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数据页 / 行 / 记录

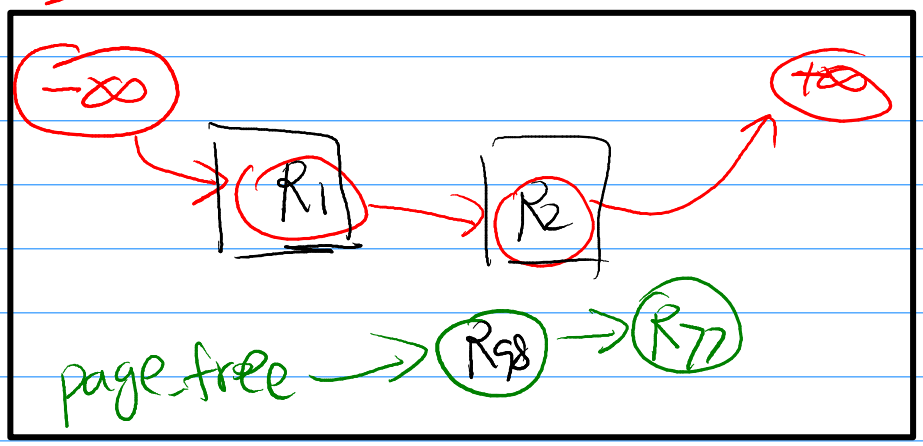
row record

FSP_HDR

INODE

INDEX(数据, 索引)

INDEX



Redundant 最差 5.0 之前 (5.6, 5.7>)

```
→  data/rtc hexdump -C -s 0x10000 -n 256 t1.ibd
00010000  e1 0e 06 25 00 00 00 04  ff ff ff ff ff ff ff ff  |...%............|
00010010  00 00 00 00 19 c7 92 5f  45 bf 00 00 00 00 00 00  |......._E.......|
00010020  00 00 00 00 00 49 00 02  00 b3 00 03 00 00 00 00  |.....I..........|
00010030  00 89 00 05 00 00 00 01  00 00 00 00 00 00 00 00  |................|
00010040  00 00 00 00 00 00 00 00  00 fc 00 00 00 49 00 00  |.............I..|
00010050  00 02 02 72 00 00 00 49  00 00 00 02 01 b2 08 01  |...r...I........|
00010060  00 00 03 00 89 69 6e 66  69 6d 75 6d 00 09 02 00  |.....infimum....|
00010070  08 03 00 00 73 75 70 72  65 6d 75 6d 00 2a 27 17  |....supremum.*'.|
00010080  13 0c 06 00 00 10 0d 00  74 00 00 00 00 04 00 00  |........t.......|
00010090  00 00 00 13 2c 82 00 00  00 e6 01 10 80 00 00 01  |....,...........|
000100a0  61 61 20 20 20 20 20 20  20 20 20 20 20 20 20 20  |aa              |
000100b0  62 62 62 00 00 00 00 00  00 00 00 00 00 00 00 00  |bbb.............|
000100c0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  |................|
*
00010100
```

```
→  data/rtc hexdump -C -s 0x10000 -n 256 t1.ibd
00010000  e1 0e 06 25 00 00 00 04  ff ff ff ff ff ff ff ff  |...%............|
00010010  00 00 00 00 19 c7 92 5f  45 bf 00 00 00 00 00 00  |......._E.......|
00010020  00 00 00 00 00 49 00 02  00 b3 00 03 00 00 00 00  |.....I..........|
00010030  00 89 00 05 00 00 00 01  00 00 00 00 00 00 00 00  |................|
00010040  00 00 00 00 00 00 00 00  00 fc 00 00 00 49 00 00  |.............I..|
00010050  00 02 02 72 00 00 00 49  00 00 00 02 01 b2 08 01  |...r...I........|
00010060  00 00 03 00 89 69 6e 66  69 6d 75 6d 00 09 02 00  |.....infimum....|
00010070  08 03 00 00 73 75 70 72  65 6d 75 6d 00 2a 27 17  |....supremum.*'.|
00010080  13 0c 06 00 00 10 0d 00  74 00 00 00 00 04 00 00  |........t.......|
00010090  00 00 00 13 2c 82 00 00  00 e6 01 10 80 00 00 01  |....,...........|
000100a0  61 61 20 20 20 20 20 20  20 20 20 20 20 20 20 20  |aa              |
000100b0  62 62 62 00 00 00 00 00  00 00 00 00 00 00 00 00  |bbb.............|
000100c0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  |................|
*
00010100
```

0x89 ⇒ R1 ⇒ 0x74

① next_rec ⇒ 0x74

② nbyte_flag ⇒ 1

③ n_fields ⇒ 6

④ heap_no ⇒ 0b10 ⇒ 2

⑤ n_owned ⇒ 0

⑥ info_bits ⇒ 无

10 0d

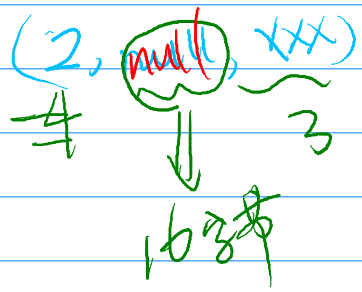
0001 0000 0000 1101

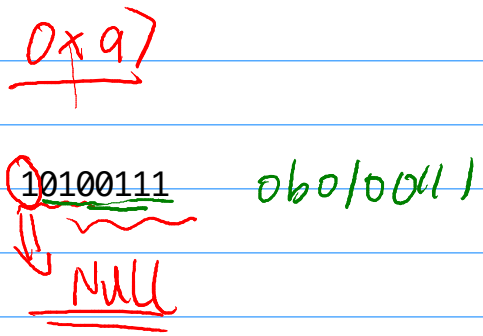
0b110 ⇒ 6

06
0C
13
17 4
27 16
2a 3

```
CREATE TABLE `t1` (
  `k1` int DEFAULT NULL,
  `c1` char(4) DEFAULT NULL,
  `c2` varchar(4) DEFAULT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci ROW_FORMAT=RED
```

```
→  data/rtc hexdump -C -s 0x10000 -n 256 t1.ibd
00010000  d2 5e 89 45 00 00 00 04  ff ff ff ff ff ff ff ff  |.^.E............|
00010010  00 00 00 00 19 c7 94 b3  45 bf 00 00 00 00 00 00  |........E.......|
00010020  00 00 00 00 00 49 00 02  00 e9 00 04 00 00 00 00  |.....I..........|
00010030  00 bf 00 02 00 01 00 02  00 00 00 00 00 00 00 00  |................|
00010040  00 00 00 00 00 00 00 00  00 fc 00 00 00 49 00 00  |.............I..|
00010050  00 02 02 72 00 00 00 49  00 00 00 02 01 b2 08 01  |...r...I........|
00010060  00 00 03 00 89 69 6e 66  69 6d 75 6d 00 09 03 00  |.....infimum....|
00010070  08 03 00 00 73 75 70 72  65 6d 75 6d 00 2a 27 17  |....supremum.*'.|
00010080  13 0c 06 00 00 10 0d 00  bf 00 00 00 00 04 00 00  |................|
00010090  00 00 00 13 2c 82 00 00  00 e6 01 10 80 00 00 01  |....,...........|
000100a0  61 61 20 20 20 20 20 20  20 20 20 20 20 20 20 20  |aa              |
000100b0  62 62 62 2a a7 17 13 0c  06 00 00 18 0d 00 74 00  |bbb*..........t.|
000100c0  00 00 00 04 01 00 00 00  00 13 2d 81 00 00 01 a8  |..........-.....|
000100d0  01 10 80 00 00 02 00 00  00 00 00 00 00 00 00 00  |................|
000100e0  00 00 00 00 00 00 78 78  78 00 00 00 00 00 00 00  |......xxx.......|
000100f0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  |................|
00010100
```





compact (紧凑)

```
→  data/rtc hexdump -C -s 0x10000 -n 256 t2.ibd
00010000  e9 4d 19 06 00 00 00 04  ff ff ff ff ff ff ff ff  |.M..............|
00010010  00 00 00 00 19 c7 d9 e3  45 bf 00 00 00 00 00 00  |........E.......|
00010020  00 00 00 00 00 4a 00 02  00 9e 80 03 00 00 00 00  |.....J..........|
00010030  00 80 00 05 00 00 00 01  00 00 00 00 00 00 00 00  |................|
00010040  00 00 00 00 00 00 00 00  00 fd 00 00 00 4a 00 00  |.............J..|
00010050  00 02 02 72 00 00 00 4a  00 00 00 02 01 b2 01 00  |...r...J........|
00010060  02 00 1d 69 6e 66 69 6d  75 6d 00 02 00 0b 00 00  |..infimum.......|
00010070  73 75 70 72 65 6d 75 6d  03 04 00 00 00 10 ff f0  |supremum........|
00010080  00 00 00 00 04 02 00 00  00 00 13 3a 81 00 00 00  |...........:....|
00010090  9f 01 10 80 00 00 01 61  61 20 20 62 62 62 00 00  |.......aa  bbb..|
000100a0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  |................|
*
00010100
```

R1 C1 C2

R1 = 99+0x1a = 0x80

```
create table t2 (k1 int, c1 char(4), c2 varchar(4)) row_format=compact;
```

row_info

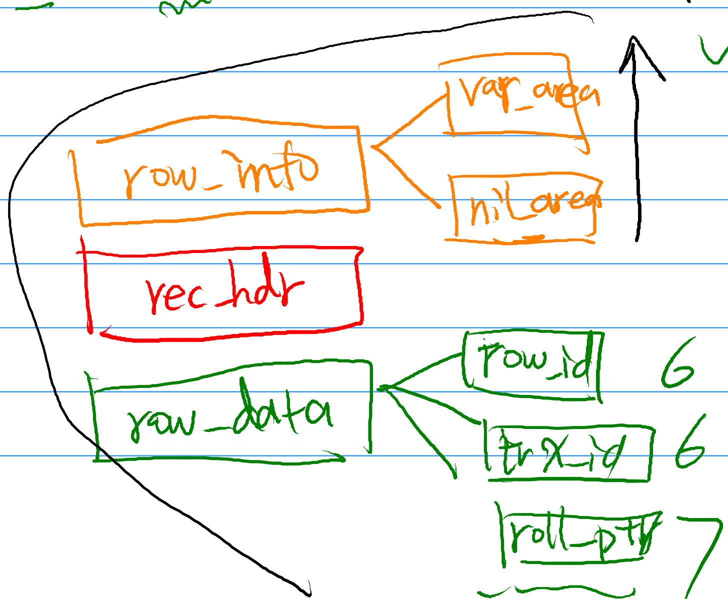
① nil_area 可空字段是否为空
只用1个字节=8位

可空字段 数量
K1 ✓
C1 ✓ 3
C2 ✓

13位=2字节

② 变 var_area
变长字段的长度列表
[C1, C2]
4 3

变长字段
× K1 int (4字节)
?✓ C1 char(4)
✓ C2 varchar



```
→  data/rtc hexdump -C -s 0x10000 -n 256 t2.ibd
00010000  23 b7 0c 9d 00 00 00 04  ff ff ff ff ff ff ff ff  |#...............|
00010010  00 00 00 00 19 c7 e2 5d  45 bf 00 00 00 00 00 00  |.......]E.......|
00010020  00 00 00 00 00 4a 00 02  00 ea 80 05 00 00 00 00  |.....J..........|
00010030  00 cc 00 02 00 02 00 03  00 00 00 00 00 00 00 00  |................|
00010040  00 00 00 00 00 00 00 00  00 fd 00 00 00 4a 00 00  |.............J..|
00010050  00 02 02 72 00 00 00 4a  00 00 00 02 01 b2 01 00  |...r...J........|
00010060  02 00 1d 69 6e 66 69 6d  75 6d 00 04 00 0b 00 00  |...infimum......|
00010070  73 75 70 72 65 6d 75 6d  03 04 00 00 00 10 00 26  |supremum.......&|
00010080  00 00 00 00 04 02 00 00  00 00 13 3a 81 00 00 00  |...........:....|
00010090  9f 01 10 80 00 00 01 61  61 20 20 62 62 62 03 04  |.......aa  bbb..|
000100a0  00 00 00 18 00 26 00 00  00 00 04 03 00 00 00 00  |.....&..........|
000100b0  13 3b 82 00 00 00 f6 01  10 80 00 00 02 78 78 78  |.;...........xxx|
000100c0  20 79 79 79 03 04 00 00  00 20 ff a4 00 00 00 00  | yyy..... ......|
000100d0  04 04 00 00 00 00 13 40  81 00 00 00 a3 01 10 7f  |.......@........|
000100e0  ff ff f8 78 78 78 20 79  79 79 00 00 00 00 00 00  |...xxx yyy......|
000100f0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  |................|
00010100
```

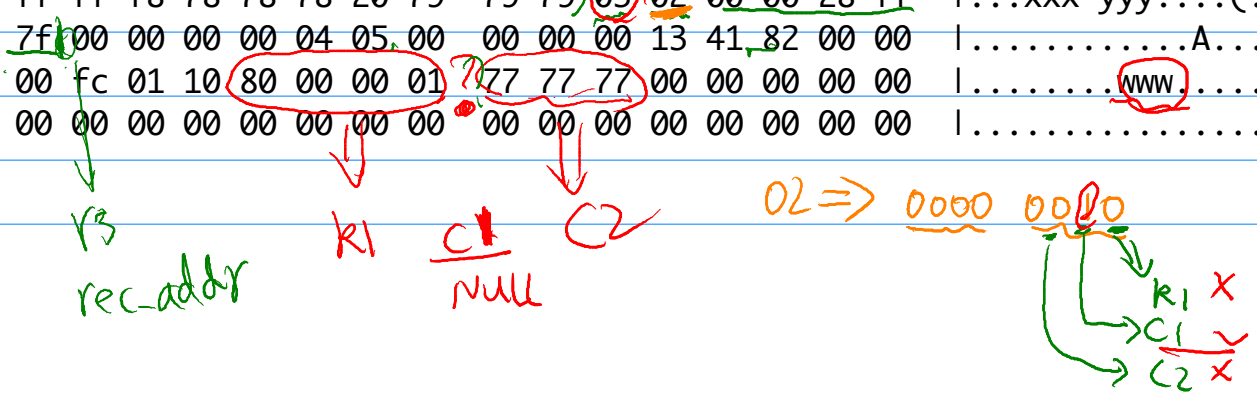
0x7ffffff8 ⇒ -8

符号位 ⇒ 1 sign= 0x80000000 ✗

1 正数

0 负数

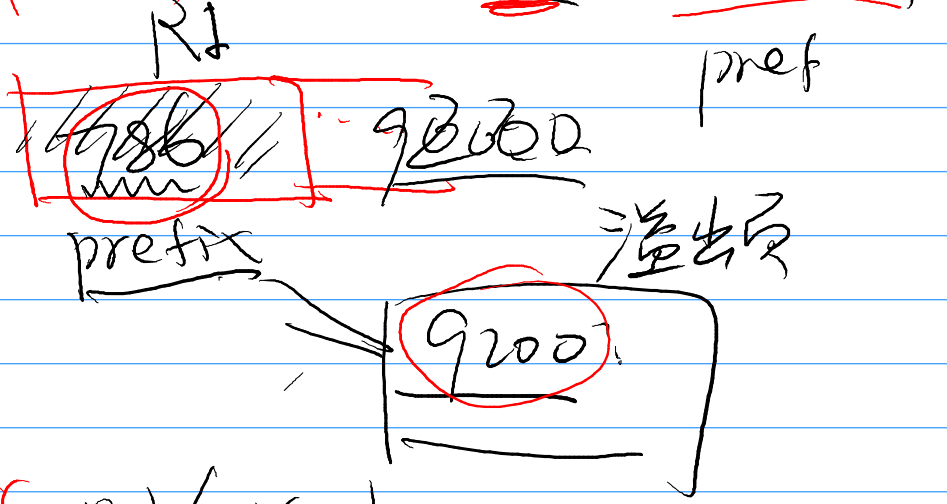
```
00010070  73 75 70 72 65 6d 75 6d  03 04 00 00 00 10 00 26  |supremum.......&|
00010080  00 00 00 00 04 02 00 00  00 00 13 3a 81 00 00 00  |...........:....|
00010090  9f 01 10 80 00 00 01 61  61 20 20 62 62 62 03 04  |.......aa  bbb..|
000100a0  00 00 00 18 00 26 00 00  00 00 04 03 00 00 00 00  |.....&..........|
000100b0  13 3b 82 00 00 00 f6 01  10 80 00 00 02 78 78 78  |.;...........xxx|
000100c0  20 79 79 79 03 04 00 00  00 20 00 25 00 00 00 00  | yyy..... .%....|
000100d0  04 04 00 00 00 00 13 40  81 00 00 00 a3 01 10 7f  |.......@........|
000100e0  ff ff f8 78 78 78 20 79  79 79 03 02 00 00 28 ff  |...xxx yyy....(.|
000100f0  7f 00 00 00 00 04 05 00  00 00 00 13 41 82 00 00  |............A...|
00010100  00 fc 01 10 80 00 00 01  77 77 77 00 00 00 00 00  |........www.....|
00010110  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  |................|
```



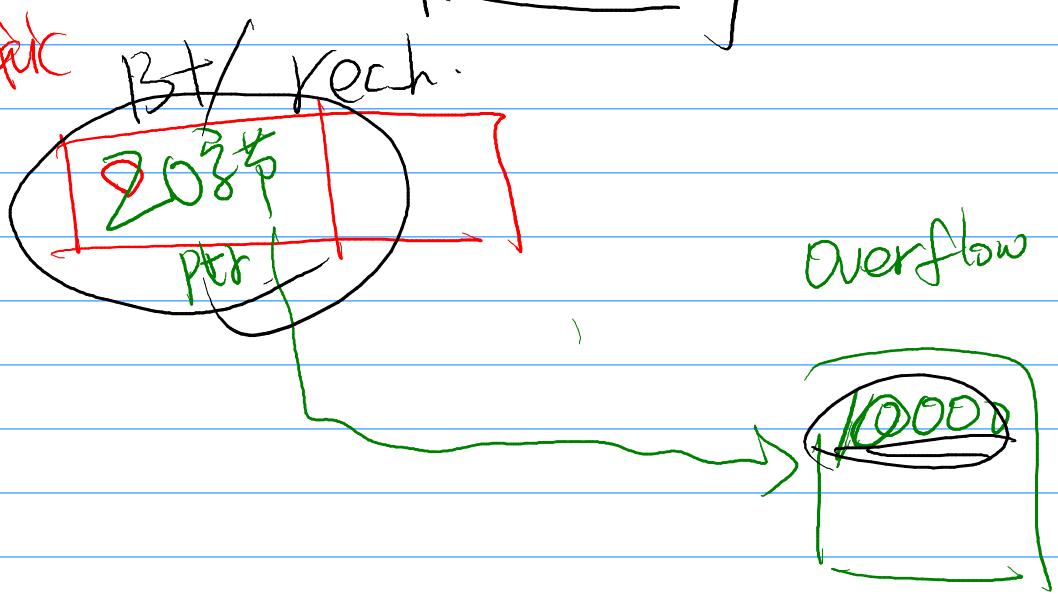
DYNAMIC 之外, compact

长字符, Text, blob

compact C1 text 10000字节



DYNAMIC



```
→  data/rtc hexdump -C -s 0x10000 -n 356 t3.ibd
00010000  cb 8a 7b 6c 00 00 00 04  ff ff ff ff ff ff ff ff  |..{l............|
00010010  00 00 00 00 19 c8 28 aa  45 bf 00 00 00 00 00 00  |......(.E.......|
00010020  00 00 00 00 00 4b 00 02  00 9a 80 03 00 00 00 00  |.....K..........|
00010030  00 80 00 05 00 00 00 01  00 00 00 00 00 00 00 00  |................|
00010040  00 00 00 00 00 00 00 00  00 fe 00 00 00 4b 00 00  |.............K..|
00010050  00 02 02 72 00 00 00 4b  00 00 00 02 01 b2 01 00  |...r...K........|
00010060  02 00 1d 69 6e 66 69 6d  75 6d 00 02 00 0b 00 00  |...infimum......|
00010070  73 75 70 72 65 6d 75 6d  01 01 00 00 00 10 ff f0  |supremum........|
00010080  00 00 00 00 04 06 00 00  00 00 13 4e 82 00 00 00  |...........N....|
00010090  86 01 10 5b 99 b4 1e 04  36 5d 00 00 00 00 00 00  |...[....6]......|
000100a0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  |................|
*
00010160  00 00 00 00                                       |....|
00010164
```

datetime/ timestamp

bigint