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**The Quest for a New Solver for *EPANET 2***

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**Supplemental Data**

Tables S1-S3 contain runtime data for four-neighbor, eight-neighbor, and real-world input systems.

**SUPPLEMENTAL DATA**

Table S1: Runtimes (in Seconds) of the Generated Squared Input Systems with a Four-Neighbor Configuration

Name	n	nnz	cholmod	viennacl	pardiso	samg	cusparse	en2	hsl
square-010	99	275	$3.45 \cdot 10^{-4}$	$2.39 \cdot 10^{-3}$	$2.80 \cdot 10^{-2}$	0.13	$7.99 \cdot 10^{-2}$	$2.56 \cdot 10^{-4}$	$1.27 \cdot 10^{-3}$
square-013	167	471	$6.11 \cdot 10^{-4}$	$5.01 \cdot 10^{-3}$	$6.58 \cdot 10^{-3}$	0.11	0.12	$4.76 \cdot 10^{-4}$	$1.59 \cdot 10^{-3}$
square-016	253	721	$9.41 \cdot 10^{-4}$	$6.89 \cdot 10^{-3}$	$3.07 \cdot 10^{-3}$	0.13	0.14	$7.33 \cdot 10^{-4}$	$2.21 \cdot 10^{-3}$
square-020	396	1,141	$1.57 \cdot 10^{-3}$	$9.92 \cdot 10^{-3}$	$3.62 \cdot 10^{-3}$	0.11	0.19	$1.35 \cdot 10^{-3}$	$3.34 \cdot 10^{-3}$
square-025	618	1,791	$2.86 \cdot 10^{-3}$	$1.54 \cdot 10^{-2}$	$4.99 \cdot 10^{-2}$	0.14	0.22	$2.26 \cdot 10^{-3}$	$4.29 \cdot 10^{-3}$
square-032	1,013	2,954	$5.05 \cdot 10^{-3}$	$2.36 \cdot 10^{-2}$	$1.10 \cdot 10^{-2}$	0.16	0.30	$3.82 \cdot 10^{-3}$	$6.96 \cdot 10^{-3}$
square-040	1,584	4,642	$8.92 \cdot 10^{-3}$	$4.65 \cdot 10^{-2}$	$1.17 \cdot 10^{-2}$	0.16	0.41	$7.78 \cdot 10^{-3}$	$1.12 \cdot 10^{-2}$
square-050	2,475	7,276	$1.66 \cdot 10^{-2}$	$7.72 \cdot 10^{-2}$	$1.66 \cdot 10^{-2}$	0.17	0.53	$1.30 \cdot 10^{-2}$	$1.62 \cdot 10^{-2}$
square-063	3,929	11,582	$3.26 \cdot 10^{-2}$	0.13	$2.49 \cdot 10^{-2}$	0.19	0.73	$2.88 \cdot 10^{-2}$	$2.81 \cdot 10^{-2}$
square-079	6,178	18,253	$6.31 \cdot 10^{-2}$	0.19	$3.67 \cdot 10^{-2}$	0.22	1.18	$4.81 \cdot 10^{-2}$	$4.17 \cdot 10^{-2}$
square-100	9,900	29,313	0.11	0.32	$5.53 \cdot 10^{-2}$	0.23	1.84	0.11	$6.78 \cdot 10^{-2}$
square-126	15,717	46,594	0.22	0.49	$9.70 \cdot 10^{-2}$	0.28	2.59	0.22	0.12
square-158	24,715	73,342	0.38	0.71	0.15	0.34	3.50	0.35	0.20
square-200	39,601	117,616	0.78	1.12	0.25	0.39	4.46	0.87	0.36
square-251	62,373	185,394	1.52	2.03	0.40	0.55	6.56	1.63	0.64
square-316	98,857	293,977	3.10	3.80	0.69	0.76	9.77	3.68	1.01
square-398	156,827	466,590	6.05	6.30	1.15	1.11	11.90	7.92	1.74
square-501	248,504	739,586	11.38	9.83	1.95	1.83	16.15	15.37	3.09
square-631	394,202	1,173,539	23.23	13.80	3.19	2.87	20.50	32.65	4.95
square-794	624,164	1,858,518	49.99	23.76	5.63	4.74	30.92	73.66	9.19

**SUPPLEMENTAL DATA**

Table S2: Runtimes (in Seconds) of the Generated Squared Input Systems with an Eight-Neighbor Configuration

Name	n	nnz	cholmod	viennacl	pardiso	samg	cusparse	en2	hsl
square-010	99	433	$4.63 \cdot 10^{-4}$	$2.16 \cdot 10^{-3}$	$4.01 \cdot 10^{-2}$	0.11	$7.56 \cdot 10^{-2}$	$3.62 \cdot 10^{-4}$	$1.71 \cdot 10^{-3}$
square-013	167	751	$9.12 \cdot 10^{-4}$	$3.02 \cdot 10^{-3}$	$3.98 \cdot 10^{-3}$	0.10	0.11	$6.60 \cdot 10^{-4}$	$2.16 \cdot 10^{-3}$
square-016	253	1,162	$1.46 \cdot 10^{-3}$	$4.86 \cdot 10^{-3}$	$2.57 \cdot 10^{-2}$	0.15	0.13	$1.24 \cdot 10^{-3}$	$2.79 \cdot 10^{-3}$
square-020	396	1,849	$3.06 \cdot 10^{-3}$	$8.92 \cdot 10^{-3}$	$1.08 \cdot 10^{-2}$	0.12	0.14	$2.20 \cdot 10^{-3}$	$4.08 \cdot 10^{-3}$
square-025	618	2,917	$4.87 \cdot 10^{-3}$	$1.33 \cdot 10^{-2}$	$1.54 \cdot 10^{-2}$	0.13	0.19	$4.27 \cdot 10^{-3}$	$5.83 \cdot 10^{-3}$
square-032	1,013	4,836	$9.44 \cdot 10^{-3}$	$2.65 \cdot 10^{-2}$	$1.26 \cdot 10^{-2}$	0.14	0.27	$8.65 \cdot 10^{-3}$	$9.11 \cdot 10^{-3}$
square-040	1,584	7,631	$1.72 \cdot 10^{-2}$	$4.13 \cdot 10^{-2}$	$1.21 \cdot 10^{-2}$	0.17	0.35	$1.56 \cdot 10^{-2}$	$1.44 \cdot 10^{-2}$
square-050	2,475	11,980	$3.13 \cdot 10^{-2}$	$7.04 \cdot 10^{-2}$	$1.90 \cdot 10^{-2}$	0.18	0.51	$2.83 \cdot 10^{-2}$	$2.04 \cdot 10^{-2}$
square-063	3,929	19,114	$5.55 \cdot 10^{-2}$	0.11	$3.28 \cdot 10^{-2}$	0.20	0.66	$4.95 \cdot 10^{-2}$	$3.19 \cdot 10^{-2}$
square-079	6,180	30,189	0.11	0.16	$4.59 \cdot 10^{-2}$	0.21	0.99	0.12	$6.04 \cdot 10^{-2}$
square-100	9,900	48,522	0.23	0.30	$7.84 \cdot 10^{-2}$	0.24	1.41	0.23	0.10
square-126	15,718	77,212	0.43	0.48	0.14	0.28	2.09	0.51	0.18
square-158	24,714	121,648	0.84	0.64	0.22	0.32	3.12	0.92	0.27
square-200	39,600	195,246	1.92	1.07	0.36	0.50	4.35	2.44	0.54
square-251	62,375	307,949	3.64	2.11	0.61	0.58	6.04	4.40	0.87
square-316	98,866	488,556	6.35	3.79	1.06	0.81	8.22	8.76	1.63
square-398	156,824	775,509	15.00	5.86	1.75	1.32	11.13	22.17	2.53
square-501	248,506	1,229,708	31.60	10.17	3.26	2.19	15.57	47.23	5.18
square-631	394,196	1,951,573	64.16	13.73	5.44	3.25	19.39	97.38	8.58
square-794	624,160	3,091,263	55.53	26.60	9.13	5.40	28.09	210.92	13.92

**SUPPLEMENTAL DATA**

Table S3: Runtimes (in Seconds) of the Real-World Input Systems

Name	n	nnz	cholmod	viennacl	pardiso	samg	cusparse	en2	hsl
01-towng2	127	281	2.98e-4	4.36e-3	8.21e-3	0.12	0.11	2.25e-4	1.18e-3
02-bwsn1	126	287	2.90e-4	4.09e-3	2.73e-2	0.13	0.13	2.05e-4	1.20e-3
03-dtown	399	850	8.08e-4	5.74e-2	5.77e-3	0.14	0	6.13e-4	2.48e-3
04-towng1	453	1,040	1.07e-3	2.57e-2	1.34e-2	0.12	0	7.93e-4	2.50e-3
05-townh	798	1,682	1.53e-3	2.54e-1	5.07e-2	0.14	0	1.19e-3	3.99e-3
06-richmond	865	1,808	1.53e-3	0	7.21e-3	0.14	0	1.03e-3	3.69e-3
07-wolf	1,782	3,770	3.53e-3	1.27e-1	1.26e-2	0.18	0.46	2.28e-3	8.29e-3
08-exnet	1,891	4,306	4.35e-3	5.64e-1	1.30e-2	0.23	1.11	2.98e-3	8.62e-3
09-run1911	5,118	11,865	1.27e-2	1.87e-1	2.25e-2	0.20	1.04	8.76e-3	2.16e-2
10-town	7,128	14,683	1.41e-2	0	2.58e-2	0.29	0	9.37e-3	2.69e-2
11-bwsn2	12,523	26,839	2.60e-2	0	4.46e-2	0.34	0	1.75e-2	4.82e-2
11-vibk	12,377	25,376	2.51e-2	0	4.70e-2	0.43	0	2.01e-2	4.37e-2
12-bwsn2	12,523	26,839	2.61e-2	0	4.59e-2	0.32	0	1.80e-2	4.80e-2
13-vtirol	82,079	166,363	1.93e-1	0	2.24e-1	1.43	0	1.36e-1	3.48e-1