

PSAS Report

Current Goals

Optimize the execution time of the Regional Version of PSAS.

Achievements

Program information for the original code, without any optimization, but running with trace profile.

<i>Ana.x</i>		<i>Solve.x</i>	
***** Program Information *****		***** Program Information *****	
Real Time (sec)	: 29158.003002	Real Time (sec)	: 2082.922624
User Time (sec)	: 26816.487829	User Time (sec)	: 2077.013758
Sys Time (sec)	: 30.789766	Sys Time (sec)	: 1.970572
Vector Time (sec)	: 23.085264	Vector Time (sec)	: 468.396853
Inst. Count	: 6062177669875	Inst. Count	: 377767306346
V. Inst. Count	: 287352444	V. Inst. Count	: 17436197163
V. Element Count	: 43018719396	V. Element Count	: 2123685833608
FLOP Count	: 74227462335	FLOP Count	: 728868623079
MOPS	: 227.655056	MOPS	: 1195.955941
MFLOPS	: 2.767979	MFLOPS	: 350.921423
VLEN	: 149.707164	VLEN	: 121.797535
V. Op. Ratio (%)	: 0.704658	V. Op. Ratio (%)	: 85.494016
Memory Size (MB)	: 320.031250	Memory Size (MB)	: 944.031250
MIPS	: 226.061582	MIPS	: 181.880021
I-Cache (sec)	: 46.149045	I-Cache (sec)	: 33.050211
O-Cache (sec)	: 136.352019	O-Cache (sec)	: 63.179570
Bank (sec)	: 0.133724	Bank (sec)	: 9.381733

Trace of preparation part in the PSAS (ana.x)

FREQUENCY	EXCLUSIVE TIME[sec](%)	AVER.TIME [msec]	MOPS	MFLOPS	V.OP RATIO	AVER. V.LEN	VECTOR TIME	I-CACHE MISS	O-CACHE MISS	BANK CONF	PROG.UNIT
177786	2281.237(48.9)	12.831	127.0	4.6	0.00	0.0	0.000	0.5880	0.9571	0.0000	m_utils.mindis
5311297683	2230.894(47.8)	0.000	135.7	26.2	0.00	0.0	0.000	0.3026	87.3649	0.0000	dist
11033697	76.066(1.6)	0.007	78.1	4.0	0.00	0.0	0.000	27.7329	0.2027	0.0000	m_utils.inthor
24	23.970(0.5)	998.748	865.3	130.1	63.56	183.0	3.672	0.0223	1.2729	0.0000	m_insitu.m2o_mass
3	12.789(0.3)	4263.103	249.6	22.7	52.70	110.0	0.624	0.4130	4.2572	0.0007	m_insitu.insitu_prep
33005454	12.223(0.3)	0.000	70.2	8.1	0.00	0.0	0.000	0.0017	0.7378	0.0000	alfa
3	5.309(0.1)	1769.613	1095.1	90.6	83.61	92.3	2.323	0.0019	0.0369	0.0010	m_insitu.sigpz
12	4.049(0.1)	337.399	332.6	0.0	0.00	10.0	0.000	0.0052	0.8303	0.0000	m_ods_structure.ods_reorder
3	3.499(0.1)	1166.487	380.7	0.0	1.86	255.9	0.007	0.0004	0.4987	0.0000	m_ods.ods_select
1	1.892(0.0)	1892.400	237.5	62.9	2.26	34.5	0.026	0.0057	0.1942	0.0641	m_sqc.buddy_check_
7	1.316(0.0)	187.932	448.5	0.0	0.98	254.8	0.002	0.0001	0.2376	0.0000	m_ods_structure.ods_moveup
720	1.130(0.0)	1.570	370.9	38.7	0.33	220.5	0.000	0.0000	0.1974	0.0000	index3r
83	1.081(0.0)	13.027	301.0	0.0	0.53	253.1	0.000	0.0000	0.1587	0.0000	indexxi

Program information using inline procedure to “dist” and “alfa” function

<i>Ana.x</i>			<i>Solve.x</i>		
***** Program Information *****			***** Program Information *****		
Real Time (sec)	:	2617.750817	Real Time (sec)	:	2099.285654
User Time (sec)	:	477.838098	User Time (sec)	:	2089.058421
Sys Time (sec)	:	8.926798	Sys Time (sec)	:	2.618961
Vector Time (sec)	:	57.825003	Vector Time (sec)	:	471.758500
Inst. Count	:	106733940860	Inst. Count	:	377767306362
V. Inst. Count	:	2258792136	V. Inst. Count	:	17436197163
V. Element Count	:	276760950912	V. Element Count	:	2123685833608
FLOP Count	:	100357107870	FLOP Count	:	728868623030
MOPS	:	797.835295	MOPS	:	1189.060544
MFLOPS	:	210.023245	MFLOPS	:	348.898152
VLEN	:	122.526082	VLEN	:	121.797535
V. Op. Ratio (%)	:	72.595683	V. Op. Ratio (%)	:	85.494016
Memory Size (MB)	:	320.031250	Memory Size (MB)	:	944.031250
MIPS	:	223.368420	MIPS	:	180.831375
I-Cache (sec)	:	4.295283	I-Cache (sec)	:	34.546508
O-Cache (sec)	:	56.281061	O-Cache (sec)	:	66.071962
Bank (sec)	:	0.136910	Bank (sec)	:	9.387038

Trace of preparation part in the PSAS (ana.x) using inline procedure to “dist” and “alfa” functions.

FREQUENCY	EXCLUSIVE TIME[sec](%)	AVER.TIME [msec]	MOPS	MFLOPS	V.OP RATIO	AVER. V.LEN	VECTOR TIME	I-CACHE MISS	O-CACHE MISS	BANK CONF	PROG.UNIT
177786	337.047(80.4)	1.896	959.0	280.2	78.16	121.4	55.459	0.0279	32.2946	0.0000	m_utils.mindis
24	22.138(5.3)	922.401	937.4	138.3	63.53	183.0	3.848	0.0063	1.4137	0.0000	m_insitu.m2o_mass
3	14.404(3.4)	4801.395	233.0	24.0	55.32	115.2	0.683	2.0121	4.4522	0.0058	m_insitu.insitu_prep
11033697	12.809(3.1)	0.001	247.4	84.3	0.00	0.0	0.000	0.0117	3.1985	0.0000	m_utils.inthor
3	5.667(1.4)	1889.141	1025.8	84.9	83.61	92.3	2.684	0.0005	0.0402	0.0010	m_insitu.sigpz
12	4.522(1.1)	376.817	297.8	0.0	0.00	10.0	0.000	0.0005	1.3058	0.0000	m_ods_structure.ods_reorder
3	3.780(0.9)	1260.142	352.4	0.0	1.86	255.9	0.015	0.0003	0.7742	0.0000	m_ods.ods_select
1	1.972(0.5)	1971.675	227.9	60.4	2.26	34.5	0.026	0.0097	0.2657	0.0571	m_sqc.buddy_check_
7	1.325(0.3)	189.273	445.4	0.0	0.98	254.8	0.002	0.0003	0.2477	0.0000	m_ods_structure.ods_moveup
720	1.234(0.3)	1.714	339.6	35.4	0.33	220.5	0.001	0.0000	0.2977	0.0000	index3r
11	1.125(0.3)	102.300	447.0	0.0	0.18	255.1	0.003	0.0002	0.2692	0.0000	m_ods.obs_moveup
83	1.078(0.3)	12.983	302.1	0.0	0.53	253.1	0.000	0.0000	0.1552	0.0000	indexxi
1	0.844(0.2)	844.130	1263.6	251.2	75.67	126.2	0.244	0.0119	0.1330	0.0000	m_ana2dyn.ana2m

Program information for a run with vectorization in the "mindis" subroutine.

<i>Ana.x</i>			<i>Solve.x</i>		
***** Program Information *****			***** Program Information *****		
Real Time (sec)	:	3961.313881	Real Time (sec)	:	2082.672294
User Time (sec)	:	1619.325592	User Time (sec)	:	2074.779567
Sys Time (sec)	:	8.155415	Sys Time (sec)	:	2.089580
Vector Time (sec)	:	1483.861573	Vector Time (sec)	:	495.004330
Inst. Count	:	156415293736	Inst. Count	:	377767136292
V. Inst. Count	:	45128248977	V. Inst. Count	:	17436197474
V. Element Count	:	11190586975215	V. Element Count	:	2123685922251
FLOP Count	:	1418773465071	FLOP Count	:	728868667352
MOPS	:	6979.370967	MOPS	:	1197.243746
MFLOPS	:	876.150832	MFLOPS	:	351.299328
VLEN	:	247.972993	VLEN	:	121.797538
V. Op. Ratio (%)	:	99.015322	V. Op. Ratio (%)	:	85.494022
Memory Size (MB)	:	336.031250	Memory Size (MB)	:	948.018753
MIPS	:	96.592862	MIPS	:	182.075794
I-Cache (sec)	:	3.919353	I-Cache (sec)	:	6.681784
O-Cache (sec)	:	13.457824	O-Cache (sec)	:	62.721620
Bank (sec)	:	5.431828	Bank (sec)	:	9.292578

Trace of preparation part in the PSAS (ana.x) using vectorization in the “mindis” subroutine.

FREQUENCY	EXCLUSIVE TIME[sec](%)	AVER.TIME [msec]	MOPS	MFLOPS	V.OP RATIO	AVER. V.LEN	VECTOR TIME	I-CACHE MISS	O-CACHE MISS	BANK CONF	PROG.UNIT
177786	1503.744(95.2)	8.458	7477.3	939.5	99.31	248.4	1494.332	0.0807	0.5912	10.0591	m_utils.mindis
24	22.416(1.4)	934.015	925.7	136.6	63.53	183.0	4.072	0.0035	1.5775	0.0000	m_insitu.m2o_mass
3	12.891(0.8)	4297.115	260.4	26.8	55.32	115.2	0.745	0.2390	4.1306	0.0072	m_insitu.insitu_prep
11033697	9.989(0.6)	0.001	317.3	108.1	0.00	0.0	0.000	0.0174	0.1967	0.0000	m_utils.inthor
3	5.547(0.4)	1848.953	1048.1	86.7	83.61	92.3	2.563	0.0012	0.0326	0.0010	m_insitu.sigpz
12	4.028(0.3)	335.652	334.3	0.0	0.00	10.0	0.000	0.0001	0.8119	0.0000	m_ods_structure.ods_reorder
3	3.608(0.2)	1202.554	369.3	0.0	1.86	255.9	0.008	0.0015	0.6028	0.0000	m_ods.ods_select
1	1.952(0.1)	1952.171	230.2	61.0	2.26	34.5	0.026	0.0098	0.2460	0.0679	m_sqc.buddy_check_
7	1.304(0.1)	186.249	452.6	0.0	0.98	254.8	0.002	0.0001	0.2263	0.0000	m_ods_structure.ods_moveup
720	1.150(0.1)	1.597	364.6	38.0	0.33	220.5	0.000	0.0000	0.2166	0.0000	index3r
83	1.083(0.1)	13.042	300.7	0.0	0.53	253.1	0.000	0.0000	0.1606	0.0000	indexxi
11	1.019(0.1)	92.610	493.7	0.0	0.18	255.1	0.000	0.0003	0.1630	0.0000	m_ods.obs_moveup
1	0.840(0.1)	840.287	1269.3	252.4	75.67	126.2	0.249	0.0119	0.1246	0.0000	m_ana2dyn.ana2m

Conclusion

From the informations showed above we can see the best choice to run the Regional version of PSAS that is the use of “inline” procedure to “dist” and “alfa” functions. In the vectorization case, isn't the best way because the size of vector in the subroutine.