

Table 1: Comparing PromiseTune with state-of-the-art tuners on “mean (standard deviation)” of the optimized (original) performance over 30 runs. \times denotes that the tuner under the case has failed to complete in a reasonable time.

Budget	System	PromiseTune	Random	Unicorn	GA	NBO	LlamaTune	FLASH	CFSCA	BOCA	OtterTune	SNAC	NEBO
$B = 50$	7z	4708.867 (1183.605)	5273.453 (1567.337)	5362.560 (1563.305)	6543.560 (2161.189)	9192.713 (11.024)	6518.793 (2439.092)	5891.473 (1907.362)	5060.080 (1547.465)	5935.133 (2081.686)	6304.920 (2309.799)	5549.080 (1845.592)	11322.653 (384.214)
	DConvert	1.820 (0.028)	1.876 (0.047)	1.879 (0.059)	1.930 (0.125)	2.101 (0.133)	1.905 (0.106)	1.830 (0.033)	1.833 (0.058)	1.817 (0.028)	1.835 (0.093)	1.859 (0.103)	1.807 (0.023)
	EXASTENCILS	4922.653 (250.626)	5056.527 (195.251)	5056.200 (197.367)	5123.987 (306.588)	7092.747 (444.882)	5007.333 (213.263)	4890.807 (288.164)	4895.213 (251.728)	5004.713 (246.019)	5044.593 (249.459)	4933.020 (256.626)	4901.420 (223.339)
	BDB-C	0.365 (0.023)	0.362 (0.007)	0.361 (0.004)	0.406 (0.107)	0.358 (0.006)	0.372 (0.027)	0.406 (0.036)	0.376 (0.031)	0.394 (0.052)	0.361 (0.007)	0.381 (0.033)	0.354 (0.002)
	DEEPARCH	1.051 (0.006)	1.975 (2.447)	2.398 (3.103)	4.052 (5.644)	1.063 (0.034)	2.308 (2.591)	1.435 (2.059)	1.059 (0.038)	5.318 (6.857)	1.457 (2.067)	1.106 (0.269)	1.047 (0.004)
	POSTGRESQL	50735.240 (56.360)	50744.080 (49.337)	50746.180 (51.343)	50725.933 (51.818)	50995.400 (0.000)	50737.413 (85.587)	50706.853 (23.012)	50743.967 (48.687)	50814.167 (80.951)	50742.320 (53.670)	50722.630 (39.114)	50709.167 (35.192)
	JAVAGC	422.250 (23.347)	424.183 (23.827)	430.300 (28.140)	446.250 (35.448)	582.533 (0.125)	435.433 (31.087)	\times	\times	\times	433.217 (31.123)	413.250 (13.730)	420.500 (0.000)
	STORM	0.997 (0.005)	0.879 (0.073)	0.880 (0.076)	0.881 (0.124)	0.905 (0.076)	0.818 (0.126)	0.985 (0.029)	0.999 (0.003)	0.983 (0.043)	0.967 (0.113)	0.991 (0.024)	0.991 (0.035)
	x264	27.348 (1.900)	28.341 (1.648)	28.428 (2.030)	29.732 (3.441)	46.961 (0.000)	27.992 (1.429)	\times	\times	\times	27.435 (3.302)	27.473 (2.397)	28.141 (0.000)
	REDIS	83684.976 (1730.885)	82524.380 (2147.521)	82524.380 (2147.521)	81203.660 (1867.615)	83144.462 (1450.932)	80152.751 (1614.575)	\times	\times	\times	83257.798 (2021.409)	81019.780 (1999.707)	79100.861 (1380.786)
	HSQLDB	248.493 (0.382)	248.580 (0.298)	248.593 (0.316)	248.800 (0.506)	261.800 (0.000)	248.553 (0.281)	248.267 (0.202)	248.453 (0.310)	249.340 (3.298)	248.887 (2.375)	248.353 (0.229)	248.273 (0.150)
	LLVM	199.970 (0.449)	203.585 (2.965)	203.511 (2.909)	200.939 (1.374)	200.802 (0.731)	206.769 (6.536)	199.923 (0.131)	200.006 (0.489)	201.728 (3.341)	200.084 (0.647)	199.894 (0.280)	200.281 (0.623)
$B = 100$	7z	4293.207 (40.522)	4725.573 (836.493)	4727.407 (849.523)	5936.580 (2005.178)	9186.007 (10.394)	5663.60 (2140.264)	5576.860 (1900.023)	4498.293 (824.447)	5276.967 (1902.842)	5962.407 (2213.152)	5045.267 (1461.807)	11322.653 (384.214)
	DConvert	1.803 (0.020)	1.849 (0.040)	1.850 (0.036)	1.907 (0.111)	2.061 (0.004)	1.865 (0.091)	1.799 (0.020)	1.809 (0.024)	1.817 (0.028)	1.834 (0.093)	1.830 (0.066)	1.790 (0.000)
	EXASTENCILS	4843.920 (242.212)	4987.760 (172.509)	4974.967 (158.882)	5032.713 (294.986)	7057.140 (426.590)	4962.073 (217.692)	4851.393 (257.255)	4820.920 (231.868)	5004.713 (246.019)	4971.107 (270.550)	4879.320 (238.236)	4763.660 (185.125)
	BDB-C	0.355 (0.003)	0.359 (0.004)	0.359 (0.004)	0.385 (0.041)	0.356 (0.004)	0.368 (0.021)	0.405 (0.036)	0.360 (0.014)	0.376 (0.046)	0.356 (0.005)	0.372 (0.026)	0.345 (0.000)
	DEEPARCH	1.048 (0.005)	1.129 (0.132)	1.130 (0.131)	3.747 (5.664)	1.046 (0.001)	2.308 (2.591)	1.059 (0.040)	1.048 (0.006)	5.318 (6.857)	1.450 (2.068)	1.048 (0.004)	1.045 (0.000)
	POSTGRESQL	50689.860 (28.115)	50714.313 (33.414)	50715.133 (31.979)	50722.467 (51.862)	50995.400 (0.000)	50748.960 (84.377)	50684.993 (13.070)	50701.600 (40.804)	50814.167 (80.951)	50718.233 (46.250)	50699.400 (30.938)	50688.373 (19.229)
	JAVAGC	407.067 (6.930)	415.167 (17.746)	414.967 (17.531)	441.533 (32.825)	582.517 (0.090)	415.500 (20.683)	\times	\times	\times	420.033 (24.548)	406.267 (7.482)	420.500 (0.000)
	STORM	1.000 (0.000)	0.907 (0.068)	0.906 (0.087)	0.912 (0.066)	0.973 (0.044)	0.911 (0.076)	0.995 (0.006)	1.000 (0.000)	0.983 (0.043)	0.971 (0.113)	1.000 (0.002)	1.000 (0.002)
	x264	26.666 (1.633)	27.076 (1.548)	26.766 (1.674)	29.447 (3.488)	46.961 (0.000)	27.514 (1.377)	\times	\times	\times	27.110 (2.753)	26.474 (2.239)	28.141 (0.000)
	REDIS	84630.706 (1537.265)	84011.967 (1612.838)	84011.967 (1612.838)	81433.009 (1726.854)	84054.234 (1351.168)	81408.419 (1169.665)	\times	\times	\times	83703.093 (2077.773)	81314.096 (1683.959)	79100.861 (1380.786)
	HSQLDB	248.327 (0.203)	248.407 (0.234)	248.407 (0.234)	248.780 (0.515)	261.800 (0.000)	248.413 (0.212)	248.200 (0.000)	248.280 (0.168)	249.333 (3.300)	248.807 (2.385)	248.300 (0.169)	248.200 (0.000)
	LLVM	199.683 (0.000)	201.580 (1.406)	201.527 (1.215)	200.910 (1.385)	199.811 (0.226)	206.769 (6.536)	199.701 (0.067)	199.692 (0.048)	201.728 (3.341)	199.918 (0.633)	199.692 (0.048)	199.854 (0.130)
$B = 150$	7z	4269.313 (43.412)	4482.607 (146.843)	4471.633 (141.090)	5936.580 (2005.178)	9186.007 (10.394)	5480.780 (2052.938)	5216.967 (1729.098)	4325.093 (89.451)	4793.707 (1439.739)	5791.780 (2158.226)	4653.773 (894.345)	11322.653 (384.214)
	DConvert	1.795 (0.013)	1.833 (0.037)	1.833 (0.034)	1.907 (0.111)	2.060 (0.000)	1.840 (0.068)	1.796 (0.017)	1.805 (0.021)	1.813 (0.024)	1.834 (0.093)	1.828 (0.066)	1.790 (0.000)
	EXASTENCILS	4830.120 (245.468)	4907.227 (126.836)	4911.627 (112.672)	5032.713 (294.986)	7057.140 (426.590)	4921.527 (225.576)	4801.487 (230.665)	4810.053 (225.540)	5004.713 (246.019)	4950.867 (280.280)	4873.313 (235.894)	4726.387 (180.723)
	BDB-C	0.354 (0.001)	0.357 (0.003)	0.357 (0.004)	0.385 (0.041)	0.355 (0.002)	0.365 (0.016)	0.398 (0.038)	0.355 (0.003)	0.372 (0.044)	0.355 (0.003)	0.369 (0.024)	0.354 (0.000)
	DEEPARCH	1.046 (0.002)	1.106 (0.126)	1.106 (0.126)	3.747 (5.664)	1.046 (0.001)	2.308 (2.591)	1.056 (0.040)	1.046 (0.002)	5.318 (6.857)	1.450 (2.068)	1.047 (0.002)	1.045 (0.000)
	POSTGRESQL	50682.680 (22.001)	50706.013 (28.775)	50705.867 (27.924)	50722.467 (51.862)	50995.400 (0.000)	50748.960 (84.377)	50680.080 (12.237)	50689.047 (29.720)	50814.167 (80.951)	50714.240 (46.489)	50693.700 (29.770)	50678.627 (11.899)
	JAVAGC	405.700 (5.487)	411.533 (14.895)	411.367 (14.591)	441.533 (32.825)	582.517 (0.090)	409.950 (13.944)	\times	\times	\times	412.517 (19.096)	405.900 (7.549)	420.500 (0.000)
	STORM	1.000 (0.000)	0.944 (0.048)	0.939 (0.058)	0.907 (0.087)	0.987 (0.019)	0.925 (0.073)	0.996 (0.006)	1.000 (0.000)	0.983 (0.043)	0.971 (0.113)	1.000 (0.000)	1.000 (0.000)
	x264	26.246 (1.570)	26.095 (1.847)	26.182 (1.979)	29.447 (3.488)	46.961 (0.000)	26.804 (1.577)	\times	\times	\times	27.033 (2.699)	26.214 (2.105)	28.141 (0.000)
	REDIS	85131.509 (1616.623)	84585.901 (1505.162)	84585.901 (1505.162)	81433.009 (1726.854)	84795.848 (1354.805)	82012.329 (1232.378)	\times	\times	\times	83750.644 (2061.550)	81416.449 (1637.641)	79100.861 (1380.786)
	HSQLDB	248.247 (0.112)	248.333 (0.166)	248.333 (0.166)	248.780 (0.515)	261.800 (0.000)	248.393 (0.203)	248.200 (0.000)	248.280 (0.168)	249.333 (3.300)	248.807 (2.385)	248.273 (0.131)	248.200 (0.000)
	LLVM	199.683 (0.000)	201.004 (1.041)	200.973 (1.000)	200.910 (1.385)	199.701 (0.067)	206.769 (6.536)	199.692 (0.048)	199.683 (0.000)	201.728 (3.341)	199.918 (0.633)	199.683 (0.000)	199.746 (0.114)
$B = 200$	7z	4251.480 (37.055)	4454.620 (151.765)	4443.647 (144.090)	5936.580 (2005.178)	9186.007 (10.394)	5063.493 (1568.028)	4997.240 (1600.747)	4300.033 (39.090)	4292.653 (57.157)	5768.227 (2130.367)	4631.160 (895.776)	11322.653 (384.214)
	DConvert	1.795 (0.013)	1.819 (0.028)	1.823 (0.030)	1.907 (0.111)	2.060 (0.000)	1.837 (0.068)	1.790 (0.000)	1.804 (0.020)	1.813 (0.024)	1.834 (0.093)	1.825 (0.066)	1.790 (0.000)
	EXASTENCILS	4826.827 (245.611)	4862.953 (83.700)	4874.760 (85.166)	5032.713 (294.986)	7057.140 (426.590)	4897.400 (230.252)	4794.527 (229.143)	4795.200 (222.532)	5004.713 (246.019)	4948.920 (279.599)	4865.247 (237.904)	4722.133 (182.236)
	BDB-C	0.354 (0.000)	0.356 (0.003)	0.356 (0.003)	0.385 (0.041)	0.362 (0.010)	0.362 (0.010)	0.393 (0.038)	0.355 (0.002)	0.371 (0.044)	0.355 (0.002)	0.369 (0.023)	0.354 (0.000)
	DEEPARCH	1.045 (0.000)	1.075 (0.035)	1.077 (0.035)	3.747 (5.664)	1.045 (0.001)	2.308 (2.591)	1.053 (0.039)	1.046 (0.002)	5.318 (6.857)	1.450 (2.068)	1.046 (0.002)	1.045 (0.000)
	POSTGRESQL	50677.740 (16.709)	50702.387 (27.424)	50698.273 (24.498)	50722.467 (51.862)	50995.400 (0.000)	50748.960 (84.377)	50675.573 (11.270)	50685.373 (26.332)	50814.167 (80.951)	50714.240 (46.489)	50690.700 (28.270)	50676.973 (9.888)
	JAVAGC	404.367 (3.049)	406.733 (6.345)	406.017 (4.434)	441.533 (32.825)	582.517 (0.090)	407.183 (11.767)	\times	\times	\times	408.217 (16.101)	405.200 (7.576)	420.500 (0.000)
	STORM	1.000 (0.000)	0.960 (0.040)	0.960 (0.040)	0.907 (0.087)	0.996 (0.005)	0.930 (0.072)	0.998 (0.005)	1.000 (0.000)	0.983 (0.043)	0.971 (0.113)	1.000 (0.000)	1.000 (0.000)
	x264	26.089 (1.356)	25.838 (1.862)	25.719 (1.981)	29.447 (3.488)	46.961 (0.000)	26.217 (1.704)	\times	\times	\times	27.033 (2.699)	26.214 (2.105)	28.141 (0.000)
	REDIS	85437.554 (1573.519)	84866.113 (1267.275)	84866.113 (1267.275)	81433.009 (1726.854)	85482.371 (1253.503)	82532.599 (1332.885)	\times	\times	\times	83750.644 (2061.550)	81416.449 (1637.641)	79100.861 (1380.786)
	HSQLDB	248.247 (0.112)	248.320 (0.160)	248.320 (0.160)	248.780 (0.515)	261.800 (0.000)	248.360 (0.196)	248.200 (0.000)	248.273 (0.159)	249.333 (3.300)	248.807 (2.385)	248.267 (0.119)	248.200 (0.000)
	LLVM	199.683 (0.000)	200.849 (0.929)	200.879 (0.963)	200.910 (1.385)	199.683 (0.000)	206.769 (6.536)	199.692 (0.048)	199.683 (0.000)	201.728 (3.341)	199.918 (0.633)	199.683 (0.000)	199.701 (0.067)