

The Serverless Application Analytics Framework: Reproducible Performance for Performance Modeling

Robert Cordingly
School of Engineering and Technology
University of Washington
Tacoma WA USA
rcording@uw.edu

Wen Shu
School of Engineering and Technology
University of Washington
Tacoma WA USA
shuwen12@uw.edu

Wes J. Lloyd
School of Engineering and Technology
University of Washington
Tacoma WA USA
wlloyd@uw.edu

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 a1→a2	18173, 0.5%, 199, 127	8189, 1.3%, 221, 58	3741, 0.11%, 36.0, 28	2580, 0.4%, 18.2, 155
CPU a1→a3	16532, 0.1%, 224, 151	8396, 0.3%, 127, 414	4218, 0.09%, 102, 406	2447, 0.3%, 14.4, 265
CPU a2→a3	17524, 0.4%, 181, 127	7844, 0.08%, 55.7, 58	3575, 0.24%, 43.6, 28	2487, 0.54%, 18.5, 155
CPU (a1,a2,a3)	CPU a1	CPU a2	CPU a3	
	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 a1→a2	51474, 0.7%, 859, 127	23440 0.23%, 286, 58	10239, 0.55%, 118, 28	6450, 0.63%, 115, 157
CPU a1→a3	53962, .38%, 487, 151	27281, .35%, 2912, 414	13373, 1.8%, 1516, 406	7240, 1.84%, 954, 266
CPU a2→a3	57203, .49%, 494, 127	25074,.042%, 283, 58	11090,.431%, 174, 28	7011, 4.66%, 900, 157
CPU (a1, a2, a3)	CPU a1	CPU a2	CPU a3	
	Avg runtime (ms), % Err, RMSE, deg of freedom			
256(13)→512(6)	48053, 0.370%, 6648, 414	23439, 0.557%, 265, 58	24936, 0.49%, 235, 151	
256(13)→1024(3)	21088, 0.032%, 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 a1→a2	41820, 0.59%, 1273, 1414	20840, .312%, 728, 652	10174, 0.54%, 373, 325	4699, .205%, 321, 1739
CPU a1→a3	44162, 0.65%, 2037, 1613	20829, 4.53%, 2875, 4572	9831, 4.30%, 1290, 4478	5052, 3.16%, 732, 2938
CPU a2→a3	46539, .24%, 763, 1414	22212, 0.56%, 403, 652	10585, 0.09%, 318, 325	5173, 0.388%, 507, 1739
CPU (a1, a2, a3)	CPU a1	CPU a2	CPU a3	
	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			
CPU a1→i1	n/a	17666, 4.3%, 1196, 142	8013, 0.37%, 665, 236	4340, 2.38%, 559, 139
CPU a1→i2	n/a	16231, 4.1%, 1991, 369	7794, 1.37%, 674, 395	3639, 0.70%, 186, 265
CPU a1→i3	30124, 4.49%, 1752, 171	13960, .13%, 1176, 99	6611, 1.40%, 287, 49	2920, .166%, 41.49, 42
CPU a1→i4	24864, 2.7%, 2298, 200	12437, 5.5%, 2357, 85	6641, 3.76%, 633, 70	2549, 3.47%, 187, 24