ngx_rbtree.h Documentation :

```c
#define ngx_rbt_red(node)              ((node)->color = 1)
#define ngx_rbt_black(node)            ((node)->color = 0)
#define ngx_rbt_is_red(node)          ((node)->color)
#define ngx_rbt_is_black(node)        (!ngx_rbt_is_red(node))
#define ngx_rbt_copy_color(n1, n2)    (n1->color = n2->color)
#define ngx_rbtree_sentinel_init(node)   ngx_rbt_black(node)

#define ngx_rbtree_init(tree, s, i)                          \
    ngx_rbtree_sentinel_init(s);                             \
    (tree)->root = s;                                        \
    (tree)->sentinel = s;                                    \
    (tree)->insert = i
```

```c
typedef ngx_uint_t  ngx_rbtree_key_t;
typedef ngx_int_t   ngx_rbtree_key_int_t;
typedef struct ngx_rbtree_node_s  ngx_rbtree_node_t;
typedef struct ngx_rbtree_s  ngx_rbtree_t;
typedef void (*ngx_rbtree_insert_pt) (ngx_rbtree_node_t *root,
    ngx_rbtree_node_t *node, ngx_rbtree_node_t *sentinel);
```

```c
struct ngx_rbtree_node_s {
    ngx_rbtree_key_t       key;
    ngx_rbtree_node_t    *left;
    ngx_rbtree_node_t    *right;
    ngx_rbtree_node_t    *parent;
    u_char               color;
    u_char               data;
}
struct ngx_rbtree_s {
    ngx_rbtree_node_t     *root;
    ngx_rbtree_node_t     *sentinel;
    ngx_rbtree_insert_pt   insert;
}
```

```
void ngx_rbtree_insert(  ngx_thread_volatile ngx_rbtree_t  *tree,
                         ngx_rbtree_node_t                 *node
                    )
void ngx_rbtree_delete( ngx_thread_volatile ngx_rbtree_t  *tree,
                        ngx_rbtree_node_t                 *node
                    )
void ngx_rbtree_insert_value(  ngx_rbtree_node_t  *root,
                               ngx_rbtree_node_t  *node,
                               ngx_rbtree_node_t  *sentinel
                         )
void ngx_rbtree_insert_timer_value(  ngx_rbtree_node_t   *root,
                                     ngx_rbtree_node_t   *node,
                                     ngx_rbtree_node_t   *sentinel
                               )
```