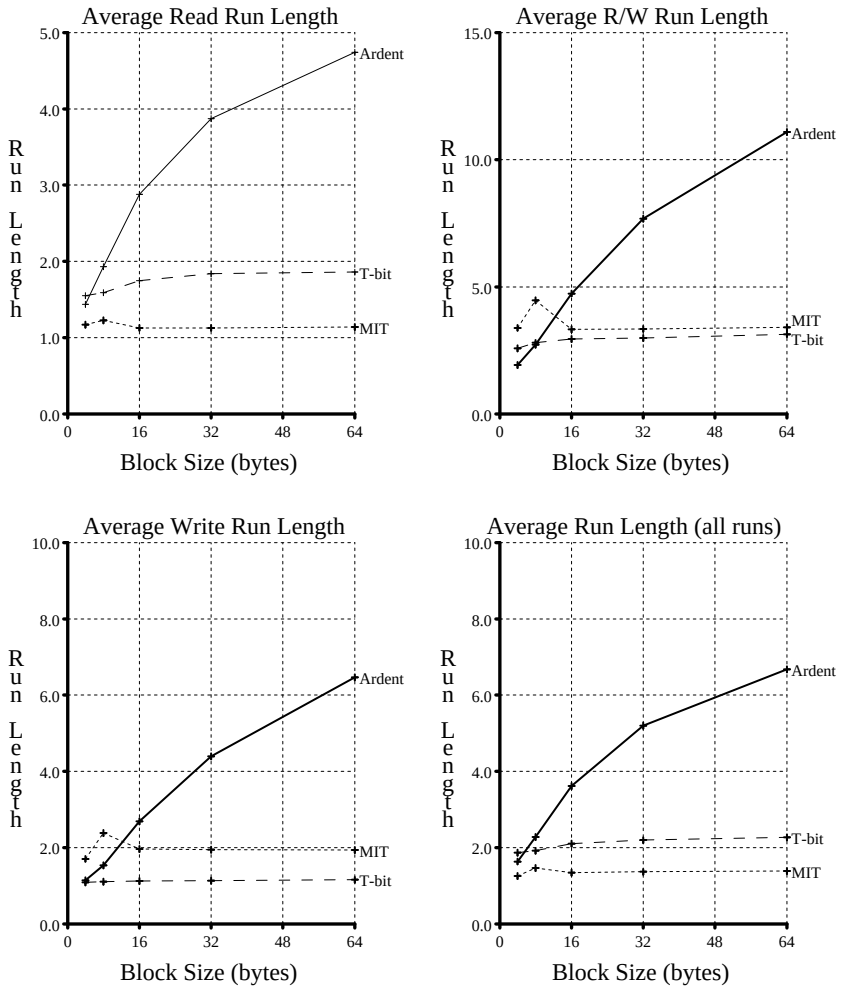

Figure 2: Average reference run lengths vs. block size

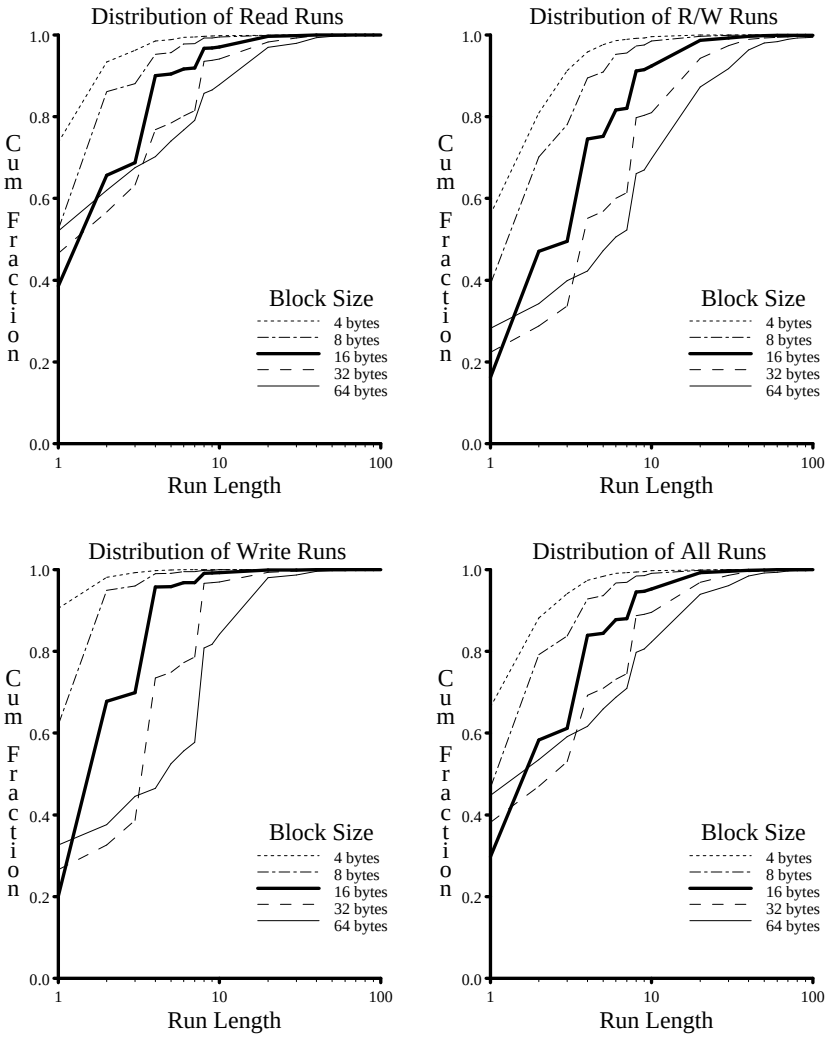

Figure 3: Ardent workload reference run distributions

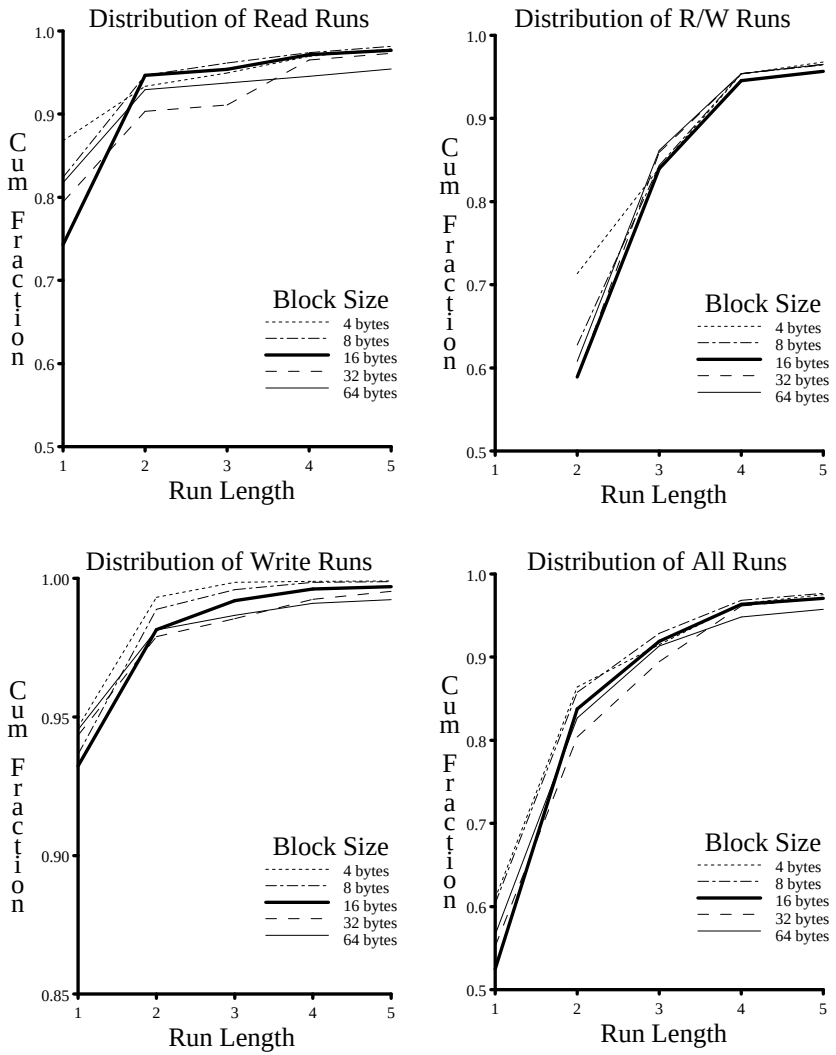

Figure 4: T-bit workload reference run distributions

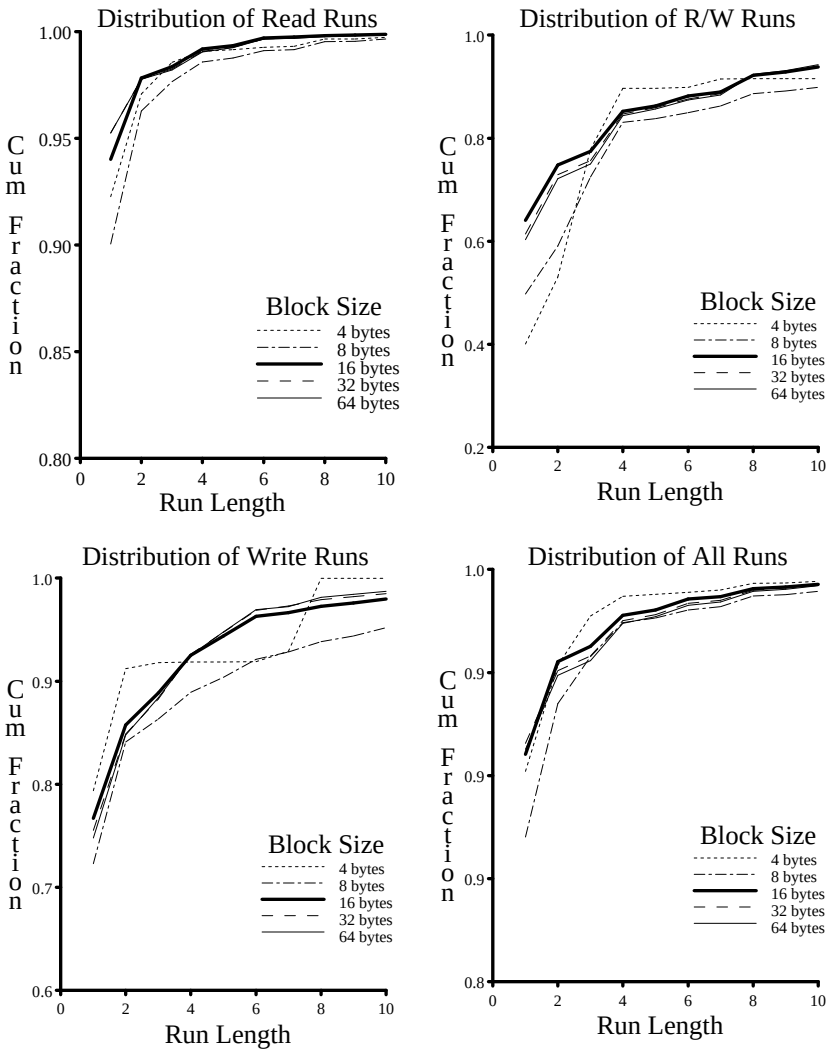

Figure 5: MIT workload reference run distributions

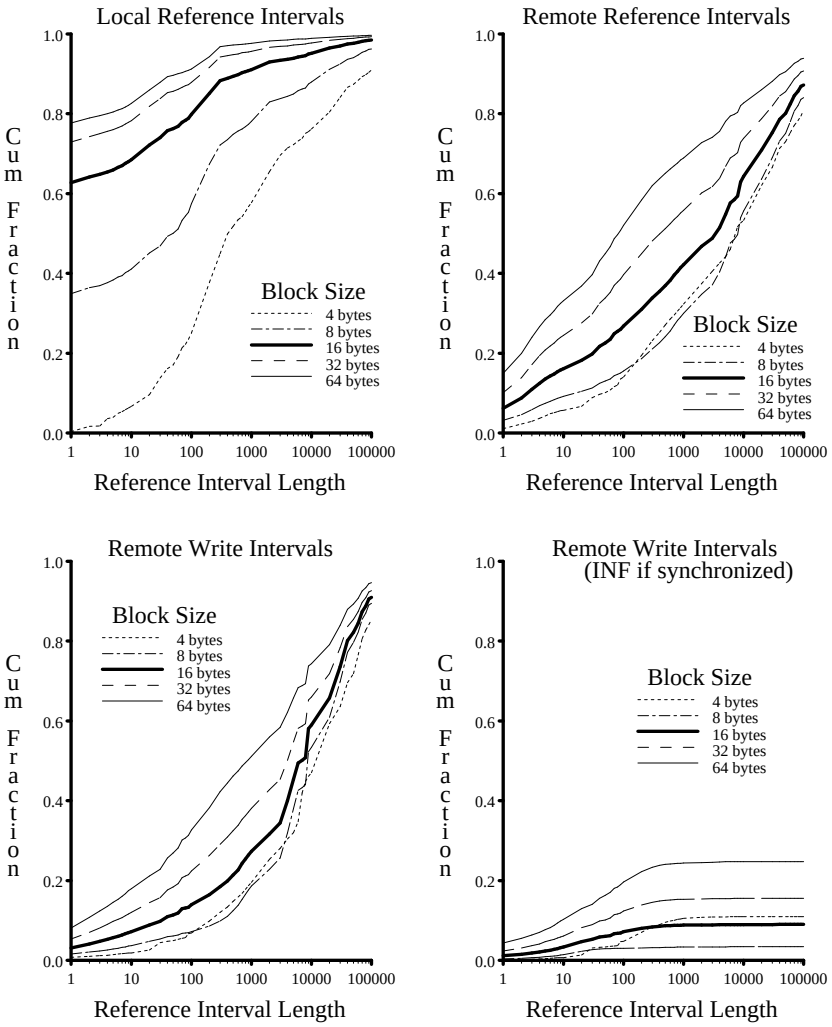

Figure 6: Ardent reference interval distributions to shared data

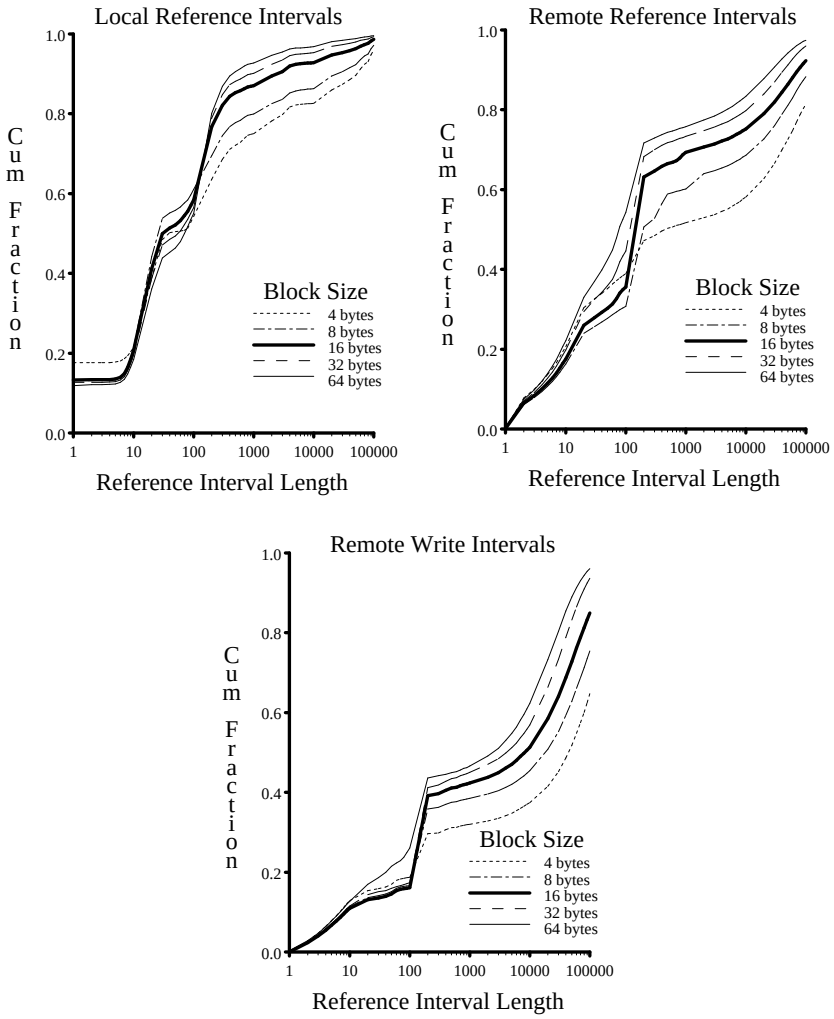

Figure 7: VAX T-bit reference interval distributions to shared data

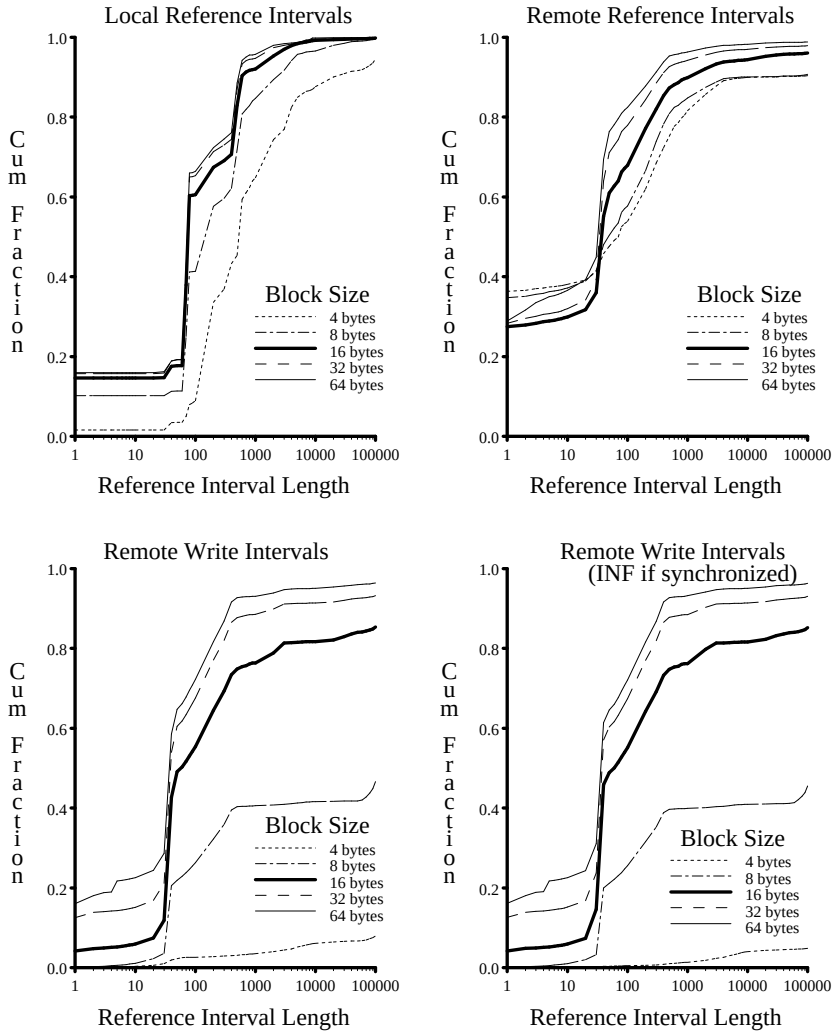

Figure 8: MIT reference interval distributions to shared data

Ardent Transition Probabilities				
Block Size: 4 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.4198	0.1644	0.2753	0.1405
LLW	0.2989	0.0441	0.5826	0.0744
LRR	0.2517	0.1446	0.4649	0.1387
LRW	0.1861	0.0390	0.5193	0.2557
Block Size: 8 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.5376	0.1372	0.2121	0.1131
LLW	0.2646	0.1919	0.4943	0.0492
LRR	0.4697	0.1144	0.3219	0.0940
LRW	0.1201	0.3435	0.3530	0.1834
Block Size: 16 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.6894	0.1019	0.1427	0.0660
LLW	0.1899	0.4721	0.2899	0.0481
LRR	0.6682	0.0237	0.2879	0.0202
LRW	0.0247	0.7089	0.0565	0.2099
Block Size: 32 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.8144	0.0656	0.0886	0.0315
LLW	0.1376	0.6849	0.1441	0.0334
LRR	0.5851	0.0220	0.3775	0.0154
LRW	0.0204	0.6348	0.0424	0.3024
Block Size: 64 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.8672	0.0493	0.0674	0.0161
LLW	0.1123	0.7797	0.0770	0.0309
LRR	0.5198	0.0206	0.4461	0.0135
LRW	0.0180	0.5770	0.0370	0.3680

Table 8: Ardent transition probabilities

VAX T-bit Transition Probabilities				
Block Size: 4 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.6280	0.1512	0.2111	0.0097
LLW	0.0980	0.0154	0.8750	0.0116
LRR	0.1685	0.2364	0.5947	0.0004
LRW	0.1073	0.1818	0.1521	0.5588
Block Size: 8 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.5279	0.1140	0.3519	0.0061
LLW	0.2624	0.0195	0.7100	0.0081
LRR	0.1959	0.2492	0.5543	0.0007
LRW	0.1432	0.2275	0.1072	0.5221
Block Size: 16 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.5427	0.1114	0.3419	0.0040
LLW	0.2750	0.0246	0.6957	0.0047
LRR	0.2444	0.2558	0.4985	0.0013
LRW	0.1850	0.1182	0.1443	0.5526
Block Size: 32 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.6274	0.1064	0.2628	0.0033
LLW	0.2744	0.0316	0.6912	0.0028
LRR	0.2038	0.2579	0.5358	0.0025
LRW	0.2173	0.0698	0.2057	0.5071
Block Size: 64 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.6846	0.1003	0.2121	0.0030
LLW	0.2610	0.0369	0.6997	0.0024
LRR	0.1865	0.2539	0.5531	0.0065
LRW	0.3660	0.0487	0.1751	0.4103

Table 9: VAX T-bit transition probabilities

MIT Transition Probabilities				
Block Size: 4 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.5108	0.1381	0.3398	0.0113
LLW	0.5582	0.0297	0.4078	0.0044
LRR	0.0965	0.0111	0.8877	0.0048
LRW	0.3649	0.0018	0.5277	0.1055
Block Size: 8 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.4679	0.2336	0.2908	0.0078
LLW	0.6913	0.0162	0.2905	0.0020
LRR	0.1165	0.0226	0.8410	0.0199
LRW	0.1390	0.0005	0.4747	0.3859
Block Size: 16 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.4127	0.3085	0.2781	0.0008
LLW	0.6601	0.0043	0.2388	0.0969
LRR	0.0630	0.0329	0.8783	0.0258
LRW	0.0682	0.0103	0.4328	0.4887
Block Size: 32 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.4457	0.3391	0.2146	0.0007
LLW	0.6790	0.0080	0.2677	0.0453
LRR	0.0486	0.0402	0.8853	0.0259
LRW	0.0567	0.0048	0.3485	0.5901
Block Size: 64 bytes				
State	LLR	LLW	LRR	LRW
LLR	0.4480	0.3516	0.1999	0.0005
LLW	0.6828	0.0127	0.2822	0.0223
LRR	0.0475	0.0438	0.8773	0.0315
LRW	0.0500	0.0030	0.3903	0.5568

Table 10: MIT transition probabilities

State Definitions:

LLR: last reference a local read
LLW: last reference a local write
LRR: last reference a remote read
LRW: last reference a remote write

Stationary Probabilities				
Block Size	State			
	LLR	LLW	LRR	LRW
Ardent Workload				
4	0.2978	0.1225	0.4310	0.1488
8	0.4295	0.1605	0.3057	0.1043
16	0.5449	0.1979	0.1947	0.0626
32	0.6033	0.2172	0.1389	0.0407
64	0.6305	0.2293	0.1106	0.0297
T-bit Workload				
4	0.2879	0.1730	0.5277	0.0114
8	0.3094	0.1685	0.5145	0.0075
16	0.3550	0.1654	0.4733	0.0063
32	0.3737	0.1633	0.4572	0.0058
64	0.3976	0.1572	0.4378	0.0075
MIT Workload				
4	0.1967	0.0367	0.7598	0.0067
8	0.2455	0.0734	0.6565	0.0246
16	0.1665	0.0755	0.7077	0.0503
32	0.1722	0.0870	0.6875	0.0533
64	0.1787	0.0937	0.6747	0.0529

Table 11: Stationary probabilities

Mean State Durations (references)					
Workload	Block Size	State			
		LLR	LLW	LRR	LRW
Ardent	4	1.72	1.05	1.87	1.34
Ardent	8	2.16	1.24	1.47	1.22
Ardent	16	3.22	1.89	1.40	1.27
Ardent	32	5.39	3.17	1.61	1.43
Ardent	64	7.53	4.54	1.81	1.58
T-bit	4	2.69	1.02	2.47	2.27
T-bit	8	2.12	1.02	2.24	2.09
T-bit	16	2.19	1.03	1.99	2.23
T-bit	32	2.68	1.03	2.15	2.03
T-bit	64	3.17	1.04	2.24	1.70
MIT	4	2.04	1.03	8.90	1.12
MIT	8	1.88	1.02	6.29	1.63
MIT	16	1.70	1.00	8.22	1.96
MIT	32	1.80	1.01	8.72	2.44
MIT	64	1.81	1.01	8.15	2.26

Table 12: Mean state durations

Ardent Transition Probabilities					
Block Size: 4 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.4198	0.1644	0.2019	0.1405	0.0734
LLW	0.2989	0.0441	-	0.0744	0.5826
LRCR	0.2360	0.0818	0.5854	0.0969	-
LRW	0.1861	0.0390	-	0.2557	0.5193
LRDR	0.2747	0.2364	0.2890	0.1998	-
Block Size: 8 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.5376	0.1372	0.1780	0.1131	0.0342
LLW	0.2646	0.1919	-	0.0492	0.4943
LRCR	0.4121	0.0675	0.4724	0.0480	-
LRW	0.1201	0.3435	-	0.1834	0.3530
LRDR	0.5471	0.1773	0.1198	0.1557	-
Block Size: 16 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.6894	0.1019	0.1266	0.0660	0.0162
LLW	0.1899	0.4721	-	0.0481	0.2899
LRCR	0.5500	0.0134	0.4119	0.0248	-
LRW	0.0247	0.7089	-	0.2099	0.0565
LRDR	0.8668	0.0409	0.0796	0.0127	-
Block Size: 32 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.8144	0.0656	0.0795	0.0315	0.0091
LLW	0.1376	0.6849	-	0.0334	0.1441
LRCR	0.4829	0.0102	0.4903	0.0165	-
LRW	0.0204	0.6348	-	0.3024	0.0424
LRDR	0.8386	0.0513	0.0976	0.0125	-
Block Size: 64 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.8672	0.0493	0.0614	0.0161	0.0060
LLW	0.1123	0.7797	-	0.0309	0.0770
LRCR	0.4432	0.0080	0.5353	0.0134	-
LRW	0.0180	0.5770	-	0.3680	0.0370
LRDR	0.8082	0.0678	0.1099	0.0141	-

Table 13: Ardent transition probabilities (second model)

New States:

VAX T-bit Transition Probabilities					
Block Size: 4 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.6280	0.1512	0.1853	0.0097	0.0257
LLW	0.0980	0.0154	-	0.0116	0.8750
LRCR	0.1272	0.0542	0.8183	0.0003	-
LRW	0.1073	0.1818	-	0.5588	0.1521
LRDR	0.2597	0.6394	0.1002	0.0006	-
Block Size: 8 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.5279	0.1140	0.2916	0.0061	0.0603
LLW	0.2624	0.0195	-	0.0081	0.7100
LRCR	0.1828	0.0820	0.7346	0.0006	-
LRW	0.1432	0.2275	-	0.5221	0.1072
LRDR	0.2295	0.6794	0.0903	0.0008	-
Block Size: 16 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.5427	0.1114	0.2706	0.0040	0.0713
LLW	0.2750	0.0246	-	0.0047	0.6957
LRCR	0.2546	0.0649	0.6790	0.0015	-
LRW	0.1850	0.1182	-	0.5526	0.1443
LRDR	0.2210	0.6946	0.0836	0.0009	-
Block Size: 32 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.6274	0.1064	0.1888	0.0033	0.0740
LLW	0.2744	0.0316	-	0.0028	0.6912
LRCR	0.1979	0.0632	0.7358	0.0032	-
LRW	0.2173	0.0698	-	0.5071	0.2057
LRDR	0.2168	0.6865	0.0956	0.0012	-
Block Size: 64 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.6846	0.1003	0.1452	0.0030	0.0669
LLW	0.2610	0.0369	-	0.0024	0.6997
LRCR	0.1867	0.0904	0.7140	0.0088	-
LRW	0.3660	0.0487	-	0.4103	0.1751
LRDR	0.1860	0.6079	0.2047	0.0014	-

Table 14: VAX T-bit transition probabilities (second model)

LRCR: last reference a remote clean read
LRDR: last reference a remote dirty read

MIT Transition Probabilities					
Block Size: 4 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.5108	0.1381	0.3237	0.0113	0.0161
LLW	0.5582	0.0297	-	0.0044	0.4078
LRCR	0.0827	0.0058	0.9082	0.0033	-
LRW	0.3649	0.0018	-	0.1055	0.5277
LRDR	0.5075	0.1693	0.2746	0.0486	-
Block Size: 8 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.4679	0.2336	0.2736	0.0078	0.0172
LLW	0.6913	0.0162	-	0.0020	0.2905
LRCR	0.1069	0.0220	0.8541	0.0171	-
LRW	0.1390	0.0005	-	0.3859	0.4747
LRDR	0.2719	0.0312	0.6310	0.0660	-
Block Size: 16 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.4127	0.3085	0.2600	0.0008	0.0181
LLW	0.6601	0.0043	-	0.0969	0.2388
LRCR	0.0641	0.0298	0.8835	0.0225	-
LRW	0.0682	0.0103	-	0.4887	0.4328
LRDR	0.0470	0.0763	0.8038	0.0729	-
Block Size: 32 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.4457	0.3391	0.1928	0.0007	0.0218
LLW	0.6790	0.0080	-	0.0453	0.2677
LRCR	0.0504	0.0356	0.9019	0.0120	-
LRW	0.0567	0.0048	-	0.5901	0.3485
LRDR	0.0236	0.1012	0.6633	0.2119	-
Block Size: 64 Bytes					
State	LLR	LLW	LRCR	LRW	LRDR
LLR	0.4480	0.3516	0.1769	0.0005	0.0230
LLW	0.6828	0.0127	-	0.0223	0.2822
LRCR	0.0501	0.0387	0.9034	0.0078	-
LRW	0.0500	0.0030	-	0.5568	0.3903
LRDR	0.0157	0.1035	0.5668	0.3141	-

Table 15: MIT transition probabilities (second model)

Stationary Probabilities						
Workload	Block Size	State				
		LLR	LLW	LRCR	LRW	LRDR
Ardent	4	0.2975	0.1217	0.2631	0.1481	0.1696
Ardent	8	0.4295	0.1606	0.1746	0.1044	0.1309
Ardent	16	0.5439	0.1975	0.1265	0.0625	0.0696
Ardent	32	0.6027	0.2169	0.1013	0.0407	0.0385
Ardent	64	0.6302	0.2290	0.0885	0.0297	0.0225
T-bit	4	0.2861	0.1684	0.3780	0.0112	0.1564
T-bit	8	0.3083	0.1637	0.3849	0.0074	0.1356
T-bit	16	0.3551	0.1631	0.3358	0.0063	0.1397
T-bit	32	0.3735	0.1620	0.3178	0.0058	0.1408
T-bit	64	0.3975	0.1569	0.3004	0.0075	0.1377
MIT	4	0.1931	0.0356	0.7437	0.0065	0.0211
MIT	8	0.2451	0.0732	0.6200	0.0246	0.0371
MIT	16	0.1665	0.0753	0.6657	0.0499	0.0426
MIT	32	0.1722	0.0868	0.6438	0.0520	0.0451
MIT	64	0.1787	0.0936	0.6250	0.0518	0.0508

Table 16: Stationary probabilities (second model)

Mean State Durations (references)						
Workload	Block Size	State				
		LLR	LLW	LRCR	LRW	LRDR
Ardent	4	1.72	1.05	2.41	1.34	1.00
Ardent	8	2.16	1.24	1.90	1.22	1.00
Ardent	16	3.22	1.89	1.70	1.27	1.00
Ardent	32	5.39	3.17	1.96	1.43	1.00
Ardent	64	7.53	4.54	2.15	1.58	1.00
VAX T-Bit	4	2.69	1.02	5.50	2.27	1.00
VAX T-Bit	8	2.12	1.02	3.77	2.09	1.00
VAX T-Bit	16	2.19	1.03	3.12	2.23	1.00
VAX T-Bit	32	2.68	1.03	3.78	2.03	1.00
VAX T-Bit	64	3.17	1.04	3.50	1.70	1.00
MIT	4	2.04	1.03	10.89	1.12	1.00
MIT	8	1.88	1.02	6.85	1.63	1.00
MIT	16	1.70	1.00	8.59	1.96	1.00
MIT	32	1.80	1.01	10.20	2.44	1.00
MIT	64	1.81	1.01	10.35	2.26	1.00

Table 17: Mean state durations (second model)