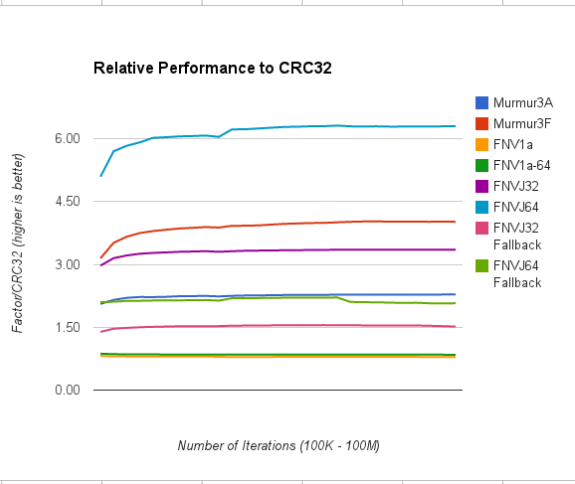
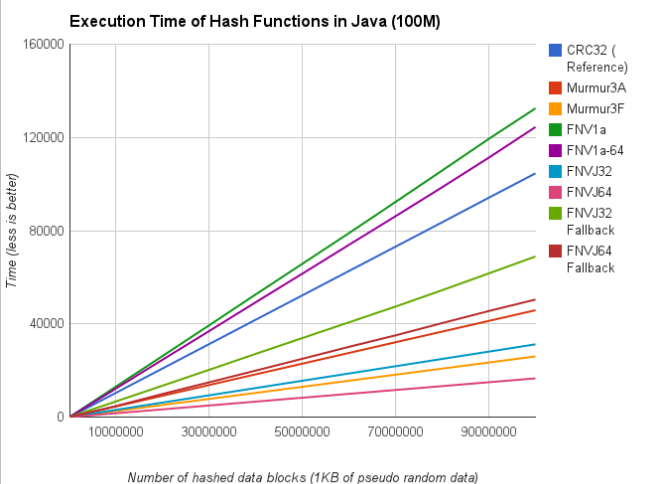
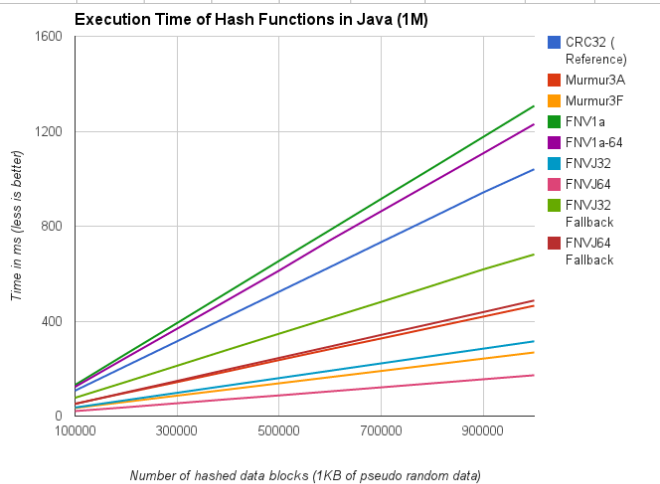




Count of 1K blocks	CRC32 (Reference)	Murmur3A	Murmur3F	FNV1a	FNV1a-64	FNVJ32	FNVJ64	FNVJ32 Fallback	FNVJ64 Fallback			Murmur3A	Murmur3F	FNV1a	FNV1a-64	FNVJ32	FNVJ64	FNVJ32 Fallback	FNVJ64 Fallback						
100000	107	52	34	131	123	36	21	77	51			2,06	3,15	0,82	0,87	2,97	5,10	1,39	2,10						
200000	211	98	60	262	246	67	37	144	100			2,15	3,52	0,81	0,86	3,15	5,70	1,47	2,11						
300000	315	143	86	392	368	98	54	212	148			2,20	3,66	0,80	0,86	3,21	5,83	1,49	2,13						
400000	420	189	112	523	490	129	71	280	197			2,22	3,75	0,80	0,86	3,26	5,92	1,50	2,13						
500000	524	236	138	654	613	160	87	347	245			2,22	3,80	0,80	0,85	3,28	6,02	1,51	2,14						
600000	628	282	164	784	741	191	104	414	293			2,23	3,83	0,80	0,85	3,29	6,04	1,52	2,14						
700000	733	327	190	915	863	222	121	481	342			2,24	3,86	0,80	0,85	3,30	6,06	1,52	2,14						
800000	837	373	216	1045	985	253	138	549	390			2,24	3,88	0,80	0,85	3,31	6,07	1,52	2,15						
900000	942	419	242	1176	1107	284	155	618	438			2,25	3,89	0,80	0,85	3,32	6,08	1,52	2,15						
1000000	1040	465	268	1307	1230	315	172	681	487			2,24	3,88	0,80	0,85	3,30	6,05	1,53	2,14						
2000000	2079	924	530	2640	2446	627	334	1353	948			2,25	3,92	0,79	0,85	3,32	6,22	1,54	2,19						
3000000	3120	1382	795	3949	3676	938	501	2026	1420			2,26	3,92	0,79	0,85	3,33	6,23	1,54	2,20						
4000000	4160	1839	1058	5261	4905	1249	666	2696	1893			2,26	3,93	0,79	0,85	3,33	6,25	1,54	2,20						
5000000	5200	2297	1316	6569	6127	1560	830	3365	2363			2,26	3,95	0,79	0,85	3,33	6,27	1,55	2,20						
6000000	6251	2754	1575	7876	7349	1872	995	4038	2835			2,27	3,97	0,79	0,85	3,34	6,28	1,55	2,20						
7000000	7295	3210	1833	9181	8576	2183	1160	4711	3308			2,27	3,98	0,79	0,85	3,34	6,29	1,55	2,21						
8000000	8340	3669	2091	10501	9807	2494	1324	5379	3780			2,27	3,99	0,79	0,85	3,34	6,30	1,55	2,21						
9000000	9381	4128	2350	11815	11041	2805	1489	6047	4253			2,27	3,99	0,79	0,85	3,34	6,30	1,55	2,21						
10000000	10452	4587	2609	13136	12304	3116	1655	6749	4727			2,28	4,01	0,80	0,85	3,35	6,32	1,55	2,21						
20000000	20888	9180	5199	26248	24657	6234	3317	13490	9924			2,28	4,02	0,80	0,85	3,35	6,30	1,55	2,10						
30000000	31349	13769	7787	39407	36942	9351	4980	20296	14941			2,28	4,03	0,80	0,85	3,35	6,29	1,54	2,10						
40000000	41821	18355	10386	52682	49306	12473	6641	27153	19962			2,28	4,03	0,79	0,85	3,35	6,30	1,54	2,10						
50000000	52256	22939	12989	65808	61568	15595	8307	33924	25024			2,28	4,02	0,79	0,85	3,35	6,29	1,54	2,09						
60000000	62718	27527	15596	78970	73943	18713	9969	40672	30147			2,28	4,02	0,79	0,85	3,35	6,29	1,54	2,08						
70000000	73157	32120	18198	92356	86227	21822	11626	47438	35079			2,28	4,02	0,79	0,85	3,35	6,29	1,54	2,09						
80000000	83614	36690	20805	105835	98651	24958	13287	54459	40344			2,28	4,02	0,79	0,85	3,35	6,29	1,54	2,07						
90000000	94147	41274	23413	119393	111333	28085	14950	61666	45510			2,28	4,02	0,79	0,85	3,35	6,30	1,53	2,07						
100000000	104599	45846	26028	132487	124449	31217	16611	68911	50436			2,28	4,02	0,79	0,84	3,35	6,30	1,52	2,07						



**Execution Time of Hash Functions in Java (1M)**

Time in ms (less is better)

Number of hashed data blocks (1KB of pseudo random data)

Legend: CRC32, Adler32, Murmur2, Murmur3A, Murmur3F, Guava, MD5

**Execution Time of Hash Functions in Java (100M)**

Time (less is better)

Number of hashed data blocks (1KB of pseudo random data)

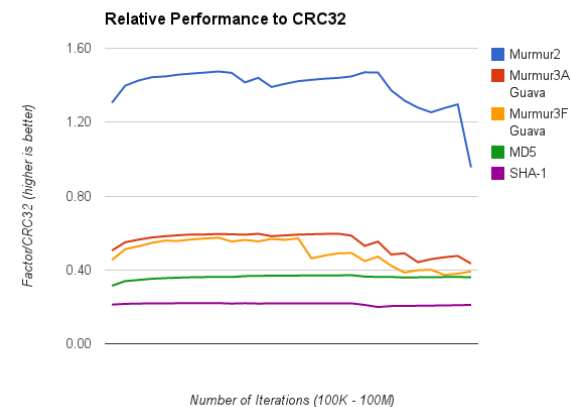
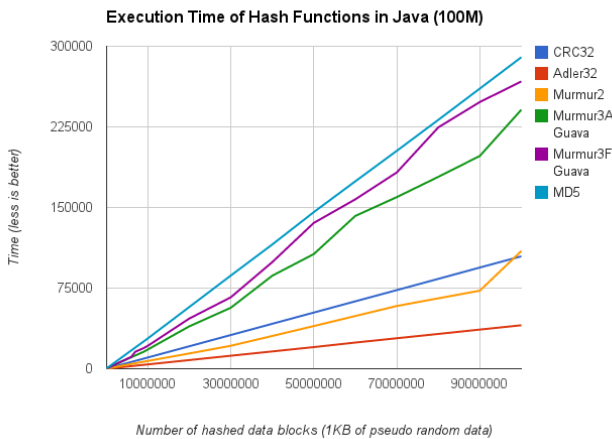
Legend: CRC32, Adler32, Murmur2, Murmur3A, Murmur3F, Guava, MD5

**Relative Performance to CRC32**

FactorCRC32 (higher is better)

Number of Iterations (100K - 100M)

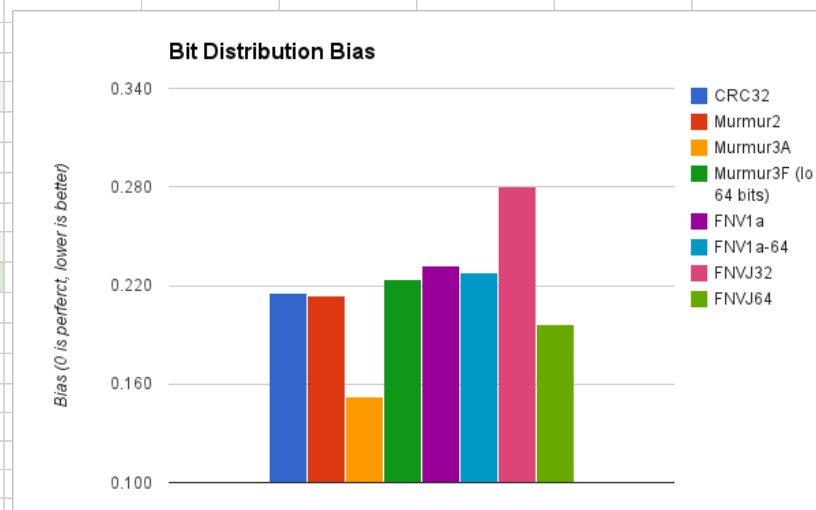
Legend: Murmur2, Murmur3A, Guava, Murmur3F, Guava, MD5, SHA-1



Count of 1K blocks	Adler32	CRC32	Murmur2	Murmur3A	Murmur3F (lo 64 bits)	FNV1a	FNV1a-64	FNVJ32	FNVJ64
	Sum of (Bit distribution off from perfect distribution) [sum of delta]								
1000000	298206	14787	10714	10590	28538	14526	24732	12714	19261
10000000	2977652	31729	43175	37267	73318	34580	88345	35295	77964
100000000	29632590	101181	109388	83283	225453	119674	209282	162460	256839
	Sum of (Bit distribution off from perfect distribution)^2 [sum of delta^2]								
1000000	20570062746	9881451	5375698	5117168	17224648	9907722	14618466	8290620	9278107
10000000	2126411572238	55235815	90872455	64303883	130912064	57231966	173767835	63046539	138207844
100000000	212361194394918	525233267	606973266	310742285	125844388	661642476	116859840	122941979	1457745923
	Negative Quality Factor (0 would be perfect) [sum of delta^2 / count / bits]								
1000000	642,814	0,309	0,168	0,160	0,269	0,310	0,228	0,259	0,145
10000000	6645,036	0,173	0,284	0,201	0,205	0,179	0,272	0,197	0,216
100000000	66362,873	0,164	0,190	0,097	0,197	0,207	0,183	0,384	0,228
AVG	24550,241	0,215	0,214	0,153	0,223	0,232	0,228	0,280	0,196

Bit Distribution Bias

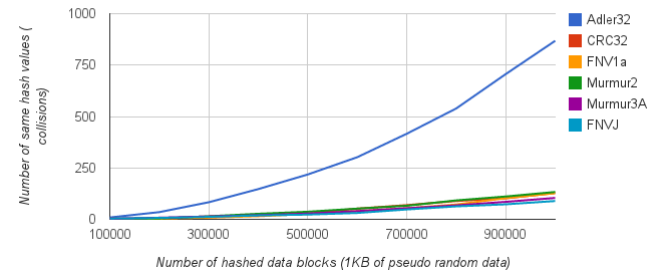
Hash Function	Bias
CRC32	0.215
Murmur2	0.214
Murmur3A	0.153
Murmur3F (lo 64 bits)	0.197
FNV1a	0.223
FNV1a-64	0.232
FNVJ32	0.228
FNVJ64	0.280



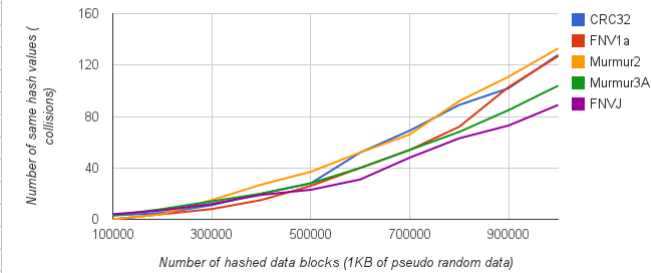
Count of 1K blocks	Adler32	CRC32	FNV1a	Murmur2	Murmur3A	FNVJ
100000	9	3	0	0	3	4
200000	35	5	4	4	8	7
300000	83	11	8	15	14	12
400000	147	20	15	27	20	19
500000	218	28	26	37	28	23
600000	302	52	40	52	40	31
700000	416	69	54	66	54	48
800000	539	89	72	92	68	63
900000	706	102	103	111	85	73
1000000	868	128	127	133	104	89
2000000	3500	476	426	507	502	446
3000000	8048	1070	1026	1082	1122	1066
4000000	14454	1856	1835	1878	1926	1930
5000000	22718	2920	2846	2894	2998	2963
6000000	32734	4180	4136	4152	4229	4254
7000000	44383	5767	5650	5695	5758	5731
8000000	57788	7560	7311	7439	7472	7461
9000000	73178	9510	9291	9427	9502	9443
10000000	90214	11665	11548	11629	11708	11676
20000000	358658	46451	46436	46399	46430	46750
30000000	801566	104323	104415	104622	104805	104460
40000000	1416730	185379	185638	185735	185984	185330
50000000	2199431	289261	289799	289925	290339	289740
60000000	3146386	416953	416546	417667	417683	416989
70000000	4251541	567502	566196	567682	567696	567455
80000000	5513740	739448	739584	740368	740290	740602
90000000	6932360	935856	936306	936819	936327	936960
100000000	8499427	1154526	1155327	1155721	1154474	1155559

Note: None of the 64 bit hash had collisions

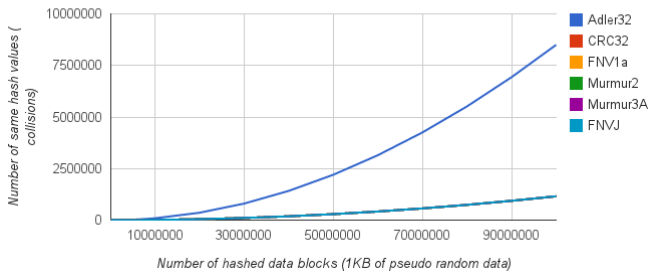
Hash collisions (up to 1M data blocks of 1KB)



Hash collisions (up to 1M data blocks of 1KB)



Hash collisions (up to 100M data blocks of 1KB)



Hash collisions (up to 100M data blocks of 1KB)

