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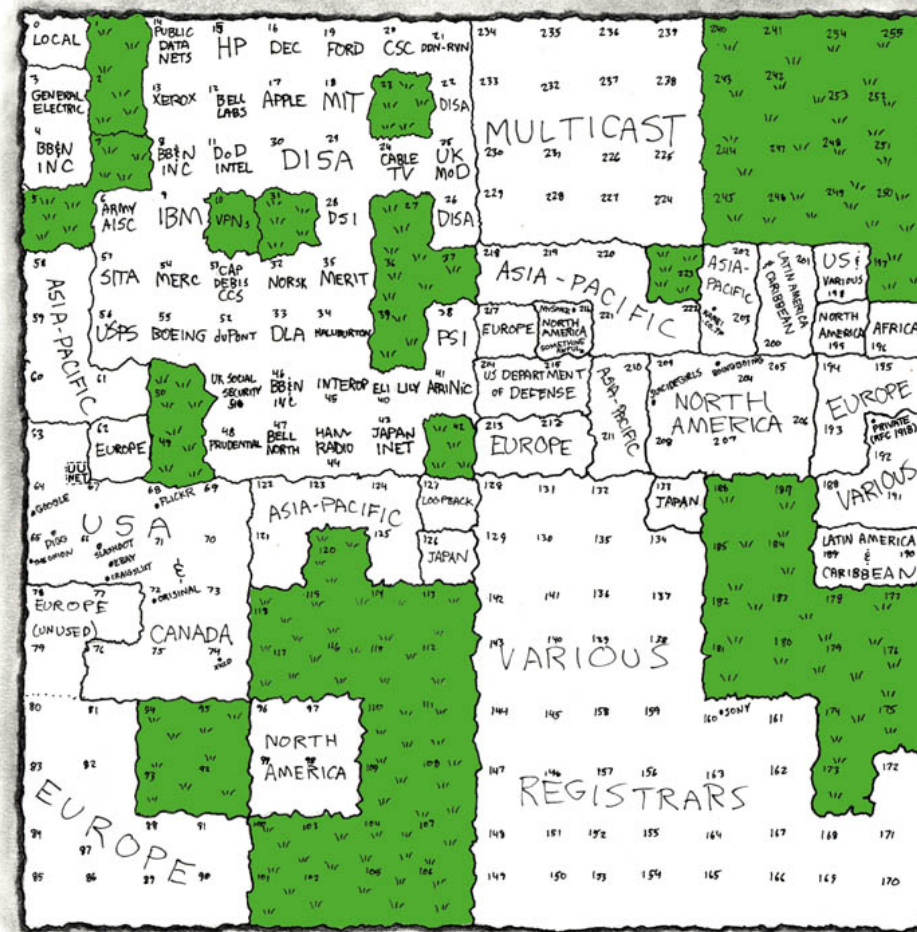
# IPv4 Heatmaps

Duane Wessels  
The Measurement Factory/CAIDA

NANOG 41  
October 16, 2007

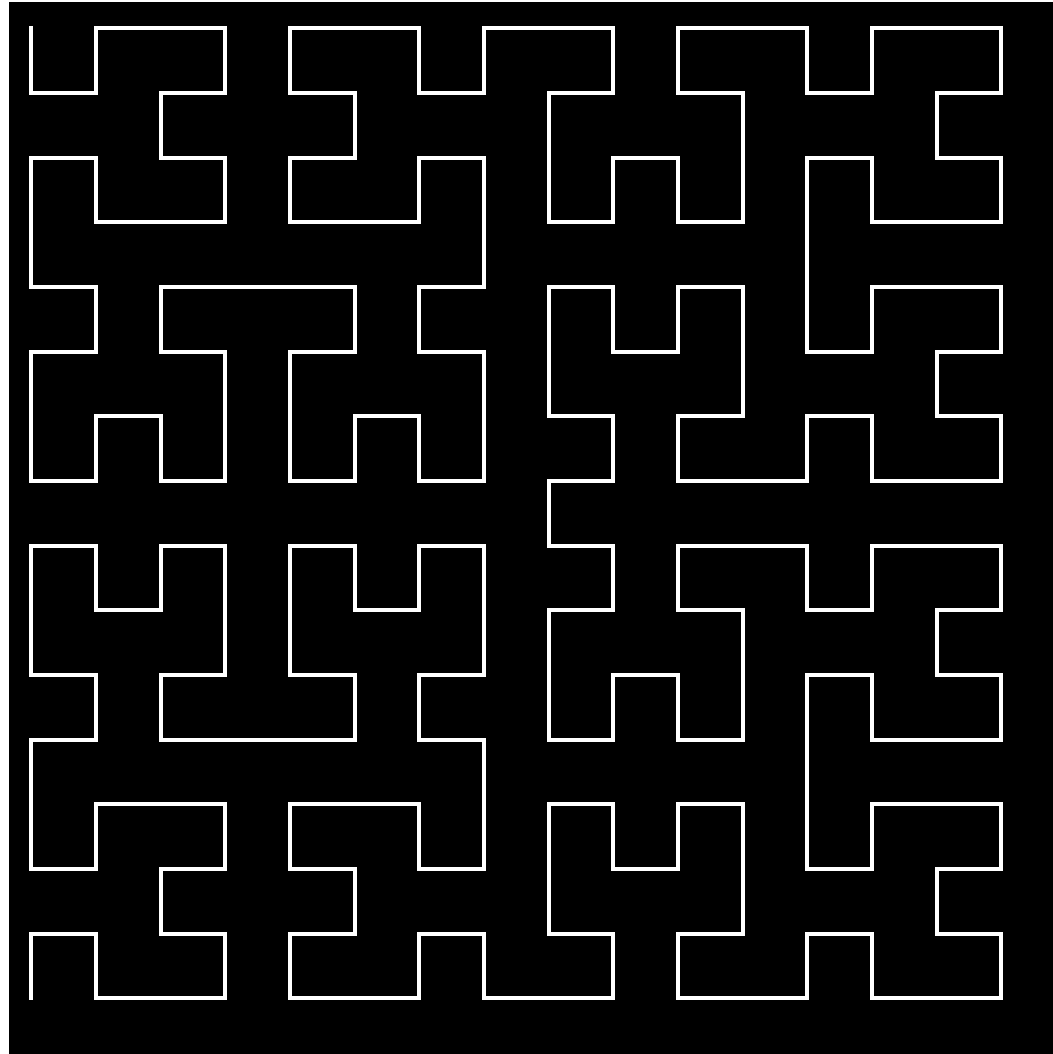
<http://xkcd.com/195/>

# MAP OF THE INTERNET



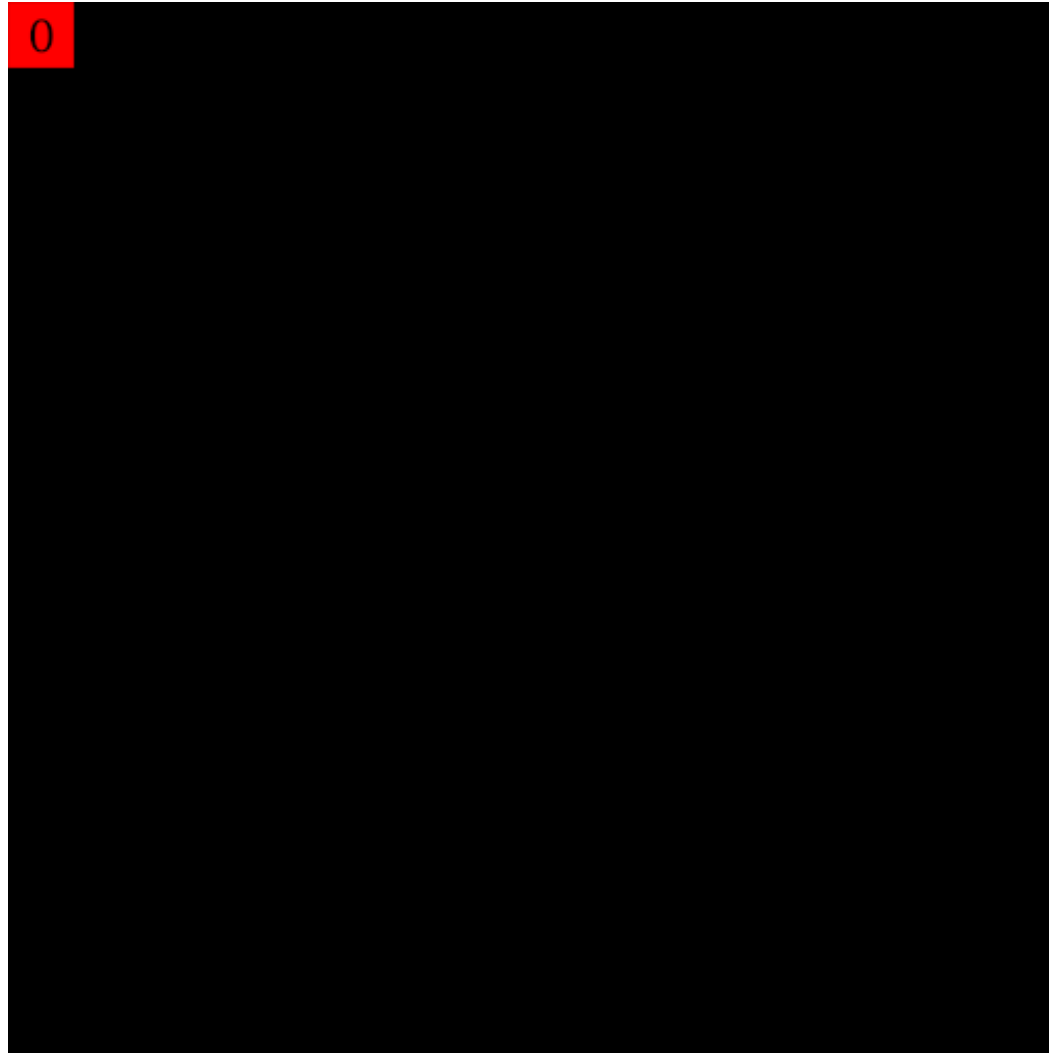
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## Hilbert Curve, 4th Order



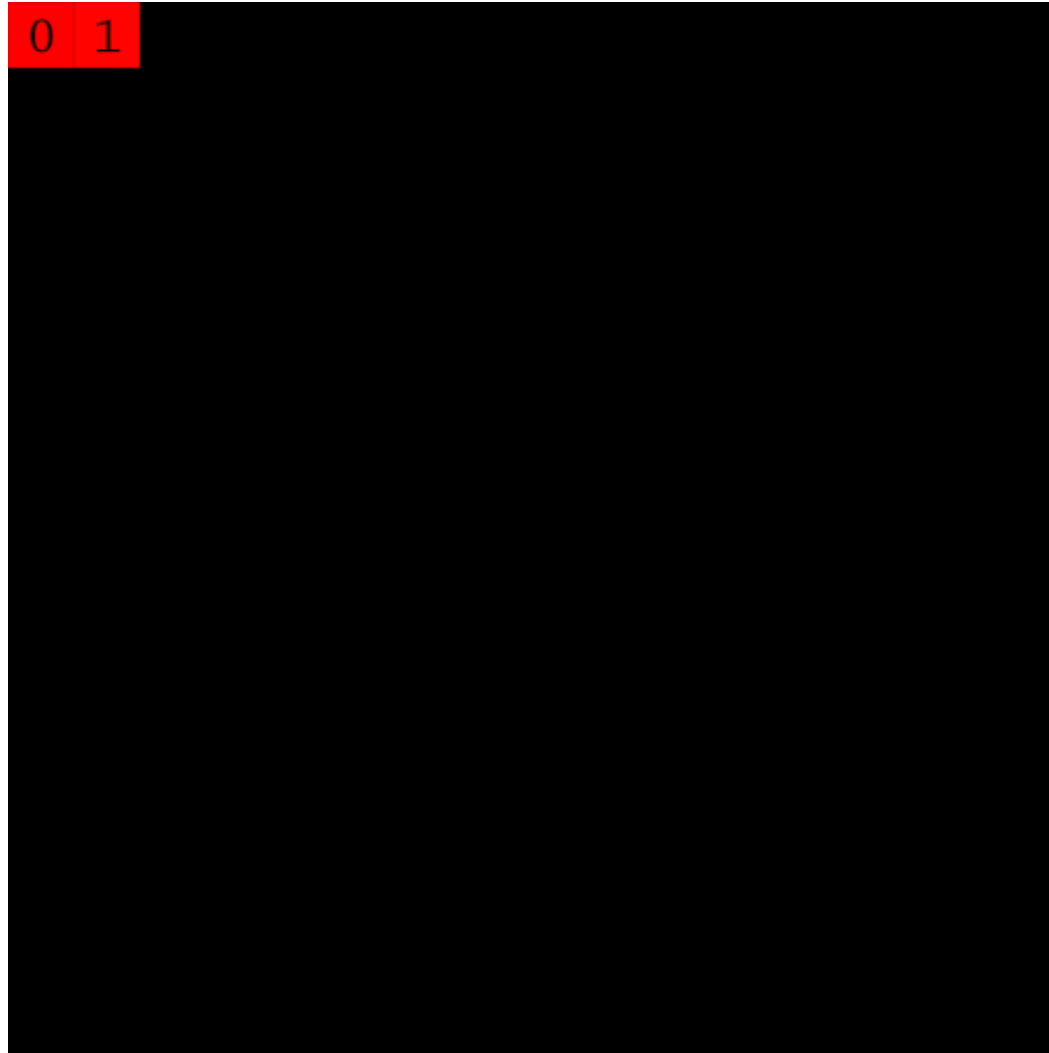
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# Hilbert Curve



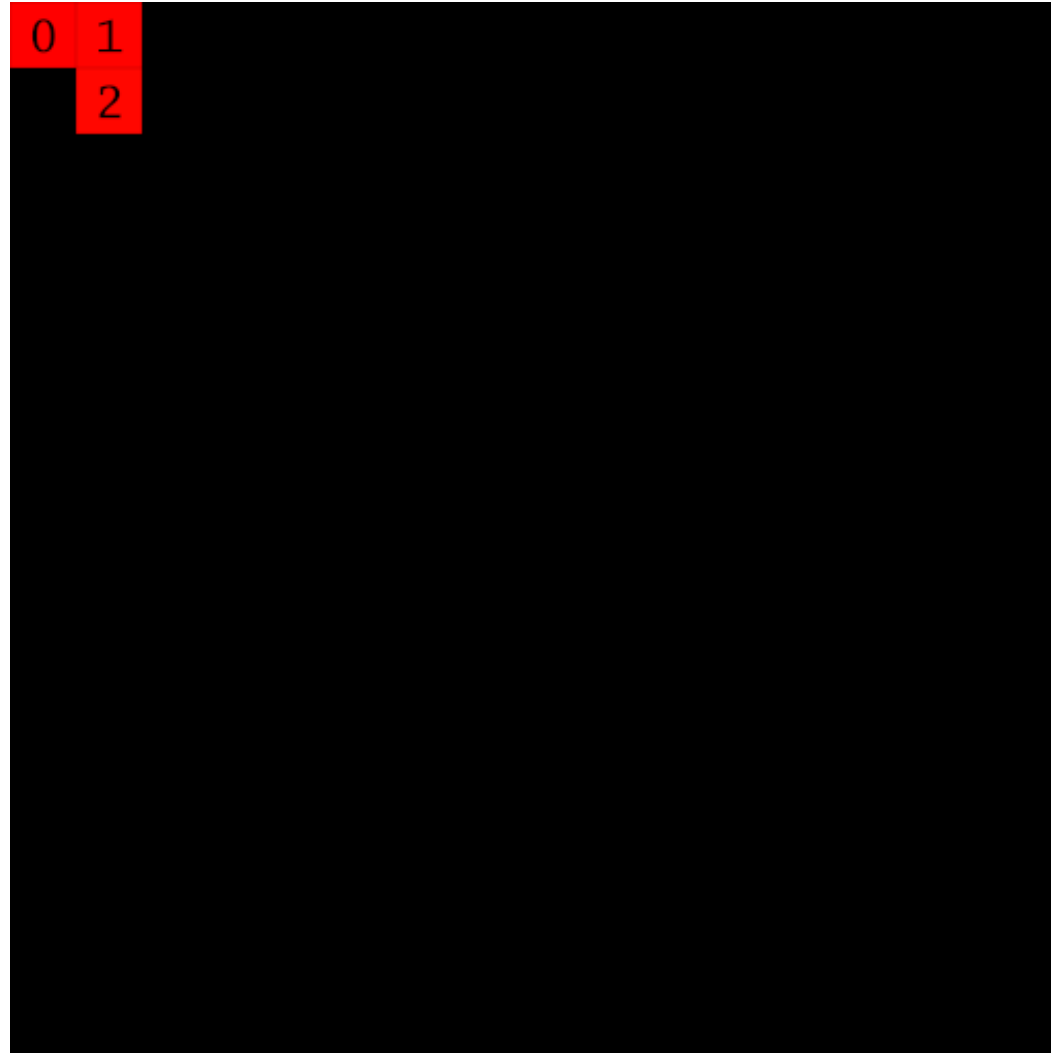
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# Hilbert Curve



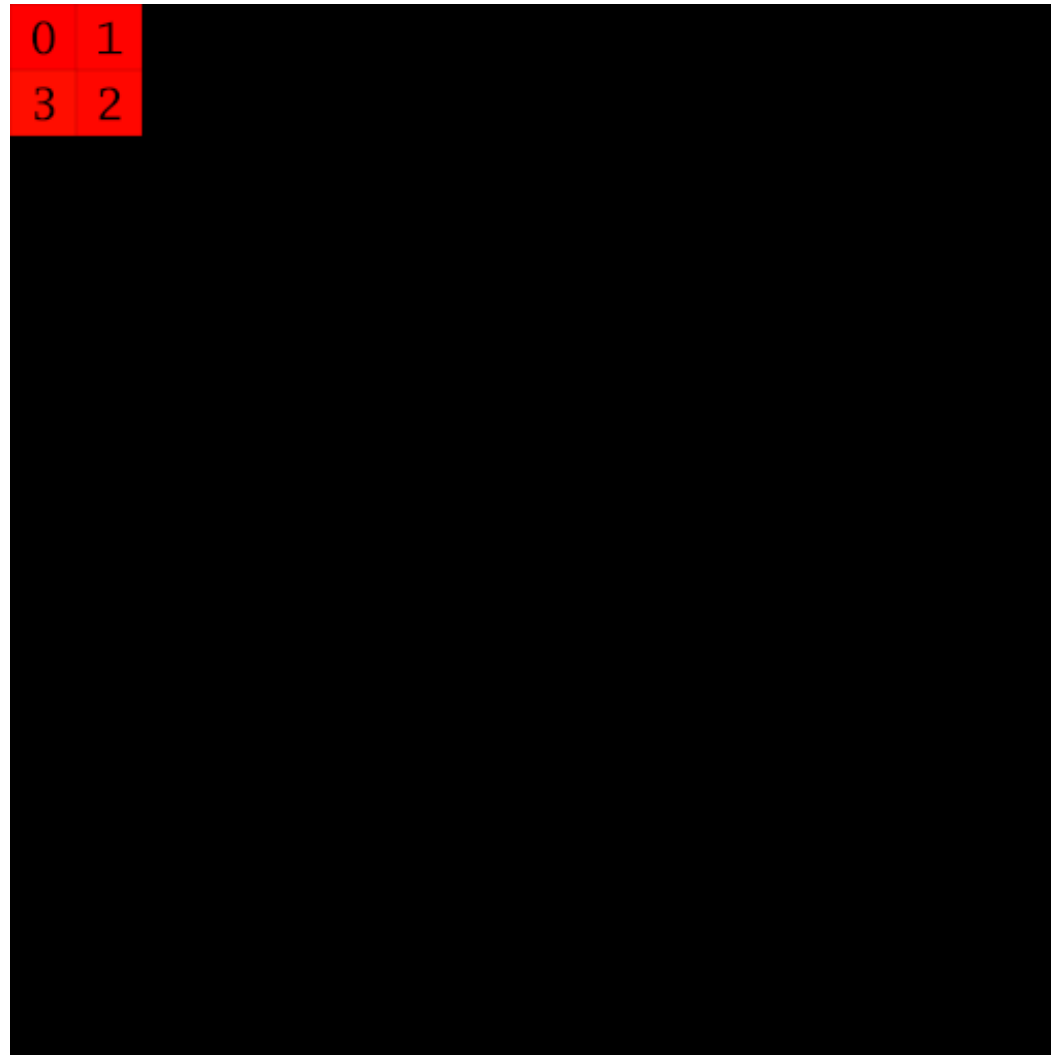
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# Hilbert Curve



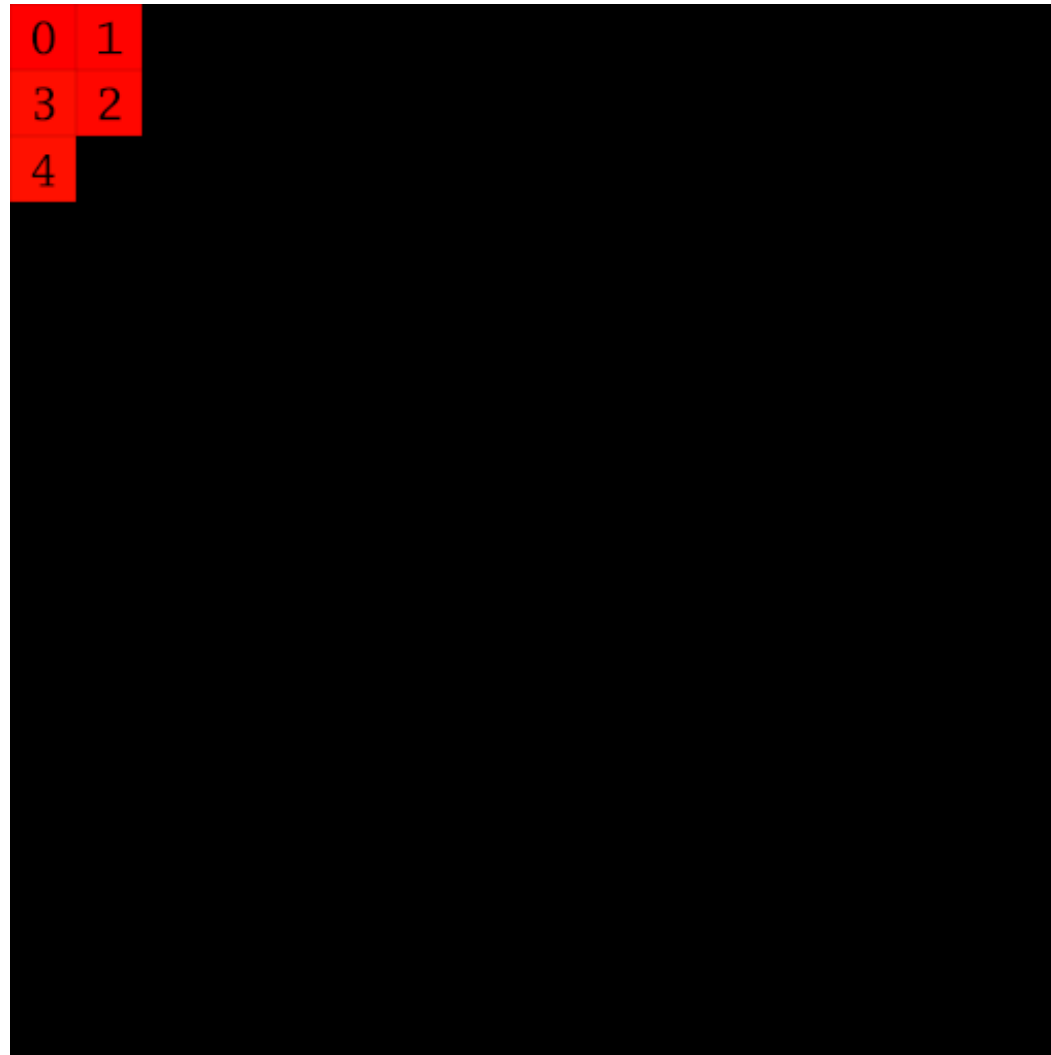
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# Hilbert Curve



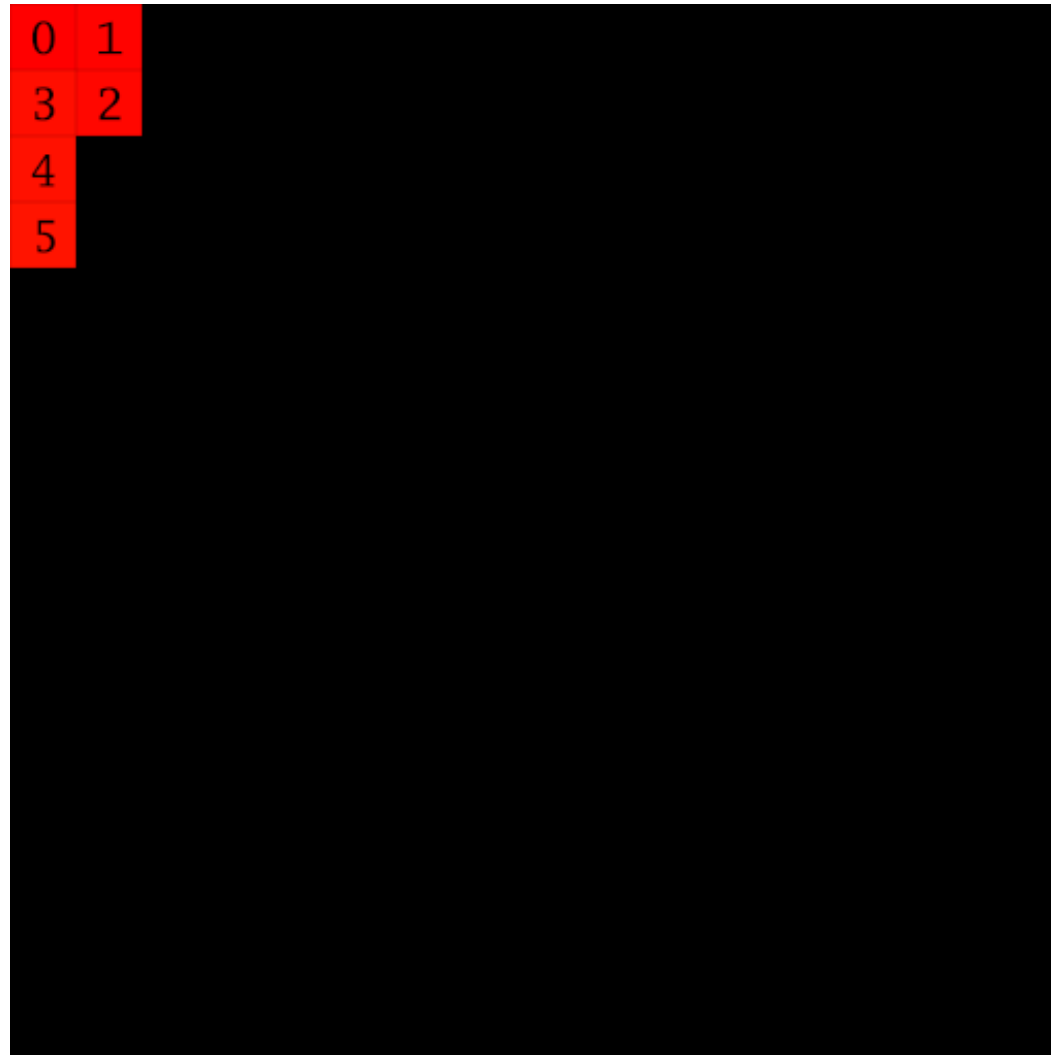
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# Hilbert Curve



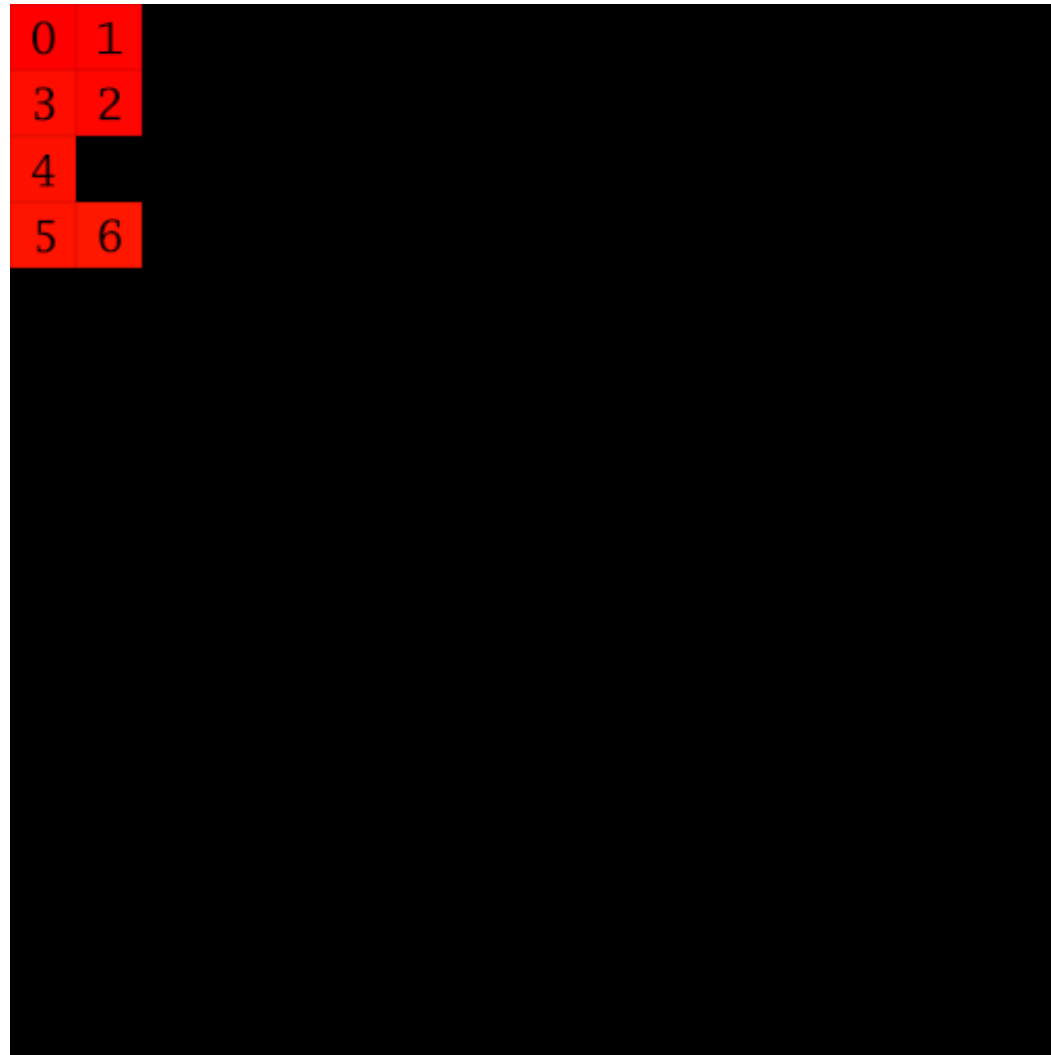
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# Hilbert Curve



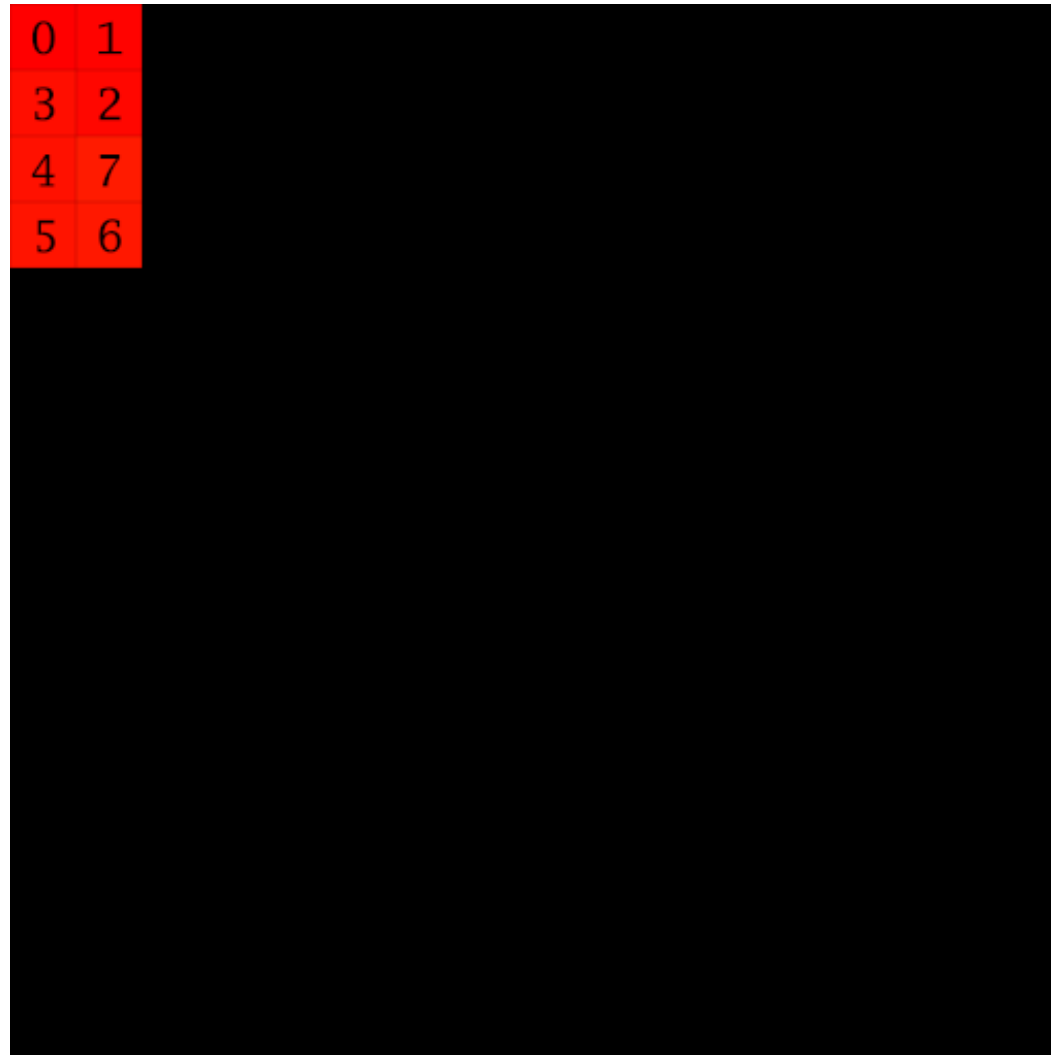
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# Hilbert Curve



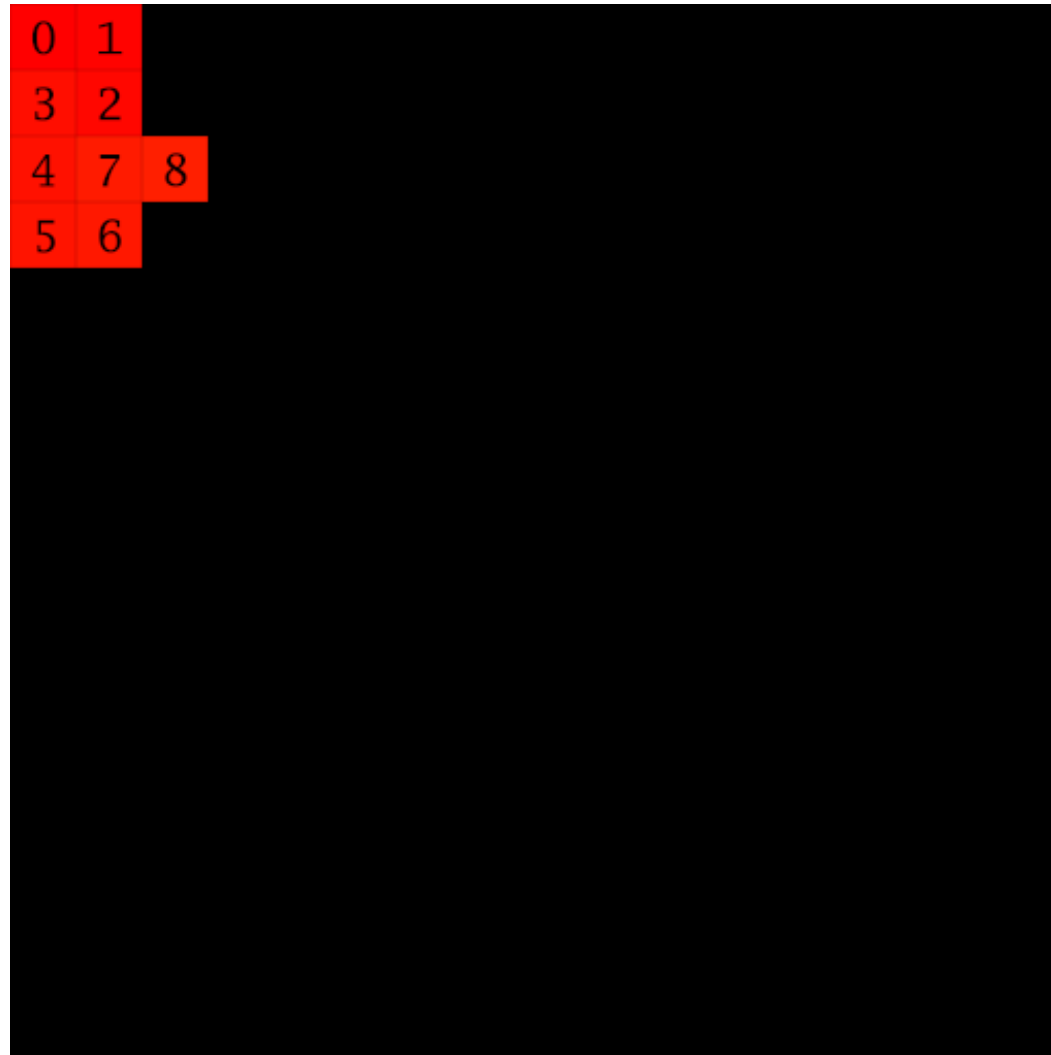
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## Hilbert Curve



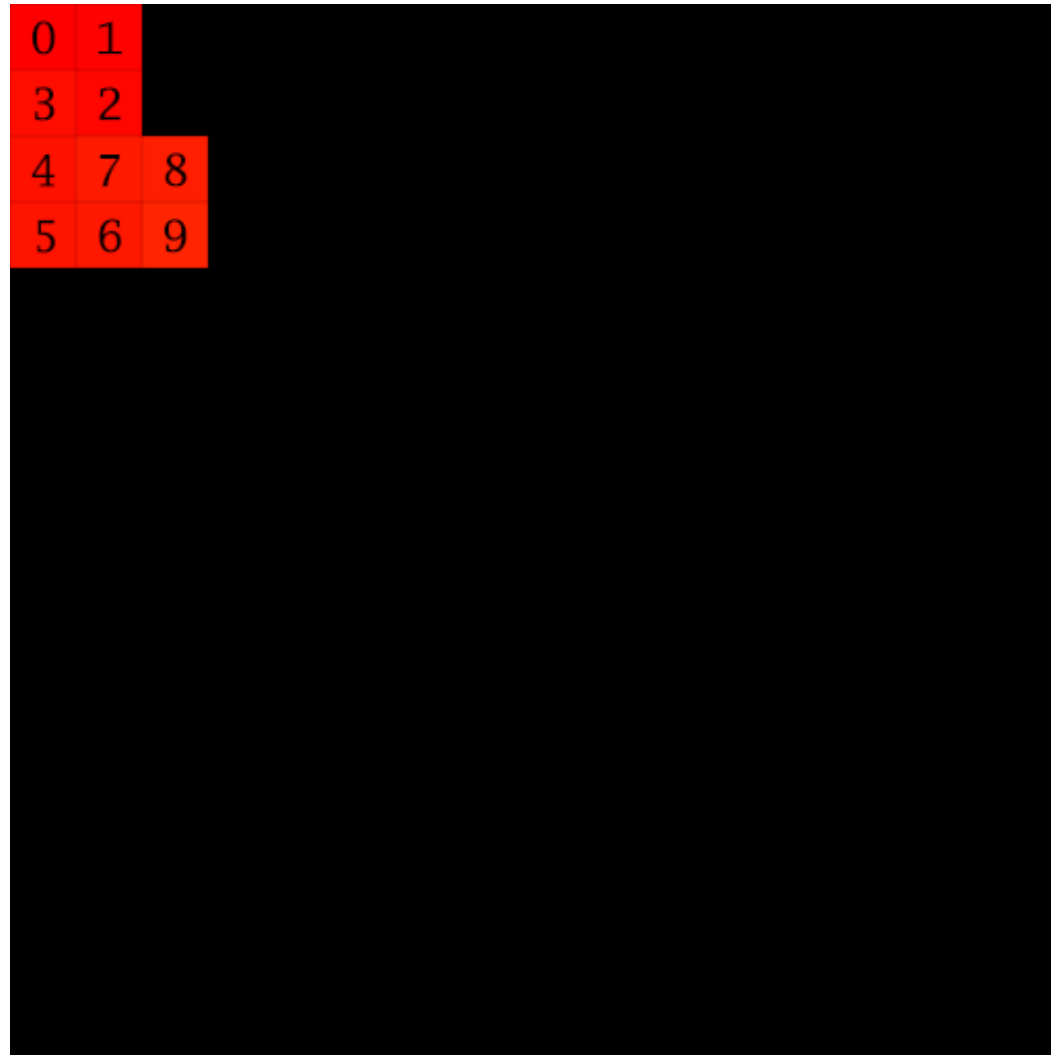
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## Hilbert Curve



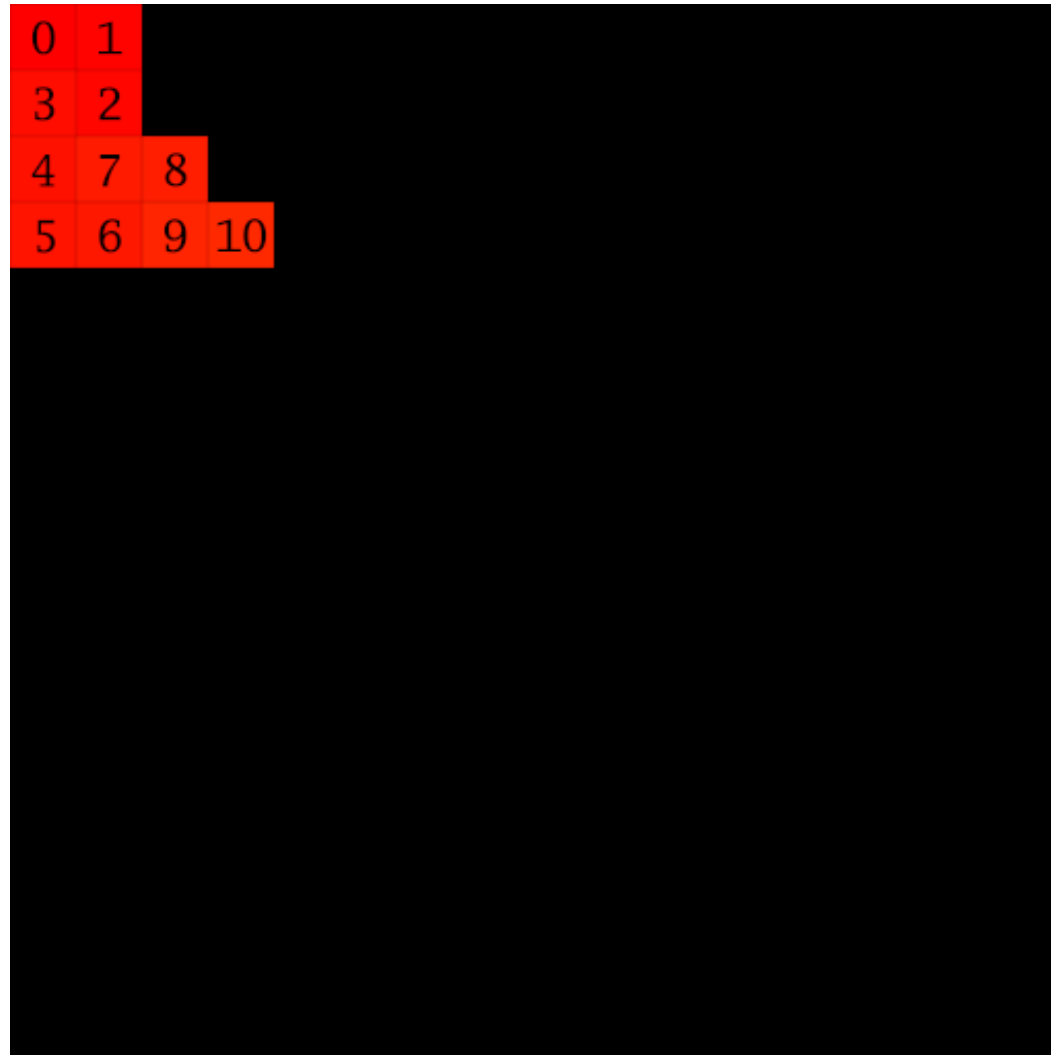
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# Hilbert Curve



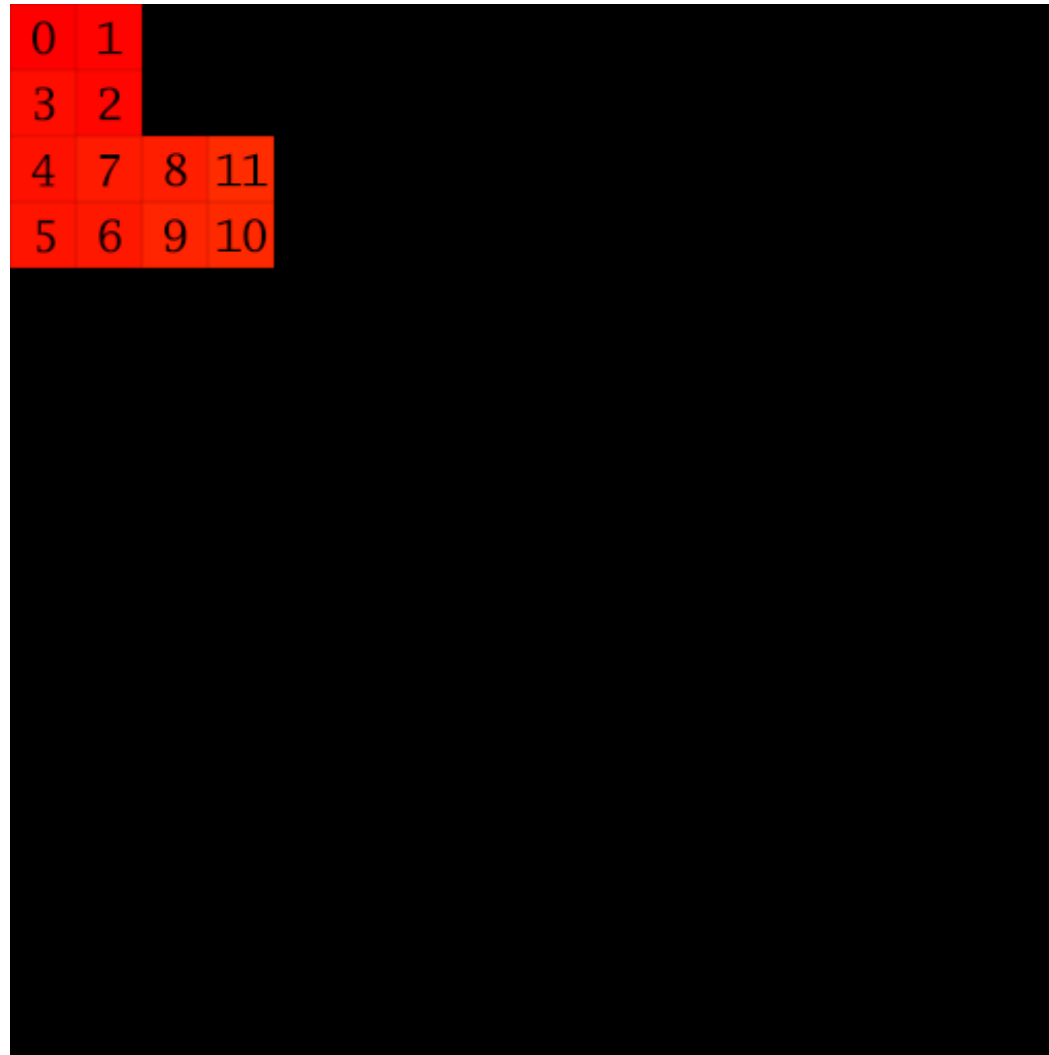
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## Hilbert Curve



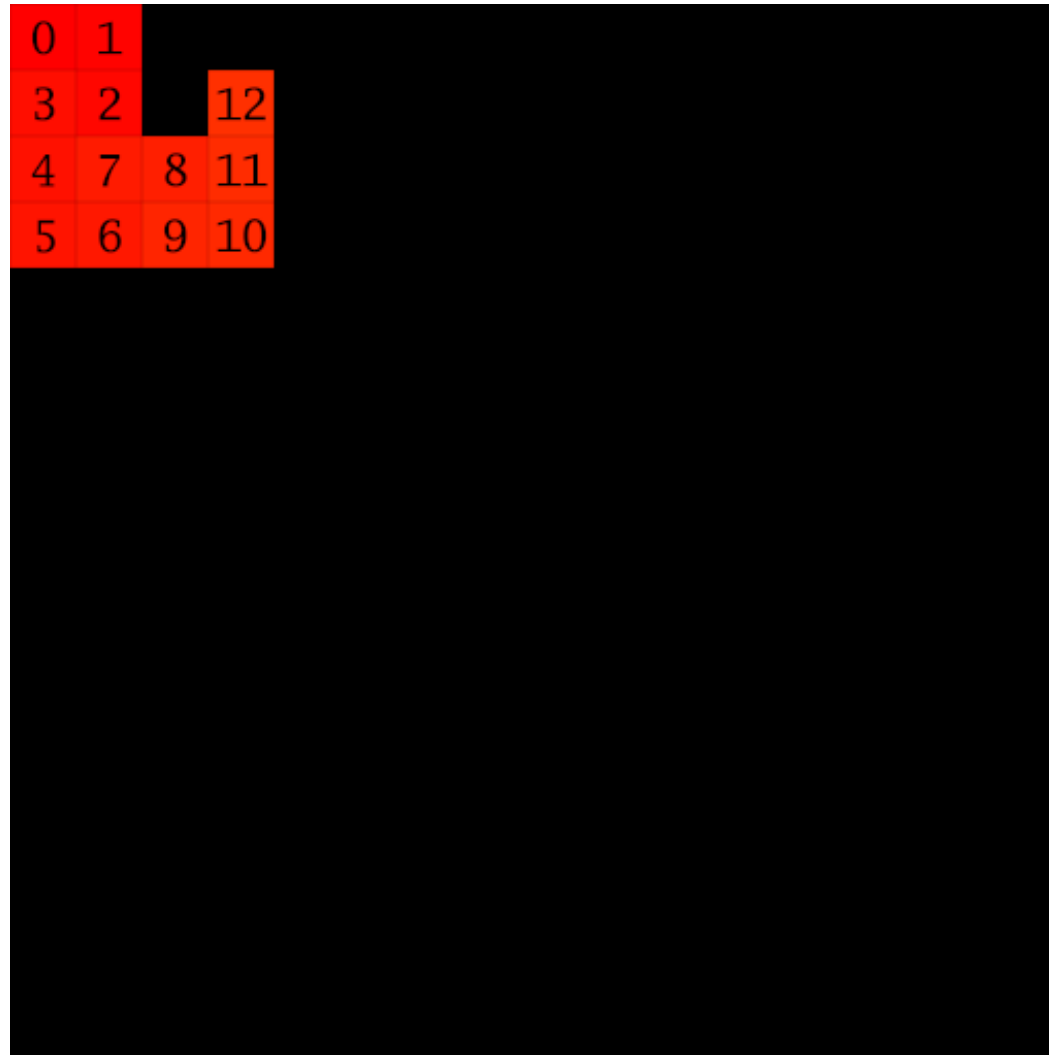
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## Hilbert Curve



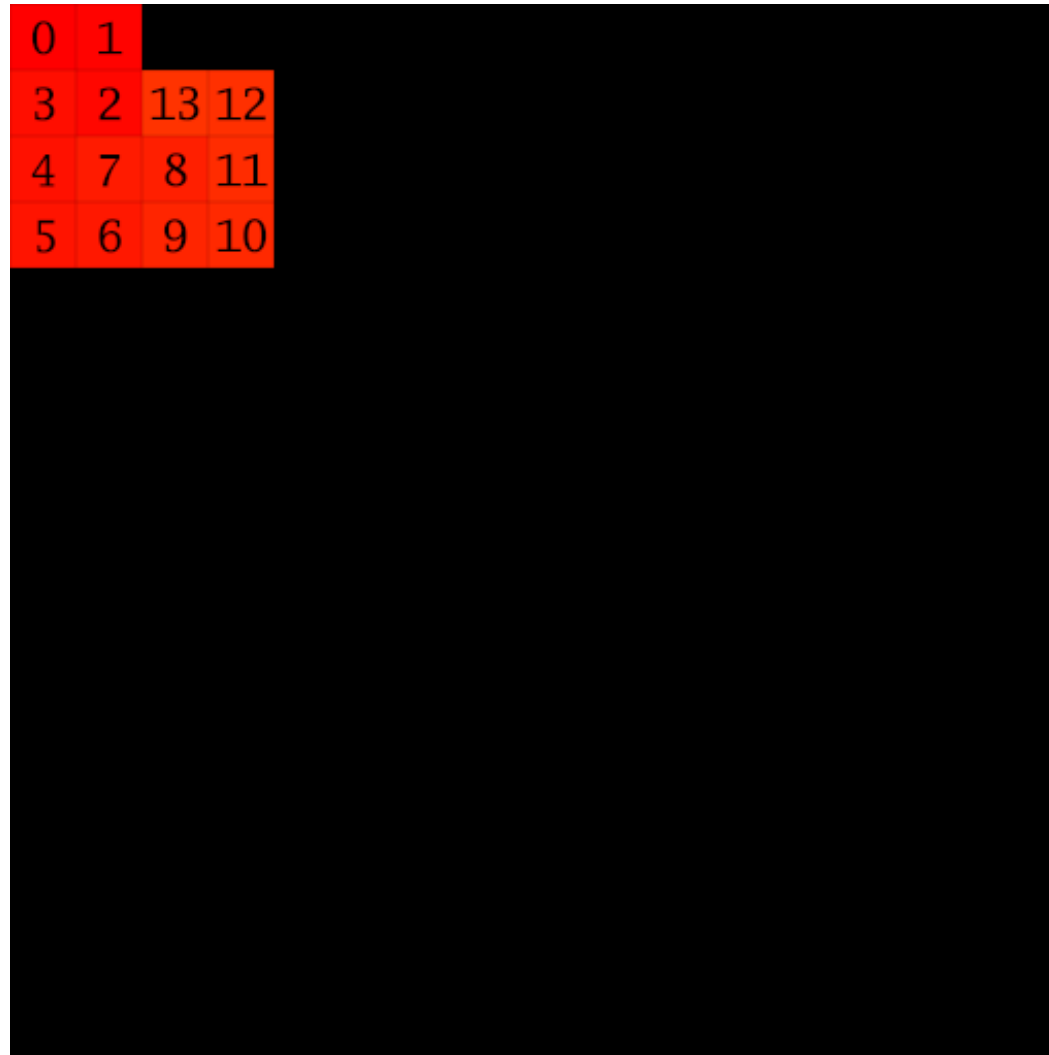
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## Hilbert Curve



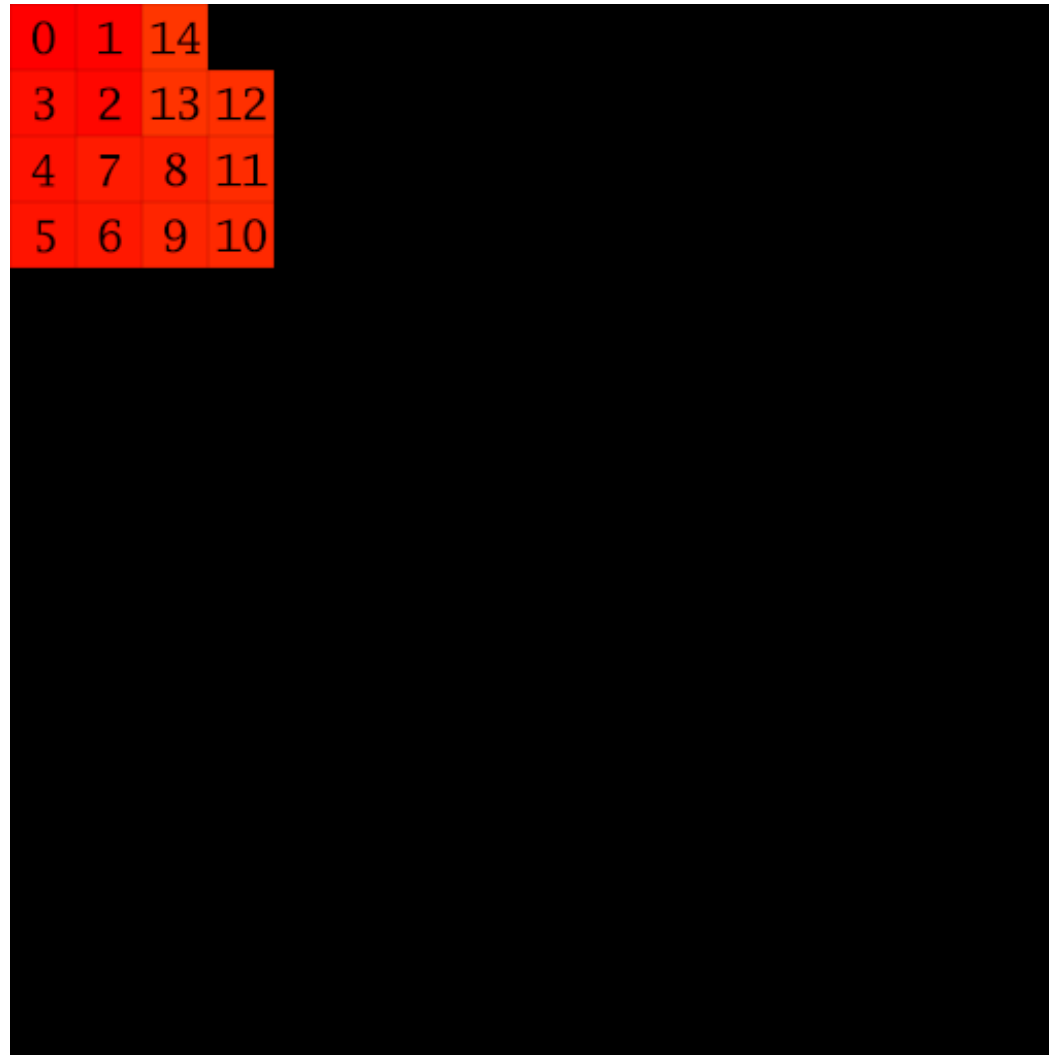
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## Hilbert Curve



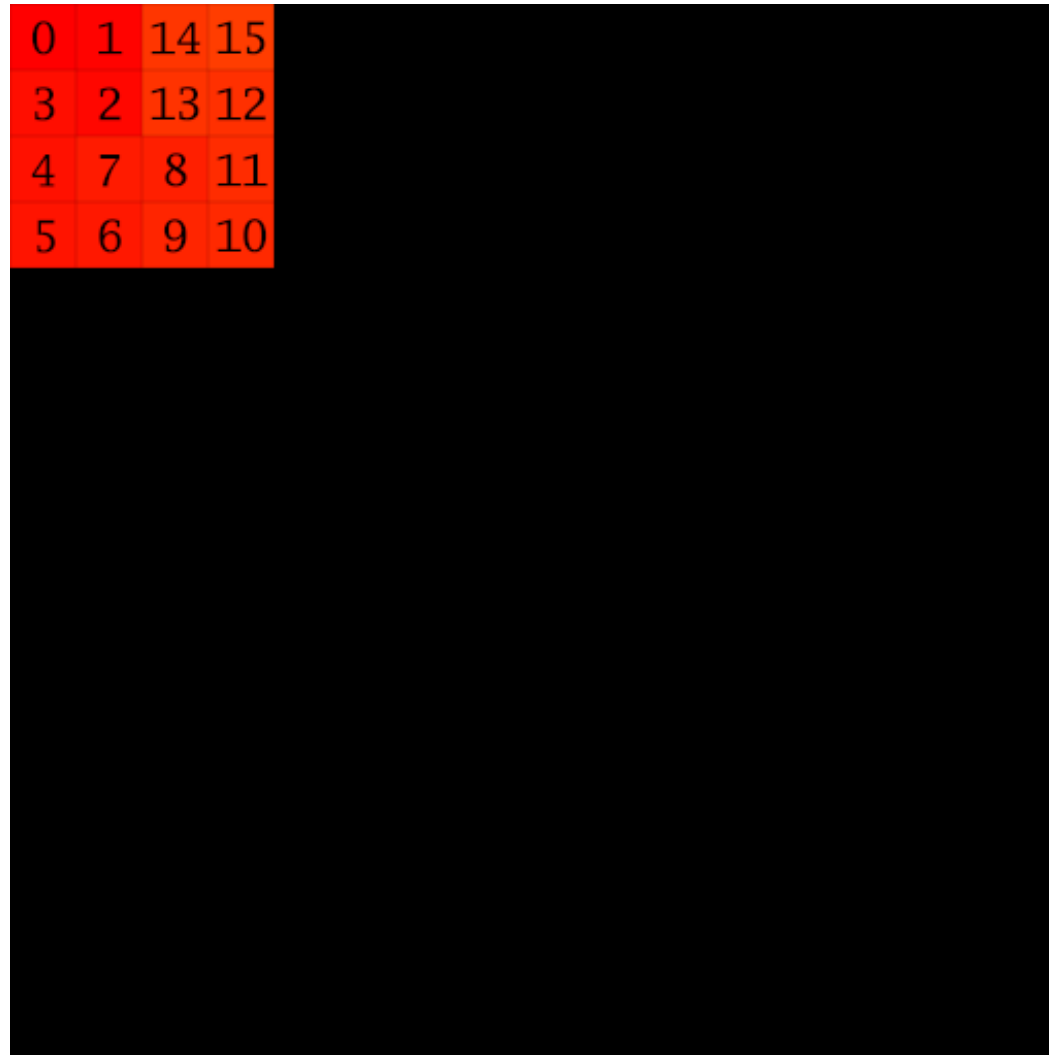
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## Hilbert Curve



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## Hilbert Curve

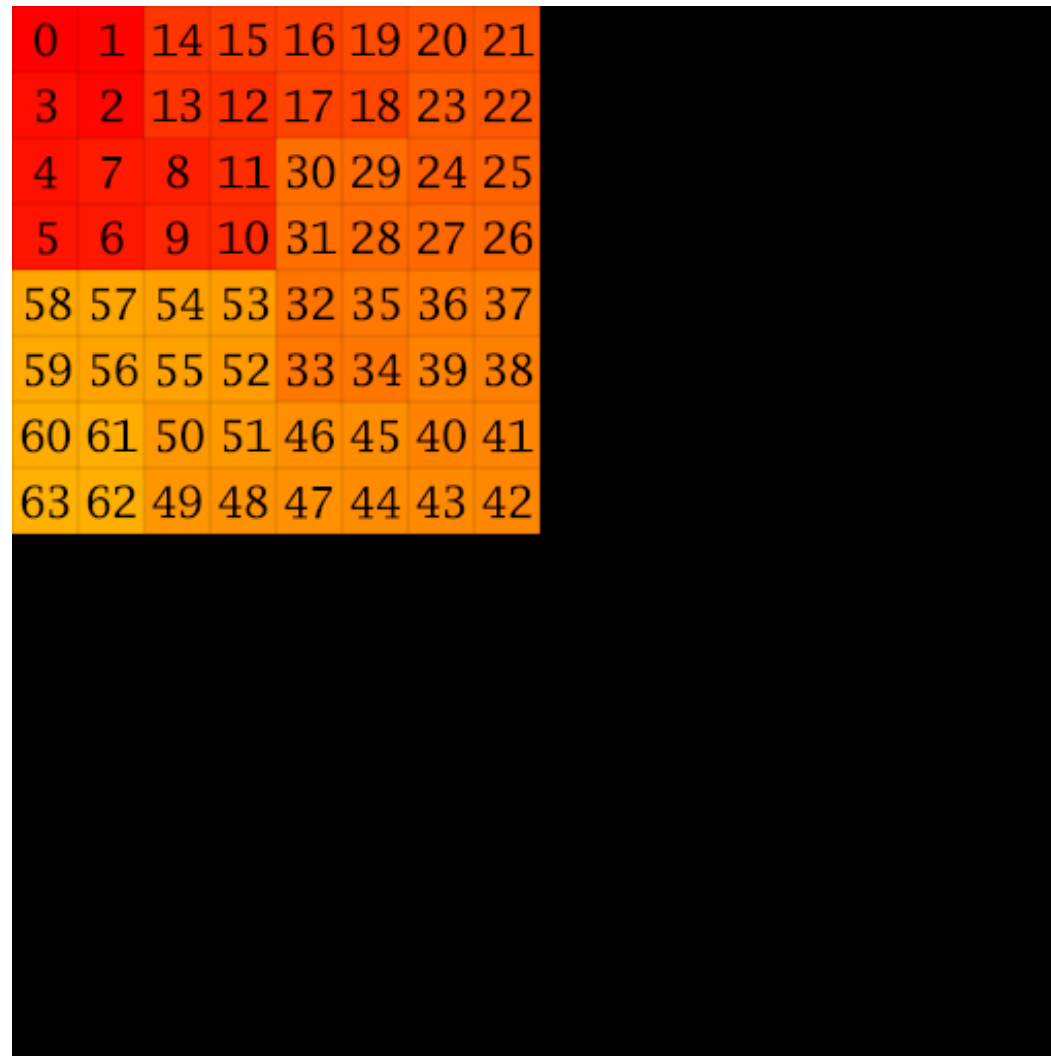


# Hilbert Curve

0	1	14	15	16	19	20	21
3	2	13	12	17	18	23	22
4	7	8	11	30	29	24	25
5	6	9	10	31	28	27	26

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## Hilbert Curve



## Hilbert Curve

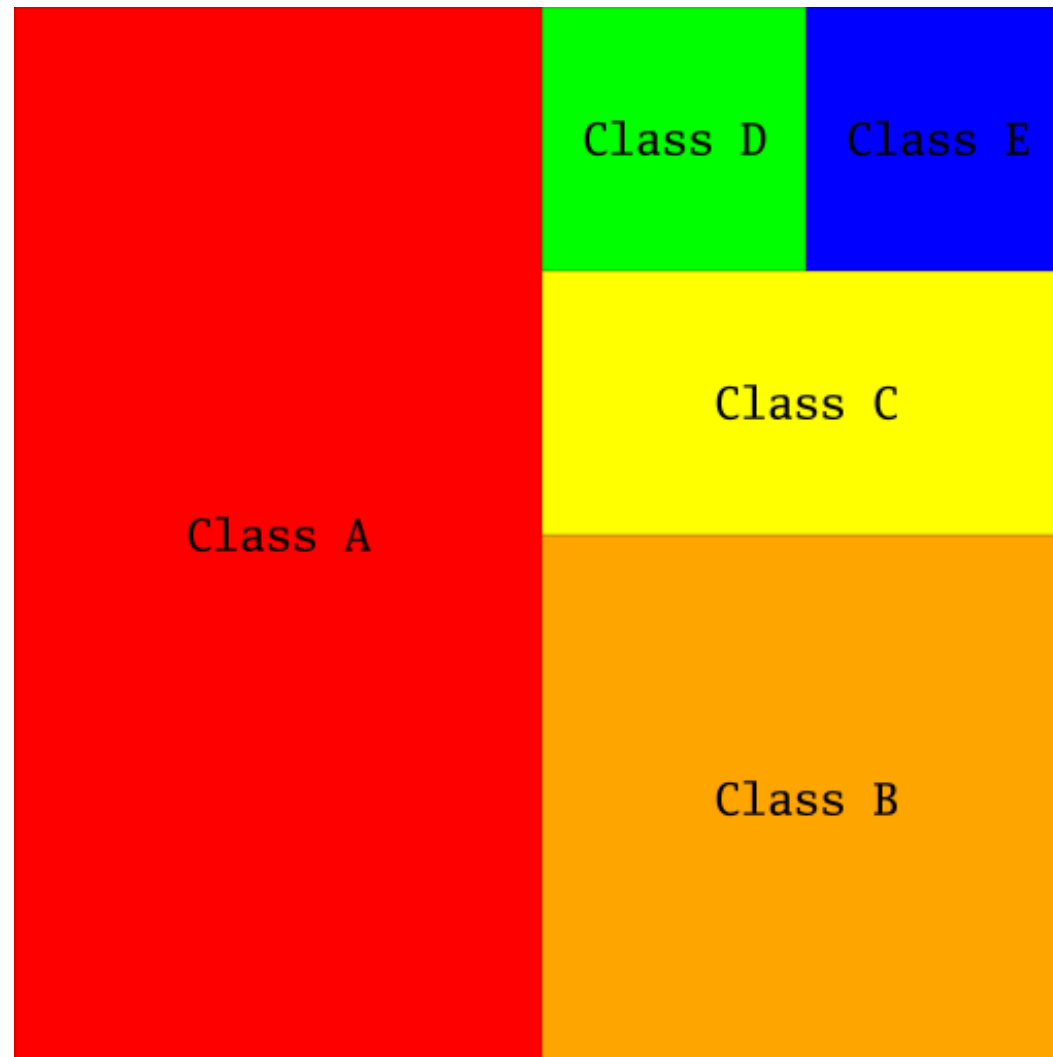
0	1	14	15	16	19	20	21
3	2	13	12	17	18	23	22
4	7	8	11	30	29	24	25
5	6	9	10	31	28	27	26
58	57	54	53	32	35	36	37
59	56	55	52	33	34	39	38
60	61	50	51	46	45	40	41
63	62	49	48	47	44	43	42
64	67	68	69	122	123	124	127
65	66	71	70	121	120	125	126
78	77	72	73	118	119	114	113
79	76	75	74	117	116	115	112
80	81	94	95	96	97	110	111
83	82	93	92	99	98	109	108
84	87	88	91	100	103	104	107
85	86	89	90	101	102	105	106

## Hilbert Curve

0	1	14	15	16	19	20	21	234	235	236	239	240	241	254	255
3	2	13	12	17	18	23	22	233	232	237	238	243	242	253	252
4	7	8	11	30	29	24	25	230	231	226	225	244	247	248	251
5	6	9	10	31	28	27	26	229	228	227	224	245	246	249	250
58	57	54	53	32	35	36	37	218	219	220	223	202	201	198	197
59	56	55	52	33	34	39	38	217	216	221	222	203	200	199	196
60	61	50	51	46	45	40	41	214	215	210	209	204	205	194	195
63	62	49	48	47	44	43	42	213	212	211	208	207	206	193	192
64	67	68	69	122	123	124	127	128	131	132	133	186	187	188	191
65	66	71	70	121	120	125	126	129	130	135	134	185	184	189	190
78	77	72	73	118	119	114	113	142	141	136	137	182	183	178	177
79	76	75	74	117	116	115	112	143	140	139	138	181	180	179	176
80	81	94	95	96	97	110	111	144	145	158	159	160	161	174	175
83	82	93	92	99	98	109	108	147	146	157	156	163	162	173	172
84	87	88	91	100	103	104	107	148	151	152	155	164	167	168	171
85	86	89	90	101	102	105	106	149	150	153	154	165	166	169	170

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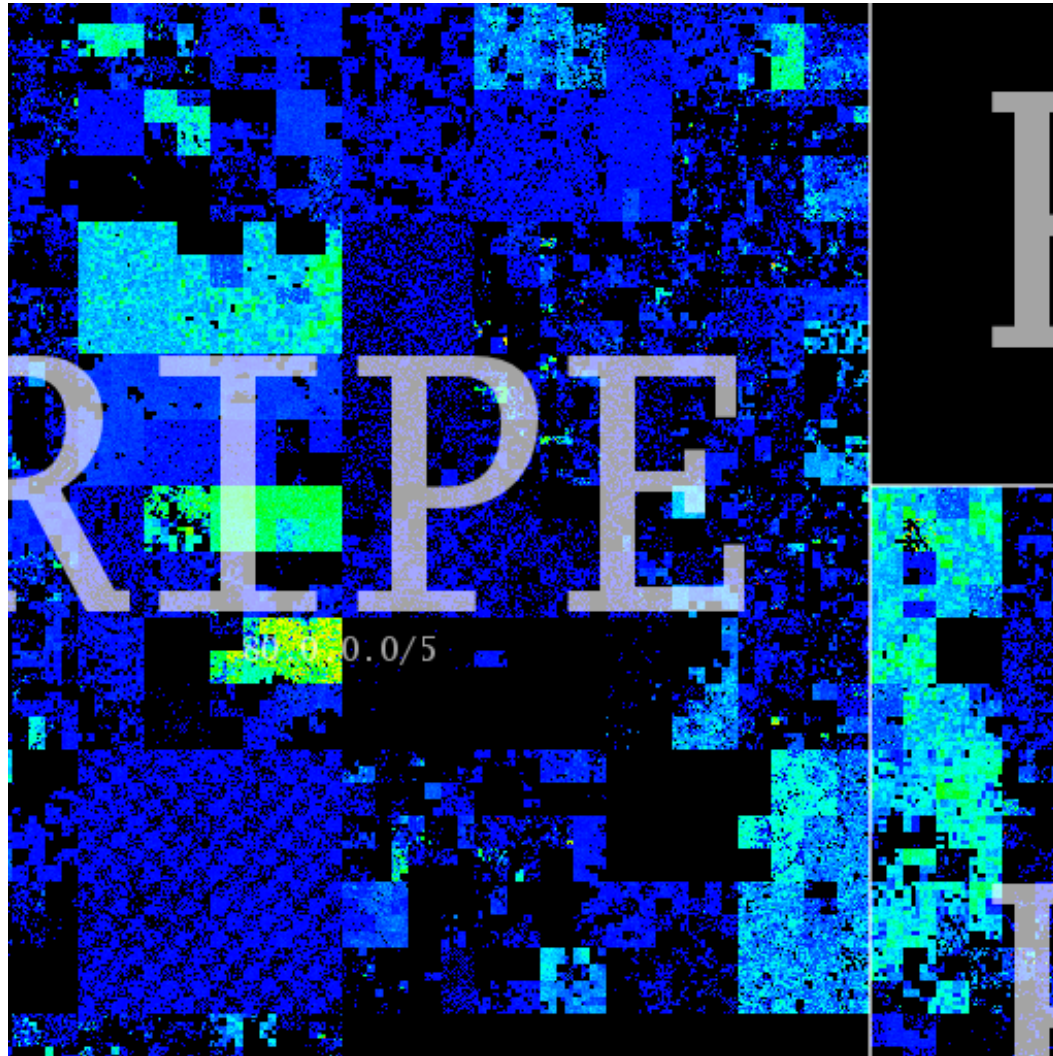
## Pre-CIDR





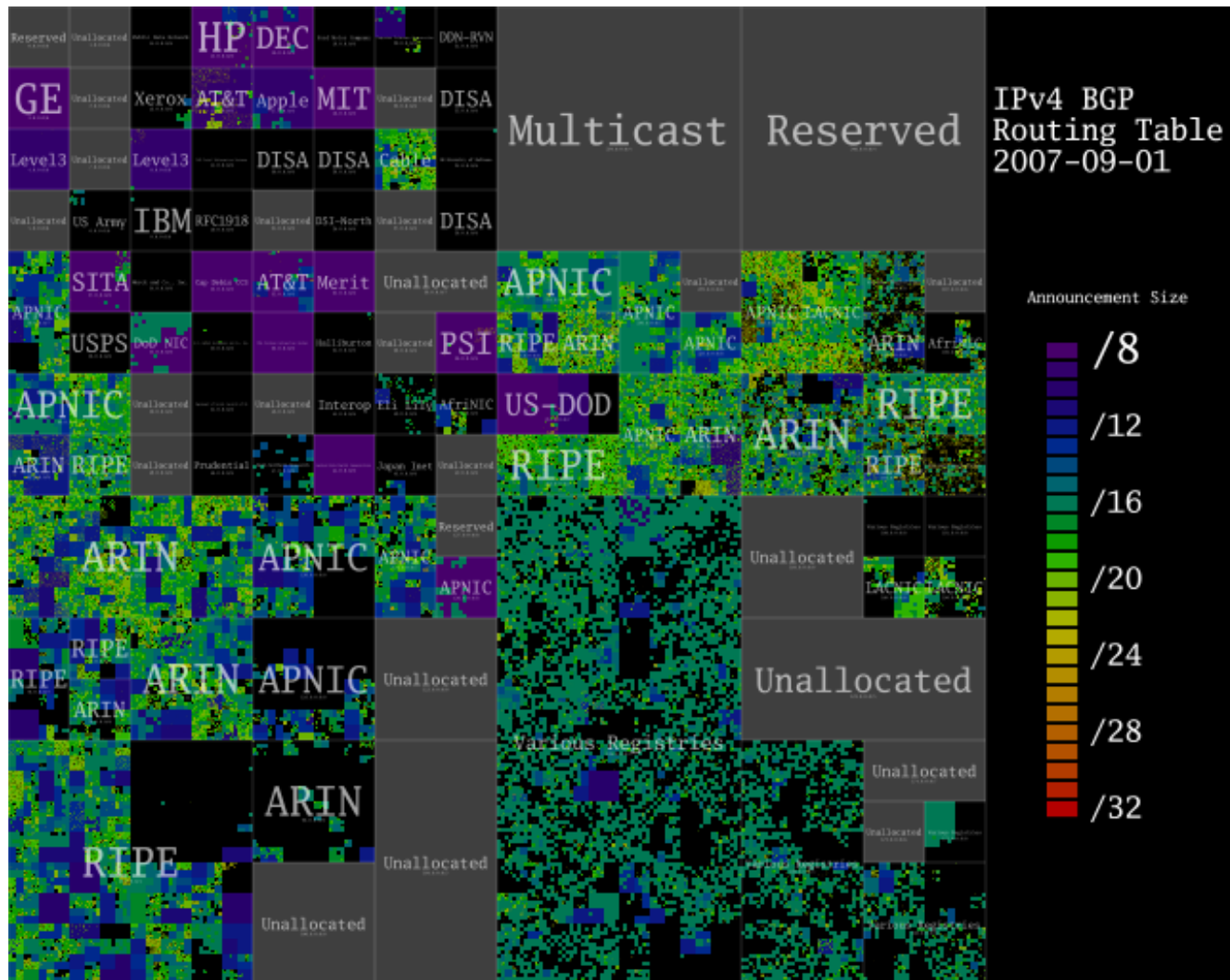
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## Open Resolvers



Open resolver survey by John Kristoff.

# Routeviews

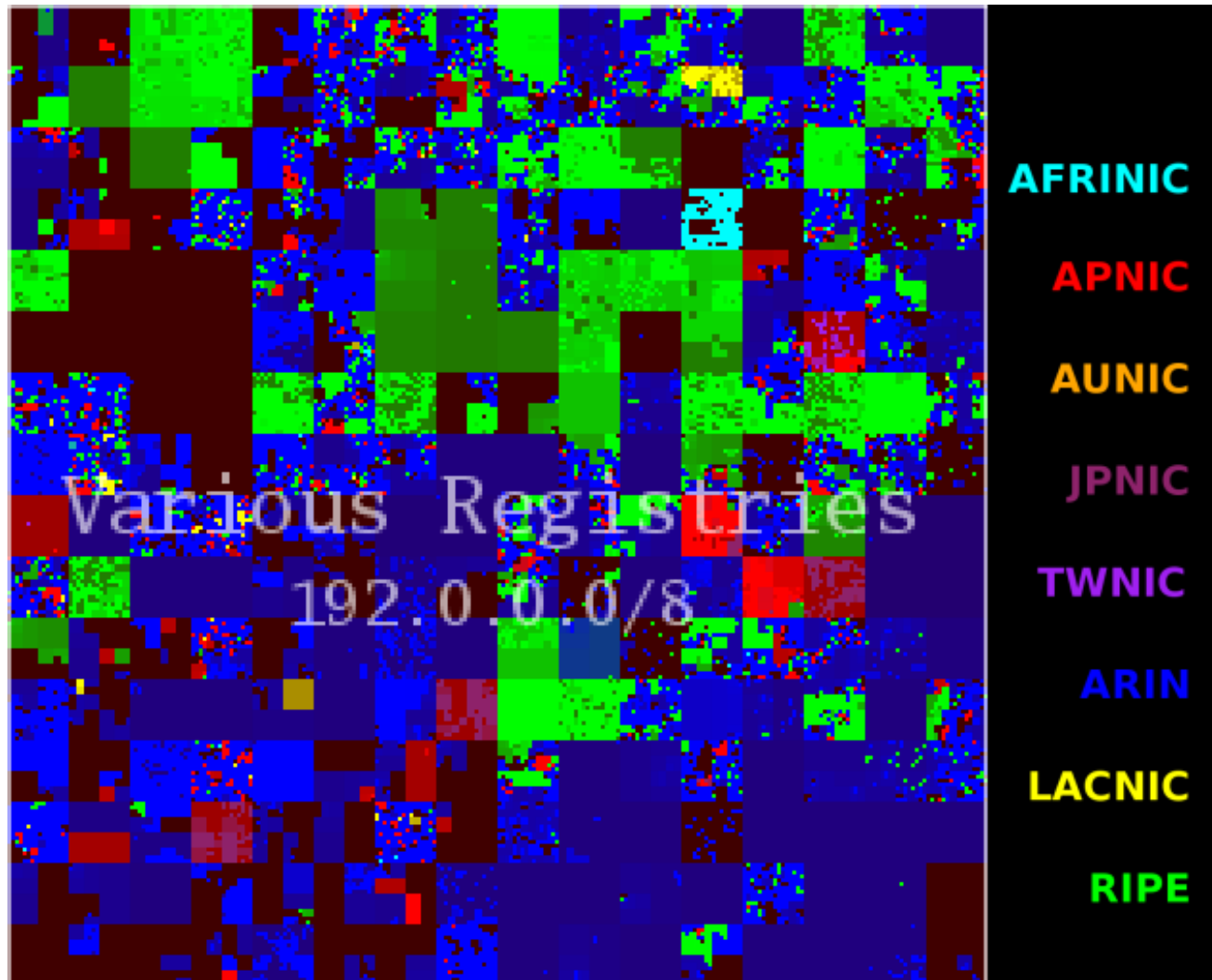


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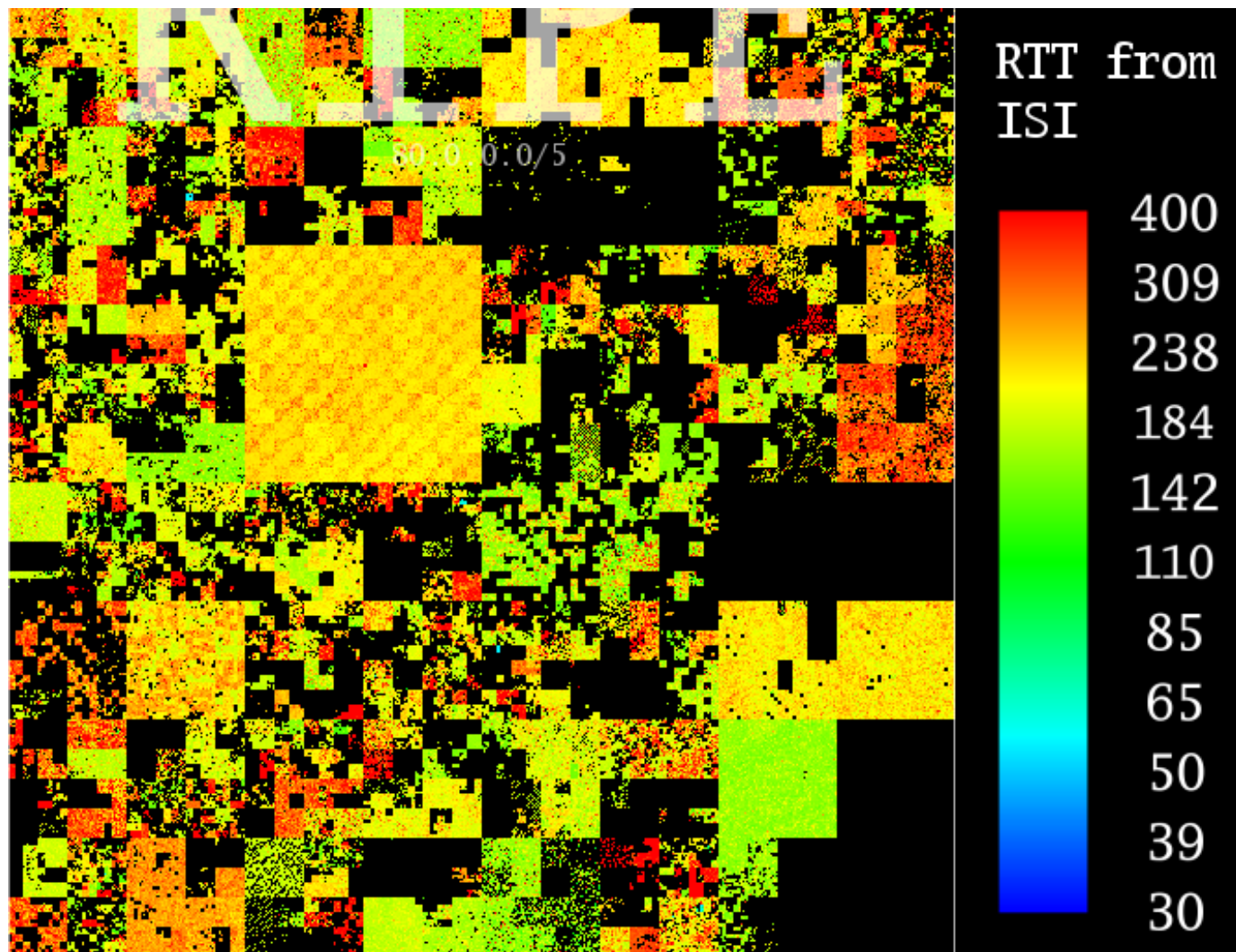
## Routeviews



## Whois



## Round Trip Times



Information Sciences Institute at the University of Southern California. Internet Addresses Survey dataset, DHS PREDICT ID USC-LANDER/internet\_address\_survey\_it15w-20061108. Traces taken 2006-11-08 to 2007-01-08. Provided by the USC/LANDER project. <http://www.isi.edu/ant/lander/>.

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## Related, Earlier Work

- [http://nsrc.cse.psu.edu/tech\\_report/NAS-TR-0018-2005.pdf](http://nsrc.cse.psu.edu/tech_report/NAS-TR-0018-2005.pdf)
- <http://monkey.org/~phy/ipmaps/>
- <http://www.isi.edu/ant/address/>
- <http://icicle.dylex.net/~ipmap/>
- xmap, <http://nsa.unaligned.org/>

<http://maps.measurement-factory.com>

Source code

Full-size images

Animations