

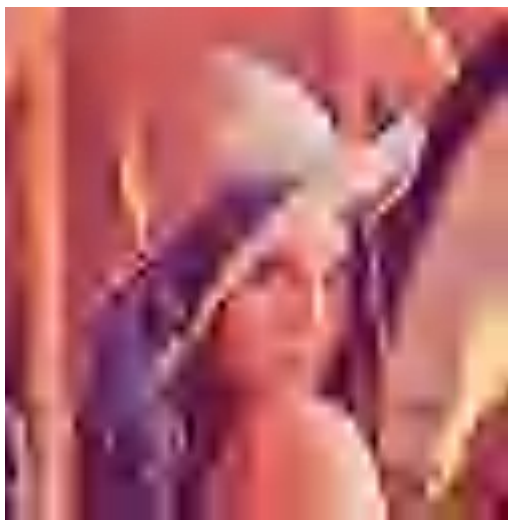
Starting with the image



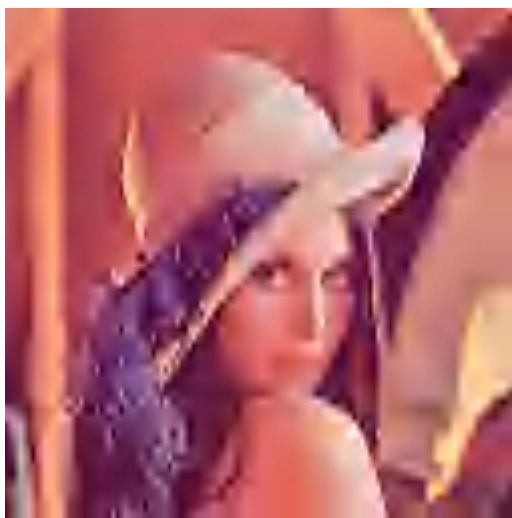
This is the command I used to compress at various levels `./opj_compress -i lena_rgb_256.bmp -q 20,22,24,26,28,30, -o lena-q-10-20-30-40-50.j2k`



then `./opj_decompress -i lena-q-10-20-30-40-50.j2k -l 1 -o lena-q1.png`



```
then ./opj_decompress -i lena-q-10-20-30-40-50.j2k -l 2 -o lena-q2.png
```



```
then ./opj_decompress -i lena-q-10-20-30-40-50.j2k -l 3 -o lena-q3.png
```



```
then ./opj_decompress -i lena-q-10-20-30-40-50.j2k -l 4 -o lena-q4.png
```



then ./opj\_decompress -i lena-q-10-20-30-40-50.j2k -l 5 -o lena-q5.png

## JPEG 2000 Markers

```
/* JPEG 2000 - defined in IEC 15444-1 "JPEG 2000 Core (part 1)" */
/* delimiters */
SOC  = 0x4f,      /* start of codestream */
SOT  = 0x90,      /* start of tile */
SOD  = 0x93,      /* start of data */
EOC  = 0xd9,      /* end of codestream */
/* fixed information segment */
SIZ  = 0x51,      /* image and tile size */
/* functional segments */
COD  = 0x52,      /* coding style default */
COC  = 0x53,      /* coding style component */
RGN  = 0x5e,      /* region of interest */
QCD  = 0x5c,      /* quantization default */
QCC  = 0x5d,      /* quantization component */
POC  = 0x5f,      /* progression order change */
/* pointer segments */
TLM  = 0x55,      /* tile-part lengths */
PLM  = 0x57,      /* packet length (main header) */
PLT  = 0x58,      /* packet length (tile-part header) */
PPM  = 0x60,      /* packed packet headers (main header) */
PPT  = 0x61,      /* packet packet headers (tile-part header) */
/* bitstream internal markers and segments */
SOP  = 0x91,      /* start of packet */
EPH  = 0x92,      /* end of packet header */
/* informational segments */
CRG  = 0x63,      /* component registration */
COM  = 0x64,      /* comment */
```

```
00000000  FF 4F FF 51  00 2F 00 00  00 00 01 00  00 00 01 00  .0.Q./.....
00000010  00 00 00 00  00 00 00 00  00 00 01 00  00 00 01 00  .....
00000020  00 00 00 00  00 00 00 00  00 03 07 01  01 07 01 01  .....
00000030  07 01 01 FF  52 00 0C 00  00 00 06 01  05 04 04 00  ....R.....
00000040  01 FF 5C 00  13 40 40 48  48 50 48 48  50 48 48 50  ..\...@HHPHHPHP
00000050  48 48 50 48  48 50 FF 64  00 25 00 01  43 72 65 61  HPHHP.d.%..Crea
00000060  74 65 64 20  62 79 20 4F  70 65 6E 4A  50 45 47 20  ted by OpenJPEG
00000070  76 65 72 73  69 6F 6E 20  32 2E 32 2E  30 FF 90 00  version 2.2.0...
00000080  0A 00 00 00  00 15 5C 00  01 FF 93 CF  88 F8 28 B1  .....\......(
00000090  F9 7F 18 AF  4B CF 3A F3  73 4F 27 C4  F4 F5 6F 06  ....K.:.s0'...o.
000000A0  36 C1 AC 6C  02 FA DC 1D  AF 04 E0 8F  25 CE 92 44  6..l.....%..D
000000B0  D7 75 3C F7  6C E0 F1 85  DF 02 C0 27  61 FF 29 81  .u<.l.....'a.).
000000C0  7E 31 7C 77  98 C6 C7 3B  A2 9A 4B A1  59 30 53 90  ~1|w...;..K.Y0S.
```

000000D0	3C CF 88 E4 74 C8 F1 E0 33 E9 3C CE 9B C6 F3 D2	<...t...3.<.....
000000E0	6D 1A 7B D5 EB FD 15 66 92 62 A3 FA 58 92 96 62	m.{....f.b..X..b
000000F0	FF 3A B9 1B 29 3E AB E9 A3 B3 BC D0 92 F8 3D 10	....)>.....=.
00000100	44 D4 CB 91 C0 B8 84 A9 A5 6C 15 20 C2 4E 97 00	D.....l. .N..
00000110	00 C5 AF 13 C5 40 4D C7 77 67 DD C9 65 8C 8A 21	.....@M.wg..e...!
00000120	F7 3F 03 B1 93 2E C7 28 EE 3A B1 29 63 52 F9 F2	.?.....(:..)cR..
00000130	32 F8 C5 BF 41 A9 A9 85 CA 7B 9C C8 00 00 00 00	2...A....{.....
00000140	00 00 00 00 00 00 00 CA B7 3B 99 04 CC F1 60 37	.....;....`7
00000150	8B F8 AE 1E D7 F3 F3 63 88 C5 F1 00 71 7A 7C 6E	.....c....qz n
00000160	C4 75 EF 67 F1 1C 47 10 8B 77 96 21 3B 12 1C D2	.u.g..G..w.!;...
00000170	61 C1 76 AE 17 FD AE 68 1C 9B 3E C0 1B 4C 6B A1	a.v....h..>..Lk.
00000180	A3 CB 00 33 36 71 9C 61 00 0B F0 D5 E3 A0 B5 7B	...36q.a.....{
00000190	E0 27 68 5A 55 9C 60 33 39 A3 A4 80 2D B8 B5 B0	.'hZU.`39....-...
000001A0	CB A5 C2 01 AA F1 1F 28 75 18 D7 42 79 11 E1 A6	.....(u..By...
000001B0	3F EE 0E DE D9 31 DE 7B 16 F9 A1 DA 0D E0 55 4B	?....1.{.....UK
000001C0	F3 D1 FF 5F 29 59 1D 45 61 EF EC EA 48 2D F4 6E	....)Y.Ea...H-.n
000001D0	93 F8 30 3F 95 6B 99 4F D9 26 E9 4F E2 75 27 CB	..0?.k.0.&.0.u'.
000001E0	33 06 88 A7 6F 09 2F 3B 96 87 E1 81 00 16 FB 04	3...o./;.....
000001F0	DB 58 B3 F4 0C 1F C9 CC 81 84 E8 98 5A 94 52 7B	.X.....Z.R{
00000200	00 00 A7 69 84 54 80 A1 DE 08 14 1D 3E A8 4B 29	...i.T.....>.K)
00000210	95 0E E2 80 8D F4 84 36 63 FA E9 AF 27 31 5E E4	.....6c...'1^.
00000220	D3 AA F6 B5 6A 74 07 3E 37 68 6D 64 9D A5 0E A0	....jt.>7hmd....
00000230	BE 53 8A 99 D8 ED 00 00 00 00 00 00 F1 40	.S.....@
00000240	82 CB 4D BC 77 90 1E 75 28 0A E4 00 FE 55 52 F4	..M.w..u(....UR.
00000250	16 3A 93 5F F1 00 64 C1 D3 15 05 0E 2B 85 CD C5	..:_.d.....+...
00000260	E2 00 58 61 FD CA E1 E2 59 9E 13 6F 28 4D D9 AD	..Xa....Y...o(M..
00000270	AC AD BC 8D 2A 60 E4 C5 0E 97 0E 94 63 34 56 33	....*`.....c4V3
00000280	52 5F 11 41 E4 69 00 33 34 44 1F B7 CD C9 96 BB	R_.A.i.34D.....
00000290	DC 9A D8 F1 10 E9 30 E1 80 27 5C B6 A8 B3 70 96	.....0..'\'...p.

000002A0	83 27 5B 92 1E 0F DF A7 4B 7D 25 4F 70 35 7D CA	.'[.....K}%0p5}.
000002B0	F1 07 1B C5 80 FF 18 8C 12 41 5B E7 3C 47 CE CD	.....A[.<G...
000002C0	E4 C1 5F 70 AC 65 E5 0A 6E E1 92 64 24 90 67 BC	..._p.e...n...d\$.g.
000002D0	D4 27 A0 70 26 66 FF 67 60 41 57 B1 E8 B7 95 43	.'.p&f.g`AW....C
000002E0	D5 DA 51 97 D5 98 AE B0 64 E0 18 EB 4A 57 31 7A	..Q.....d...JW1z
000002F0	90 68 62 36 66 18 6E A0 AE F5 18 91 D7 01 18 60	.hb6f.n.....`
00000300	55 96 6F 5C D6 6F 10 65 E7 F8 04 95 ED 66 61 F1	U.o\..o.e.....fa.
00000310	05 F6 64 14 7C F5 47 C8 A5 A7 DD 88 AB 85 ED 91	..d. .G.....
00000320	D3 80 53 8F EE B5 2B 2A F0 E6 98 7B 44 B2 01 73	..S....+*...{D..s
00000330	F3 55 8E DC F2 98 31 D8 4C 3A 3A A1 F9 B9 E5 77	.U....1.L::....w
00000340	BF 4A C2 56 B6 AE 80 42 52 8F 7C 13 37 0F BF 56	.J.V...BR. .7..V
00000350	3D A5 62 B7 34 AE 5D FE 3E 5F 56 6A 98 47 54 64	=.b.4.].>_Vj.GTd
00000360	4E 5D 00 24 39 B4 D8 D6 D6 EE E8 AB 47 8A 57 03	N].\$9.....G.W.
00000370	B2 F0 AF 34 59 89 11 97 AA 5C C4 5F DC FC 90 5D	...4Y....\.._...]
00000380	6A 6F 18 4C D3 38 E7 5D D1 F2 07 AA 1E C6 E0 2F	jo.L.8.])...../
00000390	8B D5 97 D2 F0 67 C3 B3 D5 AC 28 92 0D 05 5A 15	.....g....(...Z.
000003A0	60 78 CE E7 E2 46 70 87 22 22 9D 3F 12 0D C1 3E	`x...Fp.""?.>...
000003B0	CC 32 D3 22 5A 8A F8 EE CE 18 E4 DD 52 DC 6A 9B	.2."Z.....R.j.
000003C0	3F 1B 22 2F E6 C5 E4 00 53 E2 39 D8 78 CF E3 30	?."/....S.9.x..0
000003D0	27 58 7D AF 68 99 03 AB 2C CD 6B 3E 56 FD 27 A7	'X}.h...., .k>V.'..
000003E0	9B EE AC E8 B0 90 E8 B4 9C C7 00 00 93 BA 58 00	.....X.
000003F0	EB 00 DC 90 C2 F4 45 20 33 B2 DD 79 43 69 08 7B	.....E 3..yCi.{
00000400	38 B8 05 FA 5B 15 F8 65 D5 94 B2 4D 60 67 03 8A	8...[.e...M`g..
00000410	3A 39 F7 E0 10 D3 F4 00 D0 10 77 CF 32 BF D9 E7	:9.....w.2...
00000420	A8 BA 09 A2 D0 E4 DB 14 37 9A F0 CB A2 EE 72 73	.....7.....rs
00000430	CF AF A3 6F E7 52 49 E0 92 3F EC 00 00 00 00 00	...o.RI..?.....
00000440	F1 20 5F 98 B5 F4 7D 2B BA 79 26 E2 80 9A A5 AB	. _...}+.y&.....
00000450	82 55 00 F1 32 E4 80 00 F8 28 1C 8A B8 00 B0 89	.U..2....(.....
00000460	7E E8 F1 B2 F4 BD 84 50 41 C2 25 FB DD 6A F1 32	~.....PA.%.j.2

00000470	F0 E0 57 4E 81 14 02 4C 3E F5 E8 2E B0 A0 1D 9F	..WN...L>.....
00000480	26 8E 2D BC 0F 52 B9 CF 28 44 6E 18 9B 1E 6C 40	&.-...R...(Dn...l@
00000490	85 4F 7E 57 CE C8 67 78 F0 89 84 44 5C 71 A8 B4	.0~W...gx...D\q..
000004A0	1A 69 3C 88 E3 F6 BB 44 8B 0E 08 19 D1 9B A0 BA	.i<....D.....
000004B0	99 17 22 65 63 10 D9 4B 00 C9 D2 D3 9D 00 3F 3D	.."ec...K.....?=
000004C0	8D 45 B1 BE D5 95 02 EE 45 62 DA AE F0 75 7D 18	.E.....Eb...u}.
000004D0	A0 1E 25 15 C8 B2 AB A6 9D 7F 42 56 9F B3 41 5F	..%.....BV..A_
000004E0	26 89 8B 25 EB 70 E2 B8 90 5D 81 2E 73 ED 03 90	&..%.p...]...s...
000004F0	A3 07 4E 8D 6F 4B 2B 5D 09 6B 2C EA CB 0D EC B0	..N.oK+]..k,.....
00000500	C4 9F D5 0E 52 2E 80 F4 38 8E 65 EC B4 2F 34 3B	....R...8.e../4;
00000510	C9 33 A5 7A AA 9B A6 F2 F4 33 61 C7 00 63 7F C8	.3.z.....3a..c..
00000520	1E 4F 73 E9 AF 3D C1 55 1D 4E 1A 7A 94 BC 1A 1D	.0s...=.U.N.z....
00000530	1C 46 98 14 35 6E 46 22 06 07 43 34 A5 F5 76 F9	.F...5nF"...C4...v.
00000540	21 74 B6 82 1F 30 C0 85 42 60 14 11 E2 16 B7 38	!t...0..B`.....8
00000550	0E BD 85 46 9F 72 F1 A3 5A 65 E0 61 23 C7 FB C3	...F.r...Ze.a#...
00000560	2E 94 D9 8A 29 E5 C7 03 68 95 4C 7C AE BC CE C8	....)....h.L ....
00000570	C0 23 D4 CE 56 1A 45 96 E6 93 0A 71 CA 3A 6D 25	.#...V.E....q.:m%
00000580	E3 94 B2 98 94 9D 17 B0 AA 6C 59 EE C8 F9 7D C5	.....lY...}.
00000590	D2 13 53 89 3A 08 22 EA 9B 01 83 A5 E3 7C 20 7B	..S.:...".....  {
000005A0	2E 9B 98 7B 7C 34 BD 2D CB 59 D0 A8 35 48 69 F6	...{ 4.-.Y...5Hi.
000005B0	DA 61 0A 0B B0 30 B1 4F 7A 93 48 89 B6 84 22 8B	.a...0.Oz.H...".