

# The Serverless Application Analytics Framework: Reproducible Performance for Performance Modeling

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TABLE I. PERFORMANCE MODEL RESULTS SCNMT2 WORKLOADS

RAM (tenants)	256MB (13)	512MB (6)	1024MB (3)	2048MB (1)
	Avg runtime (ms), % Error, RMSE, deg of freedom			
CPU v2→v3	18173, -5%, 199, 127	8189, -1.3%, 221, 58	3741, 0.11%, 36.0, 28	2580, -0.4%, 18.2, 155
CPU v2→v4	16532, -1%, 224, 151	8396, -0.3%, 127, 414	4218, 0.09%, 102, 406	2447, -0.3%, 14.4, 265
CPU v3→v4	17524, -4%, 181, 127	7844, -0.08%, 55.7, 58	3575, 0.24%, 43.6, 28	2487, -5.4%, 18.5, 155
CPU (v2,3,4)	CPU v2	CPU v3	CPU v4	
	Avg runtime (ms), % Err, RMSE, deg of freedom			
256(13)→512(6)	10324, 0.28%, 199, 414	8189, -0.13%, 48.0, 58	7722, 0.076%, 41.1, 151	
256(13) → 1024(3)	5252, -0.64%, 124, 406	3731, -0.44%, 22.1, 28	3894, -0.0049%, 33.0, 151	
256(13)→2048(1)	2408, -0.38%, 19.0, 265	2578, -0.04%, 12.2, 127	2346, -0.33%, 17.3, 151	

TABLE II. PERFORMANCE MODEL RESULTS SCMT2 WORKLOADS

RAM (tenants)	256MB (13)	512MB (6)	1024MB (3)	2048MB (1)
	Avg runtime (ms), % Error, RMSE, deg of freedom			
CPU v2→v3	51474, -.7%, 859, 127	23440, -.23%, 286, 58	10239, -.55%, 118, 28	6450, -.63%, 115, 157
CPU v2→v4	53962, -.38%, 487, 151	27281, .35%, 2912, 414	13373, -1.8%, 1516, 406	7240, 1.84%, 954, 266
CPU v3→v4	57203, -.49%, 494, 127	25074, .042%, 283, 58	11090, .431%, 174, 28	7011, 4.66%, 900, 157
CPU (v2,3,4)	CPU v2	CPU v3	CPU v4	
	Avg runtime (ms), % Err, RMSE, deg of freedom			
256(13)→512(6)	48053, -.370%, 6648, 414	23439, -0.557%, 265, 58	24936, -0.49%, 235, 151	
256(13) → 1024(3)	21088, -.032%, 2832, 406	10239, 0.555%, 106, 28	12241, -1.02%, 281, 151	
256(13)→2048(1)	8116, 1.65%, 1138, 266	6505, -1.42%, 135, 127	6872, -0.69%, 280, 151	

TABLE III. PERFORMANCE MODEL RESULTS SCSMT2 WORKLOADS

RAM (tenants)	256MB (13)	512MB (6)	1024MB (3)	2048MB (1)
	Avg runtime (ms), % Error, RMSE, deg of freedom			
CPU v2→v3	41820, -.59%, 1273, 1414	20840, .312%, 728, 652	10174, 0.54%, 373, 325	4699, .205%, 321, 1739
CPU v2→v4	44162, -.65%, 2037, 1613	20829, 4.53%, 2875, 4572	9831, 4.30%, 1290, 4478	5052, 3.16%, 732, 2938
CPU v3→v4	46539, .24%, 763, 1414	22212, -.56%, 403, 652	10585, -.09%, 318, 325	5173, -.388%, 507, 1739
CPU (v2,3,4)	CPU v2	CPU v3	CPU v4	
	Avg runtime (ms), % Err, RMSE, deg of freedom			
256(13)→512(6)	35216, 0.965%, 8389, 4572	20840, -0.39%, 355, 652	19711, 0.0476%, 725, 1613	
256(13) → 1024(3)	14645, 0.472%, 2625, 4478	10173, -1.02%, 568, 325	9049, 1.212%, 838, 1613	
256(13)→2048(1)	5004, 3.97%, 1164, 2938	4526, 0.401%, 594, 1414	4639, 3.38%, 1110, 1613	

TABLE IV. PERFORMANCE MODEL RESULTS SCNMT2 AWS→IBM

RAM (tenants)	256MB (13 / 32)	512MB (6 / 16)	1024MB (3 / 8)	2048MB (1 / 4)
	Avg runtime (ms), % Error, RMSE, deg of freedom			
AWS v2 → IBM 2.0 GHz	n/a	17666, -4.3%, 1196, 142	8013, -3.37%, 665, 236	4340, -2.38%, 559, 139
AWS v2→ IBM 2.1 GHz	n/a	16231, -4.1%, 1991, 369	7794, -1.37%, 674, 395	3639, -0.70%, 186, 265
AWS v2→ IBM 2.2GHz	30124, -4.49%, 1752, 171	13960, .13%, 1176, 99	6611, 1.40%, 287, 49	2920, -.166%, 41.49, 42
AWS v2→ IBM 2.6 GHz	24864, -2.7%, 2298, 200	12437, -5.5%, 2357, 85	6641, 3.76%, 633, 70	2549, 3.47%, 187, 24