Experiment 1: Scalability with Number of # of threadss (Mops)						
Balanced workloads						
Facebook						
threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	680270	1496288	901872	896328	736256	594305	901528
16	7752602	11755955	6536813	9697846	7601358	7187420	1.15E+07
32	10209397	12911404	6907886	18222193	12823356	13353083	1.86E+07
48	10340802	14140709	8570784	19918406	17133745	19247034	2.51E+07
64	10341325	16121905	9322970	23087801	22356990	24714094	2.79E+07
80	10159264	15379787	9509680	22067836	21703313	20597843	2.62E+07
96	10400108	15122312	9617145	21514462	18740812	20810482	2.71E+07
112	10157883	14270821	9522061	22154322	18453135	20928052	2.66E+07
128	10119727	13672075	11159347	21428578	19515676	20965225	2.63E+07
Genome						
threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	678568	1898130	943106	737712	825682	595924	1.01E+06
16	7781488	18415075	6448812	8548633	8343872	7555190	1.22E+07
32	10458058	23281376	7209206	15275841	14656720	14305172	1.91E+07
48	10309799	28247448	8077935	19147289	18143599	19707693	2.40E+07
64	10192047	31403431	9399407	17198211	22937945	25022772	3.06E+07
80	10040628	23439674	9805650	17172890	21952376	21816108	2.74E+07
96	10251777	15060405	9637230	17767023	21070625	21573695	2.96E+07
112	10125161	10048546	9189427	18831534	19162181	21259875	2.70E+07
128	10374453	7324896	9817461	17166463	21204868	21031432	2.70E+07
Gnomad						
threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	673811	2004105	1079494	1198803	822846	602920	1.02E+06
16	8108423	18551718	6400800	10530667	7258588	7356793	1.16E+07
32	10466954	23296490	8049811	18267291	13514933	14091118	1.85E+07
48	10564554	28291172	8221660	24163448	16961457	19796197	2.46E+07
64	10388013	31407016	9422331	24136499	21191514	25242069	3.06E+07
80	10055818	15496161	9179183	23695156	19682027	21395157	2.73E+07
96	10214966	11169709	10117332	22394315	21101134	21843903	2.51E+07
112	10418747	7252632	9685884	25386123	17776897	20799655	2.70E+07
128	8938529	6230484	9413416	25495203	19010559	20854106	2.74E+07
OSM						
threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	681059	1579620	882252	1127985	743647	594952	980725
16	8137465	13508525	6515296	9990728	7933896	7124266	1.21E+07
32	10347351	16470766	7740533	18221310	13523109	13241669	1.93E+07
48	10745827	18320806	8135274	19999711	16007420	18755543	2.48E+07
64	9164833	19896868	10851624	20434903	22795897	24558978	2.67E+07
80	10484095	18824686	9656480	14909249	22388295	21461250	2.61E+07
96	10105155	17555532	9472769	14511926	21902607	20877925	2.69E+07
112	10371115	15470707	9671384	12070004	22071028	20964134	2.71E+07
128	9801968	11990156	11081614	10311489	21075774	20504982	2.82E+07
Planet						
threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	717982	1802777	884157	1332146	985898	593900	1.00E+06
16	7829658	14700238	5830690	14929634	7817721	7433968	1.17E+07
32	10445650	18817285	6961835	23176968	12357336	14099276	1.87E+07
48	9799068	20893891	7982858	28163809	16347342	18961451	2.59E+07
64	10148262	22924276	10508900	33637330	22263737	24709294	3.09E+07
80	9862697	18527264	10814438	31951574	23361817	21777846	2.84E+07
96	10222611	16077841	10987591	33300183	22624661	21769662	2.73E+07
112	9898623	11853913	9613131	33230865	22154801	21168273	2.74E+07
128	9834220	8622710	11160290	30148630	20142008	20696885	2.70E+07

Amazon	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	630843	2886510	957267	758754	867362	604247	1.04E+06

threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
16	8110838	23677941	6689568	8325504	8231652	7561515	1.19E+07
32	10314989	32986036	7256210	16002020	13821865	13946995	1.99E+07
48	10516923	39724477	9477841	16355945	19607128	19523842	2.53E+07
64	10311018	41463567	9547586	21642404	19616578	25319448	2.95E+07
80	10118777	19453417	9731383	19679783	21034063	21977679	2.84E+07
96	10232721	9826224	9735603	25955473	19163077	22033563	2.73E+07
112	10213878	7182901	9705779	20307472	18801084	21412830	2.53E+07
128	9998882	6084578	9674321	18032276	17667324	21034076	2.65E+07

Write-only workloads

Facebook

threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	635674	1076048	629599	586539	605132	495738	843673
16	6775275	7602732	4696917	6437543	6123285	6186027	1.03E+07
32	6540732	8869073	5260363	14045799	11504457	11352436	1.52E+07
48	7514004	10254216	5369994	14794983	14915240	16502998	2.10E+07
64	7385394	11673561	5782630	18570303	18339790	21258510	2.51E+07
80	7287348	11297629	6100862	17960516	16773310	18323213	2.32E+07
96	7337022	10954680	5978560	17868017	16846562	18868702	2.21E+07
112	7072979	10345442	7157314	15704266	15806141	18290935	2.30E+07
128	7629762	9912051	6623821	16159905	15334966	18062441	2.38E+07

Genome

threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	626749	1260874	646946	433109	650658	498813	851270
16	6967923	10891343	4616451	5802941	6677526	6300533	9.73E+06
32	7689079	15048635	4703602	12265980	12046738	11925502	1.54E+07
48	7386659	18655328	6191206	14441912	14937771	16688629	2.06E+07
64	7445974	21468723	5678982	12607500	19838119	21353525	2.51E+07
80	7048817	13035047	6006492	15478127	20000312	19113348	2.33E+07
96	7050980	7633111	6002595	15751067	18260939	19056866	2.27E+07
112	7202499	6055690	6969150	14735841	18024134	18456434	2.25E+07
128	7531856	4890087	7215448	13101511	17435401	17965593	2.11E+07

Gnomad

threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	633156	1274973	726879	801379	637931	504861	860803
16	6740869	11568506	4424594	9210423	6130769	6173057	9.57E+06
32	7543651	15478135	5656790	13805259	11224288	12113835	1.68E+07
48	7625726	18062525	5048142	19684644	14640809	16552529	2.14E+07
64	7366160	15194651	5853193	25418184	18664261	21492884	2.53E+07
80	7362072	7142742	5894799	18728274	17920539	19556219	2.33E+07
96	7317384	5552863	6832067	19660321	15531671	18914390	2.11E+07
112	7044889	4167489	6373753	17846501	15896900	18482726	2.38E+07
128	7632383	3664003	6921228	19694566	14951266	18271371	2.36E+07

OSM

threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	614588	1099184	627524	739225	617796	501161	763547
16	6764847	9122483	4451765	8639479	6495588	6129562	9.50E+06
32	7567638	10677913	4815594	11886241	11310963	11640843	1.47E+07
48	7420395	11981581	5289327	12615189	15268655	16195960	2.15E+07
64	7230582	13774117	6433329	15200410	19376393	20952829	2.50E+07
80	7319798	13182588	6093291	11239475	19825974	18514102	2.12E+07
96	7395727	12774710	6007905	7768585	19224933	18322499	2.18E+07
112	7091746	10839696	6444122	9536514	18192770	18216683	2.30E+07
128	7211459	8341794	5801207	7372756	18595000	17968515	2.40E+07

Planet

threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	678466	1209333	628221	891084	760313	498087	845226
16	6862312	9829876	4303998	11684037	6429580	6290853	9.37E+06
32	7607621	12830847	4861170	21190989	10663579	11869233	1.59E+07
48	7627735	14562732	6226318	25180038	13023603	16539713	2.04E+07
64	7324167	16052571	5618141	28625728	18688500	21505749	2.49E+07

80	7230549	12951744	6384348	26075818	19798540	18838531	2.31E+07
96	7248310	9843049	5947521	26620695	19150449	18514585	2.31E+07
112	7202629	6940164	5426303	25399093	19335389	18039062	2.30E+07
128	7304693	5790868	5551063	25019236	17978406	17941934	2.29E+07

Amazon threads	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
1	643004	1804977	676410	546075	636856	506035	864009
16	7091329	14361723	4617943	7011900	6829965	6323080	9.76E+06
32	7721553	22174915	4979974	13654661	12020653	11745817	1.47E+07
48	7333582	26548145	5251572	15930985	16202887	16969589	2.10E+07
64	7394740	29637226	6466750	16834806	17227626	21038367	2.50E+07
80	7321189	11800767	5690354	15088137	17573748	19131534	2.33E+07
96	7287757	5585800	6153632	23234068	16320263	18957795	2.23E+07
112	7273397	4003670	6934588	18386319	15409114	18406849	2.33E+07
128	7415505	3720946	6877506	14999056	14992962	18218865	2.28E+07

Experiment 2: Performace with skewed workloads (Mops)

Under a known distribution

Datasets	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
Facebook	7150050	4149398	5710318	21387406	6573013	81701	2.43E+07
Genome	7451826	9898691	5930006	23776366	6040256	89283	2.40E+07
Gnomad	7270108	6009571	5991454	35291521	6216795	72668	2.45E+07
OSM	7359815	18290965	5797957	7195483	5292802	77859	2.51E+07
Planet	7248917	10490457	6692782	26632864	7274354	89910	2.28E+07
Amazon	7344295	28417405	6539808	28872380	8689870	71430	2.34E+07

Under an unknown distribution

Datasets	Masstree	ALEX+	LIPP+	SALI	XIndex	SRIndex
Facebook	7256406	8862455	3824905	1788339	4857921	2.49E+07
Genome	7213369	10020551	3499049	2041073	4298532	2.28E+07
Gnomad	7201360	5307562	3699674	3173362	4362737	2.38E+07
OSM	7313132	20629857	3729064	4854224	6158501	2.46E+07
Planet	7311864	17040606	3446452	3139833	5634504	2.51E+07
Amazon	7400556	10254201	3695262	4678675	6514277	2.54E+07

Experiment 3: Change as Shifting Data Distributions

X to Y	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
Amazon~Facebook	-0.01	-0.57	-0.19	0.1	0.14	-0.05	-0.07
Facebook~Amazon	0	0.53	0.17	0.14	0.02	-0.11	-0.07
Amazon~Planet	0.01	-0.33	-0.08	0.41	0.01	0.01	-0.06
Planet~Amazon	0.02	0.51	0.03	-0.19	0.02	-0.08	0.03
Amazon~Genome	-0.03	-0.47	-0.23	-0.02	0.03	-0.05	-0.05
Genome~Amazon	-0.04	0.29	0.17	0.29	-0.02	-0.73	-0.03
Facebook~Planet	-0.03	0.42	0.13	0.29	0.08	-0.11	-0.05
Planet~Facebook	0.07	0	0.2	-0.19	0.06	-0.07	-0.06
Facebook~Genome	0.02	0.49	0.12	-0.14	0.05	-0.08	-0.05
Genome~Facebook	0	-0.36	-0.01	0.18	-0.01	-0.14	-0.08
Planet~Genome	0.23	0.98	-0.01	-0.29	0.14	0.06	0
Genome~Planet	-0.03	-0.23	0.09	0.4	-0.01	-0.9	0.02

Experiment 4: Tail latency (µs)

p99 of tail latency (balanced workload)

Datasets	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
Facebook	244957	37995.5	105865	55216.7	29835.2	12052.6	7899.59
Genome	267329	43821.3	21556.4	59935.9	54980	11422	8269.13
Gnomad	250085	74941.9	23526.2	16378.2	28827.3	11511.1	8967.09
OSM	263599	38123.4	24966.4	207527	34309	11143.5	7372.55
Planet	257515	45811.9	43959.7	35059.4	49038.4	11130.6	7938.67
Amazon	245535	67140.2	91546.9	33889.5	29566.2	11185.5	8341.12

p99 of tail latency (write-only workload)

Datasets	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
Facebook	271676	71979.3	168364	113211	54017.2	15825.3	6878.04
Genome	271488	79106.9	51539.7	109932	52691.1	16189.7	8684.52
Gnomad	273236	143365	40287	39396.3	34843.1	15678.8	6948.56
OSM	273783	73963.9	78154.1	253784	46050.6	15470.3	7664.46
Planet	277824	85488.3	44220.8	64279.8	39789.7	15484.1	6819.21
Amazon	269979	107669	119358	101131	61697	15142.9	6928.71
p99.9 of tail latency (balanced workload)							
Datasets	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
Facebook	468827	203664	303650	242626	236525	48223.1	12115.4
Genome	527404	376088	36977.2	198146	332387	44366.9	12693.5
Gnomad	485708	680535	42100.7	89079.8	228883	45577.5	14109.2
OSM	514814	236295	49572.5	2.00E+06	257627	42243.9	11115.4
Planet	503446	328740	101951	198614	311844	41981.7	10328.7
Amazon	469056	640623	206572	132065	240748	43221	12977.2
p99.9 of tail latency (write-only workload)							
Datasets	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
Facebook	455542	303472	451281	364659	364681	50683.5	10744.2
Genome	455141	594408	113718	356990	344698	53463.9	14196.5
Gnomad	456590	1.19E+06	84772.9	166325	275243	49366.8	10294
OSM	459872	380426	154608	2.33E+06	305509	47726.9	11956
Planet	472216	558638	107060	295025	297632	47817.5	10217.4
Amazon	451375	1031000	246707	241663	397168	44847.5	10811.3

Experiment 5: Index overhead (GB)							
With different amount of KVs							
# of KVs (M)	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
100	3.86	16.59	2.17	18.31	3.86	5.23	1.95
120	4.64	23.11	2.65	21.85	4.45	6.49	2.41
140	5.41	26.91	3	26.62	5.02	7.66	2.86
160	6.18	29.89	3.54	29.17	5.5	8.76	3.31
180	6.95	32.91	3.89	32.65	6	9.77	3.77
200	7.73	37.17	4.34	36.96	6.4	10.73	4.22
Under different datasets (100 millions KVs)							
Datasets	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
Facebook	3.86	19.03	2.24	20.12	3.87	5.23	1.95
Genome	3.86	14.58	2.2	20.42	3.74	5.23	1.95
Gnomad	3.86	13.8	2.18	16.92	3.47	5.23	1.95
OSM	3.86	14.58	2.23	20.29	3.82	5.23	1.95
Planet	3.86	14.39	2.21	17.86	3.76	5.23	1.95
Amazon	3.86	16.59	2.17	18.31	3.86	5.23	1.95

Experiment 6: peformace with range query (Mops)							
Range query with different scan size							
scan size	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
50	8278040	20860063	3674626	3460010	8498011	7924135	1.66E+07
100	5209532	13972502	2104253	1829795	5684764	4584965	1.22E+07
150	3670679	11484824	1408319	1366705	4313861	3262093	1.01E+07
200	2818503	8947610	1131035	1046465	3399032	2582260	8.39E+06
250	2303092	7922612	912606	957828	2749508	2142044	7.23E+06
300	1953851	6968188	811150	807261	2456828	1895719	6.28E+06
Rang query with differnt datasets (scan size = 300)							
Datasets	Masstree	ALEX+	LIPP+	SALI	XIndex	FINEdex	SRIndex
Facebook	1952483	6580018	931432	698896	2241471	1826313	6.26E+06
Genome	1951738	7179948	810831	686961	2084589	1884345	6.36E+06
Gnomad	1926609	6845498	811955	865679	2341549	1891440	6.50E+06
OSM	1966312	6918289	1153008	797788	1784127	1820723	6.37E+06
Planet	1954598	6347974	1094128	854976	2071394	1866187	6.37E+06
Amazon	1953851	6968188	811150	807261	2456828	1895719	6.28E+06

Experiment 7: Analysis of SRIndex						
Write-only workloads (Mops)						
Datasets	Buffer capacity = 2048	1024	512	256	128	64
Facebook	2.12E+07	2.43E+07	2.31E+07	2.09E+07	2.13E+07	1.94E+07
Genome	2.08E+07	2.43E+07	2.30E+07	2.27E+07	2.10E+07	1.95E+07
Gnomad	2.03E+07	2.37E+07	2.14E+07	2.36E+07	2.18E+07	2.10E+07
OSM	2.14E+07	2.36E+07	2.31E+07	2.25E+07	2.18E+07	1.96E+07
Planet	1.97E+07	2.36E+07	2.31E+07	2.36E+07	2.12E+07	1.98E+07
Amazon	1.98E+07	2.34E+07	2.30E+07	2.41E+07	1.99E+07	2.09E+07
Structure data (without asynchronous thread)						
Buffer capacity	number of leaf node		# of internal node		average depth in transition layer	
128	3484942		1160345		4.95	
256	1084843		360312		4.1	
512	996421		330838		4	
1024	253591		83228		3.02	
2048	250000		82031		3	

Retrains times (s)		
Buffer capacity	100M	200M
128	104.73	122.63
256	103.82	121.78
512	24.26	104.24
1024	22.49	22.84
2048	4.18	22.38