Deque

Generated by Doxygen 1.8.11

Contents

1 Todo List

Class deque_t

base should'nt be accessible, see https://stackoverflow.com/questions/5368028/how-to-make-struct-

2 Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

3 File Index

3.1 File List

Here is a list of all files with brief descriptions:

4 Data Structure Documentation

4.1 deque_t Struct Reference

```
#include <deque.h>
```

Data Fields

- size_t width
- int front
- int count
- void ** base
- int max_size

4.1.1 Detailed Description

Abstract deque using array.

Todo *base* should'nt be accessible, see https://stackoverflow.com/questions/5368028/how-to-make-struc

Definition at line 22 of file deque.h.

4.1.2 Field Documentation

4.1.2.1 void** base

pointer to the array

Definition at line 26 of file deque.h.

4.1.2.2 int count

count element amount

Definition at line 25 of file deque.h.

4.1.2.3 int front

front element index

Definition at line 24 of file deque.h.

4.1.2.4 int max_size

width * max_size bytes is reserved for the deque

Definition at line 27 of file deque.h.

4.1.2.5 size_t width

element size (in bytes)

Definition at line 23 of file deque.h.

The documentation for this struct was generated from the following file:

- deque.h

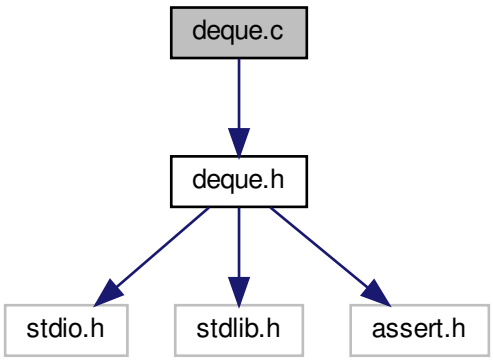
5 File Documentation

5.1 deque.c File Reference

deque's basic operations implementation (using array)

```
#include "deque.h"
```

Include dependency graph for deque.c:



Functions

- int deque_isempty (deque_t *q)
- int deque_isfull (deque_t *q)
- void deque_enqueue (deque_t *q, void *e)
- void deque_enqueue_other_end (deque_t *q, void *e)
- void * deque_dequeue (deque_t *q)
- void * deque_dequeue_other_end (deque_t *q)
- deque_t * deque_create (size_t width, int max_size)
- void deque_destruct (deque_t *q)
- void deque_int_print (deque_t *q)

5.1.1 Detailed Description

deque's basic operations implementation (using array)

Author

Firmin MARTIN

Version

0.1

Date

28/12/2017

Definition in file deque.c.

5.1.2 Function Documentation

5.1.2.1 deque_t* deque_create (size_t *width*, int *max_size*)

Given the size of each element and the deque size, create a deque.

Parameters

width	size of each element
max_size	size of the deque, max_size*width bytes will be reserved (definitively) for the deque

Returns

a deque initialized

Definition at line 101 of file deque.c.

```
00101                                          {
```

```
00102     deque_t* q = malloc(sizeof(deque_t));
00103     assert(q);
00104     q->width = width;
00105     q->max_size = max_size ;
00106     q->base = (void**) calloc(q->max_size, sizeof(void*));
00107     assert(q->base);
00108     q->front = 0;
00109     q->count = 0;
00110     return q;
00111 }
```

5.1.2.2 void* deque_dequeue (deque_t * q)

Dequeue an element from the queue s.

Parameters

q	queue

Returns

an element or NULL if the queue is empty

Definition at line 67 of file deque.c.

```
00067                                {
00068     if(deque_isempty(q)) {
00069         fprintf(stderr, "The deque is empty : failed to dequeue.\n");
00070         return NULL;
00071     }
00072     void* e = q->base[(q->front - q->count + q->max_size) % q->
      max_size];
00073     q->count--;
00074     return e;
00075 }
```

Here is the call graph for this function:

5.1.2.3 void* deque_dequeue_other_end (deque_t * q)

Dequeue an element from the deque s at the other end.

Parameters

q	deque

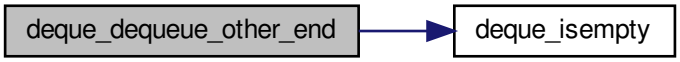
Returns

an element or NULL if the deque is empty

Definition at line 83 of file deque.c.

```
00083                                       {
00084     if(deque_isempty(q)) {
00085         fprintf(stderr, "The deque is empty : failed to dequeue.\n");
00086         return NULL;
00087     }
00088     q->front = (q->front - 1 + q->max_size) % q->max_size;
00089     void* e = q->base[q->front];
00090     q->count--;
00091     return e;
00092 }
```

Here is the call graph for this function:



5.1.2.4 void deque_destruct (deque_t * q)

Free a deque.

Parameters

q	a deque

Definition at line 118 of file deque.c.

```
00118                                   {
00119     for(int i=0; i<q->max_size;i++){
00120         free(q->base[i]);
00121     }
00122     free(q->base);
00123     free(q);
00124 }
```

5.1.2.5 void deque_enqueue (deque_t * q, void * e)

Enqueue an element e into the deque q.

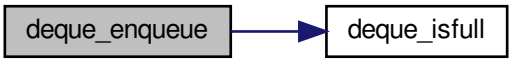
Parameters

q	deque
e	element which be endequed

Definition at line 37 of file deque.c.

```
00037                                       {
00038     if(deque_isfull(q)) {
00039         fprintf(stderr, "The deque is full : failed to enqueue.\n");
00040         return;
00041     }
00042     q->base[q->front] = e;
00043     q->count++;
00044     q->front = (q->front + 1) % q->max_size;
00045 }
```

Here is the call graph for this function:



5.1.2.6 void deque_enqueue_other_end (deque_t * q, void * e)

Enqueue an element e into the deque q at the other end.

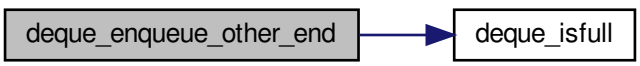
Parameters

q	deque
e	element which be endequed

Definition at line 53 of file deque.c.

```
00053                                                {
00054     if(deque_isfull(q)) {
00055         fprintf(stderr, "The deque is full : failed to enqueue.\n");
00056         return;
00057     } q->base[(q->front - (q->count + 1) + q->max_size) % q->
      max_size] = e;
00058     q->count++;
00059 }
```

Here is the call graph for this function:



5.1.2.7 void deque_int_print (deque_t * q)

Print an int deque

Definition at line 130 of file deque.c.

```
00130                                   {
00131     for(int i = 0; i < q->max_size; i++) {
00132         if ((q->front - i + q->max_size) % q->max_size <= q->
      count && i != q->front)
00133             printf("[%d]", *((int*)q->base[i]));
00134         else
00135             printf("[]");
00136     }
00137     puts("");
00138 }
```

5.1.2.8 int deque_isempty (deque_t * q)

Determinate the emptiness of a deque.

Parameters

s	deque

Returns

1 if the deque s is empty, 0 otherwise.

Definition at line 17 of file deque.c.

```
00017                                {
00018     return q->count == 0;
00019 }
```

5.1.2.9 int deque_isfull (deque_t * q)

Determinate the fullness of a deque.

Parameters

s	deque

Returns

1 if the deque s is full, 0 otherwise.

Definition at line 27 of file deque.c.

```
00027                                {
00028     return q->count == q->max_size;
00029 }
```

5.2 deque.c

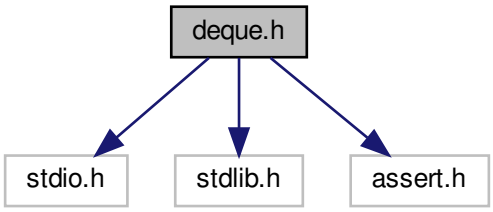
```
00001
00009 #include "deque.h"
00010
00017 int deque_isempty(deque_t* q) {
00018     return q->count == 0;
00019 }
00020
00027 int deque_isfull(deque_t* q) {
00028     return q->count == q->max_size;
00029 }
00030
00037 void deque_enqueue(deque_t* q, void* e) {
00038     if(deque_isfull(q)) {
00039         fprintf(stderr, "The deque is full : failed to enqueue.\n");
00040         return;
00041     }
00042     q->base[q->front] = e;
00043     q->count++;
00044     q->front = (q->front + 1) % q->max_size;
00045 }
00046
00053 void deque_enqueue_other_end(deque_t* q, void* e) {
00054     if(deque_isfull(q)) {
00055         fprintf(stderr, "The deque is full : failed to enqueue.\n");
00056         return;
00057     } q->base[(q->front - (q->count + 1) + q->max_size) % q->
      max_size] = e;
00058     q->count++;
00059 }
00060
00067 void* deque_dequeue(deque_t* q) {
00068     if(deque_isempty(q)) {
00069         fprintf(stderr, "The deque is empty : failed to dequeue.\n");
00070         return NULL;
00071     }
00072     void* e = q->base[(q->front - q->count + q->max_size) % q->
      max_size];
00073     q->count--;
00074     return e;
00075 }
00076
00083 void* deque_dequeue_other_end(deque_t* q) {
00084     if(deque_isempty(q)) {
00085         fprintf(stderr, "The deque is empty : failed to dequeue.\n");
00086         return NULL;
00087     }
00088     q->front = (q->front - 1 + q->max_size) % q->max_size;
00089     void* e = q->base[q->front];
00090     q->count--;
00091     return e;
00092 }
00093
00101 deque_t* deque_create(size_t width, int max_size) {
00102     deque_t* q = malloc(sizeof(deque_t));
00103     assert(q);
00104     q->width = width;
00105     q->max_size = max_size ;
00106     q->base = (void**) calloc(q->max_size, sizeof(void*));
00107     assert(q->base);
00108     q->front = 0;
00109     q->count = 0;
00110     return q;
00111 }
00112
00118 void deque_destruct(deque_t* q) {
00119     for(int i=0; i<q->max_size;i++){
00120         free(q->base[i]);
00121     }
00122     free(q->base);
00123     free(q);
00124 }
00125
00130 void deque_int_print(deque_t* q) {
00131     for(int i = 0; i < q->max_size; i++) {
00132         if ((q->front - i + q->max_size) % q->max_size <= q->
      count && i != q->front)
00133             printf("[%d]", *((int*)q->base[i]));
00134         else
00135             printf("[]");
00136     }
00137     puts("");
00138 }
00139
```

5.3 deque.h File Reference

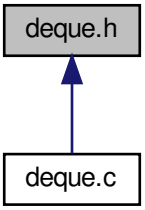
deque (using array) definition and basic operations

```
#include <stdio.h>
#include <stdlib.h>
#include <assert.h>
```

Include dependency graph for deque.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct deque_t

Functions

- deque_t * deque_create (size_t width, int max_size)
- void deque_destruct (deque_t *q)
- int deque_isempty (deque_t *q)
- int deque_isfull (deque_t *q)
- void * deque_dequeue (deque_t *q)
- void * deque_dequeue_other_end (deque_t *q)
- void deque_enqueue_other_end (deque_t *q, void *e)
- void deque_enqueue (deque_t *q, void *e)
- void deque_int_print (deque_t *q)

5.3.1 Detailed Description

deque (using array) definition and basic operations

Author

Firmin MARTIN

Version

0.1

Date

28/12/2017

Definition in file deque.h.

5.3.2 Function Documentation

5.3.2.1 deque_t* deque_create (size_t *width*, int *max_size*)

Given the size of each element and the deque size, create a deque.

Parameters

width	size of each element
max_size	size of the deque, max_size*width bytes will be reserved (definitively) for the deque

Returns

a deque initialized

Definition at line 101 of file deque.c.

```
00101                                                {
00102     deque_t* q = malloc(sizeof(deque_t));
00103     assert(q);
00104     q->width = width;
00105     q->max_size = max_size ;
00106     q->base = (void**) calloc(q->max_size, sizeof(void*));
00107     assert(q->base);
00108     q->front = 0;
00109     q->count = 0;
00110     return q;
00111 }
```

5.3.2.2 void* deque_dequeue (deque_t * *q*)

Dequeue an element from the queue s.

Parameters

q	queue

Returns

an element or NULL if the queue is empty

Definition at line 67 of file deque.c.

```
00067                                {
00068     if(deque_isempty(q)) {
00069         fprintf(stderr, "The deque is empty : failed to dequeue.\n");
00070         return NULL;
00071     }
00072     void* e = q->base[(q->front - q->count + q->max_size) % q->
      max_size];
00073     q->count--;
00074     return e;
00075 }
```

Here is the call graph for this function:

5.3.2.3 void* deque_dequeue_other_end (deque_t * *q*)

Dequeue an element from the deque s at the other end.

Parameters

q	deque

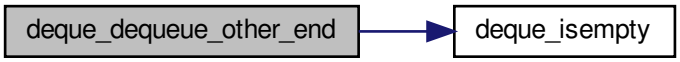
Returns

an element or NULL if the deque is empty

Definition at line 83 of file deque.c.

```
00083                                          {
00084     if(deque_isempty(q)) {
00085         fprintf(stderr, "The deque is empty : failed to dequeue.\n");
00086         return NULL;
00087     }
00088     q->front = (q->front - 1 + q->max_size) % q->max_size;
00089     void* e = q->base[q->front];
00090     q->count--;
00091     return e;
00092 }
```

Here is the call graph for this function:



5.3.2.4 void deque_destruct (deque_t * q)

Free a deque.

Parameters

q	a deque

Definition at line 118 of file deque.c.

```
00118                                   {
00119     for(int i=0; i<q->max_size;i++){
00120         free(q->base[i]);
00121     }
00122     free(q->base);
00123     free(q);
00124 }
```

5.3.2.5 void deque_enqueue (deque_t * q, void * e)

Enqueue an element e into the deque q.

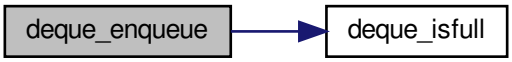
Parameters

q	deque
e	element which be endequed

Definition at line 37 of file deque.c.

```
00037                                           {
00038     if(deque_isfull(q)) {
00039         fprintf(stderr, "The deque is full : failed to enqueue.\n");
00040         return;
00041     }
00042     q->base[q->front] = e;
00043     q->count++;
00044     q->front = (q->front + 1) % q->max_size;
00045 }
```

Here is the call graph for this function:



5.3.2.6 void deque_enqueue_other_end (deque_t * q, void * e)

Enqueue an element e into the deque q at the other end.

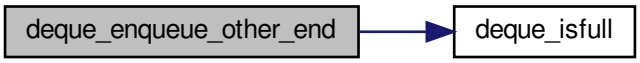
Parameters

q	deque
e	element which be endequed

Definition at line 53 of file deque.c.

```
00053                                                   {
00054     if(deque_isfull(q)) {
00055         fprintf(stderr, "The deque is full : failed to enqueue.\n");
00056         return;
00057     } q->base[(q->front - (q->count + 1) + q->max_size) % q->
      max_size] = e;
00058     q->count++;
00059 }
```

Here is the call graph for this function:



5.3.2.7 void deque_int_print (deque_t * q)

Print an int deque

Definition at line 130 of file deque.c.

```
00130                                   {
00131     for(int i = 0; i < q->max_size; i++) {
00132         if ((q->front - i + q->max_size) % q->max_size <= q->
      count && i != q->front)
00133             printf("[%d]", *((int*)q->base[i]));
00134         else
00135             printf("[]");
00136     }
00137     puts("");
00138 }
```

5.3.2.8 int deque_isempty (deque_t * q)

Determinate the emptiness of a deque.

Parameters

s	deque

Returns

1 if the deque s is empty, 0 otherwise.

Definition at line 17 of file deque.c.

```
00017                                {
00018     return q->count == 0;
00019 }
```

5.3.2.9 int deque_isfull (deque_t * q)

Determinate the fullness of a deque.

Parameters

s	deque

Returns

1 if the deque s is full, 0 otherwise.

Definition at line 27 of file deque.c.

```
00027                                {
00028     return q->count == q->max_size;
00029 }
```

5.4 deque.h

```
00001 #ifndef DEQUE_H
00002 #define DEQUE_H
00003
00004 #include <stdio.h>
00005 #include <stdlib.h>
00006 #include <assert.h>
00007
00022 typedef struct {
00023     size_t width;
00024     int front;
00025     int count;
00026     void** base;
00027     int max_size;
00028 } deque_t;
00029
00030 deque_t* deque_create(size_t width, int max_size);
00031 void deque_destruct(deque_t* q);
00032 int deque_isempty(deque_t* q);
00033 int deque_isfull(deque_t* q);
```

```
00034 void* deque_dequeue(deque_t* q);
00035 void* deque_dequeue_other_end(deque_t* q);
00036 void deque_enqueue_other_end(deque_t* q, void* e);
00037 void deque_enqueue(deque_t* q, void* e);
00038 void deque_int_print(deque_t* q);
00039
00040 #endif /* ifndef deque_H*/
```

Index