My library

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Chapter 1

myLibrary homepage

1.1 Hi!

Actually I don't know what I should put here, so at the moment I just suggest you to go to the files section. The source code and binaries are available here. Here there is a PDF version of the docs.

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

Chapter 4

Data Structure Documentation

4.1 ArrayList Struct Reference

ArrayList type

`#include <types.h>`

Data Fields

- spec_t type

  The type of the elements contained by the ArrayList. Refer to spec_t.
- void * body

  Void pointer to the first element of the ArrayList.
- unsigned int size

  The number of elements contained by the ArrayList.

4.1.1 Detailed Description

ArrayList type

Note

All the parameters in this structure must be intended as read-only. Manually modifying them can cause unknown and unwanted behavior

4.1.2 Field Documentation

4.1.2.1 body

`void* ArrayList::body`

Void pointer to the first element of the ArrayList.

4.1.2.2 size

```
unsigned int ArrayList::size
```

The number of elements contained by the ArrayList.

4.1.2.3 type

```
spec_t ArrayList::type
```

The type of the elements contained by the ArrayList. Refer to spec_t.

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

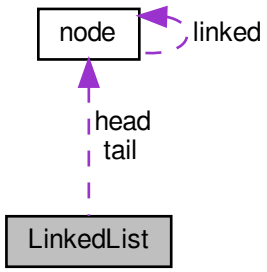
- types.h

4.2 LinkedList Struct Reference

LinkedList type

```
#include <types.h>
```

Collaboration diagram for LinkedList:



Data Fields

- spec_t type
  The type of the elements contained by the LinkedList. Refer to spec_t.
- Node head
  Head of the LinkedList.
- Node tail
  Tail of the LinkedList.
- unsigned int size
  The number of elements contained by the LinkedList.

4.2.1 Detailed Description

LinkedList type

Note

All the parameters in this structure must be intended as read-only. Manually modifying them can cause unknown and unwanted behavior

4.2.2 Field Documentation

4.2.2.1 head

```
Node LinkedList::head
```

Head of the LinkedList.

4.2.2.2 size

```
unsigned int LinkedList::size
```

The number of elements contained by the LinkedList.

4.2.2.3 tail

```
Node LinkedList::tail
```

Tail of the LinkedList.

4.2.2.4 type

```
spec_t LinkedList::type
```

The type of the elements contained by the LinkedList. Refer to spec_t.

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

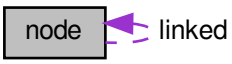
- types.h

4.3 node Struct Reference

Node type

`#include <types.h>`

Collaboration diagram for node:



Data Fields

- void * data

  Pointer to the value contained.
- struct node * linked

  The Node this Node is linked to.

4.3.1 Detailed Description

Node type

Base component of every linked data type

Note

All the parameters in this structure must be intended as read-only. Manually modifying them can cause unknown and unwanted behavior

4.3.2 Field Documentation

4.3.2.1 data

`void* node::data`

Pointer to the value contained.

4.3.2.2 linked

```
struct node* node::linked
```

The Node this Node is linked to.

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

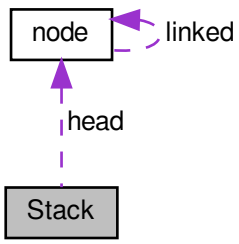
- types.h

4.4 Stack Struct Reference

Stack type

```
#include <types.h>
```

Collaboration diagram for Stack:



Data Fields

- spec_t type

  The type of the elements contained by the Stack. Refer to spec_t.
- Node head

  Head of the Stack.

4.4.1 Detailed Description

Stack type

Note

All the parameters in this structure must be intended as read-only. Manually modifying them can cause unknown and unwanted behavior

4.4.2 Field Documentation

4.4.2.1 head

```
Node Stack::head
```

Head of the Stack.

4.4.2.2 type

```
spec_t Stack::type
```

The type of the elements contained by the Stack. Refer to spec_t.

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

- types.h

Chapter 5

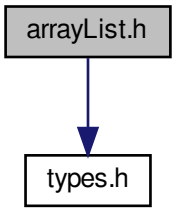
File Documentation

5.1 arrayList.h File Reference

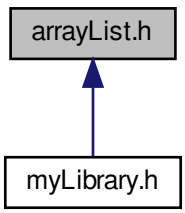
Functions and macros for working with ArrayList type.

```
#include "types.h"
```

Include dependency graph for arrayList.h:



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



Macros

- #define newALFromArray(list, size)

  Create an ArrayList from a static list.

Functions

- ArrayList newAL (const spec_t spec)

  Allocate a new ArrayList of specified type.
- ArrayList newALFromAL (const ArrayList list)

  Get a copy of an ArrayList.
- void appendToAL (ArrayList list,...)

  Insert an item at the end of an ArrayList.
- void insertToAL (ArrayList list, unsigned int index,...)

  Insert an element at a specified position of an ArrayList.
- void setALItem (ArrayList list, unsigned int index,...)

  Set value of an element of an ArrayList.
- void mergeAL (ArrayList list1, const ArrayList list2)

  Merge two ArrayList.
- void sliceAL (ArrayList list, unsigned int begin, unsigned int end)

  Slice an ArrayList.
- void printAL (const spec_t spec, const ArrayList list)

  Print contents from an ArrayList.
- void removeFromAL (ArrayList list, unsigned int index)

  Remove an item from an ArrayList.
- void getFromAL (const ArrayList list, unsigned int index, void *dest)

  Get an item from an ArrayList.
- void deleteAL (ArrayList list)

  Delete an ArrayList.
- byte areALEqual (const ArrayList list1, const ArrayList list2)

  Compare two ArrayList.
- void reverseAL (ArrayList list)

  Reverse an ArrayList.
- void bubbleSortAL (ArrayList list)

  Bubble sort for ArrayList.
- void quickSortAL (ArrayList list)

  Quicksort for ArrayList.
- byte isInAL (ArrayList list,...)

  Detect if an element is inside an ArrayList.
- int linearSearchAL (ArrayList list,...)

  Linear search for ArrayList.
- ArrayList chooseNewALFromArray (const spec_t spec, const void *list, unsigned int size)

  Create an ArrayList from an list.
- ArrayList newALFromCharArray (const char list[ ], unsigned int size)

  Create ArrayList from an list of chars.
- ArrayList newALFromByteArray (const char list[ ], unsigned int size)

  Alias for newALFromCharArray(). Used to create ArrayList from byte list. Refer to newALFromCharArray()
- ArrayList newALFromIntArray (const int list[ ], unsigned int size)

  Create ArrayList from an list of ints.
- ArrayList newALFromFloatArray (const float list[ ], unsigned int size)

Create ArrayList from an list of floats.

- ArrayList newALFromDoubleArray (const double list[ ], unsigned int size)

  Create ArrayList from an list of doubles.

- ArrayList newALFromPtrArray (const void *list, unsigned int size)

  Create ArrayList from an list of pointers.

5.1.1 Detailed Description

Functions and macros for working with ArrayList type.

Author

Pietro Firpo (pietro.firpo@pm.me)

5.1.2 Macro Definition Documentation

5.1.2.1 newALFromArray

```
#define newALFromArray(
              list,
              size )
```

Value:

```
_Generic(list, char *                       \
: newALFromCharArray, int *     \
: newALFromIntArray, float *    \
: newALFromFloatArray, double * \
: newALFromDoubleArray)(list, size)
```

Create an ArrayList from a static list.

Parameters

list	The list you want to create an ArrayList from
size	The size of `list`

Note

Passing an list of pointers is not supported

Returns

An ArrayList containing all the elements of `list`

5.1.3 Function Documentation

5.1.3.1 appendToAL()

```
void appendToAL (
            ArrayList list,
             ...  )
```

Insert an item at the end of an ArrayList.

Parameters

list	The ArrayList you want to append an item to
...	The item you want to append to `list`

Note

Even though appending more than one item for single call does not throw a compiler nor runtime error, only appending one item is supported. Other items are ignored and are not appended to `list`. If you don't specify any item to be appended, still no errors occur but the content of your ArrayList can be messed up

5.1.3.2 areALEqual()

```
byte areALEqual (
            const ArrayList list1,
            const ArrayList list2 )
```

Compare two ArrayList.

Parameters

list1	The first ArrayList you want to compare
list2	The second ArrayList you want to compare

Returns

The result of the comparison

Return values

TRUE	`list1` and `list2` have equal type, equal length and equal contents
FALSE	`list1` and `list2` do not have equal type, equal length or equal contents

5.1.3.3 bubbleSortAL()

```
void bubbleSortAL (
            ArrayList list )
```

Bubble sort for ArrayList.

Parameters

list	The ArrayList you want to bubble sort

5.1.3.4 chooseNewALFromArray()

```
ArrayList chooseNewALFromArray (
            const spec_t spec,
            const void * list,
            unsigned int size )
```

Create an ArrayList from an list.

Parameters

spec	The type specifier of the list passed. Refer to spec_t
list	The list you want to create the ArrayList from
size	The number of items of `list`

Returns

An ArrayList containing the elements in `list` in the same order

5.1.3.5 deleteAL()

```
void deleteAL (
            ArrayList list )
```

Delete an ArrayList.

Parameters

list	The ArrayList you want to delete

5.1.3.6 getFromAL()

```
void getFromAL (
            const ArrayList list,
```

```
            unsigned int index,
            void * dest )
```

Get an item from an ArrayList.

Parameters

list	The ArrayList you want to get an item from
index	The index of the item you want to get
dest	The address of the variable you want to store the item in

5.1.3.7 insertToAL()

```
void insertToAL (
            ArrayList list,
            unsigned int index,
             ...  )
```

Insert an element at a specified position of an ArrayList.

Parameters

list	The ArrayList you want to insert an element into
index	The position you want to insert an item at
...	The item you want to insert into `list`

Note

Even though inserting more than one item for single call does not throw a compiler nor runtime error, only inserting one item is supported. Other items are ignored and are not inserted into `list`. If you don't specify any item to be inserted, still no errors occur but the content of your ArrayList can be messed up

5.1.3.8 isInAL()

```
byte isInAL (
            ArrayList list,
             ...  )
```

Detect if an element is inside an ArrayList.

Parameters

list	The ArrayList you want search in
...	The element you want to search

Note

Even though inserting zero more than one item for single call does not throw a compiler nor runtime error, only searching one item is supported. Other items are ignored. If you don't specify any item to be searched, still no errors occur but the return value of the function can be unpredictable

Return values

TRUE	Given element is contained in `list`
FALSE	Given element is not contained in `list`

5.1.3.9 linearSearchAL()

```
int linearSearchAL (
            ArrayList list,
             ...  )
```

Linear search for ArrayList.

Parameters

list	The ArrayList to be inspected
...	The key to be searched

Note

This function does not support float and double ArrayList

Even though passing more than one key does not throw a compiler nor runtime error, only searching one item is supported. Other items are ignored. If you don't specify any item to be searched, still no errors occur but the return value of the function can be unpredictable

Returns

The index of the first occurence of the key in the list or the return code of the function

Return values

KEY_NOT_FOUND	The key was not found

5.1.3.10 mergeAL()

```
void mergeAL (
            ArrayList list1,
            const ArrayList list2 )
```

Merge two ArrayList.

Parameters

list1	The first ArrayList to be merged, where the merged ArrayList is saved
list2	The second ArrayList to be merged

5.1.3.11 newAL()

```
ArrayList newAL (
            const spec_t spec )
```

Allocate a new ArrayList of specified type.

Parameters

spec	Type specifier of the ArrayList you want to create

Returns

An empty ArrayList

5.1.3.12 newALFromAL()

```
ArrayList newALFromAL (
            const ArrayList list )
```

Get a copy of an ArrayList.

Parameters

list	The ArrayList you want to copy

Returns

A copy of `list`

5.1.3.13 newALFromByteArray()

```
ArrayList newALFromByteArray (
            const char list[],
            unsigned int size )
```

Alias for newALFromCharArray(). Used to create ArrayList from byte list. Refer to newALFromCharArray()

5.1.3.14 newALFromCharArray()

```
ArrayList newALFromCharArray (
            const char list[],
            unsigned int size )
```

Create ArrayList from an list of chars.

Equivalent to `chooseNewALFromArray("%c", list, size)`. Refer to chooseNewALFromArray()

5.1.3.15 newALFromDoubleArray()

```
ArrayList newALFromDoubleArray (
            const double list[],
            unsigned int size )
```

Create ArrayList from an list of doubles.

Equivalent to `chooseNewALFromArray("%lf", list, size)`. Refer to chooseNewALFromArray()

5.1.3.16 newALFromFloatArray()

```
ArrayList newALFromFloatArray (
            const float list[],
            unsigned int size )
```

Create ArrayList from an list of floats.

Equivalent to `chooseNewALFromArray("%f", list, size)`. Refer to chooseNewALFromArray()

5.1.3.17 newALFromIntArray()

```
ArrayList newALFromIntArray (
            const int list[],
            unsigned int size )
```

Create ArrayList from an list of ints.

Equivalent to `chooseNewALFromArray("%i", list, size)`. Refer to chooseNewALFromArray()

5.1.3.18 newALFromPtrArray()

```
ArrayList newALFromPtrArray (
            const void * list,
            unsigned int size )
```

Create ArrayList from an list of pointers.

Equivalent to `chooseNewALFromArray("%p", list, size)`. Refer to chooseNewALFromArray()

5.1.3.19 printAL()

```
void printAL (
            const spec_t spec,
            const ArrayList list )
```

Print contents from an ArrayList.

Parameters

spec	The type and format specifier you want to use to print the single element of the ArrayList
list	The ArrayList you want to print

5.1.3.20 quickSortAL()

```
void quickSortAL (
            ArrayList list )
```

Quicksort for ArrayList.

Parameters

list	The ArrayList you want to quicksort

5.1.3.21 removeFromAL()

```
void removeFromAL (
            ArrayList list,
            unsigned int index )
```

Remove an item from an ArrayList.

Parameters

list	The ArrayList you want to delete an item from
index	The index of the item you want to delete

5.1.3.22 reverseAL()

```
void reverseAL (
            ArrayList list )
```

Reverse an ArrayList.

Parameters

list	The ArrayList you want to reverse

5.1.3.23 setALItem()

```
void setALItem (
            ArrayList list,
            unsigned int index,
             ...  )
```

Set value of an element of an ArrayList.

Parameters

list	The ArrayList you want to edit
index	The index of the element you want to change
...	The item you want to insert into `list`

Note

Even though inserting more than one item for single call does not throw a compiler nor runtime error, only setting one item is supported. Other items are ignored. If you don't specify any item to be inserted, still no errors occur but the content of your ArrayList can be messed up

5.1.3.24 sliceAL()

```
void sliceAL (
            ArrayList list,
            unsigned int begin,
            unsigned int end )
```

Slice an ArrayList.

Parameters

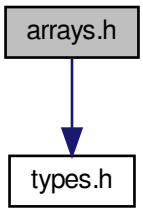
list	The ArrayList you want to slice, where the sliced ArrayList is saved
begin	The index of the beginning of the slice
end	The index of the end of the slice

5.2 arrays.h File Reference

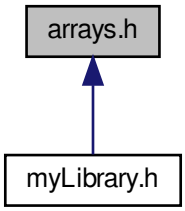
Common tasks with arrays: sorting, searching, printing etc.

```
#include "types.h"
```

Include dependency graph for arrays.h:



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



Functions

- void chooseBubbleSortArr (const spec_t spec, void ∗arr, unsigned int size)

  Bubble sort for arrays.
- void chooseQuickSortArr (const spec_t spec, void ∗arr, int size)

  Quick sort for arrays.
- int chooseLinearSearch (const spec_t spec, void ∗arr, int size,...)

  Linear search for arrays.
- void printMatrix (const spec_t spec, const void ∗matrix, const unsigned int nRows, const unsigned int n↩ Columns)

  Print matrix of specified size with specified formatting.
- void charBubbleSort (char ∗arr, unsigned int size)

  Bubblesort for arrays of chars.
- void intBubbleSort (int ∗arr, unsigned int size)

  Bubblesort for arrays of ints.
- void floatBubbleSort (float ∗arr, unsigned int size)

  Bubblesort for arrays of floats.
- void doubleBubbleSort (double ∗arr, unsigned int size)

Bubblesort for arrays of doubles.

- void ptrBubbleSort (void **arr, unsigned int size)

  Bubblesort for arrays of pointers.
- void charQuickSort (char *arr, int size)

  Quicksort for arrays of chars.
- void intQuickSort (int *arr, int size)

  Quicksort for arrays of ints.
- void floatQuickSort (float *arr, int size)

  Quicksort for arrays of floats.
- void doubleQuickSort (double *arr, int size)

  Quicksort for arrays of doubles.
- void ptrQuickSort (void **arr, int size)

  Quicksort for arrays of pointers.

5.2.1 Detailed Description

Common tasks with arrays: sorting, searching, printing etc.

Author

Pietro Firpo (pietro.firpo@pm.me)

5.2.2 Function Documentation

5.2.2.1 charBubbleSort()

```
void charBubbleSort (
            char * arr,
            unsigned int size )
```

Bubblesort for arrays of chars.

Equivalent to `chooseBubbleSortArr("%c", arr, size)`. Refer to chooseBubbleSortArr()

5.2.2.2 charQuickSort()

```
void charQuickSort (
            char * arr,
            int size )
```

Quicksort for arrays of chars.

Equivalent to `chooseQuickSortArr("%c", arr, size)`. Refer to chooseQuickSortArr()

5.2.2.3 chooseBubbleSortArr()

```
void chooseBubbleSortArr (
            const spec_t spec,
            void * arr,
            unsigned int size )
```

Bubble sort for arrays.

Parameters

spec	Type specifier of the array to be sorted. Refer to spec_t for supported types.
arr	Pointer to the first element of the array to be sorted
size	Number of elements of the array to be sorted

5.2.2.4 chooseLinearSearch()

```
int chooseLinearSearch (
            const spec_t spec,
            void * arr,
            int size,
             ...  )
```

Linear search for arrays.

Parameters

spec	Type specifier of the array to be sorted. Refer to spec_t for supported types
arr	Pointer to the first element of the array to be inspected
size	Number of elements of the array to be inspected
...	The key to be searched

Note

Even though passing more than one key does not throw a compiler nor runtime error, only searching one item is supported. Other items are ignored. If you don't specify any item to be searched, still no errors occur but the return value of the function can be unpredictable

Returns

The index of the first occurence of the key in the array or the return code of the function

Return values

KEY_NOT_FOUND	The key was not found

5.2.2.5 chooseQuickSortArr()

```
void chooseQuickSortArr (
            const spec_t spec,
            void * arr,
            int size )
```

Quick sort for arrays.

Parameters

spec	Type specifier of the array to be sorted. Refer to spec_t for supported types
arr	Pointer to the first element of the array to be sorted
size	Number of elements of the array to be sorted

5.2.2.6 doubleBubbleSort()

```
void doubleBubbleSort (
            double * arr,
            unsigned int size )
```

Bubblesort for arrays of doubles.

Equivalent to `chooseBubbleSortArr("%lf", arr, size)`. Refer to chooseBubbleSortArr()

5.2.2.7 doubleQuickSort()

```
void doubleQuickSort (
            double * arr,
            int size )
```

Quicksort for arrays of doubles.

Equivalent to `chooseQuickSortArr("%lf", arr, size)`. Refer to chooseQuickSortArr()

5.2.2.8 floatBubbleSort()

```
void floatBubbleSort (
            float * arr,
            unsigned int size )
```

Bubblesort for arrays of floats.

Equivalent to `chooseBubbleSortArr("%f", arr, size)`. Refer to chooseBubbleSortArr()

5.2.2.9 floatQuickSort()

```
void floatQuickSort (
            float * arr,
            int size )
```

Quicksort for arrays of floats.

Equivalent to `chooseQuickSortArr("%f", arr, size)`. Refer to chooseQuickSortArr()

5.2.2.10 intBubbleSort()

```
void intBubbleSort (
            int * arr,
            unsigned int size )
```

Bubblesort for arrays of ints.

Equivalent to `chooseBubbleSortArr("%i", arr, size)`. Refer to chooseBubbleSortArr()

5.2.2.11 intQuickSort()

```
void intQuickSort (
            int * arr,
            int size )
```

Quicksort for arrays of ints.

Equivalent to `chooseQuickSortArr("%i", arr, size)`. Refer to chooseQuickSortArr()

5.2.2.12 printMatrix()

```
void printMatrix (
            const spec_t spec,
            const void * matrix,
            const unsigned int nRows,
            const unsigned int nColumns )
```

Print matrix of specified size with specified formatting.

Parameters

spec	Type and format specifier used to print a cell. The printf() identifier formatting convention is supported. See spec_t for details. Additional supported specifiers: `"%hi"` (numerical output for char)

Note

The format specifier must end with the letter of the type specifier. For example, `"%5.3lf"` is supported, `"%5.3lf\n"` or `"%5.3lfTest"` is not supported and nothing is printed

Parameters

matrix	Pointer to the first element of the matrix
nRows	Number of rows of the matrix
nColumns	Number of rows of the matrix

5.2.2.13 ptrBubbleSort()

```
void ptrBubbleSort (
            void ** arr,
            unsigned int size )
```

Bubblesort for arrays of pointers.

Equivalent to `chooseBubbleSortArr("%p", arr, size)`. Refer to chooseBubbleSortArr()

5.2.2.14 ptrQuickSort()

```
void ptrQuickSort (
            void ** arr,
            int size )
```

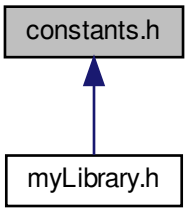
Quicksort for arrays of pointers.

Equivalent to `chooseQuickSortArr("%p", arr, size)`. Refer to chooseQuickSortArr()

5.3 constants.h File Reference

Definition of symbolic constants used by the library.

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



Macros

- #define GREATER 1

  Returned by typeCmp() functions when first argument is grater than the second.
- #define EQUAL 0

  Returned by typeCmp() functions when first argument is equal to the second.
- #define SMALLER -1

  Returned by typeCmp() functions when first argument is smaller than the second.
- #define TRUE 0xFF

  Bool value definition.
- #define FALSE 0

  Bool value definition.
- #define KEY_NOT_FOUND -1

  Returned by search functions of the library when key was not found.

5.3.1 Detailed Description

Definition of symbolic constants used by the library.

Author

Pietro Firpo (pietro.firpo@pm.me)

5.3.2 Macro Definition Documentation

5.3.2.1 EQUAL

```
#define EQUAL 0
```

Returned by *type*Cmp() functions when first argument is equal to the second.

5.3.2.2 FALSE

```
#define FALSE 0
```

Bool value definition.

5.3.2.3 GREATER

```
#define GREATER 1
```

Returned by *type*Cmp() functions when first argument is grater than the second.

5.3.2.4 KEY_NOT_FOUND

```
#define KEY_NOT_FOUND -1
```

Returned by search functions of the library when key was not found.

5.3.2.5 SMALLER

```
#define SMALLER -1
```

Returned by *type*Cmp() functions when first argument is smaller than the second.

5.3.2.6 TRUE

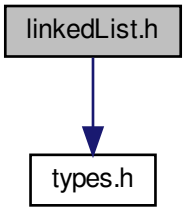
```
#define TRUE 0xFF
```

Bool value definition.

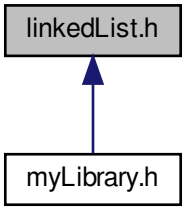
5.4 linkedList.h File Reference

Functions for working with LinkedList type.

```
#include "types.h"
```
Include dependency graph for linkedList.h:



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



Functions

- LinkedList newLL (const spec_t spec)

  Allocate a new LinkedList of specified type.
- LinkedList chooseNewLLFromArray (const spec_t spec, const void *arr, unsigned int size)

  Create a LinkedList from an array.
- void printLL (const spec_t spec, const LinkedList list)

  Print contents from an LinkedList.
- void appendToLL (LinkedList list,...)

  Insert an item at the end of a LinkedList.
- void appendToLLFromPtr (LinkedList list, const void *element)

  Insert an item at the end of a LinkedList.
- void insertToLL (LinkedList list, unsigned int index,...)

  Insert an element at a specified position of an LinkedList.
- void deleteLL (LinkedList list)

  Delete a LinkedList.
- void getFromLL (LinkedList list, unsigned int index, void *dest)

  Get an item from a LinkedList.
- void setLLItem (LinkedList list, unsigned int index,...)

  Set value of an element of a LinkedList.
- void removeFromLL (LinkedList list, unsigned int index)

  Remove an item from a LinkedList.
- void mergeLL (LinkedList list1, const LinkedList list2)

  Merge two LinkedList.
- LinkedList newLLFromLL (const LinkedList list)

  Get a copy of a LinkedList.
- void sliceLL (LinkedList list, unsigned int begin, unsigned int end)

  Slice a LinkedList.
- int linearSearchLL (LinkedList list,...)

  Linear search for LinkedList.
- void * linearSearchLLPtr (LinkedList list,...)

  Linear search for LinkedList.
- byte areLLEqual (const LinkedList list1, const LinkedList list2)

  Compare two LinkedList.
- byte isInLL (LinkedList list,...)

  Detect if an element is inside a LinkedList.

5.4.1 Detailed Description

Functions for working with LinkedList type.

Author

Pietro Firpo (pietro.firpo@pm.me)

5.4.2 Function Documentation

5.4.2.1 appendToLL()

```
void appendToLL (
             LinkedList list,
              ...  )
```

Insert an item at the end of a LinkedList.

Parameters

list	The LinkedList you want to append an item to
...	The item you want to append to `list`

Note

Even though appending more than one item for single call does not throw a compiler nor runtime error, only appending one item is supported. Other items are ignored and are not appended to `arr`. If you don't specify any item to be appended, still no errors occur but the content of your LinkedList can be messed up

5.4.2.2 appendToLLFromPtr()

```
void appendToLLFromPtr (
            LinkedList list,
            const void * element )
```

Insert an item at the end of a LinkedList.

Parameters

list	The LinkedList you want to append an item to
element	Pointer to the item you want to append to `list`

5.4.2.3 areLLEqual()

```
byte areLLEqual (
            const LinkedList list1,
            const LinkedList list2 )
```

Compare two LinkedList.

Parameters

list1	The first LinkedList you want to compare
list2	The second LinkedList you want to compare

Returns

The result of the comparison

Return values

TRUE	`list1` and `list2` have equal type, equal length and equal contents
FALSE	`list1` and `list2` do not have equal type, equal length or equal contents

5.4.2.4 chooseNewLLFromArray()

```
LinkedList chooseNewLLFromArray (
            const spec_t spec,
            const void * arr,
            unsigned int size )
```

Create a LinkedList from an array.

Parameters

spec	The type specifier of the array passed. Refer to spec_t
arr	The array you want to create the LinkedList from
size	The number of items of `arr`

Returns

A LinkedList containing the elements in `arr` in the same order

5.4.2.5 deleteLL()

```
void deleteLL (
            LinkedList list )
```

Delete a LinkedList.

Parameters

list	The LinkedList you want to delete

5.4.2.6 getFromLL()

```
void getFromLL (
            LinkedList list,
            unsigned int index,
            void * dest )
```

Get an item from a LinkedList.

Parameters

list	The LinkedList you want to get an item from
index	The index of the item you want to get
dest	The address of the variable you want to store the item in

5.4.2.7 insertToLL()

```
void insertToLL (
             LinkedList list,
             unsigned int index,
              ...  )
```

Insert an element at a specified position of an LinkedList.

Parameters

list	The LinkedList you want to insert an element into
index	The position you want to insert `element` at
...	The item you want to insert into `list`

Note

Even though inserting more than one item for single call does not throw a compiler nor runtime error, only inserting one item is supported. Other items are ignored and are not inserted into `arr`. If you don't specify any item to be inserted, still no errors occur but the content of your LinkedList can be messed up

5.4.2.8 isInLL()

```
byte isInLL (
             LinkedList list,
              ...  )
```

Detect if an element is inside a LinkedList.

Parameters

list	The LinkedList you want search in
...	The element you want to search

Note

Even though inserting zero more than one item for single call does not throw a compiler nor runtime error, only searching one item is supported. Other items are ignored. If you don't specify any item to be searched, still no errors occur but the return value of the function can be unpredictable

Return values

TRUE	Given element is contained in `list`
FALSE	Given element is not contained in `list`

5.4.2.9 linearSearchLL()

```
int linearSearchLL (
            LinkedList list,
             ...  )
```

Linear search for LinkedList.

Parameters

list	The LinkedList to be inspected
...	The key to be searched

Note

This function does not support float and double LinkedList

Even though passing more than one key does not throw a compiler nor runtime error, only searching one item is supported. Other items are ignored. If you don't specify any item to be searched, still no errors occur but the return value of the function can be unpredictable

Returns

The index of the first occurence of the key in the list or the return code of the function

Return values

KEY_NOT_FOUND	The key was not found

5.4.2.10 linearSearchLLPtr()

```
void* linearSearchLLPtr (
            LinkedList list,
             ...  )
```

Linear search for LinkedList.

Parameters

list	The LinkedList to be inspected
...	The key to be searched

Note

This function does not support float and double LinkedList

Even though passing more than one key does not throw a compiler nor runtime error, only searching one item is supported. Other items are ignored. If you don't specify any item to be searched, still no errors occur but the return value of the function can be unpredictable

Returns

A void pointer of the first occurence of the key in the list or the return code of the function

Return values

NULL	The key was not found

5.4.2.11 mergeLL()

```
void mergeLL (
            LinkedList list1,
            const LinkedList list2 )
```

Merge two LinkedList.

Parameters

list1	The first LinkedList to be merged, where the merged LinkedList is saved
list2	The second LinkedList to be merged

5.4.2.12 newLL()

```
LinkedList newLL (
            const spec_t spec )
```

Allocate a new LinkedList of specified type.

Parameters

spec	Type specifier of the LinkedList you want to create

Returns

An empty LinkedList

5.4.2.13 newLLFromLL()

```
LinkedList newLLFromLL (
            const LinkedList list )
```

Get a copy of a LinkedList.

Parameters

list	The LinkedList you want to copy

Returns

A copy of `list`

5.4.2.14 printLL()

```
void printLL (
            const spec_t spec,
            const LinkedList list )
```

Print contents from an LinkedList.

Parameters

spec	The type and format specifier you want to use to print the single element of the LinkedList
list	The LinkedList you want to print

5.4.2.15 removeFromLL()

```
void removeFromLL (
            LinkedList list,
            unsigned int index )
```

Remove an item from a LinkedList.

Parameters

list	The LinkedList you want to delete an item from
index	The index of the item you want to delete

5.4.2.16 setLLItem()

```
void setLLItem (
            LinkedList list,
            unsigned int index,
             ...  )
```

Set value of an element of a LinkedList.

Parameters

list	The LinkedList you want to edit
index	The index of the element you want to change
...	The item you want to insert into `list`

Note

Even though inserting more than one item for single call does not throw a compiler nor runtime error, only setting one item is supported. Other items are ignored. If you don't specify any item to be inserted, still no errors occur but the content of your LinkedList can be messed up

5.4.2.17 sliceLL()

```
void sliceLL (
            LinkedList list,
            unsigned int begin,
            unsigned int end )
```

Slice a LinkedList.

Parameters

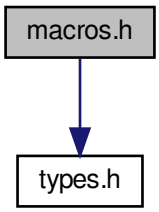
list	The LinkedList you want to slice, where the sliced LinkedList is saved
begin	The index of the beginning of the slice
end	The index of the end of the slice

5.5 macros.h File Reference

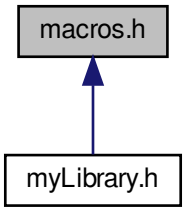
Macros for emulated overloading.

```
#include "types.h"
```

Include dependency graph for macros.h:



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



Macros

- #define cmpVal(a, b) _Generic((a, b), char: charCmp, int: intCmp, float: floatCmp, double: doubleCmp, void ∗: ptrCmp)(&a, &b)

  Compare two values. Calls the right typeCmp() function.
- #define bubbleSortArr(arr, size) _Generic(arr, char ∗: charBubbleSort, int ∗: intBubbleSort, float ∗↩ :floatBubbleSort, double ∗: doubleBubbleSort, void ∗∗: ptrBubbleSort)(arr, size)

  BubbleSort for arrays.
- #define quickSortArr(arr, size) _Generic(arr, char ∗: charQuickSort, int ∗: intQuickSort, float ∗:floatQuickSort, double ∗: doubleQuickSort, void ∗∗: ptrQuickSort)(arr, size)

  Quicksort for arrays.

5.5.1 Detailed Description

Macros for emulated overloading.

Author

Pietro Firpo (pietro.firpo@pm.me)

Note

Many of these macros work on C11 or newer compilers only. If they are not supported by your compiler you have to use the function the macro expands to in your case. For example, if you want to bubblesort an array of floats and the macro bubbleSort() is not supported by your compiler, you have to call floatBubbleSort() or chooseBubbleSortArr()

In some development environments, for example Vscode, calls to these macros can be reported as errors even if they are correct. If you use Vscode you have to set `"C_Cpp.default.cStandard": "c17"` in your `settings.json` file in order to avoid this error reportings

5.5.2 Macro Definition Documentation

5.5.2.1 bubbleSortArr

```
#define bubbleSortArr(
              arr,
              size ) _Generic(arr, char *:  charBubbleSort, int *:  intBubbleSort, float *↩
:floatBubbleSort, double *:  doubleBubbleSort, void **:  ptrBubbleSort)(arr, size)
```

BubbleSort for arrays.

Returns

The return code of the function called

Parameters

arr	Pointer to the array to be sorted
size	Number of elements in the array to be sorted

5.5.2.2 cmpVal

```
#define cmpVal(
              a,
              b ) _Generic((a, b), char:  charCmp, int:  intCmp, float:  floatCmp, double↩
:  doubleCmp, void *:  ptrCmp)(&a, &b)
```

Compare two values. Calls the right *type*Cmp() function.

Note

This macro must be called on variables. For example, `cmpVal(2, 3)` is not supported

Parameters

a	First value to be compared
b	Second value to be compared

Returns

The return code of the function called

Return values

GREATER	First element is grater than the second
EQUAL	First element is equal to the second
SMALLER	First element is smaller than the second

5.5.2.3 quickSortArr

```
#define quickSortArr(
              arr,
              size ) _Generic(arr, char *:  charQuickSort, int *:  intQuickSort, float *↩
:floatQuickSort, double *:  doubleQuickSort, void **:  ptrQuickSort)(arr, size)
```

Quicksort for arrays.

Returns

The return code of the function called

Parameters

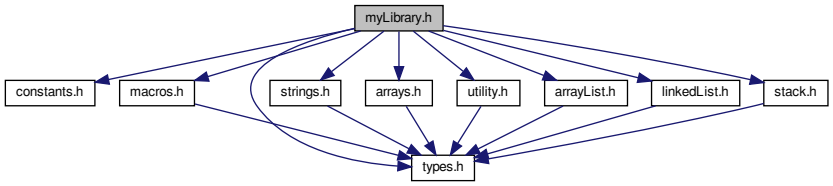
arr	Pointer to the array to be sorted
size	Number of elements in the array to be sorted

5.6 myLibrary.h File Reference

Includes all other headers. Useful for rapid import.

```
#include "constants.h"
#include "macros.h"
#include "types.h"
#include "strings.h"
#include "arrays.h"
#include "utility.h"
#include "arrayList.h"
#include "linkedList.h"
```

`#include "stack.h"`
Include dependency graph for myLibrary.h:



5.6.1 Detailed Description

Includes all other headers. Useful for rapid import.

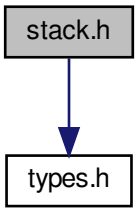
Author

Pietro Firpo (pietro.firpo@pm.me)

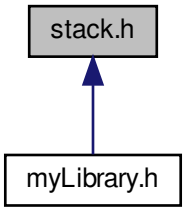
5.7 stack.h File Reference

Functions for working with Stack type.

`#include "types.h"`
Include dependency graph for stack.h:



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



Functions

- Stack newStack (const spec_t spec)

  Allocate a new Stack of specified type.
- void pushToStack (Stack stack,...)

  Push an item to a Stack.
- void printStack (const spec_t spec, const Stack stack)

  Print contents from a Stack.
- void popFromStack (Stack stack, void ∗dest)

  Pop an item from a Stack.
- void deleteHeadFromStack (Stack stack)

  Delete current Stack head.
- byte isStackEmpty (Stack stack)

  Check if Stack is empty.
- void deleteStack (Stack stack)

  Delete a Stack.
- void getHeadDataFromStack (Stack stack, void ∗dest)

  Get the item at the head of a Stack without popping it.
- byte isInStack (Stack stack,...)

  Detect if an element is inside a Stack.
- Stack chooseNewStackFromArray (const spec_t spec, const void ∗arr, unsigned int size)

  Create a Stack from an array.
- void pushToStackFromPtr (Stack stack, const void ∗element)

  Push an item to a Stack.

5.7.1 Detailed Description

Functions for working with Stack type.

Author

Pietro Firpo (pietro.firpo@pm.me)

5.7.2 Function Documentation

5.7.2.1 chooseNewStackFromArray()

```
Stack chooseNewStackFromArray (
            const spec_t spec,
            const void * arr,
            unsigned int size )
```

Create a Stack from an array.

Parameters

spec	The type specifier of the array passed. Refer to spec_t
arr	The array you want to create the Stack from
size	The number of items of `arr`

Returns

A Stack containing the elements in `arr`, having the last element of `arr` as head

5.7.2.2 deleteHeadFromStack()

```
void deleteHeadFromStack (
            Stack stack )
```

Delete current Stack head.

Parameters

stack	The Stack you want to delete the head from

5.7.2.3 deleteStack()

```
void deleteStack (
            Stack stack )
```

Delete a Stack.

Parameters

stack	The Stack you want to delete

5.7.2.4 getHeadDataFromStack()

```
void getHeadDataFromStack (
            Stack stack,
            void * dest )
```

Get the item at the head of a Stack without popping it.

Parameters

stack	The Stack you want to get the item
dest	he address of the variable you want to store the item in

5.7.2.5 isInStack()

```
byte isInStack (
            Stack stack,
             ...  )
```

Detect if an element is inside a Stack.

Parameters

stack	The Stack you want search in
...	The element you want to search

Note

Even though inserting zero more than one item for single call does not throw a compiler nor runtime error, only searching one item is supported. Other items are ignored. If you don't specify any item to be searched, still no errors occur but the return value of the function can be unpredictable

Return values

TRUE	Given element is contained in `stack`
FALSE	Given element is not contained in `stack`

5.7.2.6 isStackEmpty()

```
byte isStackEmpty (
            Stack stack )
```

Check if Stack is empty.

Parameters

stack	The Stack to be checked

Return values

TRUE	`stack` is empty
FALSE	`stack` is not empty

5.7.2.7 newStack()

```
Stack newStack (
            const spec_t spec )
```

Allocate a new Stack of specified type.

Parameters

spec	Type specifier of the Stack you want to create

Returns

An empty Stack

5.7.2.8 popFromStack()

```
void popFromStack (
            Stack stack,
            void * dest )
```

Pop an item from a Stack.

Parameters

stack	The Stack you want to pop an item from
dest	The address of the variable you want to store the popped item in

5.7.2.9 printStack()

```
void printStack (
            const spec_t spec,
            const Stack stack )
```

Print contents from a Stack.

Parameters

spec	The type and format specifier you want to use to print the single element of the Stack
stack	The Stack you want to print

5.7.2.10 pushToStack()

```
void pushToStack (
            Stack stack,
             ...  )
```

Push an item to a Stack.

Parameters

stack	The Stack you want to push to
...	The item you want to append to `stack`

Note

Even though pushing more than one item for single call call does not throw a compiler nor runtime error, only pushing one item is supported. Other items are ignored and are not pushed to `stack`. If you don't specify any item to be pushed, still no errors occur but the content of your Stack can be messed up

5.7.2.11 pushToStackFromPtr()

```
void pushToStackFromPtr (
            Stack stack,
            const void * element )
```

Push an item to a Stack.

Parameters

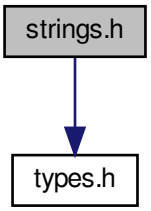
stack	The Stack you want to append an item to
element	Pointer to the item you want to push to `stack`

5.8 strings.h File Reference

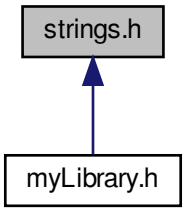
Common tasks with strings.

```
#include "types.h"
```

Include dependency graph for strings.h:



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



Functions

- string getString ()

  Reads from terminal a string of arbitrary length.
- byte endsWith (const string str, const string suffix)

  Check if a string ends with the specified substring.
- string changeLastCharacter (const string str, char newCharacter)

  Get string with different last character.
- unsigned int getLength (const string str)

  Get the lenght of a string.
- string copyOf (const string src)

  Get a copy of the given string.

5.8.1 Detailed Description

Common tasks with strings.

Author

Pietro Firpo (pietro.firpo@pm.me)

5.8.2 Function Documentation

5.8.2.1 changeLastCharacter()

```
string changeLastCharacter (
            const string str,
            char newCharacter )
```

Get string with different last character.

Parameters

str	The string you want to change the last character
newCharacter	The character you want to set as last character

Returns

A pointer to a string with the same characters of `str` and newCharacter as last character or a null pointer in case of errors

5.8.2.2 copyOf()

```
string copyOf (
            const string src )
```

Get a copy of the given string.

Parameters

src	The string to be copied

Returns

A pointer to the copy of the given string or or a null pointer in case of errors

5.8.2.3 endsWith()

```
byte endsWith (
            const string str,
            const string suffix )
```

Check if a string ends with the specified substring.

Parameters

str	The string to be inspected
suffix	The string you want to check if `string`ends with

Returns

A boolean value

Return values

TRUE	`str` ends with `suffix`
FALSE	`str` does not end with `suffix`

5.8.2.4 getLength()

```
unsigned int getLength (
            const string str )
```

Get the lenght of a string.

Parameters

str	The string to be evaluated

Returns

The lenght of the given string (terminator EXCLUDED) or the return code of the function

5.8.2.5 getString()

```
string getString ( )
```

Reads from terminal a string of arbitrary length.

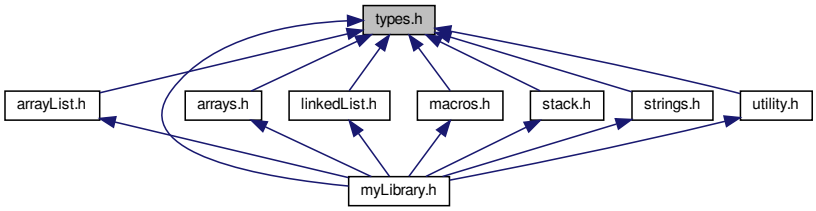
Returns

A char pointer to the first element of the string or a null pointer in case of errors

5.9 types.h File Reference

Collection of useful types.

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



Data Structures

- struct ArrayList
  ArrayList type
- struct node
  Node type
- struct LinkedList
  LinkedList type
- struct Stack
  Stack type

Typedefs

- typedef char byte
  Alias for char, just to avoid confusion with 8 bit numbers and ASCII characters.
- typedef char * spec_t
  Used to specify type of argument passed in functions that require a type specifier.
- typedef char * string
  Alias for char, used when an array of char is actually used as a string.*
- typedef struct node * Node
  Node type

5.9.1 Detailed Description

Collection of useful types.

Author

Pietro Firpo (pietro.firpo@pm.me)

5.9.2 Typedef Documentation

5.9.2.1 byte

```
typedef char byte
```

Alias for char, just to avoid confusion with 8 bit numbers and ASCII characters.

5.9.2.2 Node

```
typedef struct node * Node
```

Node type

Base component of every linked data type

Note

All the parameters in this structure must be intended as read-only. Manually modifying them can cause unknown and unwanted behavior

5.9.2.3 spec_t

```
typedef char* spec_t
```

Used to specify type of argument passed in functions that require a type specifier.

Supported specifiers: "%c" (char), "%i" (int), "%f" (float), "%lf" (double), "%p" (pointer)

Note

Some functions may not support some identifiers or may support additional identifiers. In those cases refer to that function documentation

5.9.2.4 string

```
typedef char* string
```

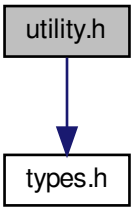
Alias for char *, used when an array of char is actually used as a string.

5.10 utility.h File Reference

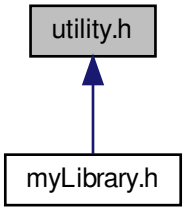
Common tasks such as comparing variables, allocate memory.

```
#include "types.h"
```

Include dependency graph for utility.h:



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



Functions

- byte chooseCmp (const spec_t spec, const void *a, const void *b)
  Compare two chars.
- byte charCmp (const void *a, const void *b)
  Compare two chars.
- byte byteCmp (const void *a, const void *b)
  Compare two bytes.
- byte intCmp (const void *a, const void *b)
  Compare two ints.
- byte floatCmp (const void *a, const void *b)
  Compare two floats.
- byte doubleCmp (const void *a, const void *b)
  Compare two doubles.

- byte ptrCmp (const void *a, const void *b)

  Compare two pointers.
- void * saferMalloc (unsigned int bytes)

  Return a pointer to a space in memory of specified size.
- void * saferRealloc (void *pointer, unsigned int bytes)

  Reallocate a space in memory.

5.10.1 Detailed Description

Common tasks such as comparing variables, allocate memory.

Author

Pietro Firpo (pietro.firpo@pm.me)

5.10.2 Function Documentation

5.10.2.1 byteCmp()

```
byte byteCmp (
            const void * a,
            const void * b )
```

Compare two bytes.

Equivalent to `charCmp(a, b)`. Refer to charCmp().

5.10.2.2 charCmp()

```
byte charCmp (
            const void * a,
            const void * b )
```

Compare two chars.

Equivalent to `chooseCmp("%c", a, b)`. Refer to chooseCmp()

5.10.2.3 chooseCmp()

```
byte chooseCmp (
            const spec_t spec,
            const void * a,
            const void * b )
```

Compare two chars.

Parameters

spec	Type specifier of the values to be sorted. Refer to spec_t for supported types.
a	Pointer to the first element to be compared
b	Pointer to the second element to be compared

Returns

Constant for the corresponding comparation result

Return values

GREATER	First element is grater than the second
EQUAL	First element is equal to the second
SMALLER	First element is smaller than the second

5.10.2.4 doubleCmp()

```
byte doubleCmp (
            const void * a,
            const void * b )
```

Compare two doubles.

Equivalent to `chooseCmp("%lf", a, b)`. Refer to chooseCmp()

5.10.2.5 floatCmp()

```
byte floatCmp (
            const void * a,
            const void * b )
```

Compare two floats.

Equivalent to `chooseCmp("%f", a, b)`. Refer to chooseCmp()

5.10.2.6 intCmp()

```
byte intCmp (
            const void * a,
            const void * b )
```

Compare two ints.

Equivalent to `chooseCmp("%i", a, b)`. Refer to chooseCmp()

5.10.2.7 ptrCmp()

```
byte ptrCmp (
            const void * a,
            const void * b )
```

Compare two pointers.

Equivalent to `chooseCmp("%p", a, b)`. Refer to chooseCmp()

5.10.2.8 saferMalloc()

```
void* saferMalloc (
            unsigned int bytes )
```

Return a pointer to a space in memory of specified size.

Calls `malloc(bytes)` for a maximum of 10 times until it returns a not null pointer. If in 10 calls does not manage to obtain a not null pointer makes the program terminate

Parameters

bytes	Number of bytes to allocate

Returns

A pointer to the allocated memory

5.10.2.9 saferRealloc()

```
void* saferRealloc (
            void * pointer,
            unsigned int bytes )
```

Reallocate a space in memory.

Calls `realloc(pointer, bytes)` for a maximum of 10 times until it returns a not null pointer. If in 10 calls does not manage to obtain a not null pointer makes the program terminate

Parameters

pointer	Pointer to the memory to be reallocated
bytes	Number of bytes to allocate

Returns

A pointer to the allocated memory

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