

Small soft core uP Inventory

Opencore and other soft core processors

Only cores in the "usable" category included

Most Prolific Authors		©2014 James Brakefield
John Kent	micro8a, micro16b, system05, system09, system11, system68	6
Daniel Wallner	ax8, ppx16, t65, t80 (8080 & z80)	5
Shawn Tan	ae18, aeMB, k68, DCPU16	4
Ulrich Riedel	68hc05, 68hc08, tiny64, tiny8	4
Jose Ruiz	ion, light52, light8080	3
Lazaridis Dimitris	mips_fault_tolerant, mipsr2000, mips_enhanced	3

Most Clones		©2014 James Brakefield
MIPS	ion, minimips, mips_fault_tolerant, misp32r1, misp789, mipsr2000, plasma, ucore, yacc, m1_core	10
6502	ag_6502, cpu6502_true_cycle, free6502, lattice6502, m65c02, t65, t6507lp, m65	8
PIC16	free_risc8, lwrisc, minirisc, m16c5x, ppx16, recore54, risc16f84, risc5x	8
microblaze	aeMB, mblite, microblaze, myblaze, openfire_core, secretblaze	6
6800	hd63701, system68, system05, 68hc05, 68hc08	5
8051	dalton_8051, light52, mc8051, t51, turbo8051	5
avr	avr_core, avr_hp, avr8, navre, riscmcu	5
z80	nextz80, t80, tv80, wb_z80, y80e	5
openrisc	altor32, minsoc, or1k, or1200_hp	4
6809	6809_6309, system09, mc6809e	3
8080	cpu8080, light8080, t80	3
68000	ao68000, tg68, v1_coldfire	3
PDP-8	pdp8, pdp8l, pdp8verilog	3
picoblaze	copyblaze, pacoblaze, picoblaze	3

Most Numerous Original Processor Type		©2014 James Brakefield
RISC	alwcpu, atlas_core, ba22, dcpu16, erp, gumnut, jane_nn, jpu16, latticemicro32, latticemicro8, natalius_8bit_risc, open8_risc, rise, sayeh_processor, scarts, szp, tiny64, xr16, cole_c16, diogenes, eco32, eight_bit_uc, erp, fpgammix, hicovec, hpc-16, jam, manik, marca, myrosc1, raptor64, risc0, risc5, yasep	33
forth	b16, dfp, J1, jop, microcore, myforthprocessor, nige_machine, ssbcc, zpu, 8bit_chapman, cpu16, dataflow_chapman, msl16, p16, x32	15
accumulator	blue, lem1_9, leros, mcpu, popcorn, tisc, usimplez	7
openrisc	altor32, minsoc, or1k, or1200_hp	4

Usage beyond original author		©2014 James Brakefield
amber	Amber ARM-compatible core	OCCP
leon	SPARC clone, commercial product, 25 FPGA boards supported	
minsoc	OpenRISC implementation of OR1200 SOC	OCCP
openMSP430	Clone of Texas Instruments MSP430 family	OCCP
or1k	OpenRISC 1000	OCCP
plasma	Plasma - most MIPS I opcodes	OCCP
system09	Color Computer, arcade games, SWTPC	
t400	T400 uController	OCCP
t48	T48 uController	OCCP
t80	8080 & Z80 variants	
zpu	Zylin CPU, commercial product	

FPGA based Legacy Processor Emulation		http://en.wikipedia.org/wiki/Home_computer_remake
Cray-1 (cray1)	www.chrisfenton.com/homebrew-cray-1a/	
PDP-8	http://www.emeritus-solutions.com/pdp8onanfpga.htm	
PDP-11/70 (w11)	http://opencores.org/project.w11	
Amiga (68000)	http://en.wikipedia.org/wiki/Minimig	
MIST(minimig)	http://harbaum.org/till/mist/index.shtml	
PDP	http://www.aracnet.com/~healyzh/pdp_fpga.html	
SWTPC 6809	http://members.optusnet.com.au/ekent/system09/	
generic	http://fpgaarcade.com/	
Color Computer	http://8littlebits.wordpress.com/category/coco3fpga/	

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Other Insights

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For small micro-controllers with small memory needs, some soft cores are competitive with ASIC cores

Both microBlaze and NIOS-2 have very good figure of merit numbers

Relative LUT usage per FPGA family: ALUTs and 6-LUTs reduce counts by 20 to 40% over 4-LUTs

Relative Fmax per FPGA family: Lost cost families (Cyclone & Spartan) 68 to 55% the speed of mid performance families (Arria & Kintex)

Spartan-6 (6 input LUT, 45nm) about 50% faster than Spartan-3 (4 input LUT, 90nm)

No one architecture dominates in performance, size or speed

Some opencores "alpha" phase designs are system designs where core is stable and working

For those barrel designs with adjustable barrel length, intermediate barrel length gives best KIPS/LUT (ugh, sample size of 1)

Only 28nm part families in webpack tools are Cyclone V, Atrix-7, Kintex-7 and Zynq-7

No parts from highest performance FPGA families available in "webpack" tools (Arria V, Stratix V, Virtex-7)