

Ignoring empty loop time

CPU Core	Cortex A72			Neoverse N1			Neoverse V1		Apple M1		
Frequency (assume boost)	1.80 GHz			3.00 GHz			2.60 GHz		3.20 GHz		
Mean instruction time	ns	inst/cycle	ref V1	ns	inst/cycle	ref V1	ns	inst/cycle	ns	inst/cycle	ref V1
NOP	0.560	0.992	+977%	0.092	3.623	+195%	0.036	10.684	0.045	6.944	+54%
ADD	0.297	1.871	+108%	0.115	2.899	+34%	0.099	3.885	0.070	4.464	-13%
ADC	0.297	1.871	+108%	0.115	2.899	+34%	0.099	3.885	0.108	2.894	+34%
ADDS	0.315	1.764	+66%	0.120	2.778	+6%	0.131	2.936	0.107	2.921	+1%
ADCS	0.559	0.994	-0%	0.334	0.998	-1%	0.388	0.991	0.313	0.998	-1%
MUL	1.677	0.331	+502%	1.002	0.333	+499%	0.193	1.993	0.156	2.003	-1%
UMULH	2.236	0.248	+702%	1.336	0.250	+699%	0.193	1.993	0.156	2.003	-1%
DIV	5.589	0.099	+12%	3.005	0.111	+0%	3.466	0.111	0.625	0.500	-78%
MUL UMULH	1.957	0.284	+602%	1.169	0.285	+599%	0.193	1.993	0.156	2.003	-1%
MUL ADCS UMULH ADCS	0.978	0.568	+130%	0.584	0.571	+129%	0.294	1.308	0.157	1.990	-34%
MUL ADD	0.839	0.662	+453%	0.501	0.665	+451%	0.105	3.663	0.104	3.005	+22%
MUL ADC	0.838	0.663	+453%	0.501	0.665	+451%	0.105	3.663	0.105	2.976	+23%
MUL ADDS	0.838	0.663	+463%	0.501	0.665	+461%	0.103	3.734	0.104	3.005	+24%
MUL ADCS	0.839	0.662	+196%	0.501	0.665	+195%	0.196	1.962	0.156	2.003	-2%
MUL ADCS (alt)	0.838	0.663	+198%	0.501	0.665	+196%	0.195	1.972	0.156	2.003	-2%
UMULH ADD	1.118	0.497	+491%	0.668	0.499	+488%	0.131	2.936	0.105	2.976	-1%
UMULH ADC	1.118	0.497	+491%	0.668	0.499	+488%	0.131	2.936	0.105	2.976	-1%
UMULH ADDS	1.118	0.497	+430%	0.668	0.499	+428%	0.146	2.634	0.104	3.005	-12%
UMULH ADCS	1.118	0.497	+128%	0.668	0.499	+127%	0.340	1.131	0.156	2.003	-44%
UMULH ADCS (alt)	1.119	0.496	+129%	0.668	0.499	+127%	0.339	1.135	0.156	2.003	-43%
UMULH NOP ADCS	0.746	0.745	+131%	0.445	0.749	+129%	0.224	1.717	0.105	2.976	-42%
UMULH ADD ADCS	0.745	0.746	+146%	0.445	0.749	+145%	0.210	1.832	0.105	2.976	-38%
UMULH ADDS ADCS	0.745	0.746	+258%	0.445	0.749	+257%	0.144	2.671	0.117	2.671	+0%
UMULH ADCS ADCS	0.745	0.746	+43%	0.445	0.749	+42%	0.361	1.065	0.210	1.488	-28%
UMULH ADC ADDS	0.745	0.746	+356%	0.445	0.749	+354%	0.113	3.404	0.098	3.189	+7%
UMULH ADC ADDS (dep. regs)	0.745	0.746	+53%	0.445	0.749	+52%	0.337	1.141	0.210	1.488	-23%
MUL ADD UMULH ADD	0.978	0.568	+450%	0.584	0.571	+448%	0.123	3.127	0.104	3.005	+4%
PACIA							0.385	0.999	0.313	0.998	+0%
AUTIA							0.385	0.999	0.313	0.998	+0%
PACIA AUTIA							0.385	0.999	0.313	0.998	+0%
PACIA ... AUTIA ...							0.385	0.999	0.314	0.995	+0%

UMULH vs. MUL

+33.3%

+33.3%

+0.0%

+0.0%

UMULH ADCS vs. MUL ADCS

+33.3%

+33.3%

+73.5%

+0.0%

ref V1 = comparison of execution time with Neoverse V1, frequency ratio included