	James	Brakef	1186	6			24	##	14.7	0.33	1.0	6.8	IX		verilog	24	z80_top_d	Y	yes	N	N	64K	64K	Y					2014	2020	https://github.cor	gate level reverse eng'd Z80	Complete implementation of a Sinclair ZX Spec
a-z80	https://opencor	stable	Goran Devic	Z80	8	8	cyclone-2	Goran Devic		2084	4		29	19	##	q11.1	0.33	1.0	3.0	IX		verilog	24	z80_top_d	Y	yes	N	N	64K	64K	Y					2014	2020	https://github.cor	gate level reverse eng'd Z80	Complete implementation of a Sinclair ZX Spec
b16	www.bernd-pay	stable	Bernd Paysan	forth	16	5	spartan-6-3	James	Brakef	554	6			134	##	14.7	0.67	1.0	161.7	IX		verilog	1	b16	Y	yes	N									2002	2011		two versions: one/15 source files, derived from c18	
babyrisc	http://www.san	stable	John Rible	RISC	8	16	kintex-7-3	James	Brakef	468	6			141	##	14.7	0.33	2.0	49.7	X		verilog	1	qs5_mix	Y		N		64K	64K	Y	15		8		1997	1999	http://www.sandj	part of a three class course	memory rd/wt & ALU per clock
basic-cpu	https://embedd	stable	Justin Rajewski	RISC	8	16																verilog	1									16				2018	2018		16 inst, scrapped web page, 98 lines of	verilog, no call/rtn, bare core, excellent exam
bc6502	http://finitron.c	beta	Robert Finch	6502	8	8	kintex-7-3	James	Brakef	619	6			197	##	14.7	0.33	4.0	26.2	X		verilog	18	bc6502		yes	N	N	64K	64K	Y					2012	2012			bare source
beri	https://www.cl	mature	Gregory Chadwick	MIPS	64	32																bluespec	34	mipstop	Y	yes								32		2012	2017	https://github.cor	Bluespec Extensible RISC Implementa	CHERI (Capability Hardware Enhanced RISC Ins
bfcpu	http://www.cliff	stable	Clifford Wolf	Turing	8	3	kintex-7-3	James	Brakef	422	6			345	##	14.7	0.01	4.0	2.0	X	B	vhdl	4	cw6671	Y	yes	N	N	64K	64K	Y	8				2003	2003	https://en.wikipe	no accum, data pointer and bracketed	current version & earlier version
bit-serial	https://github.com/howe		Richard Howe	accum	16	16																vhdl	6	top	Y		N		4K	4K	N	15				2020	2021		bit serial, 16-bit uP, very simple	supports Forth
bjx1	https://github.c	alpha	Brendan Bohannon	RISC	32	16	kintex-7-3	James	syntax errors	6					##	14.7	1.00	2.0				verilog	34	exunit	Y		Y	N	4G	4G	Y		9	16		2017	2018		128-bit memory path	based on SH-4, work suspended
blue	https://opencor	stable	Al Williams	accum	16	16	spartan-3-5	James	remov	1025	4			63	##	14.7	0.67	1.0	41.1	X		verilog	16	topbox	web		N		4K	4K	N	16		2		2009	2010		derived from Caxton Foster's Blue	http://www.youtube.com/watch?v=dt4zezZP8
bobcat		beta	Stan Drey	DSP	16	24	kintex-7-3	James	Brakef	1622	6	1		107	##	14.7	0.67	1.0	44.0	X		vhdl	30	bobcat_cp	Y		N		64K	64K						1998	2000		dead web links	
brainfuckcpu	https://opencor	beta	Aleksander Kaminski	mem	8	3	kintex-7-3	James	Brakef	110	6			432	##	14.7	0.08	2.0	157.2	X		verilog	1	brainfuck_cpu			N	Y				8		0		2014	2015	http://www.cliffo	Touring machine like, 2ndary link is a	adj prog & data mem size, terrible name
bst-cpu	https://github.c	stable	Yichun Ma	RISC	32	32	kintex-7-3	James	altera primitive	6					##	14.7	1.00	1.0		I		verilog		sc_computer			N		4G	4G				32		2016	2016		learning, pipeline uP	
bst-cpu	https://github.c	stable	Yichun Ma	RISC	32	32	arria-2	James	Brakef	1439	A		2	58	##	q18.0	1.00	1.0	40.2	I		verilog	26	sc_computer			N		4G	4G				32		2016	2016		learning, single cycle uP	
btsr1arch	https://github.c	alpha	Brendan Bohannon	CISC	64	16										14.7				X		verilog	149	bjx2	Y	yes	Y	N	256T	256T	Y	64		32		2018	2021	https://www.yout	64-bit regs, 16x inst, 48-bit VM	BJX2 is superset of BtSR1, 4 data sizes
btsr1arch	https://github.c	beta	Brendan Bohannon	CISC	32	16	kintex-7-3	James	Brakef	4762	6		10	167	##	14.7	1.00	1.5	23.3	X		verilog	11	bsrexunit	Y	yes	Y	N	64K	64K	Y	64		32		2018	2021		is BtSR1, msp430 like, fltg-pt defined	3 data sizes, no (R++) or (--R) modes
bytemachine	https://github.c	mature	c0pperdragon	forth	8	8	kintex-7-3	James	Brakef	319	6		1	250	##	14.7	0.33	2.0	129.3	IX		vhdl	7	bytemachine			N	N		4K	Y	30				2016	2017		top is Altera schematic	results are for 2016 bare core
c16	https://opencor	stable	Jsauermann	C	16	8	spartan-3-5	James	Brakef	1751	4		16	57	##	14.7	0.33	1.0	10.7	X		vhdl	22	Board_cp	mi	yes	N		64K	64K	Y			5		2003	2012		8080 derivative, optional UART, 8-bit	xilinx 4K RAM primitives
c16too	https://www.sc	stable	Cole Design and Devel	RISC	16	16	kintex-7-3	James	Brakef	510	6			271	##	14.7	0.67	4.0	88.9	X		vhdl	1	core	Y	asm	N		64K	64K	N	20		8		2003		coledd.com/electr	graphics capability	clock/2 and six phases
c88	https://github.c	alpha	Daniiel Bailey	accum	8	8	kintex-7-3	James	Brakef	3088	6	2		167	##	14.7	0.33	2.0	8.9	X		vhdl	25	C88	Y	asm	N		8	256	Y	10		8		2015	2015	https://www.yout	only 8 memory locations	used 3658 Dff, doesn't infer block or LUT RAM
c88	https://github.c	alpha	Daniiel Bailey	accum	8	8	spartan-3-5	James	Dff ge	2664	4	2		54	##	14.7	0.33	1.0	6.7	X		vhdl	25	C88	Y	asm	N		8	256	Y	10		8		2015	2015	https://www.yout	only 8 memory locations	used 3785 Dff, doesn't infer block or LUT RAM
cardiac	https://opencor	mature	Al Williams	accum	13	12	spartan-3-4	James	Brakef	557	4			71	##	14.7	0.30	1.0	38.5	X		verilog	16	vtach	Y	asm	N		100	100	N	10				2013	2019	https://www.cs.d	CARDboard Illustrative Aid to Comput	3 digit BCD arithmetic
cast_8051	http://www.cas	proprietar	CAST Inc	8051	8	8	virtex-6	CAST I	820 sli	1800	6		2	81	##	12.1	0.33	3.0	5.0	X		proprietary			Y	yes	N		64K	64K	Y			32				http://www.cast-i	Cast has uP related IP	several versions, FPGA kits
cast_ba22	http://www.cas	proprietar	CAST Inc	RISC	32	16	spartan-6	CAST Inc		1800	6		32	72			1.00	1.0	40.0	X		proprietary			Y	yes			4G	4G				32				http://www.cast-i	Cast has uP related IP	several versions, FPGA kits
cd16	http://anycpu.o	stable	Brad Eckert	forth	16	16	spartan-3-5	James	Brakef	681	4			83	##	14.7	0.67	2.0	41.0	IX	B	vhdl	16	cd16			N		128K	8M						2003	2003	http://web.archiv	Spartan-3 block RAM	bare core
cd16	http://anycpu.o	stable	Brad Eckert	forth	16	16	spartan-3-5	James	Brakef	618	4		7	31	##	14.7	0.67	2.0	16.9	IX	Y	vhdl	16	demosocext			N		128K	8M						2003	2003	http://web.archiv	Spartan-3 block RAM	includes stack RAMs & some inst RAM
cf_ssp	https://opencor	stable	Tom Hawkins	?																		confluence			Y		N									2003	2009		confluence to VHDL	CF State Space Processor
cfm	https://github.com/cbiffle		Cliff L. Biffle	forth	16	16																haskell	23				N		64K	64K						2018	2018	https://clash-lang	Forth-inspired processor targeting th	alu inst is ucoded, some missing ops
chip8	https://bitbucke	errors	Carsten Elton Sørense	RISC	8		kintex-7-3	James	missing modules						##	14.7						verilog	28	chip8	Y		N									2013	2018	https://en.wikipe	Verilog implementation of the SuperC	https://www.zophar.net/pdroms/chip8/chip-8
classic_HP_calc	https://github.c	stable	Brian Nemetz	accum	56	10	kintex-7-3	James	Brakef	1750	6		3	233	##	14.7	0.17	10.0	2.2	X		vhdl	15	classichp	Y		N		30	4K	N	40		7		2012			processor & ROMs for HP-55, 45 & 35	includes LED display driver & UART, for Papilio
classy_core_17	https://github.com/classy		Andreas Schweizer	AVR	8	16	spsrtan-3	Andr		358	4			164	##	14.7	0.33	1.0	151.2			vhdl	8	top	Y	yes	N		64K	128K	Y	72		32			2019	https://blog.classy	adjuct to some custom logic	Implementing a CPU in VHDL parts 1..3
cmips	https://github.c	mature	Roberto Hexsel	MIPS	32	32															I	vhdl	22	core	Y	yes	N	N	4G	4G	Y			32	5	2017	2019	http://www.inf.uf	5-stage pipeline, MIPS32r2 core	
c-nit	http://www.c-n	stable	Sumit	RISC	16	16	spartan-3-5	James	xilinx L	752	4		3	100	##	14.7	0.67	2.0	44.5	X		verilog	6	soc	pr	asm	N	N	64K	64K	Y	22		15		2003	2004		RISC with several load/store modes	
coco3fpga	https://github.c	mature	Gary Becker	6809	8	8																verilog	39													2007	2015	http://www.davel	uses John Kent's 6809 & adds color computer SOC	
coen_316_cpu	https://github.c	alpha	G.K Yvann Monny	RISC	32	32	kintex-7-3	James	does n	897	6			127	##	14.7	1.00	3.0	47.0	X		vhdl	8	cpu_dp			N		32	32	N	20		32		2018	2018		MIPS based, simulation DO files, I&D	very small caches do not infer any RAM
cole_c16	https://www.sc	beta	Cole Design & Develop	RISC	16	16	spartan-6-3	James	Brakef	554	6			298	##	14.7	0.67	7.0	51.4	X		vhdl	1	core	Y	asm	N		64K	64K	N	20		8		2002	2012	https://blog.classy	(7) clks per inst, complete SOC	
complete_8bit	https://www.qu	stable	Van-Lei Le		8	8	kintex-7-3	James	modifi	208	6		1	260	##	14.7	0.33	3.0	137.5	X		vhdl	6	computer	N		N		96	128	Y					2016				memory_unit uses block RAM, IO ports prunec
copro6502	https://github.c	stable	David Banks	CISC	8	8			ISE projects for each core												Y	VHDL & Verilog			Y											2014	2017	https://stardot.or	65C102, Z80, 80286, 6809, PDP11, ARM2 & 32016 cores selectable by DIP switch on '
copyblaze	https://opencor	stable	Abdallah Ellbrahimi	picoBlaze	8	18	kintex-7-3	James	missin	622	6			217	##	14.7	0.33	2.0	57.5	IX		vhdl	16	cp_copyb	Y	asm	N		256	2K	Y					2011	2016		wishbone extras	
core_arm	https://opencor	beta	Konrad Eisele	ARM	32	16	kintex-7-3	James	Brakef	1239	6		3	250	##	14.7	1.00	1.0	201.8	X	Y	vhdl	151	arm_proc	Y	yes	N		256M	256M				16		2004	2009	http://cfw.sourcef	very large project with many unused	missing files found in sourceforge dir, very litt
cortex_m3	http://www.clo	proprietar	Tobias Strauch	ARM	32	16																proprietary												16		2013		cortex M3 data sh	claims to be mature	various academic papers, several projects
cosmac	https://github.c	beta	Eric Smith	1802	8	8	kintex-7-3	James	Brakef	244	6			270	##	14.7	0.33	1.0	365.5	X		vhdl	1	cosmac	Y	asm	N	N	64K	64K	Y	100		16		2009	2020		AKA COSMAC ELF of 1976	Fmax is for bare core, runs CamelForth
cosmac	https://github.c	beta	Eric Smith	1802	8	8	kintex-7-3	James	inferre	598	6		17	87	##	14.7	0.33	1.0	48.0	X	X	vhdl	14	elf	Y	asm	N	N	64K	64K	Y	100		16		2009	2020		uses PIXIE graphics core	modified to use block RAM
cosmacELF	https://hackada	stable	Winston Lowe	1802	8	8											0.33	1.0		X		scala	8	toplevel	Y	asm	N	N	64K	64K	Y	100		16			2020	https://hackaday.	AKA COSMAC ELF of 1976	instructions on using Scala
cowgirl	https://opencor	errors	Thebeekeeper	RISC	16	16	kintex-7-3	James	incomplete sou	6						14.7	0.67	1.0				vhdl	14	cowgirl						64K				8		2006	2009		incomplete source code	
cpu_mcnally	https://www.so	untested	Iain McNally	accum	16	16															B	system verilog			Y		N	N	4K	4K							2011			for course, SystemVerilog HDL - Exam	possibly same as simplecpu
cpu_takagi	https://github.c	untested	Masayuki Takagi	RISC	16	16																verilog	3	cpu								16				2016	2016			
cpu11	https://github.c	untested	1801BM1	PDP11	16	16																verilog			Y	yes		N	64K	64K	Y	70	13	8		2014	2020		2 versions, PDP-11 uP reverse engine	USSR uP, no DEC prototype, proprietary die de
cpu16	http://www.ultr	stable	C.H. Ting	forth	16	5	kintex-7-3	James	Brakef	347	6			364	##	14.7	0.67	1.0	702.1	X		vhdl	1	cpu16			N	N	64K	64K	N	28				2000	2000		P16 in VHDL	CPU24.vhd with width=16
cpu-16	https://opencores.org/pr		Yvo Zoer	RISC	16	16											0.67	3.0		I		verilog	5	cpu16			N	N	64K	64K	N	32		8		2019	2021		no LUT RAM, uses block RAM	Altera register file
cpu6502_true	https://opencor	stable	Jens Gutschmidt	6502	8	8	kintex-7-3	James	Brakef	1678	6			159	##	14.7	0.33	4.0	7.8	X		vhdl	7	r6502_tc		yes	N	N	64K	64K	Y					2008	2018		cycle accurate	
cpu65c02_true	https://opencor	stable	Jens Gutschmidt	6502	8	8	spartan-6-3	James	latch v	4794	6			47	##	14.7	0.33	4.0	0.8	X		vhdl	8	core		yes	N	N	64K	64K	Y					2008	2021		cycle accurate	
cpu8080	https://opencor	stable	Scott Moore	8080	8	8	kintex-7-3	James	Brakef	1179	6			299	##	14.7	0.33	9.0	9.3	X		verilog	1	m8080	Y	yes	N	N	64K	64K	Y					2006	2016		includes VGA display generator, three	variants
cpu86	http://www.ht-l	beta	Hans Tiggeler	x86	8	8	kintex-7-3	James	Brakef	3421	6	1		127	##	14.7	0.17	2.0	3.1	X		vhdl	23	cpu86_top	Y	yes	N	N	1M	1M	Y					2002	2018	http://www.ht-lat	8088 clone	ht-labs offers several uP cores
cpu-arm	https://github.com/techc		Ankit Solanki	ARM	32	32																vhdl	18	processor	Y	yes	Y		4G	4G	Y	80		16			2018		Design, implementation and simulatio	probably course work	
cpugen	https://opencor	stable	Giovanni Ferrante	RISC	32	16	kintex-7-3	James	Brakef	474	6			192	##	14.7	0.67	1.0	271.8	IX		vhdl	14	cpu	Y	asm	N	N								2003	2009		x86 .exe generates VHDL RISC uP	using 16 bit example
cpugen	https://opencor	stable	Giovanni Ferrante	RISC	32	16	kintex-7-3	James	Brakef	1597	6	8		154	##	14.7	1.00	1.0	96.3	IX		vhdl	14	cpuc	Y	asm	N	N								2003	2009		x86 .exe generates VHDL RISC uP	using 32 bit example
cpus-caddr	https://github.c	untested	Brad Parker	lisp	32	48																verilog			Y	lisp		Y	16M	16K						2011	2016	https://dspace.mi	Verilog FPGA re-implementation of M	uses 48-bit u-code
cpus-pdp11	https://github.c	untested	Brad Parker	PDP11	16	16																verilog			Y	yes		N	64K	64K	Y			8		2006	2016		A working PDP-11 cpu with an RK11 disk emulator which uses a IDE disk as a backing	

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	reporter	comments	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	vendor	SOC	src code	#src files	top file	doc	tool chain	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pipe line	start year	last revis	secondary web link	note worthy	comments
cpus-pdp8	https://github.c	untested	Brad Parker	PDP8	12	12	spartan-3	James Brakef		1557	4		1		##	14.7	0.40	2.0		X	Y	verilog	15	top	Y	yes	N	Y	4K	4K						2004	2016		A working PDP-8/i cpu with an RF08 disk emulator which uses a IDE disk as a backing	
cqpic	http://www002	stable	Sumio Morioka	PIC16	8	14	arria-2	James	ROM parameter	A					##	q13.1	0.67	1.0		I		vhdl & v	5	CQPIC	Y	yes	N	Y	256	4K	Y					1999	2004		LPM macros	
cray1	www.chrisfento	alpha	Christopher Fenton	CRAY1	64	16	kintex-7-3	James Brakef		13463	6	19	10	127	##	14.7	6.00	1.0	56.6	X		verilog	46	cray_sys_t	Y	yes	Y	N	4M	4M	N	128		536		2010	2015	CRAY data sheets	homebrew Cray1	24-bit address registers
cray2_reboot	https://opencor	beta	John Kula	CRAY2	64	16																non-EDIF	gate & module	Y	yes	Y	N	256M	256M	N	128		528		2016	2017	Cray 1, 2 & 3 docs	gate level code	32-bit address registers
crisv32_axis_et	http://develope	asic	Axis Communications	RISC	32	16															Y	proprietary			Y	yes			4G	4G	Y			16			2007	http://developer.a	embedded comm	very dated product
dalton_8051	www.cs.ucr.edu	stable	Tony Givargis	8051	8	8	kintex-7-3	James Brakef		2725	6	1	1	105	##	14.7	0.33	1.0	12.7	X		vhdl	7	i8051_all	Y	yes	N	N	64K	64K	Y					1999	2003		ASIC	
darkriscv	https://github.c	alpha	Marcelo Samsoniuk	risc-v	32	32	kintex-7-3	James Brakef		1422	6		1	167	##	14.7	1.00	1.0	117.2	X		verilog	2	darksocv	Y	yes	N		4G	4G	Y			32	2	2018	2018	https://blog.hacks	written in one night, low line count	readme is descriptive, uses cache
dataflow_chap	https://opencor	alpha	Rob Chapman, Steven	forth	16	16	kintex-7-3	James	file WebCase re		6					14.7	0.33	1.0				vhdl	27	DataFlowF	Y		N		256	256						2003			course work	
dcpu16	https://github.c	beta	Shawn Tan, Marcus Pe	RISC	16	16	kintex-7-3	James Brakef		662	6	1		318	##	14.7	0.67	4.0	80.4	X		vhdl & v	5	dcpu16_c	Y	asm	N	N	64K	64K	N	37		8		2009	2012	https://en.wikipe	for the 0X10c game	4+ addressing modes, 4 & 5-bit reg /modefield
df6805	www.hitechglob	proprietar	Hitech Global	6805	8	8	stratix-1	Hitech Global		1690	4			83			0.33	4.0	4.1	I		proprietary			Y	yes	N	N	64K	64K	Y							6805 data sheets		
dfp	https://opencor	stable	Ron Chapman	forth	8	8	kintex-7-3	James Brakef		297	6			192	##	14.7	0.33	1.0	213.2	X		vhdl	25	DataFlowF	Y											2003	2009		8-bitter, generates a custom VHDL stack machine, compiler is in Forth	
dgb16	see FISA64	stable	Robert Finch	RISC	16	16	kintex-7-3	James Brakef		780	6			313	##	14.7	0.67	1.0	269.0	X		verilog	1	dbg16	Y		N	Y						8				https://github.cor	inside FISA64 project	debug uP for fisa64
diogenes	https://opencor	beta	Fekknhifer	RISC	16	16	kintex-7-3	James Brakef		807	6		1	297	##	14.7	0.67	1.0	246.3	X		vhdl	11	cpu	Y	asm	N			1K					2008	2009		"student RISC system"	
dlx		errors	Martin Gumm	DLX	32	32	kintex-7-3	James	errors		6				##	14.7	1.00	1.0				vhdl	120		Y	asm								32		1995	2014		University of Stuttgart, asic dsgn	case statmt others clause has problems
dlx_calvino	https://github.com/aleter		Alessandro Calvino	DLX	32	32																vhdl			Y	yes	N		4G	4G				32			2019		masters thesis	also supports Synopsys Design Compiler
dlx_chiara	https://github.c	stable	Alessandro Di Chiara	DLX	32	32	kintex-7-3	James Brakef		2915	6			90	##	14.7	1.00	1.0	30.9	X		vhdl	32	a-dlx	Y	yes	N		4G	4G				32	5	2017	2017		Course project, no RTL comments, VHDL via instructor?	
dlx_nicola	https://github.c	stable	Nicola Vianello	DLX	32	32																vhdl	37	a-dlx	Y	asm	N		4G	4G				32			2019		masters thesis	
dlx_palmiero	https://github.c	ASIC	Christian Palmiero	DLX	32	32	kintex-7-3	James	design heiarch		6				##	14.7	1.00	1.0				vhdl	41	a-dlx	Y	yes	N		4G	4G				32	5	2015	2017		Course project, VHDL to netlist (STM	ASIC design
dlx_superscala	https://www.rs	errors	Joachim Horch	DLX	32	32	kintex-7-3	James	degnerate		6				##	14.7	1.00	1.0				vhdl	4	dlx	Y	yes	N		4G	4G				32		1997	1998		Course project, Two inst/clock, doc in	collapses for no apparent reason
dme	https://github.c	stable	ErwinM	RISC	16	16	kintex-7-3	James Brakef		1755	6			53	##	14.7	0.67	1.0	20.4	X		verilog	49	cpu	Y	yes	N		64K	64K	Y	40		8		2016	2017		based on magic-16	computer & computer2 null dsgns: no outputs
dp32		errors	Peter Ashenden	RISC	32	32	kintex-7-3	James	errors		6				##	14.7	1.00	1.0				vhdl												32		2001	2001	book, CDROM	from The Designers Guide to VHDL	timing delays in source code
dp8051	https://www.dig	proprietar	Digital Core Design	8051	8	8														ILX		proprietary			Y	yes										1999			also PIC, HC11, 68000, 680x, d32pro	see more recent DQ8051CPU
dragonfly	http://www.leo	beta	LEOX team	MISC	16	16	kintex-7-3	James Brakef		788	6			164	##	14.7	0.67	1.0	139.3	X		vhdl	6	dgf_core	Y		N		256	2K				16		2001			unusual, uses FIFOs	
dspuva16	http://www.DTE	stable	Santiago de Pablo	DSP	16	16	kintex-7-3	James Brakef		332	6			317	##	14.7	0.67	1.0	640.7	X		verilog	1	dspuva16		asm	N	Y	256	4K		40		16		2001	2004	www.1-core.com/	16 bit data memory, 24 bit regs	broken web link
eco32	https://opencor	stable	Hellwing Geisse	RISC	32	32	kintex-7-3	James Brakef		2339	6		1	160	##	14.7	1.00	1.5	45.5	ILX	Y	verilog	14	cpu	Y	yes	N		512M	256M	Y	61		32		2003	2014	homepages.thm.d	MIPS like, slow mul & div	
eco32	https://opencor	stable	Hellwing Geisse	RISC	32	32	kintex-7-3	James Brakef		3367	6		5	147	##	14.7	1.00	1.5	29.1	ILX	Y	verilog	24	eco32	Y	yes	N		512M	256M	Y	61		32		2003	2014	homepages.thm.d	MIPS like, slow mul & div	
eco32f	https://github.c	stable	Stefan Kristiansson	RISC	32	32	kintex-7-3	James Brakef		3845	6	3	4	123	##	14.7	1.00	1.0	32.1	X		verilog	12	eco32f	Y	yes	N		512M	256M	Y	61		32	6	2014	2014		pipelined version of the eco32 CPU	cache & mmu
edge	https://opencor	alpha	Hesham ALMatary	MIPS	32	32	spartan-6-3	James Brakef		5345	6	7	1	8	##	14.7	1.00	1.0	1.5	X		verilog	30	edge_core	Y	yes	N	N	4G	4G	Y			32	5	2014	2014		Edge Processor (MIPS)	MIPS1 clone
eight_bit_uc		stable	Synplicity	RISC	8	12	kintex-7-3	James	signal/variable		6					14.7	0.67	1.0				vhdl	10	eight_bit_uc						2K	Y			32		2000	2000		part of Amplify documentation	
eight32	https://github.com/robin		Alastair M. Robinson	accum	32	8	cyclone-4	Alasta	approx	1300	4			133			1.00	1.0	102.3			vhdl	17	eighththirty	Y	yes	N		500M	500M	Y	28		8		2019	2020	https://retroramb	5-bit op-code & 3-bit reg #	full tool set, see github page for ISA description
ejrh_cpu	https://github.c	stable	Edmund Horner	RISC	16	16	kintex-7-3	James Brakef		928	6	1	2	196	##	14.7	0.67	1.0	141.6	X		verilog	17	machine	Y									16		2015	2015		see web archive for doc	
electronfpga	https://github.c	mature	David Banks	6502	8	8														IX	Y	vhdl													2014	2020	https://en.wikipe	Acorn Electron ULA in various FPGAs	uses T65 core
ensilica	http://www.ens	proprietar	ensilica.com	eSi-3200	32	16	stratix-4	ensilica		2200	A			200			2.00	1.0	181.8	IX		verilog		eSi-3250	Y	yes			4G	4G	Y	104	10	16	5	2001	2016		verilog source included with license	room for 90 user inst, also as ASIC
ensilica	http://www.ens	proprietar	ensilica.com	eSi-3200	16	16	stratix-4	ensilica		1800	A			200			1.50	1.0	166.7	IX		verilog		eSi-3200	Y	yes			4G	4G	Y	104	10	16	5	2001	2016		verilog source included with license	room for 90 user inst, also as ASIC
ensilica	http://www.ens	proprietar	ensilica.com	eSi-1600	16	16	virtex-5	ensilica		1100	6			160			1.00	1.0	145.5	IX		verilog		eSi-1600	Y	yes			64K	64K	Y	92	10	16	5	2001	2016		verilog source included with license	room for 90 user inst, also as ASIC
ensilica	http://www.ens	proprietar	ensilica.com	eSi-1600	16	16	virtex-5	ensilica		1100	6			160			1.00	1.0	145.5	IX		verilog		eSi-1650	Y	yes			64K	64K	Y	92	10	16	5	2001	2016		verilog source included with license	room for 90 user inst, also as ASIC
ep16	https://github.c	beta	C.H. Ting	forth	16	5	kintex-7-3	James Brakef		837	6			254	##	14.7	0.67	1.0	203.6	X		vhdl	5	ep16.vhd	Y	yes	N	N	32K	32K	N	32				2005	2012	PDF files	initialized Lattice memory blocks	5-bit instructions
ep24		stable	C.H. Ting	forth	24	6	kintex-7-3	James	substit	1020	6		3	167	##	14.7	0.83	1.0	135.6	X		vhdl	1	ep24	Y	asm	N	N		4K		27				2002	2002		room for 37 additional op-codes	removing stack clear: 503 LUT6 & 143MHz
ep32	https://www.am	proprietar	C.H. Ting	forth	32	6	XP2	C.H. Ting		3368	4					ispL	1.00	1.0				proprietary														2007	2018	https://wiki.forth-	kindle book & RTL available: EP32 RIS	RTL: $25 from C.H. Ting
ep32	http://forth.org/	mature	CH Ting	forth	32	5																vhdl	7	ep32	Y	forth	N									2012		has eForth binary & source	now free
ep8080	https://github.c	beta	C.H. Ting	8080	8	8	kintex-7-3	James Brakef		1276	6			184	##	14.7	0.33	9.0	5.3	X		vhdl	4	ep80.vhd	Y	yes	N	N	64K	64K	Y					2002	2016	8080 data sheets	initialized Lattice memory blocks	work related to eP16
ep994a	https://github.c	stable	Erik Piehl	9900	16	16	kintex-7-3	James Brakef		1340	6		5	286	##	14.7	0.83	3.0	59.0	X		vhdl	10	ep994a	Y	yes	N	N	64K	64K	Y			16		2016	2019	https://hackaday.	TI 990 emulation	also tms9902 (uart) core by Paul Urbanus?
ep994a/icy99	https://github.c	stable	Erik Piehl	9900	16	16											0.83	3.0		L		verilog	29	tms9900	Y	yes	N	N	64K	64K	Y			16		2016	2020	https://hackaday.	TI 990 emulation	also tms9902 (uart) core by Paul Urbanus?
eric5	http://www.ent	proprietar	Thomas Entner	forth	9	8	cyclone-4-6	entner-electr		110	4	opt		60			0.42	1.0	229.1	I		proprietary							512	1K				3-4		2005	2011		25 MIPS: ERIC5xs, ERIC5Q	
erp	https://opencor	stable	Shahzadjk	RISC	8	16	spartan-3-5	James Brakef		366	4	1	1	70	##	14.7	0.33	1.0	63.5	X		verilog	1	ERPverilog	Y							15		6		2004	2014		two report PDFs & one Verilog file	
ez8	https://github.c	stable	Howard Mao	accum	8	16	kintex-7-3	James	replac	644	6		2	233	##	14.7	0.33	2.0	59.6	X		verilog	13	ez8_cpu					256	4K						2014	2014	http://zhehaomao.com/	not sure inferred RAM correct?	
f18a	http://www.gre	asic	Chuck Moore	forth																		proprietary			Y	yes												AKA G144A12: 12x12 array	family of parallel processors
f21	http://www.ultr	asic	Jeff Fox	forth	21	5																proprietary														1997	2011	http://www.ultrat	"machine forth", crazy address space	chip & simulator, AKA MuP21 or F21
f32c	https://github.c	beta	marko zec, vordah, Dar	risc-v/MIP	32	32	atrix-7-3	zec & vordah		1048	6	4	33	185	##	14.7	1.00	1.0	176.5	X		vhdl	50		Y	yes	N	Y	4G	4G	Y	30		32	5	2014	2019	http://www.nxlab	MIPS or RISC-V ISA, Arduino support	https://www.youtube.com/watch?v=55MzMH
fc16		paper	Richard Haskell	forth	16																	proprietary																PDF papers	chpt 11: VHDL By Example: Fundamentals of D
fgpu	https://github.c	stable	Muhammed al Kadi	SIMT	32	32	zynq7045	Muhammed a		128K	6	192	167		##	v17.2				X		vhdl	34	fgpu	Y	yes	Y		4G	4G	Y			32		2016	2017	https://dl.acm.org	eigth cores, reviews comparable proj	vivado fltg-pt IP, benchmarks, wikipedia: GPGP
fisa32	https://github.c	beta	Robert Finch	RISC	32	32	kintex-7-3	James Brakef		3479	6	3	2	152	##	14.7	1.00	1.0	43.7	X		verilog	1	FISA32	Y		N	Y						32		2014	2014	https://github.com/robfinch/Cores		
fisa64	https://github.c	beta	Robert Finch	RISC	64	32	kintex-7-3	James Brakef		10404	6	12	7	65	##	14.7	1.50	1.0	9.4	X		verilog	1	FISA64	Y		N	Y								2015	2015	https://github.com/robfinch/Cores	need to use multi-cycle on mult	
fisc	https://github.c	stable	Miguel Santos	RISC	64	32	arria-2	James	errors		A				##	q18.0	2.00	1.0				vhdl	21		Y	yes	Y	N				Y	85	6	32	5	2018	2018	http://www.archf	Flexible Instruction Set Computer	caches, VHDL & System Verilog versions, altera
fisc	https://github.c	stable	Miguel Santos	RISC	64	32	cyclone-4	James Brakef		5036	4		21	66	##	q18.0	2.00	1.0	26.1	I		system v	13	fisc_core	Y	yes	Y	N				Y	85	6	32	5	2018	2018	http://www.archf	Flexible Instruction Set Computer	caches, VHDL & System Verilog versions, altera
flexgrip	http://www.ecs	paper	Kevin Andryc	GPU	32	32	atrix-7	James Brakef		72649	6	156	119	100	##	14.7	1.00	0.1	11.0	X		vhdl	46	gpgpu_ml505_top_level												2013	2016	http://www.ecs.u	eight GPU processors	requested & received source files
flexgripplus	https://github.c	mature	Josie Condia	gpgpu	32	32																vhdl														2020	https://opencores	GPGPU based on G80 architecture of	NVIDIA, heavly based on flexgrip
fluid_core	https://opencor	alpha	Azmathmoosa	RISC	8	12	kintex-7-3	James Brakef		956	4			381	##	14.7	0.33	1.0	131.7	X		verilog	17	FluidCore			N	Y						8		2015	2015		data width adj., mem sizes adj.	
forth_cpu	https://anycpu.g	untested	Richard Howe	forth	16	16																vhdl	11	top												2013	2020	http://www.aholn	https://github.com/howerj/forth-cpu	based on J1 uP, used to operate DIY GPS recie
forth_kf532	https://github.c	stable	Tarasov Ilia	forth	32	6	kintex-7-3	James	no *.c	1719	6	4	4	172	##	14.7	1.00	1.0	100.3	X		vhdl	1	kf532	N		N	Y	1K	16K						2013	2013		no trace of source code on web	
forth-cpu/h2	https://opencor	stable	Richard Howe	forth	16	16	kintex-7-3	James Brakef		1858	6		9	149	##	14.7	0.67	1.0	53.8	X	Y	vhdl	11	top					64K	64K		25				2017	2020	https://github.cor	H2 Forth SoC, VHDL reads *.hex & *.b	derived from J1, hex & bin files in 2/16/2018 ta
fpag4_risc16_t	http://www.fpg	errors	Van Loi Le	RISC	16	16	kintex-7-3	James	degenerate des		6					14.7	0.66	1.0				verilog	15	Risc_16_b	Y		N	Y	64K	64K		13	4	16		2017	2017		similar to mips16_16_1cycl	incomplete Risc_16_bit module
fpg1	https://github.com/hrvac		Hrvoje Čavrak	PDP1	18	18														Y	Y	verilog	31	cpu	Y	yes	N		4K	4K							2019		video display of PDP-1 console, a mister core, retro gaming	
fpga4_8bit_up	http://www.fpg	stable	Van Loi Le	accum	8	8	kintex-7-3	James Brakef		258	6		1	200	##	14.7	0.33	3.0	85.3	X		vhdl	9	computer	me		N		96	128	Y	10		2		2016	2016	book: LaMeres Int	educational	16 input & 16 output ports fill out 256 byte adr
fpga4_mips_5p	http://www.fpg	errors	Van Loi Le	MIPS	32	32	kintex-7-3	James	degenerate des		6				##	14.7	1.00	1.0				verilog					N	N	4G	4G	Y			32	5	2017	2017		educational, full pipelined MIPS	incomplete
fpga4_mips16	http://www.fpg	stable	Van Loi Le	RISC	16	16	kintex-7-3	James Brakef		369	6			200	##	14.7	0.67	1.0	363.1	X		verilog	8	mips_16			N		65K	65K		13		8		2017	2017		educational, no block RAM inferred	same prog & data mem and alu as mips16_16
fpga4_mips16	http://www.fpg	stable	Van Loi Le	RISC	16	16	kintex-7-3	James Brakef		352	6			213	##	14.7	0.67	1.0	405.0	X		vhdl	8	mips_vhdl			N		65K	65K		8		8		2017	2017		educational, no block RAM inferred	actual prog sz=16, actual data mem sz=256
fpga4_up8_12	http://www.fpg	errors	Van Loi Le	accum	8	12	kintex-7-3	James	degenerate des		6				##	14.7	0.33	1.0				verilog	7	microcontroller			N									2016	2016		educational, simplified PIC12	incomplete
fpga-64	http://www.syn	stable	Peter Wendrich	6502	8	8	kintex-7-3	James Brakef		2210	6		2	156	##	14.7	0.33	4.0	5.8	X	Y	vhdl	26	fpga64_co	Y	yes	N	N	64K	64K	Y			26		2005	2008		Rendition of Commodore 64	altera top level schematic
fpga-bbc	https://github.c	untested	Mike Stirling	6502	8	8																vhdl					N		65K	65K						2011	2016	https://www.mike	BBC micro, uses t65 uP	also ZX-spectrum retro project
fpgacomputer	https://github.c	errors	Milan Vidakovic	RISC	16	8	arria-2	James	errors						##	q18.0	0.67	4.0			Y	verilog	10	computer	Y	asm	N	N	64K	64K	Y	25		8		2018	2018	https://mvidakovi	16-bit CPU, 64KB, UART (115200 bps), and VGA	
fpgacomputer	https://github.c	errors	Milan Vidakovic	RISC	16	8	kintex-7-3	James	erros		6				##	14.7	0.67	4.0			Y	verilog	10	computer	Y	asm	N	N	64K	64K	Y	25		8		2018	2018	https://mvidakovi	16-bit CPU, 64KB, UART (115200 bps), and VGA	
fpgammix	https://github.c	stable	Tommy Thorn	MMIX	64	32	arria-2	James Brakef		11605	A	8	10	94	##	q13.1	1.50	4.0	3.0	I		system v	3	core	Y	yes	Y	Y	16Q	16Q	Y	256		288		2006	2014	https://en.wikipe	clone of Knuth's MMIX	micro-coded
fpz8	https://opencor	stable	Fabio Pereira	Z8	8	8	cyclone-4	James Brakef		5184	4	1	16		##	14.7	0.33	4.0		I		vhdl	4	fpz8_cpu	Y		N	Y	2K	16K	Y					2016	2016		Zilog Z8 encore (eZ8) 8-bit core	Altera megafunctions (mem)
free_risc8	https://web.arc	stable	Thomas Coonan	PIC16	8	14	kintex-7-3	James Brakef		355	6			142	##	14.7	0.33	1.0	132.2	X		verilog	8	cpu	Y	yes	N		256	4K	Y					2002	2011	https://web.archive.org/web/20120309123835/http://www.mindspring.com/~tcoonan/index.html		
free6502	http://web.arch	stable	David Kessner	6502	8	8	kintex-7-3	James Brakef		646	6			193	##	14.7	0.33	4.0	24.6	X		vhdl	5	free6502	Y	yes	N	N	64K	64K	Y					1999	2000	http://www.sprov	microcoded	
ft64	https://github.c	alpha	Robert Finch	RISC	64	32																verilog		FT64v3b	Y	yes	Y		16E	16E	Y					2017	2018	https://www.ama	4th attempt at 64-bit core (raptor64,	amazon kindle book, L1 & L2 icaches & L1 dcac
fx68k	http://fx68k.fxa	untested	Jorge Cwik	68000	16	16																system v	3	fx68k	Y	yes	N		4G	4G	Y			16		2018	2021	https://github.cor	Cycle accurate, see http://atari-forum.com/viewtopic.php?f=28&t=34730#p358139	
gl85	http://simlab.ec	stable	Alex Miczo	8085	8	8	kintex-7-3	James	gate level desig		6					14.7	0.33	4.0		X		vhdl	1	i8085	Y	yes	N	N	64K	64K	Y					1993		http://www.fpga.	also a TTL implementation in VHDL	
gpu	https://opencor	stable	Diego A. Idarraga				kintex-7-3	James	errors in source		6				##	14.7	1.00	1.0				vhdl	21	gpu			Y									2015	2015		graphic processing unit	coding errors
gumnut	http://digitaldes	stable	Peter Ashenden	RISC	8	18	kintex-7-3	James Brakef		388	6			259	##	14.7	0.33	1.0	220.7	IX		verilog	6	gumnut-rt	Y	asm	N	Y	256	4K	Y			8		2007			see Digital Design: An Embedded Systems Approach Using VHDL	
gup	https://opencor	stable	Kevin Phillipson	68HC11	8	8	arria-2	James Brakef		925	A	1	1	127	##	q13.1	0.33	4.0	11.3	I		vhdl	25	gator_upr	Y	yes	N	N	64K	64K	Y					2008	2011	https://www.mil.u	top level is schematic	

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	reporter	comments	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	vendor	SOC	src code	#src files	top file	doc	tool chain	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pipe len	start year	last revis	secondary web link	note worthy	comments
hack	https://gitlab.com/x653/r	Michael Schroder	accum	16	16															I		verilog	24	cpu	Y		N	Y	32K	32K	N			2			2016	https://www.nan	CPU used to run Tetris	book: Elements of Computing Systems
hack	https://github.com/theap	Peter Clarke	accum	16	16															X		verilog	22	cpu	Y		N	Y	32K	32K	N			2			2016	https://www.nan	CPU used to run Tetris	book: Elements of Computing Systems
hack	https://github.com/wuha	Wu Han	accum	16	16		Wu Ha	not co	267	4		4								L		verilog	22	hack	Y		N	Y	32K	32K	N			2			2020	https://www.nan	CPU used to run Tetris	book: Elements of Computing Systems
hamblen_scon	http://hamblen.i	stable	James O. Hamblen	accum	16	16	cyclone-10	James	altera	80	4		1	204	##	q18.0	0.67	2.0	852.7	I		verilog	1	scomp			N	N	256	256	N	4					2008	http://hamblen.ec	from Hamblen 2008 "Rapid prototypi	tiny edu, high IO count
hamblen_scon	http://hamblen.i	stable	James O. Hamblen	accum	16	16	cyclone-10	James	altera	196	4		1	166	##	q18.0	0.67	2.0	283.5	I		verilog	2	DE2_TOP			N	N	256	256	N	4					2008	http://hamblen.ec	from Hamblen 2008 "Rapid prototypi	tiny edu, high IO count
harvard_arch	https://github.com/omar	omarelhedaby	RISC	32	32																	vhdl	135	harvard_pro	asm	N	Y								2021			many source files
hc11core	http://www.gm	stable	Green Mountain Comp	68HC11	8	8	kintex-7-3	James	Brakef	2190	6		127	##	14.7	0.33	4.0	4.8	X		vhdl	1	hc11rtl	Y	yes	?	N	64K	64K	N	53		8	2	2000		6811 data sheets	restricted use license, with corrections	
hd63701	https://opencor	planning	Tsuyoshi Hasegawa	6801	8	8	spartan-6-3	James	Brakef	1412	6	1	3	31	##	14.7	0.33	4.0	1.8	X		verilog	6	HD63701_CORE			N	N	64K	64K	Y					2014			Used in Atari game console, 6801 clone?	
hf-risc	https://opencor	stable	Sergio Johann Filho	MIPS	32	32	kintex-7-3	James	Brakef	1446	6		4	115	##	14.7	1.00	1.0	79.2	X		vhdl	9	spartan3e_n	yes	N	N	4G	4G	Y	41		32		2016		https://github.cor	MIPS I subset, no multiplier	
hicovec	https://opencor	beta	Harald Manske, Gunde	RISC	32	32	kintex-7-3	James	compiler errors		6					14.7	1.00	1.0				vhdl	28	cpu	Y	asm	N				Y					2008	2010		hybrid scalar & vector processor	
hive	https://opencor	stable	Eric Wallin	stack	32	16	arria-2	James	Brakef	1420	A	8	24	283	##	q13.1	1.00	1.0	199.4	ILX		verilog		hive_core	Y		N				N	40		10	8	2013	2015		4 symetrical stacks, eight threads via	pipeline barrel
hp86b	https://sites.goo	errors	Olivier De Smet	Capricorn	8	8	spartan-3-5	James	unresolved xilir		4				##	14.7	0.33	2.0				verilog	85	cpu										64		2010		https://en.wikipe	uses PicoBlaze, emualtes HP86B	picoblaze uart uses LUT4s
hpc-16	https://opencor	beta	Umair Siddiqui	RISC	16	16	kintex-7-3	James	Brakef	871	6			152	##	14.7	0.67	1.0	116.6	X		vhdl	20	cpu	Y	asm	N		64K	64K				16		2005	2015			
hrm-cpu	https://github.c	untested	Alexandre Dumont	accum	8	16																verilog			Y		N									2018	2019		modelled on "Human Resource Machine"	
i8051		stable	Tony Givargis	8051	8	8	kintex-7-3	James	Brakef	2690	6	1	1	105	##	14.7	0.33	4.0	3.2	X		vhdl	9	i8051_all	Y	yes	N		64K	64K	Y					1999	1999		author has book & course	Embedded System Design: A Unified Hardware
ice_mk2	https://github.co	alpha	Mario Hoffmann	RISC	16	16																verilog	8	top	Y		N		4K	4K	N	16		16		2020	2020	https://hackaday.io/project/174049-ice-cpu-mk-ii	variant of fpga4student	
iDEA	https://github.c	alpha	Hui Yan Cheah etal	RISC	16	32	virtex-6	Liu Ch	unable	321	6	1	2	405		13.2	0.67	1.0	845.3	X		verilog	22	cpu_top	Y	yes	N	Y	64K	64K	N	24		32	9	2011	2016	The iDEA DSP Blo	uses DSP slice in barrel mode for ALU	from GitHub, rq'd NOPs lower actual results
ignite_ptsc		asic	George Shaw	forth	32	8											1.0					proprietary					N		4G	4G						1995	2002		ShBoom clone, fast ASIC with high co	PTSC web site had full documentation
igor	https://github.c	errors		lisp			kintex-7-3	James	missing files		6				##	14.7	0.33	1.0				vhdl	25	leval												2010	2010		IGOR - A microprogrammed LISP mac	two versions, spartan3 LUT4
iitb-proc	https://github.com/preet	Preetam Pinnada	RISC	16	16																	vhdl	17	iitb_proc			N									2020			course project for EE224 @EE.IITB, fo	very little doc, sizeable state machine
inst_list_proce	https://opencor	planning	Mahesh Palve	accum	8	15	kintex-7-3	James	using	786	6		1	340	##	14.7	0.33	1.0	142.6	X		verilog	34	top	Y		N		128	1K		32				2014			pipelined, state machine	UART, SPI & timer included
instant-soc	https://www.fp	beta		risc-v	32	32																vhdl					N		4G	4G	Y			32			2020		converts C++ into VHDL, risc-v CPU &	perpherials, unused instructions omitted
ion	https://opencor	mature	Jose Ruiz	MIPS	32	32	kintex-7-3	James	Brakef	1533	6			163	##	14.7	1.00	1.0	106.0	IX		vhdl	12	mips_soc	Y	yes	N		4G	4G	Y			32		2011	2018	https://github.cor	new version: moving to MIPS32r1	new version not ready, keeping old numbers
J1	www.excamera	stable	James Bowman	forth	16	16	**zu-2e**	James	area o	253	6		1	336	##	v20.1	0.80	1.0	1061.1	X		vhdl	1	j1	Y	forth	N		64K	64K		20			2	2006	2015	https://github.cor	uCode inst, dual port block RAM	16 deep data & return stacks
J1	www.excamera	stable	James Bowman	forth	16	16	kintex-7-3	James	Brakef	335	6		1	180	##	14.7	0.80	1.0	431.0	X		vhdl	1	j1	Y	forth	N		64K	64K		20			2	2006	2015	https://github.cor	uCode inst, dual port block RAM	16 deep data & return stacks
J1a	www.excamera	stable	James Bowman	forth	16	16	kintex-7-3	James	DFF ex	518	6			412	##	14.7	0.80	1.0	636.1	X		verilog	3	j1	Y	forth	N		64K	64K		20			2	2006	2017	https://github.cor	uCode inst, dual port block RAM	DFF used for 18 deep data & return stacks
J1a32	www.excamera	stable	James Bowman	forth	32	16	kintex-7-3	James	DFF ex	930	6			358	##	14.7	1.00	1.0	384.4	X		verilog	3	j1	Y	forth	N		64K	64K		20			2	2006	2017		uCode inst, dual port block RAM	DFF used for 18 deep data & return stacks
J1b	www.excamera	stable	James Bowman	forth	32	16	kintex-7-3	James	DFF ex	2612	6			302	##	14.7	1.00	1.0	115.5	X		verilog	3	j1	Y	forth	N		64K	64K		20			2	2006	2017		uCode inst, dual port block RAM	DFF used for 32 deep data & return stacks
J1b_16	www.excamera	stable	James Bowman	forth	32	16	kintex-7-3	James	DFF ex	1588	6			355	##	14.7	1.00	1.0	223.4	X		verilog	3	j1	Y	forth	N		64K	64K		20			2	2006	2017		uCode inst, dual port block RAM	DFF used for 16 deep data & return stacks
j1sc	https://github.c	scala	Steffen Reith	forth	32	16																scala	11	j1	Y	forth	N		64K	64K		20				2017	2018		J1 reimplemented using Scala/Spinal	to generate VHDL or Verilog
j1vh	https://github.com/flamir	Theo Hussey	forth	32	16															I		vhdl	5	j1vh	Y	forth	N		64K	64K		20					2019		VHDL clone of J1 forth CPU	altera block RAM
jam	https://github.c	stable	Johan Thelin etal	RISC	32	32	kintex-7-3	James	Brakef	1396	6			159	##	14.7	1.00	1.0	113.7	X		vhdl	17	cpu_sys	Y		N	Y	128K	128K				32	5	2002	2014		serial multiply & divide	took out clock divider
jam	https://github.c	stable	Johan Thelin etal	RISC	32	32	kintex-7-3	James	Brakef	1369	6			143	##	14.7	1.00	1.0	104.2	X		vhdl	17	cpu	Y		N	Y	128K	128K				32	5	2002	2014		serial multiply & divide	
jane_nn		stable	Suresh Devanathan	RISC	4	8	kintex-7-3	James	Brakef	723	6			178	##	14.7	0.33	1.0	81.4	X		vhdl	3	Processor	Y							27		16		2002			neural network microprocessor, specialized registers	
jca		stable	John Cronin	RISC	8	32	kintex-7-3	James	replac	3287	6	3	3	157	##	14.7	0.33	1.0	15.8	IX	Y	verilog	17	soc										16					has VGA controller, plays Pong	altera memories
jcore_aka_sh2	http://www.j-co	difficult	Jeff Dionne. Rob Landl	SH2	32	16			need to run make per README file													vhdl	136												2014	2016	https://www.yout	https://www.youtube.com/watch?v=	Americans in Japan
jimmy	https://github.com/kuash	Eduardo Corpeño	RISC	8	8															IX		verilog	2	jimmy	Y		N	Y	256	256	Y	16		4			2020		educational, 4 regs, 8-bit adr spaces	vendor neutral source code
jop	https://opencor	stable	Martin Schoeberl etal	forth	16	16	cyclone-1	Martin	Schoe	2000	4			100		q10.0	0.67	1.0	33.5	I		vhdl	11	core	Y	yes	N		256K	256K						2004	2014		https://github.com/jop-devel/jop	java app builds some source code files
Jpu16	https://github.c	stable	Joksan Alvarado	RISC	16	26	kintex-7-3	James	missing RAM fi		6					14.7	0.67	1.0				vhdl	9	JPU16	Y	asm	N		64K	64K				16		2012			32 deep call stack, 8 addressing modes	
k1	http://mcforth.net/		Klaus Kohl-Schoepe	forth	16	16																verilog	11	K1	Y	forth	N		64K	64K		24					2020		based on J1, Quartus project file	
k68	https://opencor	alpha	Shawn Tan	68000	16	16	kintex-7-3	James	Brakef	2392	6			24	##	14.7	0.67	4.0	1.7	X		verilog	15	k68_cpu	Y	yes	N	N	4K	4G	Y			16		2003	2009		68K binary compatible	
kcp53000	https://github.c	simulation	Samuel Falvo II	risc-v	64	32	kintex-7-3	James	trimm	2455	6			175	##	14.7	2.00	1.0	142.9	X	B	vlerilog	4	polaris	Y	yes	N	Y	16E	16E	Y			32		2016	2017	https://github.cor	kestrel #3, basic 64-bit RISC-V	uses state machine RTL generator
kestrel-2	kestrelcompute	stable	Samuel Falvo II	forth	16	16	kintex-7-3	James	Brakef	735	6		8	172	##	14.7	0.67	1.0	157.2	X	Y	verilog	27	M_kestrel	Y	yes	N		64K	64K		20			2	2012	2015	https://hackaday.	J1 with wishbone bus	M _j1a runs at 244MHz & 368 LUTs
kgp-risc	https://github.com/kranti	Kiran & Aluru	RISC	32	32																	verilog			Y		N		4G	4G						2018	2020		only two register fields + shift amount	
klc32	https://opencor	planning	Robert Finch	RISC	32	32	kintex-7-3	James	Brakef	3790	6	4	1	200	##	14.7	1.00	4.0	13.2	X		verilog	25	KLC32	Y		N		4G	4G	Y			32		2011	2012	https://github.cor	single ported block RAM register file :(	heavy use of includes
kpu	https://github.c	alpha	Andrea Corallo	RISC	32	32	kintex-7-3	James	missin	6178	6	3		19	##	14.7	1.00	1.0	3.0	X	Y	verilog	19	kpu	Y	yes	N	Y	4G	4G				32		2016	2018	http://andreacora	KPU is a minimal system on chip written	used as testbench for the KPU core
kraken16	https://people.e	stable	Bruce R. Land	RISC	18	18	kintex-7-3	James	Brakef	281	6		1	278	##	14.7	0.67	1.0	662.3	X		verilog	1	DE2_TOP	Y	asm	N	N	256	256	N	22		16		2008		https://people.ec	Cornell course material	
ks10	http://www.tec	alpha	Rob Doyle	PDP10	36	36	spartan-6-2	Rob Doyle		4427	6		15	50	##	14.7	1.00	2.0	5.6	X		verilog	39	esm_ks10	Y	yes	Y	N			N					2011	2014		36-bit accum & 18-bit adrs	ucf file, most tests pass
ladybug	https://github.c	untested	Arlet Ottens	6502	8	8																verilog														2016		http://ladybug.xs4all.nl/arlet/fpga/6502/		
lattice6502	https://opencor	beta	Ian Chapman	6502	8	8	kintex-7-3	James	Brakef	4942	6			214	##	14.7	0.33	4.0	3.6	X		vhdl	3	ghdl_proc	Y	yes	N	N	64K	64K	Y					2010	2010		targeted to LCMXO2280	
latticemico32	http://www.latt	stable	Yann Siommeau, Mich	LM32	32	32	ecp3	Lattice	Semic	2166	A	4	30	149	##	q13.1	0.80	1.0	55.0	LX		verilog	24	lm32_cpu	Y	yes	N	Y	4G	4G	Y			32	6	2006	2017	https://en.wikipe	optional data & inst caches	Diamond3.10; see lm32 & misoc folders
latticemico32	http://www.latt	stable	Yann Siommeau, Mich	LM32	32	32	ECP3	Lattice	Semic	2370	4	4	30	115			0.80	1.0	38.8	LX		verilog	24	lm32_cpu	Y	yes	N	Y	4G	4G	Y			32	6	2006	2017	https://en.wikipe	optional data & inst caches	Diamond3.10; see lm32 & misoc folders
latticemico8	http://www.latt	stable	Lattice Semiconductor	RISC	8	18	LFE2	Lattice	Semic	265	4		1	104			0.33	2.0	64.4	ILX		vhdl	10	isp8_core	Y	yes	N		256	4K	Y			32		2005	2010	https://en.wikipe	16 deep call stack, four configuration	tool kit: LMS for Diamond3.10
lc-2	http://www.cs.u	mature	Eric Frohnhoefer	CISC	16	16	kintex-7-3	James	gate level prim		6				##	14.7	0.67	2.0				vhdl	13	lc2_all	Y	yes	N		64K	64K	N	16		8		2002	2002	https://en.wikipe	from book: 978-0072467505 by Patt &	educational, compiled via Synopsys
lc-3	https://github.com/Sacus	Sudhanshu Gupta	RISC	16	16																	vhdl			Y	asm	N		64K	64K	Y	16		8			2017	https://en.wikipe	from book: 978-0072467505 by Patt &	apndx has schematic
legv8	https://github.c	simulation	Warren Seto	AA64	64	32	kintex-7-3	James	Brakefield		6				##	14.7	1.00	1.0			B	verilog	2	arm_cpu	Y	yes	N		4G	4G	Y	10		32		2018	2019		coursework, limited ISA, 3 versions	single cycle, inst: LDUR, STUR, ADD, SUB, ORR,
legv8	https://github.c	stable	Warren Seto	AA64	64	32	kintex-7-3	James	Brakef	731	6		2	154	##	14.7	1.00	1.0	210.5	X	B	verilog	2	arm_cpu	Y	yes	N		4G	4G	Y	10		32		2018	2019		coursework, limited ISA, 3 versions	pipelined, inst: LDUR, STUR, ADD, SUB, ORR, A
legv8	https://github.c	stable	Warren Seto	AA64	64	32	kintex-7-3	James	Brakef	884	6		2	137	##	14.7	1.00	1.0	155.0	X	B	verilog	2	arm_cpu	Y	yes	N		4G	4G	Y	10		32		2018	2019		coursework, limited ISA, 3 versions	inst: LDUR, STUR, ADD, SUB, ORR, AND, CBZ, B
legv8	https://github.com/matt	Matthew Olsson	AA64	64	32	kintex-7-3	James	Brakef	884	6		2	137	##	14.7	1.00	1.0	155.0			verilog			Y	yes	N		4G	4G	Y	10		32		2018	2019		another implementation	legv8 from Patterson & Hennessy 2017
lem1_9	https://opencor	alpha	James Brakefield	accum	1	9	kintex-7-3	James	1 stage	75	6		1	171	##	14.5	0.04	1.0	91.2	IX		vhdl	2	lem1_9	Y		N	Y	32	2K	N	24			1	2016	2017		single bit at a time, absolute adrs	
lem1_9min	https://opencor	stable	James Brakefield	accum	1	9	kintex-7	James	1 stage	63	6		1	358	##	14.5	0.04	1.0	227.2	ILX		vhdl	3	lem1_9mi	Y	asm	N	Y	64	2K	N	8		64	1	2003	2009		logic emulation machine	
lem1_9ptr	https://opencor	beta	James Brakefield	accum	1	9	kintex-7-3	James	1 stage	147	6		1	176	##	14.5	0.06	1.0	72.0	IX		vhdl	2	lem1_9ptr	Y		N	Y	512	2K	N	24			1	2016			use speed opt, logic emulation machi	4 index registers: (ix),(--ix),(ix++),(ix+off)
lem16_18		alpha	James Brakefield	accum	16	18	kintex-7-3	James	Brakef	483	6		1	294	##	14.5	0.16	1.0	97.4	X		vhdl	2	lem16_18m			N		256	1K		77			1	2010	2018		variable bit-length memory read/writ	op-codes coded, untested
lem4_9	https://opencor	beta	James Brakefield	accum	4	9	kintex-7-3	James	1 stage	144	6		1	195	##	14.5	0.16	1.0	216.7	IX		vhdl	2	lem1_9	Y		N	Y	32	2K	N	24			1	2016			binary & BCD digit addition, speed mode	
lem4_9ptr	https://opencor	beta	James Brakefield	accum	4	9	**zu-2e**	James	1 stage	210	6		0	397	##	v20.1	0.24	1.0	453.5	IX		vhdl	2	lem1_9ptr	Y		N	Y	512	2K	N	24			1	2016			binary & BCD digit addition, speed mo	4 index registers: (ix),(--ix),(ix++),(ix+off)
lem4_9ptr	https://opencor	beta	James Brakefield	accum	4	9	kintex-7-3	James	1 stage	151	6		1	151	##	14.5	0.24	1.0	240.0	IX		vhdl	2	lem1_9ptr	Y		N	Y	512	2K	N	24			1	2016			binary & BCD digit addition, speed mo	4 index registers: (ix),(--ix),(ix++),(ix+off)
lemberg	https://github.c	stable	Wolfgang Puffitsch	VLIW	32	32	cyclone-4-6	James	Brakef	37459	4	25	54	43	##	q13.1	1.00	1.0	1.1	I		vhdl	57	core	Y	yes	Y		4G	2M	Y			32	4	2011		http://www2.imr	upto 4 inst/clock	LPM mem & floating point
leon2	https://github.c	stable	Jiri Gaisler	SPARC	32	32	kintex-7-3	James	Brakef	5992	6	1	12	133	##	14.7	1.00	1.0	22.3	X		vhdl	82	leon	Y	yes	Y		4G	4G	Y			64	5	1999	2003	https://en.wikipe	large config file, rad-hard asic version	https://www.gaisler.com/index.php/products/
leon2	https://github.c	stable	Jiri Gaisler	SPARC	32	32	cyclone-1	Klas	Westerlu	7554	4		42	50	##		1.00	1.0	6.6	I		vhdl	90	leon	Y	yes	Y		4G	4G	Y			64	5	1999	2003	https://en.wikipe	LUT #s from Nios vs Leon2 compariso	https://www.gaisler.com/index.php/products/
leon3	http://www.gai	stable	Jiri Gaisler, Jan Anders	SPARC	32	32	kintex-7-3	Jiri	Gaisler	2920	6			183			1.00	1.0	62.7	AILX	Y	vhdl	100s	leon3x	Y	yes	Y		4G	4G	Y			64	7	2003	2020	https://en.wikipe	**customized for ~50 FPGA boards,**	**xls with utilization for all targets**
leros	https://opencor	stable	Martin Schoeberl	accum	16	16	spartan-6	Martin	Schoe	112	6		1	182			0.67	1.0	1088.8	IX		vhdl	5	leros	Y	yes	N	Y	256	64K				2	2	2008	2020	https://github.cor	256 word data RAM, PIC like	short LUT inst ROM
lgp30	http://www.e-b	stable	Stanley Frankel	accum	32	32															Y	vhdl	42	LGP-30	Y	yes	N		4K	4K	N			3			2017		FPGA version of LGP30 drum computer,	also LGP21, RPC4000, 65F02
light52	https://opencor	beta	Jose Ruiz	8051	8	8	kintex-7-3	James	Brakef	1022	6	1	1	154	##	14.7	0.33	6.0	8.3	IX	Y	vhdl	8	light52_m	Y	yes	N	N	64K	64K	Y					2012	2018		targeted to balanced	~ 6 clocks/inst
light8080	https://opencor	stable	Jose Ruiz, Moti Litoche	8080	8	8	kintex-7-3	James	Brakef	154	6		1	247		14.7	0.33	9.0	58.9	IX		verilog	5	i80soc	Y	yes	N	N	64K	64K	Y					2007	2015		targeted to area, includes UART, inte	older versions have both VHDL & Verilog
limen	https://github.com/domir	Dominik Salvet	RISC	16	16																	vhdl	12	core	Y		N	Y	64K	64K	N	20		8		2018	2020		teenager, highschool thesis	
lion	https://github.com/llion/	Theodoulos Liontakis		16																	Y	vhdl	7	lionsysten	Y	yes			64K	64K	Y			8		2015	2019	https://hackaday.	custom gaming CPU, mem segments	software in C#, has BASIC
lipsi	https://github.c	stable	Martin Schoeberl	accum	8	8	cyclone4	Martin	Schoe	162	4		1	162			0.17	1.0	167.0			scala	2		Y		N	N	64K	64K	Y	9	3	16		2017	2019	https://github.cor	goal is 100 LUTs, program mapped to	"Lipsi, a very tiny processor"
lispmicrocontr	http://nyuzi.org	errors	Jeff Bush	lisp	32	32	kintex-7-3	James	missing init file		6				##	14.7	1.00	1.0				verilog	10	ulisp	Y		N													program.hex missing	
lm32	https://github.c	mature	Sebastien Bourdeaudu	LM32	32	32																verilog	24	lm32-top	Y	yes	N	Y	4G	4G	Y			32	6		2014		cleaned up lattice micro32, see milkymist	
Lutiac		custom	David Galloway, David	reg	16	NA	stratix-4	David	Gallow	140	A	4		198			0.67	1.0	947.6	I		vhdl & verilog								64	N	64		32	3		2010	Talks at Un. Toron	synthesis maps PC into ucode	no inst mem: small state machine, ~200 inst op
lwrisc	https://opencor	stable	Li Wu	accum	8	12	arria-2	James	Brakef	88	A		1	230	##	q13.1	0.17	1.0	443.6	I		verilog	9	risc_core		asm	N	Y	256	2K	Y	16				2008	2009		ClaiRISC simplified PIC, 4 reg rtn stack	absolute addressing only, lowered MIPS/clk

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	reporter	comments	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	vendor	SOC	src code	#src files	top file	doc	tool chain	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pipe line	start year	last revis	secondary web link	note worthy	comments
lxp32	https://opencor	beta	Alex Kuznetsov	RISC	32	32	kintex-7-3	James Brakef		850	6	3	1	196	##	14.7	1.00	2.0	115.4	AIX		vhdl	20	lxp32u_to	Y	asm	N	N	4G	4G	Y	30		256	3	2016	2019	https://lxp32.gith	register file in block RAM	vendor neutral source code, no div inst
m1_core	https://opencor	beta	Fabrizo Fazzino, Albert	MIPS?	32	32	arria-2	James Brakef		2101	A			190	##	q13.1	1.00	1.0	90.6	IX		verilog	9	m1_core		yes	N		4G	4G	Y			32		2007	2012		GCC target?	
m16c5x	https://opencor	mature	Michael Morris	PIC16	8	14	spartan-3-4	Michael Morr		1217	4		3	60	##		0.33	1.0	16.3	X	Y	verilog	3	m16C5x	Y	yes	N	Y	256	4K	Y					2013	2014		SOC LUT count	core at P16C5X
m17	http://users.ece	asic	Philip Koopman	stack																		proprietary															chapter 4.3 in Koopman	6600 gate ASIC
m32632	https://opencor	stable	Udo Moeller	N32032	32	8	kintex-7-3	James Brakef		10167	6	19	16	83	##	14.7	1.00	1.0	8.2	IX		verilog	18	example	Y	yes	Y	Y	4G	4G	Y	200		24	3	2009	2019	http://cpu-ns32k.net/		21.97 VAX Mips at 50MHz (Cyclone IV)
m65	www.ip-arch.jp/	stable	Naohiko Shimizu	6502	8	8	arria-2	James Brakef		483	A			110	##	q13.1	0.33	4.0	18.8	X		sfl & TDI	8	m65cpu	Y	yes	N	N	4K	4K	Y					2001	2002			
m65c02	https://opencor	mature	Michael Morris	6502	8	8	spartan-6-3	James Brakef		466	6		3	118	##	14.7	0.33	4.0	20.8	X	Y	verilog	13	M65C02	Y	yes	N	N	64K	64K	Y					2013	2020	https://github.cor	also a m65c02a version	micro-coded via F9408 soft sequencer
m68k	https://github.com/usoki		Salvador Garcia	68000	32	16																vhdl	13	cpu3017											2018		simplified 68K	
mais		stable	Rene Doss	MIPS	32	32	kintex-7-3	James Brakef		2760	6	4	5	245	##	14.7	1.00	1.0	88.7	X		vhdl	22	MAIS_soc	Y	yes	N	N	4G	4G				32	5	2013		use MIPS tools	register forwarding around ALU	license req'd for commercial use
mangomips32	https://github.c	stable	Ricky Tino	MIPS	32	32											1.00	1.0				verilog	25		Y	yes	N		4G	4G	Y	100		32	5	2019	2019		cache support, runs linux	very percise specs
manik	https://www.ds	stable	Sandeeo Dytta	RISC	32	32	kintex-7-3	James	needs editing t	6						14.7	0.33	1.0				vhdl	45	manik2top	Y	yes	N		4K	4K	Y			16		2002	2006	www.niktech.com	optional data & inst caches	supports Xilinx, Altera, Actel, Lattice; broken w
mano_machine	https://github.c	stable	Susam Pal	accum	16	16	kintex-7-3	James	needs	364	6				##	14.7	0.67	2.0				vhdl	5	microproc	Y		N		4K	4K	N	25				2005	2016	Computer System	course project, bidir mem data	for XC9572 CPLD, large # of latches
marca	https://opencor	stable	Wolfgang Puffitsch	RISC	16	16	arria-2	James Brakef		1763	A		22	157	##	q13.1	0.67	6.0	10.0	I		vhdl	40	marca	Y		N		8K	16K		75		16	4	2007	2009		serial multiply & divide	clks/inst is approx
mblite	https://opencor	beta	Tamar Kranenburg	uBlaze	32	32	kintex-7-3	James Brakef		941	6		2	227	##	14.7	1.00	1.0	240.9	IX		vhdl	18	core_wb	Y	yes	N		4G	4G	Y	86		32		2009	2017		not all instructions implemented	moved everything to work library
mb-lite_plus	http://www.late	stable	Huib Arriens	uBlaze	32	32	kintex-7-3	James Brakef		244	6		2	319	##	14.7	1.00	1.0	1308.1	X	B	vhdl	34	tumbl	Y	yes	N		4G	4G	Y			32		2010	2012		Delft Un. Of Tech. course work	use inferred RAM
mc6803	https://opencor	stable	Dukov	6803	8	8											0.33	3.0				system verilog			Y	yes	N	N	64K	64K	Y					1999			based on System68 and System01 by	John E. Kent, translated CPU core from VHDL to
mc6809	https://github.c	stable	Greg Miller	6809	8	8																verilog	6	gd6809	Y	yes	N	N	64K	64K	Y					2016	2017	https://shop.trenz	Cycle Accurate MC6809 Core	emphasis on cycle accuracy, DIP replacement
mc6809e		beta	Flint Weller	6809	8	8	kintex-7-3	James	gate level prim	6						14.7	0.33	3.0				vhdl	26	core_6809	Y	yes	N	N	64K	64K	Y					1999		https://www.linke	course work, ASIC orientation	
mc68kods	https://sites.goo	beta	Olivier De Smet	68000	32	16	kintex-7-3	James	errors	4617	6				##	14.7	1.00	8.0			Y	vhdl	10	mc68kods												2011			SOC for HP9816 computer emulation	
mc8051	http://www.ore	stable	Helmut Mayrhofer	8051	8	8	kintex-7-3	James Brakef		3022	6	1		83	##	14.7	0.33	4.0	2.3	X		vhdl	49	mc8051cc	Y	yes	N	N	256	64K	Y					1999	2013	www.oreganosyst	fast 8051, version available with floating-point by David Lundgren	
mcip_open	https://opencor	beta	Mezzah Jbrahim	PIC18	16	24	kintex-7-3	James Brakef		881	6	1		200	##	14.7	0.67	1.0	152.1	X		vhdl	23	MCIOopen_r	Y	yes	N	Y	4K	1M	Y					2014	2015		light version of PIC18	
mcl51	http://www.mic	stable	Ted Fried	8051	8	8	artix-7-3	Ted Fried		312	6		2	180			0.33	8.0	23.8	X		proprietary			Y	yes	N	N	64K	64K	Y					2016			**micro-coded**	
mcl65	http://www.mic	stable	Ted Fried	6502	8	8	atrix-7-3	Ted Fried		252	6		2	196	##	14.7	0.33	4.0	64.2	X		verilog	1	mcl65	Y	yes	N	N	64K	64K	Y					2017			**microcoded, cycle exact**	**excellent micro-coding LUT counts**
mcl65	http://www.mic	stable	Ted Fried	6502	8	8	kintex-7-3	James	inserte	326	6		2	196	##	14.7	0.33	4.0	49.6	X		verilog	1	mcl65	Y	yes	N	N	64K	64K	Y					2017			**microcoded, cycle exact**	**excellent micro-coding LUT counts**
mcl86	http://www.mic	stable	Ted Fried	x86	16	8	kintex-7-3	Ted Fried		308	6		4	180			0.67	20.0	19.6	X		proprietary			Y	yes	N	N	1M	1M	Y					2016		http://www.embe	**microcoded, meets original 8088 timing@100MHz**	
mcpu	https://opencor	stable	Tim Boscke	accum	8	8	spartan-6-3	James Brakef		41	6			384	##	14.7	0.08	1.0	749.0	X		vhdl	1	tb02cpu2	Y	asm	N		64	64	Y	4				2007	2018	https://github.cor	MCPU A minimal CPU for a CPLD	reduced MIPS/clk due to only 4 inst
mcs-4	https://opencor	alpha	Reece Pollack	4004	4	4	kintex-7-3	James Brakef		228	6			376	##	14.7	0.16	4.0	66.0	X		verilog	7	i4004			N		4K	4K	N					2012	2012		4004 was multi-chip	4004 CPU & MCS-4
mcu8	https://opencor	alpha	Dimo Pepelyashev	accum	8	8	kintex-7-3	James Brakef		274	6			299	##	14.7	0.33	1.0	360.1	X		vhdl	16	processor_E	asm				256	256	Y	17				2008	2009		asm, simulated, builds?	
mega65	https://github.c	untested	Paul Gardner-Stephen	6502	8	8	kintex-7-3	James	bash script	6					##	14.7	0.33	2.0		X	Y	vhdl	114	machine	Y	yes	N	N	64K	64K	Y					2017	2020		Enhanced c65 running in FPGA	seeks high performance
mega65	https://github.c	untested	Paul Gardner-Stephen	6502	8	8		James	missing file	6					##	v20.1	0.33	2.0		X	Y	vhdl	114	nocpu	Y	yes	N	N	64K	64K	Y					2017	2020		Enhanced c65 running in FPGA	seeks high performance
micro_nating	https://github.c	mature	Geoff Natin	RISC	16	16																vhdl	56	processor_final			N	N	64K	64K	N	10		9		2016	2016		microcoded instruction set processor,	educational
micro16b	http://members	beta	John Kent	accum	16	16	kintex-7	James Brakef		205	6			434	##	14.7	0.33	2.0	349.0	X		vhdl	1	u16bcpu	Y	asm	N	N	64K	4K	Y	8				2002	2008	http://members.c	very limited inst set	MIPS/clk adj'd, 2 clks/inst
micro8a	http://members	beta	John Kent	accum	8	16	kintex-7	James Brakef		531	6			204	##	14.7	0.33	3.0	42.3	X		vhdl	11	Micro8	Y		N	N	2K	2K	Y					2002	2002	http://members.c	derived from Tim Boscke's mcpu	also micro8 and micro8b variants
microblaze	https://www.xil	proprietar	Xilinx	uBlaze	32	32	virtex ultra	Xilinx		563	6		1	682	##		1.03	1.0	1247.7	X		proprietary			Y	yes	opt		4G	4G	Y	86		32	3	2002		https://en.wikipe	MicroBlaze MCS, smallest configurati	70 configuration options, MMU optional
microblaze	https://www.xil	proprietar	Xilinx	uBlaze	32	32	kintex-7	Xilinx		546	6		1	320			1.03	1.0	603.7	X		proprietary			Y	yes	opt		4G	4G	Y	86		32	3	2002			MicroBlaze MCS, smallest configurati	70 configuration options, MMU optional
microcore110	http://www.pld	beta	Klaus Schleisiek	forth	12	8	kintex-7-3	James Brakef		399	6		1	294	##	14.7	0.40	2.0	147.4	X		vhdl	30	core	Y	asm	N	Y	512	2K						1999	2004	www.microcore.o	indexing into return stack, auto inc/d	only one block RAM? simplest core
microcore120	http://www.pld	beta	Klaus Schleisiek	forth	16	8	kintex-7-3	James Brakef		1101	6			168	##	14.7	0.67	2.0	51.1	X		vhdl	17	ucore	Y	asm	N	Y	4K	4K						1999	2004		indexing into return stack, auto inc/d	no block RAM?, uses tri-state signals
microwatt	https://github.c	untested	anton blanchard	PPC	32	32																vhdl	37	toplevel	Y	yes			4G	4G	Y					2019	2020	https://openpowe	open source PPC from IBM	supports microPython, beta stage
milkymist	https://github.c	stable	Sebastien Bourdeaudu	LM32	32	32	spartan-6	James	failed	13531	6	31	78	50	##	14.7	0.80	1.0	3.0	X	Y	verilog	169	system	Y	yes	N	Y	4G	4G	Y			32	6	2007	2014		uses LM32, uses Spartan-6 IO	failed in mapper
mimafpga	https://github.c	stable	Manuel Killinger	accum	24	24															Y	vhdl	32	mimappro	Y		N					19				2019		Minimal Machine processor taught at	has testbench
minicpu	http://www.cs.l	stable	Hirotsugu Nakano	stack	16	5	kintex-7-3	James	lots of	433	6	1	1	128	##	14.7	0.33	1.0	97.7	X		verilog	7	minicpu	Y	yes	N		4K	4K	N	26				2008	2018		same as tiny-cpu	uses Flex, Bison & Perl to create gcc compiler
minicpu-s	https://github.c	stable	Michael Morris	stack	16	8	kintex-7-3	James Brakef		147	6			741	##	14.7	0.67	28.0	120.6	X		verilog	2	both	Y		N					33				2012	2013		separate source for each CPLD chip,	fits (2) XC9500 CPLD
minimig	https://code.go	stable	Frederic Requin	68000	32	16	stratix-2	Freder	speed	1900	4		4	180			1.00	6.0	15.8	I		verilog	1	j68	Y	yes	N		4G	4G	Y			16		2009	2014		for use with Minimig	micro-coded on stack machine
minimig-j68_cp	https://github.com/fredre		Frédéric REQUIN	68000	8	16																verilog	16	soc_j68	Y	yes	N		4G	4G	Y			32			2018		Stack based CPU with Forth-like microcode implementing 68000 uP	
minimips	https://opencor	stable	Samuel Hangouet	RISC	32	32	kintex-7-3	James Brakef		2939	6	8		118	##	14.7	1.00	1.0	40.1	X		vhdl	12	minimips	Y	yes	N	N	4G	4G				32	5	2004	2018		based on MIPS I	
minimips_supe	https://opencor	alpha	Miguel Cafruni	RISC	32	32											1.00	0.5				vhdl	18	minimips	Y	asm	N	N	4G	4G				32	5	2017	2018		based on MIPS I	dual issue to two pipes, 16-bit mulitplier
minirisc	https://opencor	stable	Rudolf Usselmann	PIC16	8	14	spartan-3	Rudolf Usseln		460	4			80			0.33	1.0	57.4	X		verilog	7	risc_core_	Y	yes	N	Y	256	4K	Y					2001	2012			
minsoc	https://opencor	stable	Raul Fajardo etal	OpenRISC	32	32	kintex-7-3	James Brakef		4945	6	4	8	107	##	14.7	1.00	1.0	21.7	ILX	Y	verilog	88	or1200_to	Y	yes	Y	M	4G	4G	Y			32		2009	2013	https://github.cor	minimal OR1200, vendor neutral, has caches	
mips_16	https://opencor	stable	Doyya Doyya	RISC	16	16	kintex-7-3	James	collapsed in co	6						14.7	1.00	1.0				verilog	12	mips_16_(	Y		N		64K	64K		13		8	5	2012	2013		Educational 16-bit MIPS Processor	
mips_fault_tol	https://opencor	stable	Lazaridis Dimitris	MIPS	32	32	kintex-7-3	James Brakef		2017	6	4	6	45	##	14.7	1.00	1.0	22.5	X		vhdl	40	main	Y	yes	N		4G	4G	Y			32	5	2013	2013		arithmetic includes fault detection	no external memory port?
mips_linder	https://www.sc	paper	Michael Linder	MIPS	32	32	kintex-7-3	James Brakef		1100	6			238	##	14.7	1.00	1.0	216.5		B	vhdl	39	a_mips	Y	yes	N		4G	4G				32		2007	2007		masters thesis	no LUT RAM, source code in PDF
mips_pipelined	https://github.c	mature	Mohammad Hossein Y	MIPS	32	32																verilog	23	toplevelci	Y	yes	N		4G	4G				32	5	2017	2019		course project, hazard detection as well as forwarding, limited ISA	
mips_sc_rubio	http://www.ece	untested	Victor P. Rubio	MIPS	32	32																vhdl		mips_sc	Y	yes			4G	4G						2004	2004		MIPS RISC Processor for Comp Arch Ed, 2004, single cycle, RTL in PDF	
mips32	https://opencor	stable	Jin Jifang	MIPS	32	32	kintex-7-3	James Brakef		3696	6		8	192	##	v17.4	1.00	1.0	52.0	X		verilog	17	pipelinem	Y	yes			4G	4G	y			32	5	2017			vivado project	"classic MIPS"
mips32r1	https://opencor	stable	Grant Ayers	MIPS	32	32	arria-2	James Brakef		3716	A	8		79	##	q13.1	1.00	1.0	21.3	IX		verilog	20	processor	Y	yes	N	Y	4G	4G	Y			32	5	2012	2015	https://github.cor	Harvard arch	complete software tool chain
mips789	https://opencor	stable	Li Wei	MIPS	32	32	kintex-7-3	James Brakef		1432	6		1	171	##	14.7	1.00	1.0	119.1	IX		verilog	10	mips_core	Y	yes	N		4G	4G	Y			32	5	2007	2014		supports most MIPSI instructions	
mipscpu	https://github.com/mfbsc		Matheus Souza	MIPS	32	32																system v	24	cpu	N		N		4G	4G						2017	2019		MIPS like cpu, course project, VHDL verilog & system verilog	
mips-cpu	https://github.c	alpha	Jeremiah Mahler	MIPS	32	32	kintex-7-3	James	added	596	6		1	244	##	14.7	1.00	1.0	409.2	X		verilog	15	cpu	Y	yes	N		4G	4G	Y			32	5	2017	2017		Very early stage project, only implem	no outputs, missing im_data.txt
mips-cpu2	https://github.c	untested	Yash Bhutwala	MIPS	32	32																verilog			Y	yes	N		4G	4G	Y			32		2016	2017		Pipelined CPU, course project, actual design in fibinacci or helloWorld	
mipsfpga	https://www.mi	stable	MIPS Technologies	MIPS	32	32	atrix-7-3	James Brakef		10692	6		47	118	##	14.7	1.00	1.0	11.0	X	Y	verilog	193	mfp_syste	Y	yes	N		4G	4G	Y			32		2014	2018	https://www.yout	M14K core & mipsfpga-plus	DRAM interface, I&D caches. 8789 FF
mips-hls-vivad	https://github.c	stable	Grammatopoulos Vasi	MIPS	32	32																cpp		cpu	Y	yes	N		4G	4G	Y			32			2019		written in cpp, no inst decode, limited	ISA
mips-lite	https://github.c	untested	Jon Craton	MIPS	32	32	kintex-7-3	James	insufficient me	6					##	14.7	1.00	1.0				vhdl	65	cpu		asm	N							32		2009	2009			
mipsr2000	https://opencor	stable	Lazaridis Dimitris	MIPS	32	32	kintex-7-3	James Brakef		1971	6	4	6	71	##	14.7	1.00	1.0	36.2	X		vhdl	35	Dm	Y	yes	N		4G	4G	Y			32	5	2012	2016		supports almost all instructions of mi	course project
misoc	https://github.c	stable	M-Labs	RISC	32	32	arria_2		python source code run thru migen		##	q13.1	0.80	1.0			ILX	V*HDL			Y	yes	N		4G	4G	Y			32		2007	2019	https://m-labs.hk	Video IP for Mist & others	choice of latticemicro32 or mor1kx uP
mist1032	https://github.c	errors	Takahiro Ito	RISC	32	32	arria_2	James	altera mem		A				##	q18.0	1.00	1.0				verilog	87	mist1032sa					4G	4G	Y			64			2014		mist32 uP: out of order version	missing cache_ram_16entry_512bit.v
mist1032	https://github.c	stable	Takahiro Ito	RISC	32	32	arria_2	James	altera	10801	A	4	125	98	##	q18.0	1.00	1.0	9.1			system v	50	mist32e10	Y				4G	4G	Y			64			2014		mist32 uP: embedded version	
mist1032	https://github.c	errors	Takahiro Ito	RISC	32	32	cyclone-10	James	altera	33251	4	4	138	32	##	q18.0	1.00	1.0	1.0			verilog	100	mist1032isa					4G	4G	Y			64			2015		mist32 uP: inorder version	high pin count
mitecpu	https://github.c	untested	Jeff Bush	accum	8	11																					N	Y	256		Y	7				2017	2017		only 7 inst, also: RISC-Processsor, **ChiselGPU,** LispMicrocontroller, **PASC** & NyuziProc	
mix-fpga	https://opencor	alpha	Michael Schroeder	accum	31	31																verilog	29	mix	Y		Y		4K	4K	N	49	4	8			2021	https://en.wikipe	binary version of the MIX-Computer as described in "The Art of Computer Programm	
mocha	https://github.c	stable	Sanjay Gupta	accum	8	8																vhdl	29	processor	Y	asm	N		64K	64K	Y	31					2018		8-bit microcontroller developed at NIIT University, course materials include full RTL &	
mor1kx	https://github.c	stable	Julius Baxter	OpenRISC	32	32	kintex-7-3	James Brakef		2718	6	3	3	217	##	14.7	1.00	1.0	80.0	X		verilog	48	mor1kx	Y	yes	N		4G	4G	Y			32		2012	2018	https://www.yout	lots of configuration parameters	considered best openrisc design
moxie	https://github.c	stable	Anthony Green	RISC	32	32	arria-2	James	missing module		A				##	q18.0	1.00	1.0				verilog	16	moxie					4G	4G	Y			16		2009	2017	https://github.com/atgreen/moxie-cores	four read, two write register file missing	
moxielite	https://github.c	stable	Anthony Green	RISC	32	32	kintex-7-3	James Brakef		3159	6	3		152	##	14.7	1.00	1.0	48.0	X		vhdl	11	moxielite_wb					4G	4G	Y			16		2009	2017	https://github.com/atgreen/moxie-cores		
moxielite	https://github.c	stable	Anthony Green	RISC	32	32	arria-2	James Brakef		2696	A	4		93	##	q18.0	1.00	1.0	34.6	X		vhdl	11	moxielite					4G	4G	Y			16		2009	2017	https://github.com/atgreen/moxie-cores		
mpdma	https://opencor	beta	quickwayne	uBlaze	32	32	kintex-7-3	James	Brakefield		6				##	14.7	1.00	1.0			Y	perl			Y	yes	N		4G	4G	Y			32		2006	2009		Soft MultiProcessor on FPGA	Perl gens *.xmp, mhs, mss & ucf files
mproz	http://www.bitl	stable	K. Lee	stack	16	16	kintex-7-3	James	schematic		6				##	14.7	1.00	1.0				schematic			Y	asm	N			32K						1999	2007	https://groups.go	little documentation, CPLD implemen	*.1 schematics, also mproz3
mrisc32	https://github.c	alpha	Marcus Geelnard	RISC	32	32																vhdl	36	mc1	Y	asm	Y		4G	4G	Y	68		32		2018	2021	https://www.bits	Mostly harmless Reduced Instruction	Cray-1 vector inst, also a1 variant, LLVM suppo
mroell_cpu	https://bitbucke	stable	Matthias Roell	accum	8	8	kintex-7-3	James	added	185	6			357	##	14.7	0.33	1.0	637.1	X		vhdl	8	cpu	Y							10				2014	2016		university course project	
msl16		beta	Philip Leong, Tsang, Le	forth	16	4	kintex-7-3	James Brakef		303	6			256	##	14.7	0.67	1.0	566.4	X		vhdl	13	cpu	Y	asm	N		256			16				2001			CPLD prototype	
msp430_vhdl	https://opencor	beta	Peter Szabo	MSP430	16	16	kintex-7-3	James Brakef		1735	6			127	##	14.7	0.67	2.0	24.5	IX		vhdl	9	cpu	Y	yes	N		64K	64K	Y			16		2014	2017		Comprehensive verification was not	compiles on cyclone II
multicomp	http://searle.ho	untested	Grant Searle	accum	8	8																														2014		https://blog.gadg	6502, 6800, 6809 & Z80 on Cyclone II;	Basic, CamelForth and CPM; also SD card, UAR
multicycle_risc	https://github.c	stable	Yash Sanjay Bhalgat	RISC	16	16	kintex-7-3	James Brakef		1470	6			213	##	14.7	0.67	1.0	97.0	X		verilog	62	risc15	Y		N		64K	64K		15		8		2015	2015		multi-cycle IIT-B-RISC15 ISA	developed on Altera, course project

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	reporter	comments	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	vendor	SOC	src code	#src files	top file	doc	tool chain	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pipe len	start year	last revis	secondary web link	note worthy	comments
multi-cycle-cpu	https://github.com/Amrik		Amrik Sadhra	RISC	32	32																vhdl	48	top_level	Y				4G	4G	Y	21		32		2016	2016	https://www.yout	nicely documented with state diagrar	spreadsheet for test programs, ISE project
mxp	http://vectorblo	stable	VectorBlox Computing	vect	8		zynq45-7	vectorblox		39856	6	64	81	175	##	v17.2	1.00	0.1	35.1			proprietary			Y										2012	2017	http://www.ece.u	MXP Matrix Processor is a scalable so	LUT count for 8 lanes with custom inst
my8085light	https://github.com/debta		Debtanu Mukherjee	8085	8	8																verilog	7	my8085	Y		N		64K	64K	Y	18		8			2020	https://opencores	light weight 8085 with 18 inst	
myblaze	https://opencor	mature	Jian Luo	uBlaze	32	32	kintex-7-3	James Brakefield			6				##	14.7	1.00	1.0				myhdl	15	top	Y	yes	N		4G	4G	Y			32		2010	2010		clone, python code generators	
myblaze	https://opencor	mature	Jian Luo	uBlaze	32	32	kintex-7-3	James Brakefield			6				##	14.7	1.00	1.0				myhdl			Y	yes	N		4G	4G	Y			32		2010	2010		clone, python code generators	
mycpu	http://www.my	mature	Dennis Kuschel	accum	8	8	kintex-7-3	James Brakef		3428	6	1		155	##	14.7	0.33	3.0	5.0	X		vhdl	28	cpu_top	Y		N		64M	64M	Y					2010			originally in TTL	micro-coded
myforthproces	https://opencor	stable	Gerhard Hohner	forth	32	8	SP-kintex7-	James Brakef		2959	6		6	223	##	14.7	1.00	1.0	75.3	X		vhdl	58	mycpu	Y	yes	N		64M	64M		96				2004	2012		DPANS'94 32-bit Forth, masters thesi	25.15 Whetstones
myproc	https://github.c	alpha	A. Raamakrishnan	RISC	32	32																verilog					N		4G	4G				32			2017		uP for educational purposes: myproc1	(single cycle), myproc2 (pipelined)
myrisc1		stable	Muza Byte	RISC	8	8	arria-2	James Brakef		121	A		2	231	##	q13.1	0.33	1.0	628.7	I		verilog	1	myRISC1	Y		N	Y	256	256	Y	16		4		2011	2011		Verilog source included in PDF file	LPM macros
nanoblaze	https://opencor	beta	Francois Corthay	picoBlaze	8	18	kintex-7-3	James punctuation			6				##	14.7	0.33	2.0		X		vhdl	12	nanoblaze		asm			256	2K	Y					2015	2015		nanoBlaze compatable, adjustable data width	
nanoblaze	https://opencor	beta	Francois Corthay	picoBlaze	8	18	kintex-7-3	James Brakef		247	6		1	169	##	14.7	0.33	2.0	113.2	X		vhdl	12	nanoblaze		asm			256	2K	Y					2015	2015		nanoBlaze compatable, adjustable data width	
natalius_8bit_	https://opencor	beta	Fabio Guzman	RISC	8	16	kintex-7-3	James Brakef		232	6		1	175	##	14.7	0.11	3.0	27.7	X		verilog	12	natalius_p	Y	asm	N	Y	256	2K	Y	29		8		2012	2012		return stack & register file	3 clocks/inst
navre	https://opencor	stable	Sebastien Bourdeaudu	AVR	8	16	kintex-7-3	James Brakef		990	6			207	##	14.7	0.33	1.0	69.0	AILX		verilog	1	softusb_n	Y	yes	N		64K	64K	Y	72		32	2	2010	2013	https://www.milk	AVR clone, part of www.milkymist.org	
nc4016	https://en.wikic	asic	Chuck Moore	forth	16																	proprietary																chapter in Koopman	
ncore	https://opencor	alpha	Stefan Istvan	accum	16	8	kintex-7-3	James Brakef		223	6			105	##	14.7	0.67	1.0	316.3	X		verilog	3	nCore	Y		N		128K	64K		16		16		2006	2018		This is a little-little processor core	
neo430	https://opencor	alpha	Stephan Nolting	MSP430	16	16	virtex-6	Stephan Nolt		402	6		2	204	##	14.7	0.67	8.0	42.5	IX		vhdl	19	neo430_t	Y	yes	N		28K	32K	Y			16		2015	2020	https://github.cor	website has detailed resource untiliza	minimal configuration
neo430	https://opencor	alpha	Stephan Nolting	MSP430	16	16	artiix-7	James chang		947	6		2	203	##	14.7	0.67	8.0	17.9	IX	Y	vhdl	19	neo430_t	Y	yes	N		28K	32K	Y			16		2015	2020	https://github.cor	edit neo430_sysconfig.vhd to set opti	~8+ clocks for R-R inst
neo430	https://opencor	alpha	Stephan Nolting	MSP430	16	16	cyclone-4	Stephan Nolt		626	6		2	117	##	14.7	0.67	8.0	15.7	IX		vhdl	19	neo430_t	Y	yes	N		28K	32K	Y			16		2015	2020	https://github.cor	**website has detailed resource unt**	minimal configuration
next186	https://opencor	stable	Nicolae Dumitrache	x86	16	8	arria-2	James Brakef		1966	A	2		77	##	q13.1	0.67	2.0	13.1	IX		verilog	4	Next186_(	Y	yes	N	N	1M	1M	Y					2012	2013		boots DOS	
next186_soc_p	https://opencor	stable	Nicolae Dumitrache	x86	16	8	kintex-7-3	James translate errors			6	1			##	14.7	0.67	2.0			Y	verilog	40	ddr_186	Y	yes	N	N	1M	1M	Y					2013	2019		SoC version of next186	boots DOS, does video games & sound
next186mp3	https://opencor	stable	Nicolae Dumitrache	x86	16	8	kintex-7-3				6	1			##	14.7	0.67	2.0			Y	verilog	16	ddr_186	Y	yes	N	N	1M	1M	Y					2013	2014		SoC version of next186	boots DOS, has DSP core, no x86 source
nextz80	https://opencor	stable	Nicolae Dumitrache	Z80	8	8	kintex-7-3	James Brakef		854	6			119	##	14.7	0.33	1.0	46.0	X	B	verilog	3	NextZ80C(	Y	yes	N	N	64K	64K	Y					2011	2019			claim of 700 LUTs in Spartan-3 probably wrong
nige_machine	https://github.c	stable	Andrew Read	forth	32	8	kintex-7-3	James Brakef		5033	6	8	33	123	##	14.7	1.00	1.0	24.5	X		vhdl	29	Board	Y	yes	N		16M	16M		512		512			2014			standalone Forth system	https://www.youtube.com/watch?v=PRItE8q6
niloofar1	http://ce.sharif.(	errors	Mahdi Amiri	RISC	16	16	kintex-7-3	James ran out of mem			6				##	14.7	0.67	1.0				verilog	3	nf1	Y														derived from risc-16	ASIC, uses Leonardo for synthesis
nios2		proprietar	Altera	Nios II	32	32	stratix-3	Altera consis		1020	A			290	##	q13.1	0.90	1.0	255.9	I		proprietary			Y	yes	opt		4G	4G	Y			32		2004			fltg-pt, caches & MMU options	Nios II/f: fastest version, DMIPS adj, 2.15 Core
nios2		proprietar	Altera	Nios II	32	32	stratix-5	Altera consis		584	A			420	##	q16.0	0.10	1.0	71.9	I		proprietary			Y	yes	opt		4G	4G	Y			32		2004			fltg-pt, caches & MMU options	Nios II/e: min LUTs version, DMIPS adj, 1.68 Co
niosprocessor	https://github.com/Julien		Julien Malka	Nios II	32	32																vhdl	25	cpu	Y	yes	N		4G	4G	Y			32		2019	2019		Project for Computer Architecture co	uses much Altera source code
nnarm	ftp://ftp.gwdg.d	untested	Sheng Shen	ARM	32	16																																mentioned at https://en.wikipedia.org	/wiki/Amber_(processor_core), ran afoul of A
nocpu	https://github.c	beta	John Tzonevrakis	RISC	8	8	kintex-7-3	James Brakef		175	6			243	##	14.7	0.33	1.5	306.1	X		verilog	5	cpu	N	no	N		256	256	Y			4					minimal & complete	8 ALU inst, 3 port reg file
non-von-1	http://www.chr	stable	Christopher Fenton	accum	8	8	kintex-7-3	James Brakef		230	6			556	##	14.7	0.33	1.0	797.1			verilog	1	nonvontop		no	N		64		Y	30							SIMID in tree structure	A & B regs, instructions broadcast
nybbleForth	https://github.c	errors	Lars Brinkhoff	forth	16	4	kintex-7-3	James missing init file			6				##	14.7	0.67	1.0				verilog	1	cpu	Y	yes			4K	4K	Y	11				2017	2017		empty design, no init file	tiny
oberon_sdram	http://projectob	beta	Nicolae Dumitrache	RISC	32	32	kintex-7-3	James Brakef		2103	6		1	104	##	14.7	1.00	1.0	49.5	X		verilog	16	risc5	Y	yes	Y		4G	4G				16		2013	2017		minimalist Wirth, part of Project Obe	modified to use DRAM, serial mult
oc54x	https://opencor	beta	Richard Herveille	DSP	16	16	kintex-7-3	James Brakef		2225	6	1		180	##	14.7	0.67	1.0	54.1	X		verilog	10	oc54_cpu	Y	yes	N	Y	64K	64K						2002	2009		40-bit accumulator, barrel shifter	C54x clone
octagon	https://opencor	beta	Jon Pry	MIPS	32	32	kintex-7-3	James Brakef		3021	6	4	9	333	##	14.7	1.00	1.0	110.2	X		vhdl	46	octagon		asm			4G	4G	Y			32		2015	2015	https://github.cor	8 thread barrel processor, largely MIPS	compatible
octavo	http://fpgacpu.c	beta	Charles LaForest	reg	16	16	stratix-4	Charles LaFor		500	A	1		550			0.67	1.0	737.0	I		verilog	18	Octavo	Y	asm	N					14		16	10	2012	2019	https://github.cor	8 core barrel, adjustable data width	~= performance across word sizes, no call/rtn i
odess	https://opencor	stable	Dmytro Senyakin	RISC	128	16	cyclone-5	James too big		130160	A	288	462		##	q18.0	4.00	0.3		I		system v	27	CoreQuad	Y	asm	Y		4G	4G				16		2017	2017	https://opencores	Altera proj, Multicore, P&R results at	37-bit adr, quad issue, caches, 32-64-128 fltg-p
odess	https://opencor	stable	Dmytro Senyakin	RISC	128	16	stratix-5	Dmytro Senya		32978	A	72	112	192	##	q17.1	4.00	1.0	23.3	I		system v	27	CoreOneV	Y	asm	Y		4G	4G				16		2017	2017	https://opencores	Altera proj, Multicore, P&R results at	37-bit adr, quad issue, caches, 32-64-128 fltg-p
odess	https://opencor	stable	Dmytro Senyakin	RISC	128	16	stratix-5	Dmytro Senya		148078	A	72	122	184	##	q17.1	4.00	0.3	19.9	I		system v	27	CoreQuad	Y	asm	Y		4G	4G				16		2017	2017	https://opencores	Altera proj, Multicore, P&R results at	37-bit adr, quad issue, caches, 32-64-128 fltg-p
odess	https://opencor	stable	Dmytro Senyakin	RISC	128	16	stratix-5	Dmytro Senya		50814	A	72	112	180	##	q17.1	4.00	1.0	14.1	I		system v	27	CoreOneV	Y	asm	Y		4G	4G				16		2017	2017	https://opencores	Altera proj, Multicore, P&R results at	37-bit adr, quad issue, caches, 32-64-128 fltg-p
odess	https://opencor	stable	Dmytro Senyakin	RISC	128	16	cyclone-5	James reduce		35984	A	72	112	103	##	q18.0	4.00	1.0	11.4	I		system v	27	CoreOneV	Y	asm	Y		4G	4G				16		2017	2017	https://opencores	Altera proj, Multicore, P&R results at	37-bit adr, quad issue, caches, 32-64-128 fltg-p
odess	https://opencor	stable	Dmytro Senyakin	RISC	128	16	cyclone-5	James slow t		50135	A	72	112	90	##	q18.0	4.00	1.0	7.2	I		system v	27	CoreOneV	Y	asm	Y		4G	4G				16		2017	2017	https://opencores	Altera proj, Multicore, P&R results at	37-bit adr, quad issue, caches, 32-64-128 fltg-p
oks8	https://opencor	alpha	Kongzilee	ARM7	32	32	kintex-7-3	James bad coding pra			6				##	14.7	0.67	1.0				verilog	8	oks8	Y	yes	N		64K	64K	Y					2006	2009			clone of KS86C4204/C4208/P4208, SAM87RI instruction set
oldland-cpu	http://jamieiles.	errors	Jamie Iles	RISC	32	32	arria-2	James syntax errors			A				##	q18.0	1.00	1.0		I		verilog	22	oldland_c	Y		N	N	4G	4G	Y			16	5	2015	2017	https://github.cor	has caches & MMU	runs on Cyclone V
oldland-cpu	http://jamieiles.	errors	Jamie Iles	RISC	32	32	arria-2	James syntax errors			A				##	q18.0	1.00	1.0		I	Y	verilog	32	keynsham	Y		N	N	4G	4G	Y			16	5	2015	2017	https://github.cor	has caches & MMU	runs on Cyclone V
oms8051mini	https://opencor	alpha	Simon Teran, Dinesh A	8051	8	8	kintex-7-3	James Brakef		1991	6	1	32	133	##	14.7	0.33	5.0	4.4	X	Y	verilog	66	digital_co	Y	yes	N		64K	64K	Y					2000	2018			
one-der	http://www.drd	untested	Al Williams	CISC	32		spartan-3	James missing file			4				##	14.7	1.00	1.0				verilog	18	topbox												2009	2009		The One Instruction Wonder	TTA
opa	https://github.c	stable	Wesley W. Terpstra	RISC	32	32	cyclone-5	Wesle largest		8540	A			125		q15.0	1.00	0.5	29.3	I		vhdl												32		2013	2016		An Out-of-Order Superscalar Soft CPU	tested, incomplete
opc.opc2cpu	https://github.c	stable	revaldinho	accum	8	16	kintex-7-3	James reduce		117	6			556	##	14.7	0.15	4.0	178.1	X		verilog	2	opc2cpu	Y	asm	N	N	256	1K	Y	12	3			2017	2019	https://revaldinho	OPC2 revised OPC1, for XC9572 CPLD	see hackaday One Page Computing Challenge
opc.opc3cpu	https://github.c	stable	revaldinho	accum	16	16	kintex-7-3	James reduce		174	6			526	##	14.7	0.30	4.0	226.9	X		verilog	2	opc3cpu	Y	asm	N	N	64K	64K	N	13	3			2017	2019	https://revaldinho	OPC3 16-bit OPC1, for XC95144 CPLD	see hackaday One Page Computing Challenge
opc.opc5cpu	https://github.c	stable	revaldinho	RISC	16	16	kintex-7-3	James reduce		273	6			294	##	14.7	0.40	3.0	143.6	X		verilog	7	opc5cpu	Y	asm	N	N	64K	64K	N	15	4	16		2017	2019	https://revaldinho	OPC5 RR inst, ISA similar to OPC1	see hackaday One Page Computing Challenge
opc.opc5lscpu	https://github.c	stable	revaldinho	RISC	16	16	kintex-7-3	James Brakef		383	6			247	##	14.7	0.67	3.0	144.0	X		verilog	2	opc5lscpu	Y	asm	N	N	64K	64K	N	18	4	16		2017	2019	https://revaldinho	OPC5LS OPC5 with predicate inst	see hackaday One Page Computing Challenge
opc.opc6cpu	https://github.c	stable	revaldinho	RISC	16	16	kintex-7-3	James Brakef		450	6			222	##	14.7	0.67	2.0	165.4	X		verilog	2	opc6cpu	Y	asm	N	N	64K	64K	N	27	4	16		2017	2019	https://revaldinho	OPC6 based on OPC5LS, more inst	see hackaday One Page Computing Challenge
opc.opc7cpu	https://github.c	stable	revaldinho	RISC	32	16	kintex-7-3	James Brakef		624	6			303	##	14.7	1.00	2.0	242.8	X		verilog	2	opc7cpu	Y	asm	N	N	1M	1M	N	32	5	16		2017	2019	https://revaldinho	OPC7 32bit, based on OPC5LS, more i	see hackaday One Page Computing Challenge
opc.opc8cpu	https://github.c	beta	revaldinho	RISC	24	24	kintex-7-3	James no tes		516	6			323	##	14.7	0.80	2.0	250.1	X		verilog	1	opc8cpu	Y	asm	N	N	16M	16M	N	32	4	16		2017	2019	https://revaldinho	OPC8 24bit, based on OPC5LS, more i	see hackaday One Page Computing Challenge
opc.opccpu	https://github.c	stable	revaldinho	accum	8	16	kintex-7-3	James reduce		101	6			526	##	14.7	0.15	4.0	195.4	X		verilog	2	opccpu	Y	asm	N	N	256	2K	Y	13	3			2017	2019	https://revaldinho	OPC1 one page computer for CPLD	**see hackaday One Page Computing Challe**
open8_urisc	https://opencor	stable	Kirk Hays, Jshamlet	RISC	8	8	kintex-7-3	James Brakef		691	6	1		263	##	14.7	0.33	1.0	125.6	X		vhdl	9	Open8	Y	yes	N		64K	64K	Y			8		2006	2020		accum & 8 regs, clone of Vautomation u	RISC processor, in use
openfire_core	https://opencor	alpha	Alex Marschner, Steph	uBlaze	32	32	kintex-7-3	James empty project			6					14.7	0.33	1.0				verilog	12	openfire_(	Y	yes	N	N	4G	4G	Y			32		2007	2009		OpenFire Processor Core	"FPGA Proven"
openfire2	https://opencor	beta	Antonio Anton	uBlaze	32	32	kintex-7-3	James Brakef		1201	6	3	2	105	##	14.7	1.00	1.0	87.4	X	Y	verilog	27	openfire_(	Y	yes	N	N	4G	4G	Y			32		2007	2012		"FPGA Proven"	derived from Stephen Craven's OpenFire
openmsp430	https://opencor	stable	Oliver Girard	MSP430	16	16	stratix-3-2	Oliver Girard		1147	A	1		98			0.67	2.0	28.5	IX		verilog	30	openMSP4	Y	yes	N	N	64K	64K	Y			16		2009	2018		near cycle accurate	performance spreadsheet
openpiton	https://github.c	difficult	mmckeown	SPARC	32	32	kintex-7-3	James too many files		6					##	14.7	1.00	1.0				verilog			Y	yes	Y	N	4G	4G	Y			64		2015	2019	http://parallel.prii	Princeton Un.	both FPGA & ASIC, very many source files
openscale	http://www.lirm	stable	Lyonel Barthe	uBlaze	32	32	spartan-3-4	Lyonel Barthe		1563	4			91		i12.1	1.00	1.0	58.2	X	Y	vhdl	26	sb_core		yes			4G	4G	Y	86		32	5	2010	2012	www.lirmm.fr/AD	NoC secretblaze	data is for single secretblaze
openxlr8	https://github.com/Aloriu		alorium technology	AVR	8	16															Y	verilog														2019	https://www.alori	AVR clone, Snō and Hinj Arduino com	https://www.youtube.com/watch?v=Drr1M9z
or1200	https://github.c	stable	Damjan Lampret	OpenRISC	32	32	kintex-7-3	James Brakef		5231	6	4	8	118	##	14.7	1.00	1.0	22.5	X		verilog	78	or1200_tc	Y	yes	Y	M	4G	4G	Y			32		2010	2015	https://openrisc.i	best older openrisc implementation	no LUT RAM for reg file
or1200_hp	https://opencor	stable	Strauch Tobias	OpenRISC	32	32	virtex-5	Strauc 3 slot		5602	6			185	##		1.00	1.0	33.1	X		verilog	39	or1200_ic	Y	yes	Y	M	4G	4G	Y			32		2010	2013	https://openrisc.i	3 slot barrel version of OR1200	numbers from published paper
or1200_soc	https://opencor	beta	gaz	OpenRISC	32	32	cyclone-2	James missing files			4				##	q11.1s	0.67	2.0			Y	verilog	39	top	Y	yes	Y	M	4G	4G	Y			32		2011	2015	https://openrisc.i	OpenRISC on Terasic DE1 board	
or1200mp	https://github.c	stable	Stefan Wallentowitz	OpenRISC	32	32	kintex-7-3	James Brakef		4960	6	4	8	111	##	14.7	1.00	1.0	22.4	X		verilog	104	or1200_tc	Y	yes	Y	M	4G	4G	Y			32		2012	2012	https://openrisc.i	multiprocessor variant, single core	
or1k	https://github.c	stable	Julius Baxter, Stefan K	OpenRISC	32	32	kintex-7-3	James Brakef		3299	6	3	3	189	##	14.7	1.00	1.0	57.3	IX		verilog	39	mor1kx	Y	yes	N	M	4G	4G	Y			32		2001	2018	https://opencores	no longer supported, see mor1kx	cappuccino ALU
or1k_marocchi	https://github.c	stable	Andrey Bacherov	RISC	32	32																verilog			Y	yes	Y		4G	4G	Y			32		2012	2019	https://github.cor	Implements a variant of Tomasulo algorithm	
or1k_soc	https://opencor	mature	Xianfeng Zeng	OpenRISC	32	32	arria-2	James syntax errors			6				##	q18.0	1.00	1.0		I	Y	verilog	194	or1k_soc_	Y	yes			4G	4G	Y			32		2009	2010	https://openrisc.i	SoC using OpenRISC 1200	huge tar file
or1k-cf	https://opencor	alpha	Kenr	OpenRISC	32	32																confluence														2004	2009			
osu8	https://www.pj	alpha	Paul Stoffregen	accum	8	8																schematic			Y	asm	N	N	64K	64K	Y	24				1994	2005	https://github.cor	OSU8 Microprocessor Project "instru	*.1 schematics, doc at web page, currently acti
p16	http://www.ultratechnolo		Don Golding	forth	16	5	kintex-7-3	James bad syntax			6					14.7	0.67	1.0				vhdl	1	p16			N		64K	64K						2000				
p16b		beta	C. H. Ting	forth	16	5	kintex-7-3	James case c		367	6			355	##	14.7	0.67	1.0	648.1	X		vhdl	1	cpu16	Y	asm	N		64K	64K		28				2000			part of eForth?	data width can be expanded
p16c5x	https://opencor	mature	Michael Morris	PIC16	8	14	kintex-7-3	James Brakef		378	6			252	##	14.7	0.33	1.0	220.2	IX		verilog	3	P16C5x	Y	yes	N	Y	256	4K	Y					2013	2014			
p24e		beta	C. H. Ting	forth	24	6	spartan_3-5	James Brakef		1175	4		16	51	##	14.7	0.83	1.0	36.0	X		vhdl	1	p24c	Y	asm	N		2K	2K		28				2000			part of eForth?	data width can be expanded
pacoBlaze	www.bleyer.org	mature	Pablo Kocik	picoBlaze	8	18	spartan-3	Pablo Kocik		177	4		1	117			0.33	2.0	109.1	X		verilog	18	pacoblaze	Y	asm	N		256	2K	Y	57			2		2006		3 versions, behavioral coding	
pancake	https://people.e	stable	Bruce Land	stack	16	5	kintex-7-3	James bypass		441	6	1	1	128	##	14.7	0.67	1.0	194.8	X		verilog	7	de2_minic	Y	yes	N		4K	4K		31				2010	2014	http://www.cs.hir	The Pancake Stack Machine dervied f	Cornell ECE5760
parwan		stable	Zainalabedin Navabi	accum	8	8	kintex-7-3	James Brakef		157	6			435	##	14.7	0.33	4.0	228.5	X		verilog	16	par_beh	Y	yes	N	N	4K	4K	Y					1995	1997	2nd uP in director	from VHDL: Analysis and Modeling of	AKA cpu8, both vhdl & verilog versions
parwan		stable	Zainalabedin Navabi	accum	8	8	kintex-7-3	James Brakef		161	6			76	##	14.7	0.33	4.0	38.8	X		vhdl	2	parwan	Y	yes	N	N	4K	4K	Y					1995	1997	2nd uP in director	from VHDL: Analysis and Modeling of	AKA cpu8, both vhdl & verilog versions
pasc	https://github.c	untested	Jeff Bush	RISC	16	16																verilog			Y		N		64K	64K	N	20	2	8		2017	2019	https://github.cor	16 RISC cores	
patmos	https://github.c	stable	Martin Schoeberl	RISC	32	32																scala														2015		http://patmos.compute.dtu.dk/		
pauloblaze	https://github.c	mature	Paul Genssler	picoBlaze	8	18																vhdl	7	pauloBlaz	Y	asm	N		256	2K	Y					2015	2019		course project, slower more LUTs than original	claims easier to modify and extend

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	repor ter	com ents	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	ven dor	SOC	src code	#src files	top file	doc	tool chai n	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pip e len	start year	last revis	secondary web link	note worthy	comments
pavr	https://opencor	alpha	Doru Cuturela	AVR	8	16	kintex-7-3	James	Brakef	2630	6		1	132	##	14.7	0.33	1.0	16.5	X		vhdl	18	pavr_cont	Y	yes	N	Y	4K	4M	Y	72		32	6	2003	2009		superset of AVR	
pdp1	https://opencor	alpha	Yann Vernier	PDP1	18	18	spartan-3a	James	Brakef	1390	4		6	138	##	14.7	0.50	10.0	5.0	X		vhdl	15	top	Y	yes	N	N	4K	4K		28				2011	2017	http://pdp-1.com	PDP-1 descended from MIT TX-0	uses Minimal UART from opencores
pdp11-34verilo	www.heeltoe.co	stable	Brad Parker	PDP11	16	16	arria-2	James	Brakef	2532	A			126	##	q13.1	0.67	2.0	16.7	IX	Y	verilog	24	pdp11	Y	yes	N	N	64K	64K		70	13	8		2009			boots & runs RT-11, EIS inst & MMU	
pdp2011	http://pdp2011.	stable	Sytse van Slooten	PDP11	16	16	kintex-7-3	James	Brakef	5060	6	1		205	##	14.7	0.67	2.0	13.6	IX	Y	vhdl	3	cpu	Y	yes	Y	N	64K	64K		70	13	8		2008	2019	http://pdp2011.sy	SoC, build files for A&X boards	complete impl including orig IO devices
pdp8	https://opencor	alpha	Joe Manojlovick, Rob I	PDP8	12	12	kintex-7-3	James	Brakef	1219	6	1		183	##	14.7	0.50	2.0	37.5	X	Y	vhdl	55	cpu	Y	yes	N	N	32K	32K				8		2012	2013		PDP-8 Processor Core and System	Boots OS/8, runs apps, several variants
pdp8l	https://opencor	beta	Ian Schofield	PDP8	12	12	cyclone-3	James	Brakef	1088	4		48	63	##	q13.1	0.50	2.0	14.4	I		vhdl	11	top	Y	yes	N	N	4K	4K						2013	2013		Minimal PDP8/L implementation with 4K disk monitor system	
pdp8verilog	www.heeltoe.co	stable	Brad Parker	PDP8	12	12	kintex-7-3	James	Brakef	505	6			366	##	14.7	0.50	2.0	181.3	X		verilog	18	pdp8	Y	yes	N	N	32K	32K				8		2005	2010		boots & runs TSS/8 & Basic	
pet_fpga	https://github.c	stable	Thomas Skibo	6502	8	8	kintex-7-3	James	Brakef	1052	6			242	##	14.7	0.33	4.0	19.0	X		verilog	1	cpu6502	Y	yes	N	N	64K	64K	Y					2007	2011	https://github.cor	for Commodore PET	
pic_coonan		alpha	Tom Coonan	PIC16	8	14	kintex-7-3	James	Brakef	328	6		1	165	##	14.7	0.33	1.0	166.1	X		verilog	7	piccpu	Y	yes	N	Y	256	4K	Y					1999			risc8 by Tom Coonan also a PIC uP	
pic-16c5x	https://tams-wv	errors	Ernesto Romani	PIC16	8	12	kintex-7-3	James	std library prob		6				##	14.7	0.33	2.0				vhdl	16	pic_core	Y	yes	N	Y	256	4K	Y					1998	2002		as part of thesis?	
picoblaze	https://www.xil	stable	Ken Chapman	picoBlaze	8	18	kintex-7-3	James	Brakef	110	6		2	217	##	14.7	0.33	2.0	325.5	X		vhdl	1	kcspm6	Y	asm	N		256	2K	Y					2003		https://en.wikipe	2 clocks/inst, no prog ROM	this is the original picoBlaze author
picoblaze	https://www.xil	stable	Ken Chapman	picoBlaze	8	18	spartan-3-4	James	Brakef	178	4		1	182	##	14.7	0.33	2.0	168.9	X		vhdl	1	kcspm3	Y	asm	N		256	2K	Y					2003		https://en.wikipe	2 clocks/inst, no prog ROM	this is the original picoBlaze author
picoblaze	https://www.xil	stable	Ken Chapman	picoBlaze	8	18	kintex-7-3	James	Brakef	317	6		2	195	##	14.7	0.33	2.0	101.6	X	Y	vhdl	19	kc705_kcp	Y	asm	N		256	2K	Y					2003		https://en.wikipe	2 clocks/inst	this is the original picoBlaze author
piropiro	https://github.c	stable	pandora2000	RISC	32	32	kintex-7-3	James	port m	7491	6	11	1	118	##	14.7	1.00	1.0	15.7	X		vhdl	42	top			Y	N	64K	64K	Y			32		2010	2011		five variants	no doc, xilinx constraint file
plasma	https://opencor	stable	Steve Rhoads	MIPS	32	32	kintex-7-3	James	Brakef	2462	6		3	97	##	14.7	1.00	1.0	39.5	X		vhdl	22	plasma	Y	yes	N		4G	4G	Y			32		2001	2016	http://plasmacpu.	wide outside use, opencores page has list of related publications	
plasma_cortex	https://github.com/Nucle	stable	Dylan Brophy	RISC	32	16					6						1.00	1.0		X		vhdl	4	cpu	Y	yes	N		4G	4G	Y			8			2018	https://hackaday.io/project/160180-plasma-cortex-open-source-cpu-in-vhdl		
plasma_fpu	https://opencor	stable	Maximilian Reuter	MIPS	32	32	kintex-7-3	James	errors		6				##	14.7	1.00	1.0				vhdl	20	plasma	Y	yes	Y		4G	4G	Y			32		2015	2015		plasma with FPU	based on Plasma by Steve Rhoads
pop11-40	http://www.ip-s	simulatio	Naohiko Shimizu	PDP11	16	16	ep1K	Naohiko	Shin	2687	4			20	##		0.67	2.0	2.5	I		NSL	17	top	Y	yes		N	64K	64K	Y	70	13	8		2009		www.ip-arch.jp/in	Boots UNIX	various papers, no verilog or vhdl
popcorn	http://www.fpg	stable	Jeung Joon Lee	accum	8	8x	kintex-7-3	James	Brakef	267	6			347	##	14.7	0.33	1.0	428.4	X		verilog	4	pc	Y		N		64K	64K	Y	43				1998	2000		small 8 bit uP	
power_a2	https://github.com/openp		IBM (open PPC)	PPC	64	32	vu3p-2		TCL files													vhdl	285		Y	yes	Y		16E	16E	Y			32		2019	2020		PPC RTL, asic gate RTL	Virtex VU3P-2 FPGA implementation (380K luts
ppx16	https://opencor	stable	Daniel Wallner	PIC16	8	14	kintex-7-3	James	missin	409	6			238	##	14.7	0.33	1.0	192.1	X		vhdl	10	P16C55	Y	yes	N	Y	256	4K	Y					2002	2009		both 16C55 & 16F84	with fake instruction ROM
prawn		errors	Tadatoshi Ishii	accum	8	8	spartan_6-3	James	missing files		6				##	14.7	0.33	3.0				vhdl	2	prawn	Y	yes	N	N	4K	4K	Y					1992			reduced version of parwan from VHDL: Analysis and Modeling of Digital Systems, 19	
processor-core	https://github.c	untested	Steven Hua	RISC	32	32																vhdl			Y		N	N	4G	4G		16		32		2018	2018		clean, simple, prob classwork	Quartus proj, basic RISC instructions
propeller	https://propelle	proprietar	Chip Gracey	RISC	32	32																verilog							4G	4G				512	5	2014	2020	https://github.cor	original propeller has verilog (FPGA) s	ISA: op/ddd/sss format with predication
propeller_p8x3	https://www.pa	stable	Chip Gracey	RISC	32	32	kintex-7-3	James	Brakef	9498	6		20	160	##	14.7	1.00	0.1	134.8	X		verilog	9	top	Y	yes										2014			eight propellers, clocking from ucf file	several FPGA card build files
pt13	http://www.sing	stable	Daniel Ogilvie	accum	8	8	kintex-7-3	James	Brakef	301	6			357	##	14.7	0.33	3.0	130.5			verilog	1	pt13	Y	asm	N	Y	64K	8K	Y	40	3			2011	2018	https://www.edn.	PT13 is optimized to be completely e	micro-code & register updates, minimal ISA
pulserain	https://github.c	errors	PulseRain Tech LLC	8051	8	8	arria-2	James	missing files		A				##	q18.0	0.33	3.0		I		system verilo		PulseRain	Y	yes	N	Y	64K	64K	Y					2017	2018	https://www.puls	intended for Max10	
pulserain	https://github.c	stable	PulseRain Tech LLC	8051	8	8	arria-2	James	some	2376	A	2	41	130	##	q18.0	0.33	3.0	6.0	I		system v	25	FP51_fast	Y	yes	N	Y	64K	64K	Y					2017	2018	https://www.puls	1 clk/inst, intended for Max10	
p-vex	https://github.com/tvana		Thijs van As	VLIW	32	128	kintex-7-3	James	bypass	1660	6		1	233	##	14.7	1.00	1.0	140.1			vhdl	26	system	Y	yes	N				73		32	4	2005	2015	http://www.vliw.c	1, 2 or 4 issue VLIW, uses HP VEX too	probable degeneracy, LUT RAM for program m
pycpu	https://pycpu.w	myhdl	Norbert Feurle			8																myhdl													2013		https://pycpu.wo	python hardware processor	
qnice-fpga	https://qnice-fp	stable	Bernd Ulmann	RISC	16	16															Y	vhdl	40	quince_cp	Y	yes	N	N	64K	64K	N	18	4	16			2020	https://github.cor	derived from NICE: http://www.vaxm	PDP11-like, no byte operations
qrisc32	https://opencor	alpha	Viacheslav	RISC	32	32	arria-2	James	Brakef	3075	A	4		144	##	q13.1	1.00	1.0	46.9	I		system v	8	qrisc32	Y	yes	N		4G	4G	Y			32	4	2010	2011		qrisc32 wishbone compatible risc cor	for PhD thesis
qs5-rible	http://www.san	stable	John Rible	RISC	8	16	kintex-7-3	James	Brakef	468	6			135	##	14.7	0.33	1.0	95.3	X		verilog	1	qs5_mix			N		256	32K	Y					1998	1999		used in his class, also uses eP32	
r4000		errors	Michael Povlin	MIPS	32	32	kintex-7-3	James	lots of problem		6				##	14.7	1.00	1.0				verilog														1994	1995		does not implement 64-bit data	only a few insts implemented, test vehicle
r8051	https://github.c	stable	Li Xinbing	8051	8	8	kintex-7-3	James	Brakef	1031	6	1		139	##	14.7	0.33	4.0	11.1	X		verilog	2	r8051	Y	yes	N	N	64K	64K	Y					2015	2019			
r8-core	https://github.com/vctrop		Victor O. Costa	RISC	16	16															Y	vhdl	14	r8_uc	Y	asm	N		64K	64K	N	35		16			2019		university project, doc in portuguese	expanded R8 ISA
raptor16	www.spacewire	stable	Steve Haywood	CISC	16	16	kintex-7-3	James	Brakef	590	6			319	##	14.7	1.40	2.7	280.2	X		vhdl	1	raptor16	Y	yes	N	N	64K	64K	N					2004			8 data & 8 adr regs	no multiply, 8 adr modes
raptor64	https://opencor	alpha	Robert Finch	RISC	64	32																verilog	63	raptor64	Y		Y	Y	4G	4G	Y	105	2	96	9	2005	2013		16 register sets, inst & data cache, m	ISA not finished, core runs
recon	https://github.com/jefflie		jeff lieu	Nios II	32	32																verilog			Y	yes	opt		4G	4G	Y			32			2019	https://hackaday.	software helper files also	
recore54		beta	Hans Tiggeler	PIC16	8	14	kintex-7-3	James	Cannot find <rc		6					14.7	0.33	1.0				vhdl	20	rcore54_s	Y	yes	N	Y	256	4K	Y					1999			not available at ht-lab website	www.ht-lab.com
reduceron	https://www.cs	stable	Matthew Naylor/Tommy	Thorm											##					IX				Reduceron												2008	2018	https://github.cor	hardware for functional programmin	red-lava generates the RTL
reflet	https://github.com/Arkae		Maxime Bouillot	accum	8	8																verilog															https://github.cor	original design	most ops between accumulator & register, risc
reonv	https://github.c	difficult	Lucas Castro	risc-v	32	32	kintex-7-3	James	many files		6				##	14.7	1.00	1.0				vhdl			Y	yes	N		4G	4G	Y			32		2017	2018	https://strijar.live	uses Leon infrastructure with risc-v ISA	
reverse-u16	https://github.c	stable	A.T.	Z80	8	8	cylcone-4	James	Brakef	11224	4		60		##	14.7	0.33	4.0		X	Y	vhdl	29	zxpoly	Y	yes	N	N	64K	64K	Y					2015			SOC project using T80, HDMI generat	retro Z80 based on T80 by Daniel Wallner
risc_core_i	https://opencor	planning	Manuel Imhof	RISC	16	16	kintex-7-3	James	Brakef	349	6	1		526	##	14.7	0.67	3.0	336.8	X	B	vhdl	13	CPU	Y	asm	N		1K	1K				8	4	2001	2009		Havard arch, thesis project	derived clocks: estimated derating
risc_cpu	https://electron	untested		accum	8	8																vhdl					N		32	32	Y	8					2017				
risc0	https://sourcefo	beta	Niklaus Wirth	RISC	32	32	kintex-7-3	James	Brakef	1186	6	4	6	110	##	14.7	0.67	1.0	61.9	X		verilog	8	RISC0	Y	yes	N		4G	4G						2011			minimalist Wirth, education tool	
risc-16	https://github.c	stable	Bruce Jacob	RISC	16	16											0.67					vhdl	12	soc	Y	yes	N		64K	64K	N	9		8		2000	2015	https://user.eng.u	single cycle, pipeline & OO variants	Little Computer (LC-896) derivative
risc16f84	https://opencor	stable	John Clayton	PIC16	8	14	kintex-7-3	James	Brakef	375	6			392	##	14.7	0.33	2.0	172.5	IX		verilog	1	risc16f84	Y	yes	N	Y	256	4K	Y					2002	2018		derived from CQPIC by Sumio Moriok	other variants with RTL
risc5	http://www.pro	beta	Niklaus Wirth	RISC	32	32	zu-2e	James	Brakef	2001	6	4		177	##	v20.1	1.00	1.0	88.3	ILX		verilog	8	RISC5	Y	yes	Y		4G	4G				16		2013	2017	http://www.astro	minimalist Wirth, part of Project Obe	32x32 multiplier, wikipedia entry
risc5	http://www.pro	beta	Niklaus Wirth	RISC	32	32	kintex-7-3	James	Brakef	2441	6	4	1	92	##	14.7	1.00	1.0	37.8	ILX		verilog	8	RISC5	Y	yes	Y		4G	4G				16		2013	2017	http://www.astro	minimalist Wirth, part of Project Obe	32x32 multiplier, wikipedia entry
risc5	http://www.pro	beta	Niklaus Wirth	RISC	32	32	atrix7-35	James	Brakef	2913	6		48	50	##	v20.1	1.00	1.0	17.2	ILX		verilog	8	RISC5Top	Y	yes	Y		4G	4G				16		2013	2017	http://www.astro	minimalist Wirth, part of Project Obe	32x32 multiplier, wikipedia entry
risc5x	https://opencor	stable	MikeJ	PIC16	8	14	kintex-7-3	James	RLOC constrain		6					14.7	0.33	1.0				vhdl	15	cpu	Y	yes	N	Y	256	4K	Y					2002	2011		makes extensive use of xilinx primitives	
risc63	https://github.c	alpha	Dominik Salvet	RISC	64	16																vhdl	16	risc63			N				Y	39		16			2021		tightly packed 16-bit ISA	thesis in Chech
risc8	https://web.arc	stable	Tom Coonan	PIC16	8	12	kintex-7-3	James	Brakef	355	6			154	##	14.7	0.33	2.0	71.5	X		verilog	8	cpu	Y	yes	N	Y	256	2K	Y					1999	1999	https://github.cor	excellent HTML doc	directory contains derivative design by anothe
risc8softcore	https://github.com/osres		Trammell Hudson	AVR	8	16																verilog	6	risc8-soc	Y	yes	N	Y	64K	64K	Y					2020	2020		mostly compatible with the AVR instruction set	
riscff		proprietar	ExpressIf	RISC	16	16																proprietary														2004			now produce ESP8266 & ESP32	
risc-fuggit	https://github.com/itsShn		Nikhil Shah	RISC	32	32																verilog	33	riscmain	y		N		4G	4G				32			2019		non-standard set of conditional branches, schematic conflicts with documentation o	
riscmcu	https://opencor	stable	Yap Zi He	AVR	8	16	arria-2	James	LPM parameter		4				##	q18.0	0.33	1.0		I		vhdl	15	v_riscmcu	Y	yes	N	Y	128	512	Y	92		16	3	2002	2009		thesis	added 5 inst to AVR
riscompatible	https://opencor	beta	Andre Soares	RISC	32	32	kintex-7-3	James	set IO	2167	6		1	145	##	14.7	1.00	3.0	22.3	X		vhdl	12	riscompat	Y	yes	N	Y	4G	4G	Y			16		2014			based on RISCO processor by Junqueira & Suzim 1993	
risc-processor	https://github.c	stable	Jeff Bush	RISC	32	32	kintex-7-3	James	Brakef	1445	6		6	161	##	14.7	1.00	1.0	111.6	X		verilog	22	fpga_top	Y	yes	N		4G	4G	Y			32		2008	2019	https://github.cor	two designs with same name	MIT course work?
riscuva1	http://www.sc	stable	S. de Pablo	picoBlaze	8	14	kintex-7-3	James	Brakef	109	6			370	##	14.7	0.33	2.0	560.7	X		verilog	1	riscuva1	ome		N	Y	256	1K	Y	35				2006	2006	https://github.cor	Verilog source included in PDF file	also VHDL version by Bikash Gogoi with identic
riscv_ariane	https://github.c	untested	pulp project	risc-v	64	32											1.00	1.0							Y	yes	Y		4G	4G	Y			32	6	2018	2020	https://github.cor	single issue, in-order CPU which implements the 64-bit RISC-V ISA IMAC extensions,	
riscv_biriscv	https://opencores.org/pr		Ultra Embedded	risc-v	32	32																verilog							4G	4G	Y			32		2020	https://github.cor	dual issue	also single issue version
riscv_bonfire	https://github.c	vado proj	Thomas Hornschuh	risc-v	32	32	kintex-7	James	Brakefield		6				##	14.7	1.00	1.0				vhdl		bonfire_cp	Y	yes			4G	4G	Y			32			2018	http://bonfirecpu.	vivado project, based on lxp32	comingled lxp32 & RISCv; poorly organized gith
riscv_boom	https://github.c	untested	UC Berkeley	risc-v	32	32																scala			Y	yes	Y		4G	4G	Y	45		32				https://boom-cor	Berkeley Out-of-Order RISC-V Processor	
riscv_briscv	https://ascslab.u	untested	various	risc-v	32	32																			Y	yes	Y		4G	4G	Y	45		32		2018	2020	https://opencores	six implementations of risc-v	Boston Un. Course work
riscv_clarinet	https://github.com/HPC-L		Riya Jain etal	risc-v	32	32																bluespec verilog			Y	yes	Y		4G	4G	Y	45		32	5		2020	https://github.cor	RISC-V with posit arithmetic, bluespe	verilog for riscv flute & (3) posit sizes
riscv_clarvi	https://github.c	stable	Robert Eady	risc-v	32	32	arria-2	James	Altera	2616	A			178	##	q18.0	1.00	1.0	68.2	I	B	system v	7	clarvi	Y	yes	N		4G	4G	Y			32	6	2016	2017	https://www.cl.ca	educational simple RISC-V implement	doesn't make use of block RAM RTL
riscv_cpu	https://github.c	untested	misha kevlishvili	risc-v	32	32											1.00	1.0				verilog			Y	yes	N		4G	4G	Y	45		32		2019	2019	https://www.yout	simple and easy to understand design	
riscv_dark	https://github.c	beta	Marcelo Samsoniuk	risc-v	32	32	kintex-7-3	Marcelo	Sam	1000	6			220	##	v20.1	1.00	1.0	220.0			verilog	4	darkriscv	Y	yes	N		4G	4G	Y	45		32		2018	2021	https://opencores	written in one night, low line count	builds for five fpga boards
riscv_engine-v	https://github.c	untested	Antti Lukats	risc-v	32	32				306	4						1.00	6.7		AL		verilog	11		Y	yes	N		4G	4G	Y	45		32		2018	2018	https://riscv.org/2	RISC-V contest 2nd place, 8-bit ALU	no source for xilinx, no implementation docs
riscv_femtoRV	https://github.c	stable	Bruno Levy	risc-v	32	32																verilog	45	femtosoc	Y	yes	N		4G	4G	Y	45		32		2020	2021	https://members.	teach FPGAs to university students, research director	
riscv_fwrisc	https://github.c	untested	Matthew Balance	risc-v	32	32	ice40	Matthew	Bala	1653	4				##		1.00	6.7		AL		system v	8	fwrisc_fpg	Y	yes	N		4G	4G	Y	45		32		2018	2018	https://opencores	featherweight entry 2018 RISC-V cont	0.15 DMIPS/MHz
riscv_fwrisc	https://github.c	untested	Matthew Balance	risc-v	32	32	igloo2	Matthew	Bala	1060	4			20	##		1.00	6.7	2.8	AL		system v	8	fwrisc_fpg	Y	yes	N		4G	4G	Y	45		32		2018	2018	https://opencores	featherweight entry 2018 RISC-V cont	0.15 DMIPS/MHz
riscv_GRVI-pha	https://fpga.org/	beta	Jan Gray	risc-v	32	32	virtex-u-2	Jan	Gray	320	6		1	375	##	v16.4	1.00	1.0	1171.9	X		proprietary			Y	yes	N		4G	4G	Y	45		32	3	2015	2018	https://www.yout	hand fitted & placed	"Hoplite" router, 1680 cores in XCVU9P
riscv_hl5	https://github.c	stable	Paolo Mantovani	risc-v	32	32																systemC	12	hl5	Y	yes	N		4G	4G	Y	45		32		2017	2020		32-bit RISC-V processor designed with HLS, coded in SystemC	
riscv_humming	https://github.c	stable		risc-v	32	32	kintex-7-3	James	too many los		6					14.7	1.00	1.0				verilog	141	e203_cpu	Y	yes	N		4G	4G	Y			32		2016	2018		e200 has opensource	also have a chip
riscv_humming	https://github.c	stable		risc-v	32	32	kintex-7-3	James	Brakef	14119	6		32	62	##	14.7	1.00	1.0	4.4	X		verilog	141	e203_soc	Y	yes	N		4G	4G	Y			32		2016	2018		e200 has opensource	also have a chip
riscv_humming	https://github.c	untested		risc-v	32	32																verilog			Y	yes	N		4G	4G	Y			32		2017	2018		AKA e200, Chinese	software tools take 80MB
riscv_ibex_low	https://github.c	stable	Philipp Wagner	risc-v	32	32																system v	27	ibex_core	Y	yes	N		4G	4G	Y			32			2020	https://www.lowr	AKA zero-riscy, also see pulp	
riscv_jive	https://github.com/fredre		Frédéric REQUIN	risc-v	32	32											1.00	20.0				verilog	19	jive_cpu_f	Y	yes	N		4G	4G	Y			32			2018		Size-Optimized Microcoded RISC-V CF	16-bit ALU

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	repor ter	com ents	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	ven dor	SOC	src code	#src files	top file	doc	tool chai n	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pip e	start year	last revis	secondary web link	note worthy	comments
riscv_lattice	https://www.lat	stable	Lattice Semi	risc-v	32	32	machXO3D	Lattice	Semic	1507	4		4	60	##		1.00	1.0	39.8	L	Y				Y	yes	N		4G	4G	Y			32	5		2021		RV32I ISA, 5 stage pipeline, configured & generated using Lattice Propel	
riscv_lowrisc	https://github.c	scala	Alex Bradbury	risc-v	32	32															Y	scala														2017	http://www.lowri	version 0.4-lowRISC with tagged memory and minion core	
riscv_microsem	https://github.c	stable	Microsemi	risc-v	32	32	polarfire	microsemi		8614	4	2	10	122		L11.8	1.00	1.0	14.2			proprietary			Y	yes	N		4G	4G	Y			32		2016	2018	https://www.micr	is encrypted IP	has caches
riscv_minerva	https://github.com/lambc		lambdaconcept	risc-v	32	32																nmigen			Y	yes	N		4G	4G	Y			32	6		2020		microarchitecture of Minerva is largely inspired by the LatticeMico32 processor	
riscv_myth	https://github.com/kuby1		Kubiran Karakaran	risc-v	32	32																															https://tl-x.org		
riscv_neorv32	https://github.c	stable	Stephan Nolting	risc-v	32	32	cyclone-IV	Stepha	rtl fpg	848	4			111	##	q19.1	1.00	4.0	32.7	AL	Y	vhdl	25	neorv32_t	Y	yes	N		4G	4G	Y			32		2020	2021	https://opencores	**very well documented, customiza**	**many perpherals, LUT counts for all variati**
riscv_orca	https://github.c	beta	VectorBlox	risc-v	32	32	stratix-5	vectorblox		1082	A		?	244	##	14.7	0.98	1.0	221.0	I		vhdl	13	orca	Y	yes	N		4G	4G	Y			32		2016			*, /, fltg-pt all optional	RV32IM
riscv_piccolo	https://github.c	untested	BlueSpec	risc-v	32	32																bluespec	verilog		Y	yes	N		4G	4G	Y			32	3	2018	2018		RISC-V CPU, simple 3-stage pipeline, for low-end applications (e.g., embedded, IoT),	
riscv_picorv32	https://github.c	beta	Clifford Wolf	risc-v	32	32	xcku3p-3	Cliffor	small	761	6			769	##	v16.2	1.00	3.0	336.8	X	Y	verilog	1	picorv32	Y	yes	N		4G	4G	Y			32		2016	2020		mimimal features, soc options	designed for minimum LUTs
riscv_picorv32	https://github.c	beta	Clifford Wolf	risc-v	32	32	kintex-U-3	Cliffor	small	761	6			454	##	v16.2	1.00	3.0	198.9	X	Y	verilog	1	picorv32	Y	yes	N		4G	4G	Y			32		2016	2020		mimimal features, soc options	LUTs & Fmax for Kintex, Virtex & Ultrascale+
riscv_potato	https://github.c	beta	Kristian Skordal	risc-v	32	32	kintex-7-3	James	Brakef	2467	6			116	##	14.7	1.00	1.0	47.1	X	B	vhdl	24	pp_core	Y	yes	N	N	4G	4G	Y	30		32		2014	2020		risc-V interger only, no mult	"rocket-core" version at risc.org
riscv_pulpino	https://github.c	untested	Andreas Kurth	risc-v	32	32	arria-2	James	missing files		A				##	q18.0						system v	9		Y	yes	N		4G	4G	Y			32		2015	2020	http://www.pulp-	pulpissimo is single core "pulp" with interest in non-riscv ISA expansion	
riscv_reboot	https://github.c	pre alpha	Robert Baruch	risc-v	32	32																python	8		Y	yes	N		4G	4G	Y	45		32			2020	https://www.yout	work in progress, has 60 minute video on design issues	
riscv_reindeer	https://github.c	untested	pulserain.com	risc-v	32	32														AL		verilog			Y	yes	N		4G	4G	Y	45		32	4	2018	2018	https://riscv.org/2	RISC-V contest prize	
riscv_rocket	https://github.c	scala	Andrew Waterman	risc-v	32	32															Y	scala			Y	yes	N		4G	4G	Y			32		2016	2018			
riscv_rpu	https://github.c	untested	Colin Riley	risc-v	32	32																vhdl			Y	yes	N		4G	4G	Y			32		2015	2018	http://labs.domip	Series of 16 tutorials on uP design, w	RPU uP, TPU now discarded
riscv_rsd	https://github.com/rsd-de		Susumu Mashimo	risc-v	32	32	zynq	Susumu	Mast	28166	6			90			1.00	1.0	3.2			system verilog			Y	yes	N		4G	4G	Y			32			2020		RISC-V out-of-order superscalar proc	can be synthesized for small FPGAs
riscv_rtg4	https://github.c	mature	microsemi	risc-v	32	32																			Y	yes	N		4G	4G	Y			32		2018	2020	https://github.cor	risc-v for actel FPGAs, tcl files only	based on rocket chip
riscv_rudolv	https://github.com/bobbl		Jörg Mische	risc-v	32	32	kintex-7-3	Jörg	Mische	545	6			200	##		1.00	1.0	367.0	ALMX		verilog	4	pipeline	Y	yes	N		4G	4G	Y			32	5		2021		RISC-V processor for real-time system	34 clock mult & divide
riscv_rv01_cor	https://opencor	stable	Stefano Tonello	risc-v	32	32	kintex-7-3	James	Brakef	13997	6	4	62	130	##	14.7	1.00	1.0	9.3	X		vhdl	65	rv01_selft	Y	yes	N		4G	4G	Y			32		2015	2017		all files in one directory	two self test tops
riscv_rv12	https://github.c	untested	Roa Logic BV	risc-v	32	32	arria-2	James	Brakefield		A				##	q18.0						system verilog			Y	yes	N		4G	4G	Y			32				https://roalogic.com		
riscv_rv3n	https://github.com/riscli		Li Xinbing	risc-v	32	32																verilog	17		Y	yes	N		4G	4G	Y			32			2020		RV32IMC processor core, which has a new pipeline with "3+N" stages	
riscv_rvbs	https://github.com/CTSRD		Alexandre Joannou	risc-v	32	32																bluespec	33		Y	yes	N		4G	4G	Y			32			2020		descript of the RISC-V instruction set in Bluespec, requires bluespec, no verilog code	
riscv_scarv-cpu	https://github.com/scarv		Daniel Page	risc-v	32	32															Y	verilog	31	frv_core	Y	yes	N		4G	4G	Y			32		2019	2020	https://www.ukri	side channel hardened, no cache, branch prediction or virtual memory, research pro	
riscv_scr1	https://github.c	untested	Syntacore	risc-v	32	32	arria-2	James	Brakefield		A				##	q18.0						system v	47	scr1_top	Y	yes	N		4G	4G	Y			32		2017	2018	http://syntacore.com		
riscv_scr1	https://github.c	untested	Syntacore	risc-v	32	32																system v	47	scr1_core	Y	yes	N		4G	4G	Y			32		2017	2021	http://syntacore.com		
riscv_serv	https://github.c	untested	Olof Kindgren	risc-v	32	32	ice40				4									L		verilog	17		Y	yes	N		4G	4G	Y	45		32		2018	2020	https://riscv.org/2	RISC-V contest prize, 1-bit ALU	https://github.com/olofk/corescore
riscv_shakti	https://bitbucke	untested		risc-v	32	32																			Y	yes	N		4G	4G	Y			32					500MB download	
riscv_sifive	https://www.sif	asic		risc-v	32	32																proprietary			Y	yes	N		4G	4G	Y			32				https://www.sifiv	ASIC IP house, 32-bit "freedom" core	free Artix-7 bitstream
riscv_sifive	https://www.sif	asic		risc-v	64	32																proprietary			Y	yes	N		4G	4G	Y			32				https://www.sifiv	ASIC IP house, 64-bit "freedom" core	free Artix-7 bitstream
riscv_sodor	https://github.c	scala	UC Berkeley	risc-v	32	32																scala			Y	yes	N		4G	4G	Y			32					1, 2, 3 and 5 stage pipe versions	
riscv_spu32	https://github.c	untested	Merten Maik	risc-v	32	32																verilog			Y	yes	N		4G	4G	Y			32		2019	2019		actively being developed	
riscv_steel	https://opencores.org/pr		Rafael Calcada	risc-v	32	32	**zu2-2**	James	Brakef	1775	6			208	##	v19.2	1.00	1.0	117.4			verilog	21	steel_top	Y	yes	N		4G	4G	Y			32	3		2020	https://github.cor	github version has vivado proj	under grad thesis
riscv_steel	https://opencores.org/pr		Rafael Calcada	risc-v	32	32	atrix-7-3	James	Brakef	1784	6			116	##	v19.2	1.00	1.0	65.0			verilog	21	steel_top	Y	yes	N		4G	4G	Y			32	3		2020	https://github.cor	github version has vivado proj	under grad thesis
riscv_swerv	https://github.c	untested	Western Digital	risc-v	32	32																system verilog			Y	yes			4G	4G	Y			32		2019	2020	https://blog.weste	9 stage pipe, dual issue	risc-v SoC for fpga, riscv_swerv_eh1_fpga now
riscv_taiga	https://gitlab.co	stable	Eric Matthews	risc-v	32	32	zynq			1551			1	123			1.00	1.0	79.3	X		system v	46		Y	yes	N		4G	4G	Y			32		2017			TAIGA: A new RISC-V soft-processor f	33% smaller & 39% faster than LEON3
riscv_tinsel	https://github.com/POET		Ghaith Tarawneh	risc-v	32	32																bluespec	verilog													https://poets-proj	message-passing architecture designed for FPGA clusters	
riscv_urv-core	https://github.c	error	Tomasz Włostowski	risc-v	32	32	kintex-7-3	James	missing files						##	14.7	1.00	1.0				verilog			Y	yes	N		4G	4G	Y			32		2015	2015			
riscv_vexriscv	https://github.c	beta	Charles Papon	risc-v	32	32	artix-7	Charles	Papon?		6						0.52	1.0		X		vero;pg			Y	yes			4M	4M	Y						2018		verilog source	scala not needed
riscv_vexriscv	https://github.c	beta	Charles Papon	risc-v	32	32	artix-7	Charles	Papo	481	6			346			0.52	1.0	374.1	X		scala		smallest	Y	yes			4M	4M	Y						2018	https://riscv.org/2	preformance #s for 8 configurations c	"Briey" is SOC variant
riscv_vexriscv	https://github.c	scala	Charles Papon	risc-v	32	32	atrix-7-3	Charles	Papo	1399	6			295			1.00	1.0	210.9	X	Y	scala		full no cac	Y	yes	N		4G	4G	Y			32			2018	https://riscv.org/2	preformance #s for 8 configurations c	"Briey" is SOC variant
riscv_vhdl	https://opencor	errors	Sergey Khabarov	risc-v	64	32	kintex-7-3	James	many files, mis		6				##	14.7	1.00	1.0			Y	vhdl & verilog			Y	yes	N		4G	4G	Y			32		2016	2018	https://github.cor	System-On-Chip based on bare Rocke	both rocket & river cores
riscv_zscale	https://github.c	scala	UC Berkeley	risc-v	32	32																scala			Y	yes	N		4G	4G	Y			32		2015	2017		not maintained & not conformant	
rise	https://opencor	beta	Jlechner etal	RISC	16	16	kintex-7-3	James	missing black b		6	1				14.7	0.67	1.0		X		vhdl	26	rise	Y	asm	N		64K	64K				16	5	2006	2010	en.wikiversity.org	ARM style register usage	
rj32	https://github.c	alpha	rj45	RISC	16	16																verilog	8	top	Y	asm	N		64K	64K	Y	32		16		2013	2021			verilog generated from schematic
rois	https://opencor	alpha	James Brakefield	RISC	24	24	**zu-2e**	James	no blk	627	6			382	##	v19.2	0.83	1.0	507.1	X		vhdl	2	rois24_24min			N		16M	16M	N	30		64	1	2016	2017		single pipe stage, passes simulation	24-bit word operations only
rois	https://opencor	alpha	James Brakefield	RISC	24	24	kintex-7-3	James	Brakef	384	6		1	170	##	14.7	0.83	1.0	368.8	X		vhdl	2	rois24_24min			N		16M	16M	N	30		64	1	2016	2017		single pipe stage, passes simulation	24-bit word operations only
rois	https://opencor	alpha	James Brakefield	RISC	24	24	kintex-7-3	James	Brakef	382	6		1	120	##	14.7	0.83	1.0	261.7	X		vhdl	2	rois24_24up			N		16M	16M	Y	55		64	1	2016	2017		single pipe stage, pre simulation stag	8, 16 & 24-bit load/store
rois	https://opencor	alpha	James Brakefield	RISC	24	24	**zu-2e**	James	huge l	9000	6			150	##	v19.2	0.83	1.0	13.9	X		vhdl	2	rois24_24up			N		16M	16M	Y	55		64	1	2016	2017		single pipe stage, pre simulation stag	8, 16 & 24-bit load/store
rtf64	https://github.c	alpha	Robert Finch	RISC	64	8																system v	3	rtf64	Y	yes	Y				Y			32		2020	2021		variable length instructions	Posit support, glossary & references
rtf65002	https://opencor	alpha	Robert Finch	accum	32	8	kintex-7-3	James	Brakef	11216	6	4	6	123	##	v14.1	0.67	2.0	3.7	X		verilog	10	rtf65002d	Y		N		4G	4G	Y			16		2013	2013	https://github.cor	32-bit 6502 + 6502 emulation	"proven"
rtf6809	https://opencor	alpha	Robert Finch	6809	8	8	kintex-7-3	James	many	7506	6	1	2	106	##	14.7	0.33	4.0	1.2	X		verilog	4	rtf6809	Y	yes	N	N	4G	4G	Y			8		2012	2015	http://www.finitr	6809 with 32-bit "FAR" addressing	probably for simulation?
rtf68ksys	https://opencor	alpha	Robert Finch	68000	16	16	spartan-3e	James	need t	13639	4	12	17		##	14.7	0.67	4.0		X	Y	verilog	49	rtf68kSys	Y	yes	N	N	4G	4G	Y			16		2011	2011	https://github.cor	based on Tobias Gubener's TG68	
rtf8088	https://opencor	planning	Robert Finch	x86	16	8	kintex-7-3	James	Brakef	4514	6	4		174	##	14.7	0.67	3.0	8.6	X		verilog	57	rtf8088	Y	yes	N	N	1M	1M	Y					2012	2013	https://github.cor	8-bit memory data, e.g. 8088	
rtx2000	http://www.mp	asic	Tom Hand	forth	16	16																proprietary																Harris Corp., FPGA version at MPEforth	
s1_core	https://opencor	stable	Fabrizio Fazzino etal	SPARC	64	32	kintex-7-3	James	Brakef	52845	6	8	59	56	##	v14.1	2.00	1.0	2.1	IX		verilog	136	s1_top	Y	yes	Y	N	4G	4G	Y			32		2007	2012	https://en.wikipe	reduced version of OpenSPARC T1	Vivado run
s16x4a	https://github.c	stable	Samuel Falvo II	forth	16	4	kintex-7-3	James	Brakef	514	6			476	##	14.7	0.67	1.0	620.7	X	B	verilog	1	s16x4a	Y		N	N	64K	64K	Y	12				2012	2017		kestrel #2, byte & word data	derived from Myron Plichota's design (streame
s430	https://www.p-	stable	Paul Taylor	MSP430	16	16	artix-7	Paul	Taylor	449	6			100			0.67	9.0	16.6			vhdl	1	s430					64K	64K	Y					2019	2019		msp430 subset with 8-bit alu	coded for size & not for speed
s64x7	https://github.c	stable	Samuel Falvo II	forth	64	8																verilog	4	s64x7					16E	16E	Y	56				2017			64-bit simple Forth engine	very little doc
s6soc	https://opencor	stable	Dan Gisselquist	RISC	32	32	spartan-6-3	James	sparta	2820	6	1	10	133	##	14.7	1.00	1.0	47.3	X	Y	verilog	31	toplevel			N	N	4G	4G	N	20		16	5	2015				uses ZIP CPU
s80186	https://github.c	stable	Jamie Iles	x86	16	8	cyclone-V	Jamie	Iles	1750	A			60			0.67	2.0	11.5	I	Y	system v	50	core	Y		N		1M	1M	Y					2017	2021	https://www.jami	80186 binary compatible core	implementing the full 80186 ISA
sap	https://opencor	stable	Ahmed Shahein	accum	8	8	kintex-7-3	James	no LU	48	6			200	##	14.7	0.10	4.0	104.2	X		vhdl	15	mp_struct			N		16	16	Y	5				2012	2017	https://shirishkoir	Simple as Possible Computer from M	https://www.youtube.com/watch?v=prpyEFxZ
sardmips	https://opencor	systemC	Igor Loi	MIPS	32	32																systemC			Y	yes	N		4G	4G	Y			32		2006	2009		synthesizable parametric IP core supporting full MIPS R2000 ISA	
sayeh_cpu	https://github.c	untested	Armin Kazemi	RISC	16	16											0.67	1.0				vhdl		Sayeh	Y	asm	N		64K	64K				64			2017		16-bit MIPS, data flow schematic	64 word reg file?	
sayeh_process	https://opencor	stable	Alireza Haghdoost, Arr	RISC	16	8	kintex-7-3	James	Brakef	479	6	1		164	##	14.7	0.67	1.0	229.7	X		verilog	13	Sayeh	Y		N		64K	64K				32		2008	2009	haghdoost.persiangig.com		simple RISC
sayuri_cpu	http://www.mo	stable	Toyoaki Sagawa	RISC	32	32	kintex-7-3	James	Brakef	1604	6			208	##	14.7	1.00	1.0	129.9	X		vhdl	13	cpu01				Y	4G	4G				32		2000	2000		dead weblink	high number of DFF
sc20	http://www.for	proprietar	Brad Eckert	forth	32	8	virtex-6	Brad	Eckert	1977	6			150			1.00	1.0	75.9	X		proprietary																PDF file, Forth Inc.	
scarts	https://opencor	beta	Jlechner, Martin Walte	RISC	16	16	kintex-7-3	James	missing signal c		6					14.7	0.67	1.0				vhdl	18	scarts		yes	N		64K	64K		122		16	4	2011	2012		Scarts Processor	GCC compiler
schoolmips	https://github.com/MIPSf		Andrea Guerrieri	RISC	32	32																				yes			4G	4G							https://github.cor	small MIPS CPU core originally based	schoolMIPS has several versions
secretblaze	http://www.lirm	beta	Lyonel Barthe	uBlaze	32	32	spartan-3-4	Lyonel	Barthe	1563	4			91		i12.1	1.00	1.0	58.2	X		vhdl	26	sb_core		yes			4G	4G	Y	86		32	5	2010	2012	www.lirmm.fr/ADAC		
senior-sagn-1	https://github.c	simulatio	Niranjan Ramadas	RISC	64	32	kintex-7-3	James	way to	135009	6	32		75	##	14.7	1.00	1.0	0.6	X		verilog	28	pipeline			N	Y			Y	137		32	4-8	2012	2012	nrbramadas.apps	university ASIC project, read PDF	64-bit data paths, superscalar, branch analysis
simplecpu	https://www-us	untested	Michael Freeman	RISC	32	32																vhdl									8				2018	2019	https://www-user	Educational, also a version 2 with VHI	both mips & riscv RTL
single_cyc_mip	https://www.fpga4student.com/2017/01/verilog			MIPS	16	16																verilog	2	single_cyc_mips					64K	64K							https://www.fpga4student.com/p/verilog-project.html		
single-cyc-cpu	https://github.c	mature	Victor A Pajaro	MIPS	32	32																vhdl	30	AlvarezPajaro_sing	N				4G	4G	Y			32			2019		nice schematic and clear description, course work	
socdp8	https://github.c	beta	Folke Will	PDP8	12	12																														2019	2019		SoC implementation of a PDP-8/I for	includes extended ALU
socz80	http://sowerbut	stable	Will Sowerbutts	Z80	8	8	spartan-6-3	James	constr	2568	6		15	93	##	14.7	0.33	3.0	4.0	X		vhdl	25	top_level	Y	yes	N	N	64K	64K	Y					2013	2014		based on Daniel Wallner's T80, for Papillio Pro board	
softavrcore	https://opencores.org/pr		Andras Pal	AVR	8	16	atrix-7-3													XL	Y	verilog	8	top	Y	yes	N		64K	64K	Y					2019	2020	https://szofi.net/p	full implementation of AVR 2-stage pi	variants: VR2, AVR2.5, AVR3, AVR4 & AVR5
softcore-cpu	https://github.com/Ayme		Aymen Sekhri	RISC	32	16														I		vhdl	15	control_u	Y	asm	N		4G	4G	Y	32		7		2019	2020		course project, seven "x86" registers, 32-bit immediates, multi-cycle design	
softpc	https://github.com/alreac		Michael S	Nios II	32	32	cyclone-10	Micha	block	613	4		1	180		q17.1	1.00	5.0	58.9			vhdl	13	nios2ee	Y	yes	opt		4G	4G	Y			32			2019		nine variations in attempt to improve	16-bit ALU	
sparc64soc	https://opencor	alpha	Dmitry Rozhdestvensk	SPARC	64	32	kintex-7-3	James	errors		6				##	14.7	2.00	1.0			Y	verilog	263	W1	N		Y										2009	2010		huge source file count	work in progress with no progress
spartanMC	http://www.spa	stable	Falk Hassler	RISC	18	18	kintex-7-3	James	Brakef	853	6	1	2	120	##	14.7	0.67	1.0	94.6	X	Y	verilog	38	spartanmc	Y	asm										2012	2014		SPARC like register windows	
sp-i586	https://github.c	stable	Lini Mestar	x86	32	8	kintex-7-3	James	Brakef	32144	6	4	28	73	##	14.7	1.00	2.0	1.1	X		verilog	37	top_sys	Y	yes	Y		4G	4G	Y					2016	2016	http://lmeshoo.ne	gate level dsgn, vivado project also	http://img.youtube.com/vi/2W1guyhCJuE/0.jp

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	reporter	comments	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	vendor	SOC	src code	#src files	top file	doc	tool chain	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pipe line	start year	last revis	secondary web link	note worthy	comments
spu-mark-ii	https://github.c	WIP	Felix Queißner	hybrid	16	16																vhdl	17	soc	Y		N		16M	16M	Y					2020	2021	https://ashet.com	SPU Mark II instruction set architecture, RISCish cpu that uses the stack machine app	
src	https://github.c	untested	Heuring & Jordan	RISC	32	32																verilog														2018	http://www.zeep	book by Heuring & Jordan	also Kilts cpt17 Adv FPGA dsgn
ssbcc	https://opencor	stable	Rodney Sinclair	forth	8	9	kintex-7	Rodney	Sincla	196	6			474		14.7	0.33	1.0	797.9	ILX		verilog	3	core	Y	asm	N	Y	1K	8K	Y	41		3		2012	2014	https://github.cor	Python program generates the Verilo	inst after branch/call/rtn always execs
stack_machine	http://people.ec	stable	Bruce R. Land	forth	16	5	cyclone10	James	Brakef	5101	4	6	29	66	##	q18.0	0.67	0.3	25.9	X		verilog	9	VGA_sram	Y	asm	N	N	64K	4K	N					2009	2011	https://people.ec	(3) uP cores, Cornell course material	VGA output, uses Nakano's tiny_cpu
stack-cpu	https://github.com/Arlet/		Arlet Ottens	stack	16	16														X		verilog	2	cpu					64K	64K	N	23				2017			3 or 4 stacks, load/store with stack de	xilinx block RAM
storm_core	https://opencor	beta	Stephan Nolting	ARM7	32	32	kintex-7-3	James	Brakef	2312	6	3		179	##	14.7	1.00	1.0	77.4	IX		vhdl	16	core	Y	yes	N			4G	4G	Y		32	8	2011	2014		Storm Core (ARM7 compatible)	I & D caches not compiled
storm_soc	https://opencor	beta	Stephan Nolting	ARM7	32	32	kintex-7-3	James	Brakef	3514	6	3	4	159	##	14.7	1.00	1.0	45.2	X	Y	vhdl	40	storm_top	Y	yes	N			4G	4G	Y		32	8	2012	2015		STORM SoC	cache & no peripherals
streamer16	http://www.ultr	stable	Myron Plichota	forth	16	3	kintex-7-3	James	Brakef	143	6			417	##	14.7	0.20	1.2	485.6	X		vhdl	8	streamer	Y	yes	N	N	64K	64K	N	8	2			2001	2001	http://www3.sym	MIPS/inst reduced	2nd web adr non-functional
sub86	https://opencor	alpha	Jose Rissetto	x86	16	8	kintex-7-3	James	Brakef	1916	6			172	##	14.7	0.67	3.0	20.1	X		verilog	1	sub86	Y	yes	N	N	64K	64K	Y			7		2012	2013		very small x86 subset core	no segment registers, limited op-codes
superscaler-ris	https://github.com/riscli		Li Xinbing	risc-v	32	32																verilog	15	ssrv_top	Y	yes	N		4G	4G	Y			32		2019	2020		Super-scalar out-of-order RV32IMC	performance: 6.4 CoreMark/MHz
supersmall	http://www.eec	stable	Michael Ritchie	RISC	32	32	stratix_3	Michael	Ritch	207	A		2+8	126	##	q9.0	1.00	16.0	38.1	I		verilog														2005	2009		2-bit serial, Mostly MIPS-I compliant	Copyright 2005,2006,2009 Jonathan Rose, and
suska-III	http://www.exp	beta	Wolfgang Forster	68000	16	16	arria-2	James	Brakef	7388	A			55	##	q13.1	0.67	4.0	1.3	I		vhdl	11	wf68k00ip	Y	yes	N	N	4G	4G	Y			16		2003	2013		for use as an Atari ST	
suslik	https://opencor	alpha	Goran Dakov	RISC	32	32	kintex-7-3	James	missing file(s)		6				##	14.7	1.00	1.0				verilog	4	cpu	pr	asm										2015	2016		"arithmetic core"	has testbench & caches
sweet32	https://opencor	alpha	Valentin Angelovski	MIPS	32	16	kintex-7-3	James	Brakef	1050	6	1		142	##	14.7	1.00	1.0	135.1	X	B	vhdl	2	Sweet32_	Y	yes	N	N	4G	4G	Y	26		16		2014	2015		targets MACHXO2, no RAM	
sweet32	https://opencor	alpha	Valentin Angelovski	MIPS	32	16	kintex-7-3	James	Brakef	1797	6	1	2	185	##	14.7	1.00	1.0	103.1	X	Y	vhdl	28	sweet32_	Y	yes	N	N	4G	4G	Y	26		16		2014	2015		targets MACHXO2, DDR RAM	clock divider to Sweet32_v1_core
sweet32	https://opencor	alpha	Valentin Angelovski	MIPS	32	16	kintex-7-3	James	Brakef	1177	6	1		116	##	14.7	1.00	1.0	98.8	X	B	vhdl	2	Sweet32_	Y	yes	N	N	4G	4G	Y	26		16		2014	2015		targets MACHXO2, no RAM	
swt16	https://github.com/captai		captaindane	RISC	16	16																verilog	10	swt16-top	Y	asm	N	Y	64K	64K	Y	31		16	5		2020		16-bit, 5-stage RISC uP. RTL description in Verilog. Includes assembler, simulator, and	
sxp	https://opencor	beta	Sam Gladstone etal	RISC	32	32			too many Ios													verilog	12	sxp			N		4G	4G				32		2001	2009		basic RISC	too many Ios
symphony	http://www.ece	alpha	Jason Yu	vect	32	32																verilog	47	vpu_top												2007	2008		vector addon to NIOS	
synpic12		stable	Miguel Angel Ajo Pelay	PIC12	8	12	kintex-7-3	James	Brakef	474	6		1	197	##	14.7	0.33	1.0	136.8	IX		vhdl	7	synpic12	Y	yes	N	N	256	2K	Y					2011	2011	http://projects.nb	CHDL to verilog	bad weblink
sys0800	https://github.c	stable	Zoltan Pekic	TMS0800	4	12																vhdl	26	sys0800	Y	yes	N	Y	12	512						2019	2020	https://hackaday.	calculator chip, both TI Datamath and	256x52 micro code
sys9080	https://github.c	stable	Zoltan Pekic	8080	8	8																vhdl	15	sys9080	Y	yes	N	N	64K	64K	Y					2017	2018	https://opencores	8-bit 8080 CPU based on 29XX bit-slice series of devices AMD 1978 51 pge ap note	
system01	http://members	beta	John Kent, David Burn	6801	8	8	kintex-7-3	James	Brakefield		6					14.7	0.33	4.0				vhdl			Y	yes	N	N	64K	64K	Y					2003	2009			
system05	https://opencor	beta	John Kent, David Burn	6805	8	8	kintex-7-3	James	Brakef	834	6			204	##	14.7	0.33	4.0	20.2	X	Y	vhdl	10	System05	Y	yes	N	N	64K	64K	Y					2003	2009	http://members.o	tushome.com.au/jekent/	
system09	https://opencor	stable	John Kent, David Burn	6809	8	8	kintex-7-3	James	Brakef	1631	6		41	88	##	14.7	0.33	3.0	6.0	IX	Y	vhdl	40	cpu09l	Y	yes	N	N	64K	64K	Y					2003	2021	http://members.c	from John Kent web page	opencores download URL incorrect, use col E
system11	https://opencor	alpha	John Kent, David Burn	68HC11	8	8	kintex-7-3	James	Brakef	1218	6			153	##	14.7	0.33	4.0	10.3	X	Y	vhdl	17	cpu11	Y	yes	N	N	64K	64K	Y					2003	2009	http://members.c	known bugs & untested instructions	
system68	https://opencor	stable	John Kent, David Burn	6801	8	8	spartan-3-5	James	Brakef	2235	4		4	46	##	14.7	0.33	4.0	1.7	X	Y	vhdl	21	cpu68	Y	yes	N	N	64K	64K	Y					2003	2009	http://members.o	tushome.com.au/jekent/	
system6801	https://opencor	stable	Michael L. Hasenfratz	6801	8	8	cyclone-3	James	Brakef	1507	4		3	73	##	14.7	0.33	4.0	4.0	I		vhdl	15	wb_cyclor	Y	yes	N	N	64K	64K	Y					2003	2009	http://members.c	based on John Kent's 6801	tested on Apex20K, Cyclone & Stratix boards
t180-cpu		stable	Leonard Brandwein	accum	16	8	kintex-7-3	James	bypass	709	6			83	##	14.7	0.67	3.0	26.2	X		vhdl	23	cpu	Y		N	N	64K	64K	Y	182				2016	2016	https://www.vtto	8-bitter with pc, sp, a, b, c & d regs	based on Viktor Toth's 4 bit microcontroller
t400	https://opencor	stable	Arnim Laeuger	COP400	4	8	spartan-2	Arnim	Laeuge	643	3		2	60			0.16	4.0	3.7	IX		vhdl	36	t400_core	Y	yes	N	Y	64	1K	Y					2006	2009		implementation of National's 4-bit COP400 microcontroller	
t48	https://opencor	stable	Arnim Laeuger	MCS-48	8	8	cyclone-1	Arnim	Laeuge	738	4		1	59			0.33	4.0	6.6	IX		vhdl	70	t48_core	Y	asm	N		256	1K						2004	2021		T48 uController	used in several projects
t51	https://opencor	stable	Andreas Voggeneder	8051	8	8	kintex-7-3	James	Brakef	1942	6	1		147	##	14.7	0.33	4.0	6.2	IX		vhdl	17	T8032	Y	yes	N	N	64K	64K	Y					2002	2010		8052 & 8032	8032 SoC
t65	https://opencor	stable	Daniel Wallner	6502	8	8	kintex-7-3	James	Brakef	575	6			291	##	14.7	0.33	4.0	41.7	IX		vhdl	7	T65	Y	yes	N	N	64K	64K	Y					2002	2010		6502, 65C02 & 65C816; wide use	
t6507lp	https://opencor	beta	Gabriel Oshiro, Samue	6502	8	8	spartan-6-3	James	errors							14.7		4.0				verilog	22	t6507lp	Y	yes	N	N	64K	64K	Y					2009	2010		for use in ATARI 2600	
t80	https://opencor	stable	Daniel Wallner	Z80	8	8	kintex-7-3	James	Z80 m	1389	6			163	##	14.7	0.33	3.0	12.9	X		vhdl	5	T80a	Y	yes	N	N	64K	64K	Y					2002	2018		Z80, 8080 & gameboy inst sets, several usages	
table887	https://github.c	alpha	Robert Finch	RISC	16	16	kintex-7-3	James	Brakef	643	6		2	208	##	14.7	0.67	1.0	217.1	X		verilog	2	table887_	Y		N	N	64K	64K		28		8		2014	2016			included with Table888 source code
table888	https://github.c	alpha	Robert Finch	RISC	32	16	kintex-7-3	James	Brakef	5756	6	9	6	137	##	14.7	2.00	1.0	47.6	X		verilog	3	table888	ome				4G	4G	Y	130		8		2014	2016		2016 version gives same reults as 201	code for cache & mmu incomplete
tarhi	https://github.c	alpha	Dagvadorj Galbadrakh	RISC	32	32	kintex-7-3	James	everyt	396	6		1	123	##	14.7	1.00	4.0	77.9	X		verilog	4	tarhi_controller			N		16M	16M	N	11		4		2013	2013		no doc, extremely small RISC	difficulty with timing, try 7.0ns
td4	https://github.c	stable	cielo_ee	accum	8	8	spartan-3	James	Brakef	102				200	##	14.7	0.20	1.0	392.2	X		verilog	5	td4_top						16	Y					2012	2015			very small uP
temlib	http://temlib.or	stable		SPARC	32	32	kintex-7-3	James	Brakef	2579	6		32	111	##	14.7	1.00	1.0	43.1	X		vhdl	48	mcu_simple			Y	N	4G	4G	Y			64		2013	2015		copywrite: experimental use	has caches
temlib	http://temlib.or	stable		SPARC	32	32	kintex-7-3	James	Brakef	3730	6	5		111	##	14.7	1.00	1.0	29.8	X		vhdl	48	fpu_simple			Y	N	4G	4G	Y			64		2013	2015		copywrite: experimental use	options for fltg-pt, pipeline, mul & div configur
tg68	https://opencor	stable	Tobias Gubener	68000	16	16	kintex-7-3	James	Brakef	2331	6			44	##	14.7	0.67	4.0	3.2	X		vhdl	2	TG68_fast	Y	yes	N	N	4G	4G	Y			16		2007	2012		TG68 - execute 68000 Code	for use with Minimig
tg68kc	https://opencor	stable	Tobias Gubener	68000	16	16	kintex-7-3	James	Brakefield								0.67	4.0		X		vhdl	3	TG68docC	Y	yes	N	N	4G	4G	Y			16		2013	2019		68020 ISA	
the12X_12uP		alpha	James Brakefield	stack/acc	12	12	kintex-7-3	James	Brakef	972	6	1	1	123	##	14.7	0.50	1.0	63.3	X		vhdl	2	the12x_12	Y		Y	N	4K	4K	N	54		64	1	2015			combo stack/accumulater design	load/store arch, not optimized
theia_gpu	https://opencor	beta	Diego Valverde	RISC	96	64	kintex-7-3	James	huge a	934049	6				##	14.7	0.40	1.0			GPL	verilog	32	theia											2009	2012		Ray Cast Programable graphic Proces	four cores, huge LUT count, 2/3rds LUT RAM
thor	https://opencor	mature	Robert Finch	RISC	32	32			Robert Finch	90000			306									verilog		thor	Y	asm	Y		4G	4G	Y			64		2015	2019	https://github.com/robfinch/Cores		
thor	https://opencor	mature	Robert Finch	RISC	64	32			Robert Finch	210000			306									verilog		thor2	Y	asm	Y		4G	4G	Y			64		2015	2019	https://github.cor	Thor-2: L1 & L2 caches, GP float & vector regs	
thor	https://opencor	mature	Robert Finch	RISC	64	16			Robert Finch	210000			306									verilog		thor5	Y	asm	Y		4G	4G	Y			64		2015	2019	https://github.cor	Thor-5: L1 & L2 caches, GP float & ve	plans for more features, eventually 2M LUTs
tigli_cpu		stable	Cleiton Juffo	RISC	16	16	kintex-7-3	James	Brakef	636	6			455	##	14.7	0.67	4.0	119.7	X		verilog	24	cpu	Y		N	Y	64K	64K		16		16		2013	2013		course project, not pipelined	no LUT RAM for reg file
tiny_cpu	http://www.cs.h	errors	K. Nakano	stack	16		kintex-7-3	James	multiple assign		6				##	14.7	0.66	3.0		IX		verilog	11	DE2_TINY	Y	yes	N		4K	4K						2007	2009	http://www.cs.hir	different from tinycpu	**uses Flex, Bison & Perl to create gcc comp**
tiny_soc	https://github.com/ept22		Ezra Thomas	RISC	8	16															Y	verilog	6	top	Y	asm	N	Y	64K	64K	Y	44		16			2020	https://ezrasrobo	small cpu with VGA	includes GPU (char gen)
tiny64	https://opencor	stable	Ulrich Riedel	RISC	32	32	kintex-7-3	James	Brakef	874	6			189	##	14.7	1.00	2.0	107.9	X		vhdl	6	tinyx					64K	64K		14		8		2004	2007		data size from 32 to 64 bits	micro-coded sub-ops
tiny8	https://opencor	altera dsg	Ulrich Riedel	accum	8	8	arria-2	James	needs async RO		A				##	q18.0	0.33	3.0		I		ahdl							256	64K	Y			256		2002	2009		Altera megafunctions	
tinycpu	https://opencor	alpha	Jordan Earls	RISC	8	8	arria-2	James	Brakef	136	A			384	##	q13.1	0.17	2.0	235.5	IX		vhdl	2	tinycpu		asm	N	N	1K	1K		12		4		2012	2012	directory contains	subset of 6502	MIPS/inst reduced due to few inst
tinyfpga	https://github.c	stable	Ken Jordan	accum	8	8	kintex-7-3	James	Brakef	185	6		1	175	##	14.7	0.33	3.6	86.9	X		vhdl	12	system			N	N	16	16	Y	10				2017	2017		educational 8-bitter with 4-bit addres	why use block RAM?
tinyisa	https://github.com/dillon		Dillon Huff	RISC	32	32																verilog	49	cpu	Y		N		4G	4G	N	13		32			2019		very small ISA with multi-cycle, pipelined & with forwarding implementations	
tiny-riscv	https://github.com/hushg		Hyounguk Shon	RISC	32	32																verilog	35	riscv_top	Y		N		4G	4G	Y	24		32			2019		course work, reduced risc-v, 24 inst, four variations: cache, multi-cycle, pipeline & sir	
tinyvliw8	https://opencor	alpha	Oliver Stecklina	VLIW	8	32	kintex-7-3	James	hacke	895	6			149	##	14.7	0.33	1.0	55.0	X		vhdl	19	sysarch			N	Y	256	1K	Y					2013	2020		tinyVLIW8 soft-core processor	bare core, Altera LPM for RAMs
tisc	https://opencor	beta	Vincent Crabtree	accum	8	8	kintex-7-3	James	Brakef	195	6			87	##	14.7	0.33	1.0	147.1	X		vhdl	1	TISC			N		256	1K	Y			2		2009	2009		Tiny Instruction Set Computer	minimal accumulator machine
tms1000	https://opencores.org/pr		Nand Gates	TMS1000	4	8																verilog	4	tms1000	Y		N		64	1K		54				2021	2021		Four function BCD calculator chip	used in several TI products
totalcpu	https://opencor	alpha		RISC	12+	12	kintex-7-3	James	Brakef	229	6	1		149	##	14.7	0.33	3.0	71.7	X		verilog	10	cpu			N							16		2007	2009		data width 12 bits and up, no data memory	
tpu	https://github.c	untested	domipheus	RISC	16	32																vhdl														2016			Test Processing Unit. Or Terrible Processing Unit. A simple 16-bit CPU in VHDL for ed	
turbo8051	https://opencor	beta	Dinesh Annayya	8051	8	8	kintex-7-3	James	Brakef	1985	6	1		127	##	14.7	0.33	4.0	5.3	IX		verilog	74	oc8051_to	Y	yes	N	N	64K	64K	Y					2011	2016		includes perpherials	
tv80	https://opencor	mature	Guy Hutchison, Howar	Z80	8	8	kintex-7-3	James	Brakef	1207	6			182	##	14.7	0.33	3.0	16.6	IX		verilog	6	tv80n	Y	yes	N	N	64K	64K	Y					2004	2018	https://github.cor	derived from Daniel Wallner's T80, ASIC implementations	
ucode_cpu	http://minnie.tu	stable	Warren Toomey	RISC	16	16	atrix-7-3	James	4K LUT	6748	6	1	1		##	14.7	0.67	2.0		I		vhdl	16	cpu			N	N	64K	64K	N			16		2012	2015			originally schematic based (Logisim)
ucore	https://opencor	stable	Whitewill	MIPS	32	32	kintex-7-3	James	Brakef	2469	6		1	231	##	14.7	1.00	1.0	93.5	X		verilog	25	ucore	Y	yes	N		4G	4G	Y			32	6	2005	2010		MMU & caches	
ucpuvhdl	https://github.c	stable	Reed Foster	RISC	8	16	kintex-7-3	James	512 LU	933	6			118	##	14.7	0.33	2.0	20.8	X		vhdl	29	core	Y	asm	N		256	64K	Y	12	2	7		2016	2017	https://github.cor	six tutorials on uCPUvhdl	using muCPUv2_1 of 3 upwards compatible de
uos	https://opencor	mature	Daniel Roggen	accum	8	16	kintex-7-3	James	Brakef	441	6			270	##	14.7	0.33	3.0	67.4	X		vhdl	14	cpu	Y								3	4		2014	2017		UoS Educational Processor	inspired by x86 ISA
up1232	http://www.dte	stable	Santiago de Pablo	RISC	8	16	kintex-7-3	James	Brakef	220	6			244	##	14.7	0.33	3.0	122.0	X		vhdl	3	up1232a			N		64K	64K	Y	33	2	32		2000	2000		bare core, prog size 4K to 64K	description in source files
up3	https://people.e	stable	Bruce Land	accum			cyclone-2	Bruce	Land	186	4		1		##	q8.0						verilog	1	de2_top														Cornell ECE576	basic core is scomp, used by up3 & de2_top'
urisc		errors	Farhad Mavaddat	RISC	16	16	kintex-7-3	James	missing module		6				##	14.7	0.67	4.0				vhdl	31	urisc	Y				64K	64K	N	1				1987	2012	https://cs.uwaterl	Ultimate Reduced Inst Set Computer Un. Of Waterloo	
usimplez	https://opencor	stable	Pablo Salvadeo etal	accum	12	12	stratix-2	Pablo	Salvade	48	4			134		q9.1	0.17	2.0	237.9	I		vhdl	3	usimplez_cpu			N		512	512		8				2011		http://www-gti.de	part of university course, simplez+i4 has an index register	
uTTA		stable	Hans Tiggeler	TTA	16	16	kintex-7-3	James	Brakef	810	6	1		57	##	14.7	0.67	1.0	47.4	X		vhdl	23	utta_struc	N	asm	N											http://www.ht-lat	time triggered arch	bad weblink
v1_coldfire	https://www.sil	proprietar	IPextreme	68000	16	16	cyclone-3	freescale		5000	4			80			0.89	1.0	14.2	I		verilog			Y	yes	N	N	4G	4G	Y			16		2008		https://www.silva	free for Altera	3500 LUTs on Stratix-III
v586	https://opencor	beta	Jose Rissetto	x86	32	8	kintex-7-3	James	Brakef	22282	6	12	16	102	##	14.7	1.00	2.0	2.3	X		verilog	22	v586	Y	yes	N		1M	1M	Y					2014		www.valptek.com	MMU & caches, branch cache	www.youtube.com/channel/UCNbm8Bah54cw
v6502	https://github.c	untested	Daniel Loffgren	6502	8	8																vhdl			Y	yes										2019	2020	https://opencores	6502 with extras: 16-bit stack pointer	www.youtube.com/watch?v=K3jH-f_r80E
verilog1802	https://github.c	errors	James Bowman	1802	8	8	kintex-7-3	James	errors		6				##	14.7	0.33	4.0				verilog	3	cdp1802	Y	yes	N	N	64K	64K	Y					2015	2017		runs CamelForth	all except RAM in one source file
verilog-6502	https://github.c	stable	Arlet Ottens	6502	8	8	kintex-7-3	James	Brakef	407	6			200	##	14.7	0.33	4.0	40.6	X		verilog	2	cpu		yes	N	N	64K	64K	Y					2007	2018	http://ladybug.xs4all.nl/arlet/fpga/6502/		
verilog-65C02	https://github.c	alpha	Arlet Ottens	6502	16	8					6							4.0				verilog	17	cpu		yes	N	N	64K	64K	Y					2011	2021	https://github.cor	16-bit data RAM "bytes"	rewritten for 6LUTs
verilog-65C02	https://github.c	alpha	Arlet Ottens	6502	16	8	kintex-7-3	James	remov	599	6		2	204	##	14.7	0.67	4.0	57.1			verilog	5	gop16		yes	N	N	4G	4G						2011	2018	http://forum.6502	16-bit data RAM "bytes"	boot ROM mapped to LUTs?
verilogboy	https://hackada	alpha	Wenting Zhang	cisc	8	8																verilog														2019	https://github.cor	Game Boy in Verilog, both CPU (SM83	also https://github.com/neildryan/GBA
verilog-harvar	https://github.com/jaywo		Jae-Won Chung	RISC	16	16																verilog	74	cpu	Y		N	Y	0	0	N			4		2019	2019		**ten implementations of increasing sophistication, course work**	

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	reporter	comments	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	vendor	SOC	src code	#src files	top file	doc	tool chain	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pipe len	start year	last revis	secondary web link	note worthy	comments
verysimplecpu	https://github.com/MC2S		Abdullah Yıldız	mem	32	32																verilog			Y	yes	N	N	16K	16K	N	8	2			2014	2019	https://github.cor	educational, 2 address, public version is missing processor RTL	
vespa	http://www.arc	untested	David J. Lilja	RISC	32	32																verilog			Y	asm	N		4G	4G	N	16		32		2005	2005		from book: Designing Digital Computer Systems with Verilog 0-521-82866-X, Un. Mir	
vhdl_cpu	https://github.com/CGras		Charles Grassin	accum	8	16	spartan-3	Charl		203	4					14.7	0.20	2.0				vhdl	6	computer	Y	asm	N	N	256	256	N	14				2017	2020	http://charleslabs	educational, very simple	case statement program
vhdl-msp430	https://github.c	mature	Rafael Hideo Toyomot	MSP430	16	16																vhdl	15	processad	Y	yes	N		64K	64K	N	27		16		2018	2018		course project, inspired by msp430, very little commentary	
vhdl-simple-up	https://github.c	untested	Pietro Lorefice	RISC	16	16	arria-2	James	ran out of mem		A				##	q18.0	0.67	1.0				vhdl	10	processor	Y		N	N	64K	64K	N			16		2014	2014		simple processor using VHDL for logic	based on Gray's xsoc
vhdl-simple-up	https://github.c	untested	Pietro Lorefice	RISC	16	16	kintex-7-3	James	ran out of mem		6				##	14.7	0.67	1.0				vhdl	10	processor	Y		N	N	64K	64K	N			16		2014	2014		simple processor using VHDL for logic	based on Gray's xsoc
vm80a	https://github.c	untested	1801BM1	8080	8	8	cyclone-3			607	4			104								verilog														2014	2018		Two versions of Soviet i8080a reverse engineered from silicon die, 607 4LUTs, 104M	
vrisc	https://github.com/jayval		Jay Valentine	RISC	32	32																vhdl	21	processor	Y		N	Y	4G	4G	Y	37	6	32			2017		little-endian Harvard architecture RIS	simple caches
vscale	https://github.c	stable	UC Berkeley	risc-v	32	32	kintex-7-3	James Brakef		3072	6			127	##	14.7	1.00	1.0	41.2	X		verilog	23	vscale_core			N							32		2016	2017		risc-v RV32IM vscale processor, depre	depreciated: not up to date (risc-v)
w11	https://opencor	alpha	Walter Mueller	PDP11	16	16	kintex-7-3	James Brakef		1760	6	1	1	147	##	14.7	0.67	2.0	28.0	X	Y	vhdl	118	pdp11_co	Y	yes	N	N	4M	4M	Y	70	13	8		2010	2019	https://github.cor	Boots UNIX, has MMU & cache, retro	PDP-11/70 CPU core and SoC
w450		errors	Ze Long	CISC	8	8	kintex-7-3	James	blocking & non		6				##	14.7	0.33	3.0				verilog	3	w450					256	256	Y	8		4	3	2012			appears to be class project	3 versions of w450, used latest, patches cause
wb_z80	https://opencor	stable	Brewster Porcella	Z80	8	8	kintex-7-3	James Brakef		2025	6			144	##	14.7	0.33	3.0	7.8	X		verilog	4	z80_core_	Y	yes	N	N	64K	64K	Y					2004	2012		derived from Guy Hutchison TV80	Wishbone High Performance Z80
wb4pb	https://opencor	stable	Stefan Fischer	picoBlaze	13	13	kintex-7-3	James	incomplete por		6				##	14.7	0.33	3.0			Y	vhdl or v	14	picoblaze_wb_uart				Y								2010	2013	https://en.wikiped	software addon for picoBlazeSoftwar	ported to kcpsm6
wb4pb	https://opencor	stable	Stefan Fischer	picoBlaze	13	13	spartan-3	Stefan Fische		309	4		1	102	##	14.7	0.33	3.0	36.2	X	Y	vhdl or v	14	picoblaze_wb_uart				Y								2010	2013	https://en.wikiped	software addon for picoBlazeSoftwar	kcpsm3 only works for Spartan 3
whitham_68k	https://www.jw	errors	Jack Whitham	68000	32	16	kintex-7-3	James	no top module						##	14.7	0.67	4.0				vhdl			Y	asm			4G	4G	Y			16		2002	2003		university project, 68020 subset	read thesis, code generator for top modules
wisc-sp13	http://git.azurev	stable	Shyamal H Anadkat	RISC	16	16																verilog												8		2007	2017	http://pages.cs.wi	CS 552 term project : functional design of a microprocessor called the WISC-SP13	
x32	http://citeseerx.	stable	Sijmen Woutersen	forth	32	8	kintex-7-3	James	missing defines		6				##	14.7	1.00	1.0				vhdl	32	core	Y	yes	N		4G	4G	Y					2006	2007	https://pdfs.sema	MS thesis, byte code, needs caches	uses preprocessor on VHDL
xgate	https://opencor	alpha	Robert Hayes	RISC	16	16	kintex-7-3	James Brakef		2778	6			159	##	14.7	0.67	1.0	38.3	X		verilog	7	xgate_top	Y		N					42		16		2009	2013		high pin count	Freescale XGATE co-processor compatible
xmega_core	https://opencor	beta	Gheorghiu Iulian	AVR	8	16	kintex-7-3	James Brakef		1116	6			120	##	14.7	0.33	1.0	35.6	X		verilog	34	mega_cor	Y	yes	N		64K	128K	Y	72		32		2017	2018	https://git.morgot	8 AVR cores, 4 sets LUT counts poste	https://git.morgothdisk.com/VERILOG/VERILO
xproz	http://www.bitl	stable	Herbert Kleebauer	CISC	16	16			schematic based									1.0				schematic			Y	asm	N		64K	64K						1993	1995		documentation in German	*.1 schematic design
xpu	http://excamera	macros	James Bowman	forth	16	8	kintex-7-3	James	requres prepro		6					14.7	0.67	1.0				vhdl	1	c2a												2003	2003		predates J1	uses preprocessor on VHDL
xr16	https://github.c	stable	Jan Gray	RISC	16	16	kintex-7-3	James Brakef		273	6			263	##	14.7	0.67	1.0	644.8	X		verilog	4	xr16	Y		N		64K	64K				16		1999	2001		handcrafted instruction set	tool FPGA P&R, speed mode better
xr16	https://github.c	stable	Jan Gray	RISC	16	16	**zu-2e**	James	needs	346	6			282	##	v20.1	0.67	1.0	547.0	X		verilog	4	xr16	Y		N		64K	64K				16		1999	2001		handcrafted instruction set	tool FPGA P&R, speed mode better
xsoc	http://www.fpg	stable	Jan Gray	RISC	16	16	kintex-7-3	James	very sl	371	6				##	14.7	0.67	1.0		X		verilog	16	xsoc	Y	yes	N	N	64K	64K	Y	16	4	16		2000	2001		very compact, bare core	similar to xr16
xtensa	https://ip.caden	proprietar	tensilica/cadence	RISC	16	16,24	proprietary															proprietary							4G	4G				32	5,7			ch 8, Processor De	upward compatible family, sliding reg	ASIC usage, TIE tool generates RTL & software
xthundercore	http://forum.ga	alpha	majordomo	RISC	32	16	kintex-7-3	James Brakef		793	6		2	193	##	14.7	1.00	1.0	243.7	X		vhdl	49	xtc	om	yes	N	Y	4G	4G				16	5	2014		http://www.xthur	Gadget Factory Forum thread	in debug, no comments, mostly in simulation
xucpu	https://opencor	alpha	Jurgen Defurne	RISC	16	16	spartan-6-3	James Brakef		356	6		4	187	##	14.7	1.00	1.0	524.8	X	Y	vhdl	25	system_4k					4K	4K						2015	2017		Experimental Unstable CPU	
xulalx25soc	https://opencor	mature	Dan Gisselquist	RISC	32	32	spartan-6-3	James	Sparta	7936	6	4	25	87	##	14.7	1.00	1.0	11.0	X	Y	verilog		toplevel			N	N	4G	4G	N	20		16	5	2015				uses ZIP CPU
y80e	https://opencor	stable	Sergey Belyashov	Z80	8	8	cycone-3	Sergey Belyas		2557	4				##	14.7	1.00	3.0				verilog	15	top_level	Y	yes	N	N	64K	64K	Y					2013	2019		Y80e - Z80/Z180 compatible processc	based on Y80 from "Microprocessor Design Us
y86-64	https://github.c	early	Adithya Sunil	x86	64	8																verilog															2021		modest set of 64-bit operations, presumably x86 like instruction formating	
yacc	https://opencor	stable	Tak Sugawara	MIPS	32	32	kintex-7-3	James	map e	2220	6	6			##	14.7	1.00	1.0		IX		verilog	10	yacc2	Y	yes	N		4G	4G	Y			32	5	2005	2009		derived from, but independent of pla	YACC Yet Another CPU CPU
yafc	https://github.c	alpha	Tim Wawrzynczak	forth	16		kintex-7-3	James Brakef		617	6		4	247	##	14.7	0.67	1.0	268.5	X		vhdl	20	cpu		asm	N	Y	8K	8K		26					2014			influenced by J1, F16 & C18
yari	https://github.c	stable	Tommy Thorn	MIPS	32	32	kintex-7-3	James Brakef		3610	6		15	189	##	14.7	1.00	1.0	52.3	X	Y	verilog	8	top					2M	2M				32		2004	2008		subset of MIPS R3000	
yarvi	https://github.c	beta	Tommy Thorn	risc-v	32	32	kintex-7-3	James Brakef		2152	6		17	122	##	14.7	1.00	2.0	28.3	X		verilog	3	yarvi_soc	Y	yes	N	N	4G	4G				32	3		2016		no multiply or divide	simple implementation of RISC-V
yasep	news.yaesp.org	alpha	Yann Guidon	RISC	16	32	kintex-7-3	James	reduce	632	6			215	##	I14.7	1.00	2.0	170.0	AX		vhdl	3	microYAE!	Y	asm	N	N	2G	2G		51		16		2005	2018		JavaScript generated VHDL, revisions	YASEP talk at www.youtube.com/watch?v=bw
yfcpu	https://github.c	errors	Cory Walker	RISC	16	16	kintex-7-3	James	degen	18	6				##	14.7	0.67	1.0				verilog	2	yfcpu	Y		N	N	256	256	Y	5	1	16				Colin Mackenzie?	Educational	very simple
z3	https://opencor	stable	Charles Cole	CISC	8	8	arria-2	James Brakef		3495	A	2		141	##	q18.0	0.33	3.0	4.4	I		verilog	3	boss	Y				128K	128K						2014	2014	https://en.wikiped	Infocom Z-Machine V3, youtube vide	http://inform-fiction.org/zmachine/standards/
z80control	https://opencor	alpha	Tyler Pohl	Z80	8	8	kintex-7-3	James Brakef		1483	6			189	##	14.7	0.33	3.0	14.0	X	Y	verilog	55	top_de1	Y	yes	N	N	64K	64K	Y					2010	2012		Microprocessor targeting embedded	interfaces to DRAM, based on T80 core
z80-fpga	https://github.com/Obiju		Juan Gonzalez-Gomez	Z80	8	8														L		verilog	5		Y	yes	N	N	64K	64K	Y						2020		Based on iceZ0mb1e by abnoname and TV80, with tinyBasic	
z80soc	https://opencor	stable	Ronivon Costa	Z80	8	8	spartan-3e-	James Brakef		2474	4	2	19	78	##	14.7	0.33	3.0	3.4	IX	Y	vhdl	19	top_s3e	Y	yes	N	N	64K	64K	Y					2008	2016		based on Daniel Wallner's T80	
zap	https://opencor	alpha	Revanth Kamaraj	ARM7	32	32	kintex-7-3	James Brakef		7558	6	1	9	135	##	14.7	1.00	1.0	17.9	X		verilog	37	zap_top	Y	yes	N	N	4G	4G	Y			16		2017	2018	ddi0100e_armv1-!	ARMv4T & Thumbv1	has cache & mmu
zap	https://opencor	alpha	Revanth Kamaraj	ARM7	32	32	arria-2	James	high D	10284	A	2	38	111	##	q18.0	1.00	1.0	10.8	X		verilog	37	zap_top	Y	yes	N	N	4G	4G	Y			16		2017	2018	ddi0100e_armv1-!	ARMv4T & Thumbv1	has cache & mmu
zbasic	https://github.c	mature	Dan Gisselquist	RISC	32	32																verilog	70	main	Y	yes	N	N	4G	4G	Y	35		16	5	2018	2020	https://github.cor	bare bones variant of zipcpu	autofpga builds complete system
zet86	https://opencor	alpha	Zeus Marmolejo	x86	16	8	kintex-7-3	James Brakef		3642	6	1		68	##	14.7	0.67	2.0	6.2	X		verilog	32	fpga_zet_	Y	yes	N	N	1M	1M	Y					2008	2018	https://github.cor	equivalent to 80186, boots MS-DOS	Zet The x86 (IA-32) open implementation
zipcpu	https://github.c	stable	Dan Gisselquist	RISC	32	32	kintex-7-3	James Brakef		1687	6		2	218	##	14.7	1.00	1.0	128.9	X		verilog	7	zipcpu	Y		N	N	4G	4G	Y	35		16	5	2015	2020	www.librecores.o	ISA has chnaged, multiple instruction	http://zipcpu.com/zipcpu/2018/01/01/zipcpu-
z-machine	https://github.c	stem veri	Robert Baruch	CISC	8	8	arria-2	James Brakefield			A				##	q18.0	0.33	3.0		I		system v	15	plugh	Y		N									2016		http://inform-ficti	Z-machine (Zork)	https://www.youtube.com/watch?v=2fNBkUC
zpu	https://github.c	stable	Oyvind Harboe	forth	32	8	kintex-7-3	James Brakef		1073	6	3		283	##	14.7	1.00	4.0	65.9	X		vhdl	23	zpu_core	Y	yes	N		4G	4G	Y	37				2008	2009		zpu4: 16 & 32 bit versions, code size 8	ZPU the worlds smallest 32 bit CPU with GCC t
zpuflex	https://github.c	mature	Alastair M. Robinson	forth	32	8	cyclone-3	Alasta	appro:	1000	4											vhdl	4	zpu_core	Y	yes	N		4G	4G	Y	37				2014	2015	https://github.cor	addditional instrucitons	
zpuino	http://alvie.com	alpha	Alvaro Lopes	forth	32	8	spartan_6-3	James Brakef		2547	6	4	12	126	##	14.7	1.00	4.0	12.3	X	Y	vhdl		papilio_pr	Y	yes	N		4G	4G	Y	37				2008	2012		SoC version of modified ZPU	pipelined, removed ucf file
ztapchip	https://github.c	stable	Vuony Nguyen	MIPS	32	32	cyclone-5	James Brakef		31331	A	43	578	100	##	q18.0	1.00	1.0	3.2	I	Y	vhdl	53	ztachip												2015	2015		multi-core with MIPS master	files no longer available, was under developme

106 # usable(beta, s 0 18 70 192 blank 493 ‡ 466 ‡ 29 318 verilog 340 non-blank 537 61

49 "B" or "X" of lim 1 777 591 a 589 vhdl 308 asm 104 Web page DMIPS p en.wikipedia.org/wiki/Instructions_per community.freesc www.eembc.org/coremark/index.php

28 zu-2e sys verilo 35 forth 10 DMIPS per clock for many microprocessors: http://en.wikipedia.org/wiki/Instructions_per_second

propriet: 35

scala 11

MIPS/MHz Pro-rating for data size:

1-bit	0.04	16-bit	0.67	64-bit	2.00
4-bit	0.17	24-bit	0.80	**Silicon Area equivalents**	
8-bit	0.33	32-bit	1.00	LUTS/DSP48	16:1
12-bit	0.40	48-bit	1.50	LUTS/Block RAM	32:1

Under the assumption that the core is capable of one instuction per clock

74	_paper_only
58	educational
25	_weak_start
6	_up_cores
5	in limbo
11	planning
44	simulation
573	main+sim
529	net main
650	total

259	VHDL
277	Verilog
26	System Verilog
11	Spinal/Scala
7	VHDL & Verilog
3	MyHDL
35	proprietary
13	other
3	Schematic
634	total

418 designs with FOM (KIPs/LUT) results (some duplicates due to multiple FPGA runs)
385 designs with best FOM (likely true measure of # of usable designs)

Column Titles	Details
"A"	A: 1st choice clone, B: 2nd choice clone, W: 1st choice original, X: 2nd choice original
"B"	used to indicate best KIPS/LUT for a given design, usually using fast FPGA family
cat	main, educational, planning, simulation, paper, in limbo or weak
_uP_all_soft folder	if opencores design is their folder name, otherwise my folder name
opencores or primary link	about 200 designs in open cores, about 100 in github
status	ASIC, paper (detailed in), planning (no source), alpha, beta, stable, mature, proprietary, untested; incomplete, educational typically <16 instructions, simulation
author	First Name, Last Name or university or corporation
style / clone	part number or "forth", RISC, accumulator, etc. "asic" indicates: avail as asic & fpga, an asic netlist source or a hard core within fpga chip
data size	data register size in bits
inst size	shortest instruction size in bits
FPGA	FPGA family for compile, place, route & timing, usually using fastest part grade
reporter	First Name, Last Name
comments	compile, place, route & timing problems
LUTs ALUT	total number of LUTs, ALUTs or tiles used including route-thrus & otherwise unavailable
LUT?	4-LUT, 6-LUT, Altera ALUT, Actel Tile
mults	total number of multipliers/DSPs used; 9x9 multiplier counts divided by two and rounded up
blk RAM	total # of block RAMs used, Xilinx half block RAM counts divided by two and rounded up
Fmax	maximum primary clock speed from compile, place & route run with best clock constraint, fastest part, best die temp
date	date of compile, place & route; serves to identify source version

_uP_all_soft folder	opencores or prmary link	status	author	style / clone	data size	inst size	FPGA	repor ter	com ents	LUTs ALUT	LUT?	mults	blk ram	F max	date	tool ver	MIPS /inst	clks/ inst	KIPS /LUT	ven dor	SOC	src code	#src files	top file	doc	tool chai n	fltg pt	Hav'd	max dat	max inst	byte adrs	# inst	adr mod	# reg	pip e len	start year	last revis	secondary web link	note worthy	comments
tool ver	Altera (**Q**uartus), Xilinx (ISE, **V**ivado), Lattice Semiconductor(**D**iamond) or MicroSemi(**L**ibero) tool version number																																						
MIPS /inst	prorated DMIPS per instruction, reduced for data word sizes under 32-bits, greater than one for multiple issue processors																																						
clks/ inst	number of clocks per instruction, typically 1.0 for modern pipelined processors, subjective for older uP																																						
KIPS /LUT	figure of merit, does not include effects of memory capacity, floating point or instruction set quality																																						
Vendor	Libero, Intel(Altera): Quartus; Latticesemi: Diamond & iCEcube, Xilinx: ISE & Vivado																																						
Prog File	:n, Vn, Zn; A: Mn, Arn, Cn, Stn; M: Tn, Pf, Fn; L: En, Mhn, Sbn, Xpn; n is family generation #																																						
SOC	ections or memory access delay), Y: System on a Chip (has peripherals)																																						
src code	System Verilog or schematic or gates or Proprietary or Scala etc																																						
# src files	er of source files for compile, place, route & timing																																						
top file	oute & timing run, multiple versions of same design distinguished here																																						
doc	is documentation provided?																																						
tool chain	re a compiler or assembler provided or available																																						
fltg pt	mpile, place, route & timing run include floating point?																																						
Hav'd	a memory(s), 2C: # caches, M: MMU, N: von Neuman (single memory bus)																																						
max data	maximum data address																																						
max inst	maximum instruction address																																						
byte adrs	is byte addressing provided																																						
# inst	ıctions, conditionals count as one instruction, somewhat subjective																																						
# adr modes	ck, indir, indir++, --indir; (indir), (indir++), (--indir), (indexed), abs-short/direct page, scaled																																						
# reg	number of registers in register file																																						
pipe len	number of pipeline stages																																						
start year	year of first design activity																																						
last revis	last year for revisions or web page updates																																						
secondary web link	secondary web address																																						
note worthy	anything special about the design																																						