

168.wupwise

Datasets profile vs. Reference Dataset

The following are the profiles for the 168.wupwise benchmark. For more details about our profile development and dataset reduction methodology, refer to the paper by AJ KleinOsowski and David J. Lilja, "MinneSPEC: A New SPEC Benchmark Workload for Simulation-Based Computer Architecture Research", Computer Architecture Letters, Volume 1, June 2002. This paper is available in electronic form at <http://www.arctic.umn.edu/~lilja/minnespec/index.html>



[http:// www.arctic.umn.edu](http://www.arctic.umn.edu)

Function level execution profile at optimization level O0

The following table contains function execution profiles and goodness-of-fit chi-squared statistic values for the train, test, large reduced (LgRed) datasets as compared to the full SPEC reference datasets. This data was gathered with the hiprof profiling utility. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall execution time spent in the stated function (in the Function column). Numbers in the Train Chi, Test Chi, and LgRed Chi are the terms of the chi-squared statistic for the stated function (in the function column).

Function	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi
zgemm_	52.00	50.10	0.07	41.30	2.20	27.10	11.92
zaxpy_	20.10	19.50	0.02	16.60	0.61	15.00	1.29
zcopy_	12.60	12.40	0.00	11.20	0.16	11.10	0.18
lsame_	3.90	3.80	0.00	3.40	0.06	3.40	0.06
zdotc_	2.50	2.40	0.00	1.80	0.20	1.40	0.48
muldoe_	1.90	1.80	0.01	1.60	0.05	1.40	0.13
muldeo_	1.70	1.70	0.00	1.50	0.02	1.30	0.09
zscal_	1.30	1.30	0.00	1.50	0.03	1.70	0.12
gammul_	1.20	1.10	0.01	1.10	0.01	0.90	0.07
dcabs1_	0.90	0.90	0.00	0.80	0.01	0.70	0.04
dznorm2_	0.70	1.10	0.23	2.60	5.16	4.30	18.51
su3mul_	0.60	0.60	0.00	0.50	0.02	0.50	0.02
dlaran_	0.30	2.30	13.33	11.20	396.03	21.90	1555.20
dlarnd_	0.10	0.50	1.60	2.30	48.40	4.30	176.40
uinith_	0.10	0.40	0.90	1.90	32.40	3.60	122.50
Sum	99.90	99.90	16.17	99.30	485.36	98.60	1887.04
	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi

90% Confidence level (15 entries) = 21.064

Function level execution profile at optimization level O1

The following table contains function execution profiles and goodness-of-fit chi-squared statistic values for the train, test, large reduced (LgRed) datasets as compared to the full SPEC reference datasets. This data was gathered with the hiprof profiling utility. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall execution time spent in the stated function (in the Function column). Numbers in the Train Chi, Test Chi, and LgRed Chi are the terms of the chi-squared statistic for the stated function (in the function column).

Function	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi
zgemm_	44.10	42.60	0.05	36.00	1.49	23.10	10.00
zaxpy_	28.20	27.60	0.01	24.80	0.41	23.20	0.89
zcopy_	9.60	9.70	0.00	9.70	0.00	10.20	0.04
lsame_	7.60	7.40	0.01	6.70	0.11	6.30	0.22
zdotc_	3.00	2.90	0.00	2.30	0.16	1.60	0.65
zscal_	2.20	2.20	0.00	2.40	0.02	3.00	0.29
dcabs1_	1.40	1.30	0.01	1.30	0.01	1.40	0.00
gammul_	1.30	1.30	0.00	1.20	0.01	1.20	0.01
dznm2_	0.90	1.20	0.10	3.00	4.90	5.30	21.51
su3mul_	0.60	0.60	0.00	0.60	0.00	0.50	0.02
muldoe_	0.50	0.50	0.00	0.40	0.02	0.50	0.00
muldeo_	0.50	0.50	0.00	0.40	0.02	0.50	0.00
dlaran_	0.30	1.80	7.50	9.40	276.03	18.90	1153.20
Sum	100.20	99.60	7.68	98.20	283.17	95.70	1186.83
	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi

90% Confidence level (13 entries) = 18.549

Function level execution profile at optimization level O2

The following table contains function execution profiles and goodness-of-fit chi-squared statistic values for the train, test, large reduced (LgRed) datasets as compared to the full SPEC reference datasets. This data was gathered with the hiprof profiling utility. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall execution time spent in the stated function (in the Function column). Numbers in the Train Chi, Test Chi, and LgRed Chi are the terms of the chi-squared statistic for the stated function (in the function column).

Function	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi
zgemm_	39.20	38.10	0.03	33.40	0.86	23.00	6.69
zaxpy_	24.80	24.10	0.02	20.20	0.85	17.90	1.92
zcopy_	10.10	10.00	0.00	9.60	0.02	10.40	0.01
lsame_	8.10	8.20	0.00	7.70	0.02	7.40	0.06
zdotc_	4.40	4.20	0.01	3.00	0.45	2.00	1.31
gammul_	4.30	4.20	0.00	4.00	0.02	3.30	0.23
dcabs1_	3.20	3.10	0.00	2.90	0.03	3.20	0.00
zscal_	1.60	1.50	0.01	1.50	0.01	1.50	0.01
su3mul_	1.10	1.00	0.01	0.90	0.04	1.00	0.01
muldoe_	1.00	1.00	0.00	0.90	0.01	0.90	0.01
muldeo_	1.00	0.90	0.01	0.90	0.01	1.10	0.01
dznm2_	0.90	1.20	0.10	2.80	4.01	4.60	15.21
dlaran_	0.20	1.30	6.05	6.70	211.25	12.70	781.25
dlarnd_	0.10	0.50	1.60	2.50	57.60	5.40	280.90
Sum	100.00	99.30	7.84	97.00	275.17	94.40	1087.62
	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi

90% Confidence level (14 entries) = 19.812

Function level execution profile at optimization level O3

The following table contains function execution profiles and goodness-of-fit chi-squared statistic values for the train, test, large reduced (LgRed) datasets as compared to the full SPEC reference datasets. This data was gathered with the hiprof profiling utility. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall execution time spent in the stated function (in the Function column). Numbers in the Train Chi, Test Chi, and LgRed Chi are the terms of the chi-squared statistic for the stated function (in the function column).

Function	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi
zgemm_	47.20	45.40	0.07	38.10	1.75	26.00	9.52
zaxpy_	20.30	19.60	0.02	17.10	0.50	15.40	1.18
lsame_	8.90	8.80	0.00	7.80	0.14	7.50	0.22
zcopy_	8.00	8.00	0.00	7.10	0.10	7.30	0.06
gammul_	3.90	4.00	0.00	3.40	0.06	3.40	0.06
dcabs1_	3.70	3.60	0.00	3.10	0.10	3.30	0.04
zdotc_	2.00	1.90	0.01	1.50	0.13	1.40	0.18
su3mul_	1.50	1.40	0.01	1.30	0.03	1.40	0.01
zscal_	1.40	1.40	0.00	1.60	0.03	1.40	0.00
dznm2_	1.10	1.50	0.15	3.10	3.64	5.00	13.83
muldeo_	0.80	0.80	0.00	0.90	0.01	0.70	0.01
muldoe_	0.80	0.70	0.01	0.80	0.00	0.70	0.01
dlaran_	0.20	1.50	8.45	8.00	304.20	14.40	1008.20
dlarnd_	0.10	0.60	2.50	2.90	78.40	5.40	280.90
Sum	99.90	99.20	11.22	96.70	389.09	93.30	1314.23
	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi

90% Confidence level (14 entries) = 19.812

Function level execution profile at optimization level O4

The following table contains function execution profiles and goodness-of-fit chi-squared statistic values for the train, test, large reduced (LgRed) datasets as compared to the full SPEC reference datasets. This data was gathered with the hiprof profiling utility. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall execution time spent in the stated function (in the Function column). Numbers in the Train Chi, Test Chi, and LgRed Chi are the terms of the chi-squared statistic for the stated function (in the function column).

Function	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi
zgemm_	52.30	50.70	0.05	43.30	1.55	30.20	9.34
zaxpy_	19.40	19.30	0.00	16.90	0.32	15.60	0.74
lsame_	8.90	8.60	0.01	7.90	0.11	8.50	0.02
zcopy_	6.70	6.50	0.01	6.80	0.00	6.90	0.01
gammul_	3.60	3.60	0.00	3.60	0.00	3.60	0.00
zdotc_	1.90	1.90	0.00	1.60	0.05	1.10	0.34
zscal_	1.40	1.50	0.01	1.90	0.18	2.50	0.86
su3mul_	1.30	1.20	0.01	1.10	0.03	1.10	0.03
dznm2_	1.10	1.40	0.08	3.20	4.01	5.10	14.55
wupwise_	1.00	1.00	0.00	0.50	0.25	0.00	1.00
muldeo_	1.00	0.90	0.01	0.90	0.01	0.90	0.01
muldoe_	1.00	1.00	0.00	0.80	0.04	0.90	0.01
dlaran_	0.20	1.60	9.80	7.60	273.80	15.60	1185.80
Sum	99.80	99.20	9.97	96.10	280.35	92.00	1212.70
	Ref	Train	Train Chi	Test	Test Chi	LgRed	LgRed Chi

90% Confidence level (13 entries) = 18.549

Instruction Mix profile at optimization level o0

The following table contains instruction mix breakdown and goodness-of-fit chi-squared statistic values for the train, test, and large reduced (LgRed) datasets, as compared to the full SPEC dataset. This data was gathered with the sim-profile simulator for the SimpleScalar suite. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall instructions of the stated instruction type (in the Inst Type column). Numbers in the Train Chi, Test Chi, and LgRed Chi columns are the terms of the chi-squared statistic for the stated instruction type (in the Inst Type column).

168.wupwise

O0 Program Inst Type	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi
load	46.83	45.56	0.03	40.42	0.88	35.33	2.82
store	8.28	8.11	0.00	7.43	0.09	6.93	0.22
unconditional branch	1.05	1.17	0.01	1.63	0.32	2.16	1.17
conditional branch	4.20	4.39	0.01	5.16	0.22	6.10	0.86
int computation	26.77	28.35	0.09	34.75	2.38	40.70	7.25
fp computation	12.87	12.42	0.02	10.61	0.40	8.78	1.30
trap	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	100.00	100.00	0.17	100.00	4.28	100.00	13.63
	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi

90% Confidence level (7 entries) = 10.645

168.wupwise

Instruction Mix profile at optimization level o1

The following table contains instruction mix breakdown and goodness-of-fit chi-squared statistic values for the train, test, and large reduced (LgRed) datasets, as compared to the full SPEC dataset. This data was gathered with the sim-profile simulator for the SimpleScalar suite. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall instructions of the stated instruction type (in the Inst Type column). Numbers in the Train Chi, Test Chi, and LgRed Chi columns are the terms of the chi-squared statistic for the stated instruction type (in the Inst Type column).

168.wupwise

O1 Program Inst Type	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi
load	29.73	29.41	0.00	27.94	0.11	25.97	0.48
store	10.42	10.43	0.00	10.49	0.00	10.63	0.00
unconditional branch	1.34	1.39	0.00	1.58	0.04	1.92	0.25
conditional branch	5.34	5.30	0.00	5.09	0.01	5.09	0.01
int computation	36.49	37.00	0.01	39.35	0.22	42.40	0.96
fp computation	16.67	16.47	0.00	15.54	0.08	13.98	0.43
trap	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	99.99	100.00	0.02	99.99	0.46	99.99	2.13
	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi

90% Confidence level (7 entries) = 10.645

168.wupwise

Instruction Mix profile at optimization level o2

The following table contains instruction mix breakdown and goodness-of-fit chi-squared statistic values for the train, test, and large reduced (LgRed) datasets, as compared to the full SPEC dataset. This data was gathered with the sim-profile simulator for the SimpleScalar suite. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall instructions of the stated instruction type (in the Inst Type column). Numbers in the Train Chi, Test Chi, and LgRed Chi columns are the terms of the chi-squared statistic for the stated instruction type (in the Inst Type column).

168.wupwise

O2 Program Inst Type	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi
load	18.61	18.36	0.00	17.23	0.10	16.05	0.35
store	7.52	7.54	0.00	7.61	0.00	7.57	0.00
unconditional branch	2.15	2.21	0.00	2.48	0.05	2.92	0.28
conditional branch	8.64	8.52	0.00	7.97	0.05	7.65	0.11
int computation	34.90	35.80	0.02	39.81	0.69	44.77	2.79
fp computation	28.17	27.57	0.01	24.90	0.38	21.04	1.80
trap	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	99.99	100.00	0.04	100.00	1.28	100.00	5.34
	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi

90% Confidence level (7 entries) = 10.645

168.wupwise

Instruction Mix profile at optimization level o3

The following table contains instruction mix breakdown and goodness-of-fit chi-squared statistic values for the train, test, and large reduced (LgRed) datasets, as compared to the full SPEC dataset. This data was gathered with the sim-profile simulator for the SimpleScalar suite. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall instructions of the stated instruction type (in the Inst Type column). Numbers in the Train Chi, Test Chi, and LgRed Chi columns are the terms of the chi-squared statistic for the stated instruction type (in the Inst Type column).

168.wupwise

O3 Program Inst Type	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi
load	19.92	19.67	0.00	18.54	0.10	17.49	0.30
store	7.57	7.58	0.00	7.62	0.00	7.57	0.00
unconditional branch	2.07	2.11	0.00	2.31	0.03	2.65	0.16
conditional branch	9.85	9.69	0.00	8.96	0.08	8.36	0.23
int computation	32.94	33.89	0.03	38.15	0.82	43.29	3.25
fp computation	27.65	27.06	0.01	24.42	0.38	20.63	1.78
trap	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	100.00	100.00	0.05	100.00	1.41	99.99	5.72
	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi

90% Confidence level (7 entries) = 10.645

168.wupwise

Instruction Mix profile at optimization level o4

The following table contains instruction mix breakdown and goodness-of-fit chi-squared statistic values for the train, test, and large reduced (LgRed) datasets, as compared to the full SPEC dataset. This data was gathered with the sim-profile simulator for the SimpleScalar suite. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. *90% Conf = Critical value of the chi-squared statistic at the 90 percent confidence level. Numbers in the Ref, Train, Test, and LgRed columns are the percent of overall instructions of the stated instruction type (in the Inst Type column). Numbers in the Train Chi, Test Chi, and LgRed Chi columns are the terms of the chi-squared statistic for the stated instruction type (in the Inst Type column).

168.wupwise

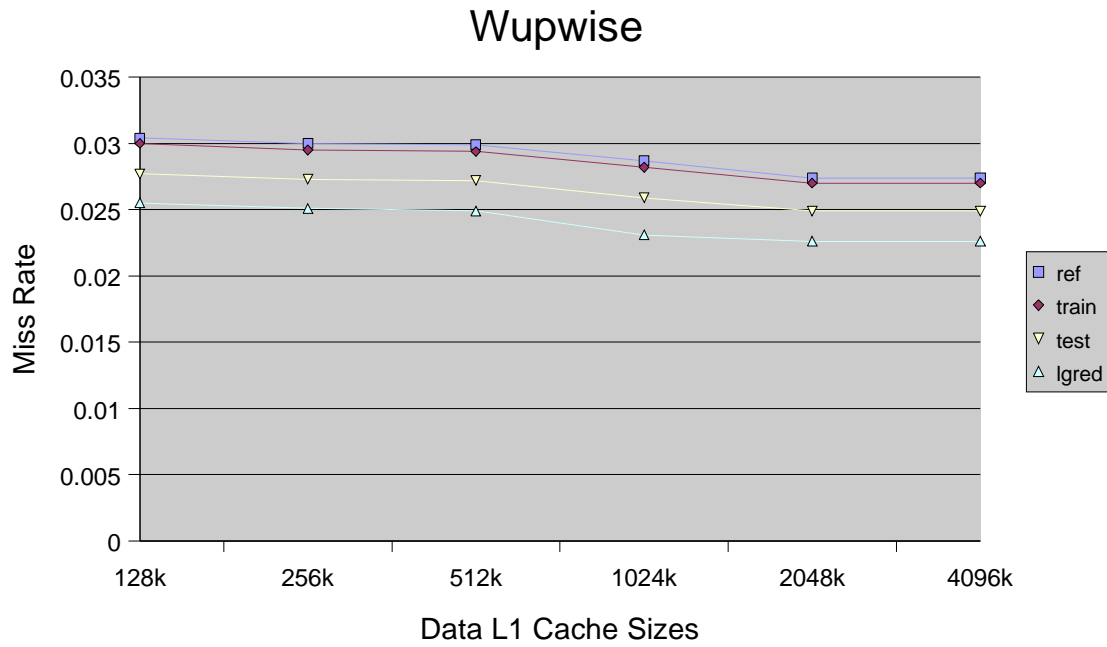
O4 Program Inst Type	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi
load	20.05	19.74	0.00	18.35	0.14	16.98	0.47
store	8.00	8.00	0.00	8.01	0.00	7.96	0.00
unconditional branch	1.55	1.58	0.00	1.70	0.01	1.96	0.11
conditional branch	9.80	9.63	0.00	8.83	0.10	8.11	0.29
int computation	31.18	32.17	0.03	36.67	0.97	42.24	3.92
fp computation	29.43	28.89	0.01	26.44	0.30	22.75	1.52
trap	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	100.01	100.01	0.05	100.00	1.53	100.00	6.31
	Ref	Train	Train Chi	Test	Test Chi	Lgred	Lgred Chi

90% Confidence level (7 entries) = 10.645

168.wupwise

Cache profile

The following chart shows level 1 data cache miss rates for the Ref, Train, Test, and LgRed datasets. This data was gathered with the sim-cache simulator from the SimpleScalar suite. Note: The medium (MdRed) and small (SmRed) reduced datasets are not available for this benchmark. Miss rate is stated as the ratio of level 1 misses to total level 1 accesses.



Instruction Counts for all Datasets

The following table shows the instruction counts and estimated simulation time for the reference (Ref), train, test, and large reduced (LgRed) datasets. Instruction counts are from the simulated benchmark, compiled at optimization level O0 and run with each input dataset. Estimated simulation times are calculated using a 45,000 instructions per second factor. This factor was determined by observing the simulation rate of a simulator similar to sim-outorder, run on a machine similar to the SPEC 2000 reference machine (a 333 Mhz Sparc).

	<u>Ref</u>	<u>Train</u>	<u>Test</u>	<u>LgRed</u>
Instruction Count				
(in millions)	746954	113219	25475	14634
Simulation Time				
(in hours)	4610.8	698.9	157.2	90.3