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Red Hat Enterprise Linux Release 9.2 Manual Pages on 'SLIST_FIRST.3' command

$ man SLIST_FIRST.3

SLIST(3) Linux Programmer's Manual SLIST(3)

NAME

SLIST_EMPTY, SLIST_ENTRY, SLIST_FIRST, SLIST_FOREACH, SLIST_HEAD, SLIST_HEAD_INITIALIZER, SLIST_INIT, SLIST_INSERT_AFTER, SLIST_IN? SERT_HEAD, SLIST_NEXT, SLIST_REMOVE, SLIST_REMOVE_HEAD - implementation of a singly linked list

SYNOPSIS

```
#include <sys/queue.h>
int SLIST_EMPTY(SLIST_HEAD *head);
SLIST_ENTRY(TYPE);
struct TYPE *SLIST_FIRST(SLIST_HEAD *head);
SLIST_FOREACH(struct TYPE *var, SLIST_HEAD *head, SLIST_ENTRY NAME);
SLIST_HEAD(HEADNAME, TYPE);
SLIST_HEAD SLIST_HEAD_INITIALIZER(SLIST_HEAD head);
void SLIST_INIT(SLIST_HEAD *head);
void SLIST_INSERT_AFTER(struct TYPE *listelm, struct TYPE *elm,
        SLIST_ENTRY NAME);
void SLIST_INSERT_HEAD(SLIST_HEAD *head, struct TYPE *elm,
        SLIST_ENTRY NAME);
struct TYPE *SLIST_NEXT(struct TYPE *elm, SLIST_ENTRY NAME);
void SLIST_REMOVE(SLIST_HEAD *head, struct TYPE *elm, SLIST_ENTRY NAME);
void SLIST_REMOVE_HEAD(SLIST_HEAD *head, SLIST_ENTRY NAME);
```

DESCRIPTION

These macros define and operate on doubly linked lists.

In the macro definitions, TYPE is the name of a user-defined structure, that must contain a field of type SLIST_ENTRY, named NAME. The argu? ment HEADNAME is the name of a user-defined structure that must be de? clared using the macro SLIST_HEAD().

A singly linked list is headed by a structure defined by the SLIST_HEAD() macro. This structure contains a single pointer to the first element on the list. The elements are singly linked for minimum space and pointer manipulation overhead at the expense of O(n) removal for arbitrary elements. New elements can be added to the list after an existing element or at the head of the list. An SLIST_HEAD structure is declared as follows:

```
SLIST_HEAD(HEADNAME, TYPE) head;
```

where struct HEADNAME is the structure to be defined, and struct TYPE is the type of the elements to be linked into the list. A pointer to the head of the list can later be declared as:

```
struct HEADNAME *headp;
```

(The names head and headp are user selectable.)

The macro SLIST_HEAD_INITIALIZER() evaluates to an initializer for the list head.

The macro SLIST_EMPTY() evaluates to true if there are no elements in the list.

The macro SLIST_ENTRY() declares a structure that connects the elements in the list.

The macro SLIST_FIRST() returns the first element in the list or NULL if the list is empty.

The macro SLIST_FOREACH() traverses the list referenced by head in the forward direction, assigning each element in turn to var.

The macro SLIST_INIT() initializes the list referenced by head.

The macro SLIST_INSERT_HEAD() inserts the new element elm at the head of the list.

The macro SLIST_INSERT_AFTER() inserts the new element elm after the element listelm.

The macro SLIST_NEXT() returns the next element in the list.

The macro SLIST_REMOVE_HEAD() removes the element elm from the head of the list. For optimum efficiency, elements being removed from the head of the list should explicitly use this macro instead of the generic SLIST_REMOVE macro.

The macro SLIST_REMOVE() removes the element elm from the list.

RETURN VALUE

SLIST_EMPTY() returns nonzero if the list is empty, and zero if the list contains at least one entry.

SLIST_FIRST(), and SLIST_NEXT() return a pointer to the first or next TYPE structure, respectively.

SLIST_HEAD_INITIALIZER() returns an initializer that can be assigned to the list head.

CONFORMING TO

Not in POSIX.1, POSIX.1-2001 or POSIX.1-2008. Present on the BSDs (SLIST macros first appeared in 4.4BSD).

BUGS

The macro SLIST_FOREACH() doesn't allow var to be removed or freed within the loop, as it would interfere with the traversal. The macro SLIST_FOREACH_SAFE(), which is present on the BSDs but is not present in glibc, fixes this limitation by allowing var to safely be removed from the list and freed from within the loop without interfering with the traversal.

EXAMPLES

```
#include <stddef.h>
#include <stdio.h>
#include <stdlib.h>
#include <sys/queue.h>
struct entry {
    int data;
    SLIST_ENTRY(entry) entries;             /* Singly linked List. */
};
SLIST_HEAD(slisthead, entry);
```

```
int
main(void)
{
    struct entry *n1, *n2, *n3, *np;
    struct slisthead head;                  /* Singly linked List
                                               head. */
    SLIST_INIT(&head);                      /* Initialize the queue. */
    n1 = malloc(sizeof(struct entry));      /* Insert at the head. */
    SLIST_INSERT_HEAD(&head, n1, entries);
    n2 = malloc(sizeof(struct entry));      /* Insert after. */
    SLIST_INSERT_AFTER(n1, n2, entries);
    SLIST_REMOVE(&head, n2, entry, entries);/* Deletion. */
    free(n2);
    n3 = SLIST_FIRST(&head);
    SLIST_REMOVE_HEAD(&head, entries);      /* Deletion from the head. */
    free(n3);
    for (int i = 0; i < 5; i++) {
        n1 = malloc(sizeof(struct entry));
        SLIST_INSERT_HEAD(&head, n1, entries);
        n1->data = i;
    }
                                            /* Forward traversal. */
    SLIST_FOREACH(np, &head, entries)
        printf("%i\n", np->data);
    while (!SLIST_EMPTY(&head)) {           /* List Deletion. */
        n1 = SLIST_FIRST(&head);
        SLIST_REMOVE_HEAD(&head, entries);
        free(n1);
    }
    SLIST_INIT(&head);
    exit(EXIT_SUCCESS);
}
```

insque(3), queue(7)

COLOPHON

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