# API Project

Generated by Doxygen 1.9.1

# Chapter 1

# Data Structure Index

## 1.1 Data Structures

Here are the data structures with brief descriptions:

# Chapter 2

# File Index

## 2.1 File List

Here is a list of all files with brief descriptions:

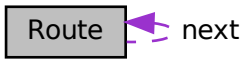
# Chapter 3

# Data Structure Documentation

## 3.1 Route Struct Reference

Represents a route in the transportation network.

Collaboration diagram for Route:




### Data Fields

- long id

  *A long integer representing the unique route ID.*
- struct Route * next

  *Pointer to the next route node in the linked list.*

### 3.1.1 Detailed Description

Represents a route in the transportation network.

This structure contains a unique identifier for the route ('id') and a pointer to the next route node in a linked list.

Definition at line 26 of file API_Tallarico.c.

### 3.1.2 Field Documentation

#### 3.1.2.1 id

```
long Route::id
```

A long integer representing the unique route ID.

Definition at line 27 of file API_Tallarico.c.

#### 3.1.2.2 next

```
struct Route* Route::next
```

Pointer to the next route node in the linked list.

Definition at line 28 of file API_Tallarico.c.

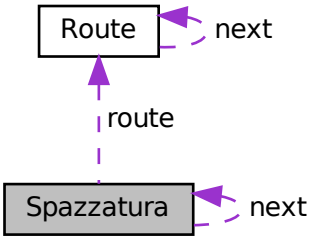
The documentation for this struct was generated from the following file:

- /home/admin/ProgettoApi/API_Tallarico.c

## 3.2 Spazzatura Struct Reference

Represents garbage collection data in the transportation system.

Collaboration diagram for Spazzatura:




### Data Fields

- Route * route

  *Pointer to the associated 'Route' structure.*
- struct Spazzatura * next

  *Pointer to the next garbage node in the linked list.*

### 3.2.1 Detailed Description

Represents garbage collection data in the transportation system.

This structure contains a pointer to a 'Route' and a pointer to the next garbage node in a linked list.

Definition at line 37 of file API_Tallarico.c.

### 3.2.2 Field Documentation

#### 3.2.2.1 next

```
struct Spazzatura* Spazzatura::next
```

Pointer to the next garbage node in the linked list.

Definition at line 39 of file API_Tallarico.c.

#### 3.2.2.2 route

```
Route* Spazzatura::route
```

Pointer to the associated 'Route' structure.

Definition at line 38 of file API_Tallarico.c.

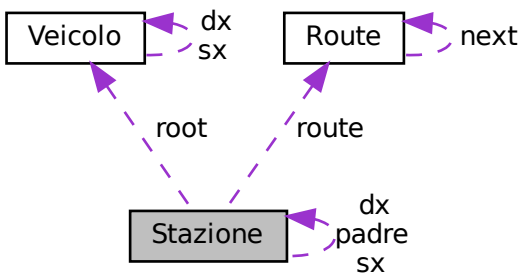
The documentation for this struct was generated from the following file:

- /home/admin/ProgettoApi/API_Tallarico.c

## 3.3 Stazione Struct Reference

Represents a station in the transportation network.

Collaboration diagram for Stazione:



## Data Fields

- long id

  *long integer representing the unique station ID, indicating the distance in kilometers from the starting point of the road, starting from 0.*
- Veicolo * root

  *pointer to the root of a binary tree of 'Veicolo' structures.*
- struct Stazione * dx

  *pointer to the right child station node.*
- struct Stazione * sx

  *pointer to the left child station node.*
- struct Stazione * padre

  *pointer to the parent station node.*
- Route * route

  *pointer to a 'Route' structure.*
- long maxAutonomia

  *long integer representing the maximum vehicle range.*

### 3.3.1 Detailed Description

Represents a station in the transportation network.

This structure contains information about the station, including its unique identifier, relationships with other stations, a binary tree of vehicles, and routing information.

Definition at line 49 of file API_Tallarico.c.

### 3.3.2 Field Documentation

#### 3.3.2.1 dx

```
struct Stazione* Stazione::dx
```

pointer to the right child station node.

Definition at line 52 of file API_Tallarico.c.

#### 3.3.2.2 id

```
long Stazione::id
```

long integer representing the unique station ID, indicating the distance in kilometers from the starting point of the road, starting from 0.

Definition at line 50 of file API_Tallarico.c.

#### 3.3.2.3 maxAutonomia

```
long Stazione::maxAutonomia
```

long integer representing the maximum vehicle range.

Definition at line 56 of file API_Tallarico.c.

#### 3.3.2.4 padre

```
struct Stazione* Stazione::padre
```

pointer to the parent station node.

Definition at line 54 of file API_Tallarico.c.

#### 3.3.2.5 root

```
Veicolo* Stazione::root
```

pointer to the root of a binary tree of 'Veicolo' structures.

Definition at line 51 of file API_Tallarico.c.

#### 3.3.2.6 route

```
Route* Stazione::route
```

pointer to a 'Route' structure.

Definition at line 55 of file API_Tallarico.c.

#### 3.3.2.7 sx

```
struct Stazione* Stazione::sx
```

pointer to the left child station node.

Definition at line 53 of file API_Tallarico.c.

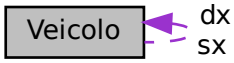
The documentation for this struct was generated from the following file:

- /home/admin/ProgettoApi/API_Tallarico.c

## 3.4 Veicolo Struct Reference

Represents a vehicle in the transportation system.

Collaboration diagram for Veicolo:




### Data Fields

- long autonomia

  *A long integer representing the vehicle's autonomy.*
- struct Veicolo * dx

  *Pointer to the right child vehicle node.*
- struct Veicolo * sx

  *Pointer to the left child vehicle node.*

### 3.4.1 Detailed Description

Represents a vehicle in the transportation system.

This structure contains information about the vehicle's autonomy and pointers to its left and right children in a binary tree.

Definition at line 14 of file API_Tallarico.c.

### 3.4.2 Field Documentation

#### 3.4.2.1 autonomia

```
long Veicolo::autonomia
```

A long integer representing the vehicle's autonomy.

Definition at line 15 of file API_Tallarico.c.

#### 3.4.2.2 dx

```
struct Veicolo* Veicolo::dx
```

Pointer to the right child vehicle node.

Definition at line 16 of file API_Tallarico.c.

#### 3.4.2.3 sx

```
struct Veicolo* Veicolo::sx
```

Pointer to the left child vehicle node.

Definition at line 17 of file API_Tallarico.c.

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

- /home/admin/ProgettoApi/API_Tallarico.c

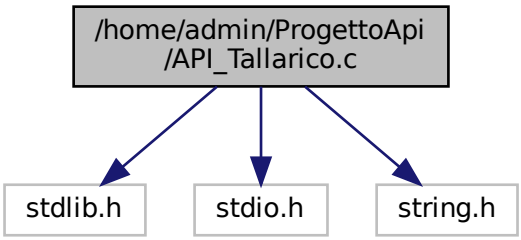
# Chapter 4

# File Documentation

## 4.1 /home/admin/ProgettoApi/API_Tallarico.c File Reference

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

Include dependency graph for API_Tallarico.c:




### Data Structures

- struct Veicolo

  *Represents a vehicle in the transportation system.*
- struct Route

  *Represents a route in the transportation network.*
- struct Spazzatura

  *Represents garbage collection data in the transportation system.*
- struct Stazione

  *Represents a station in the transportation network.*

### Macros

- #define MAX_RICHIESTA 19

## Typedefs

- typedef struct Veicolo Veicolo

  *Represents a vehicle in the transportation system.*
- typedef struct Route Route

  *Represents a route in the transportation network.*
- typedef struct Spazzatura Spazzatura

  *Represents garbage collection data in the transportation system.*
- typedef struct Stazione Stazione

  *Represents a station in the transportation network.*

## Functions

- Veicolo * creaVeicolo (long autonomia)

  *Creates and initializes a 'Veicolo' structure.*
- Stazione * creaStazione (long id)

  *Creates and initializes a 'Stazione' structure.*
- Stazione * cercaStazione (Stazione *root, long id)

  *Searches for a station with a specific ID in a binary tree of stations.*
- void inserisciVeicolo (Veicolo **root, long autonomia)

  *Inserts a vehicle into a binary tree of vehicles.*
- void inserisciStazione (Stazione **root, long id, Stazione *padre)

  *Inserts a station into a binary tree of stations in the appropriate position.*
- long eliminaVeicolo (Veicolo **root, long autonomia)

  *Removes a vehicle from a binary tree of vehicles based on its autonomy.*
- void eliminaTuttiVeicoli (Veicolo **root)

  *Deletes all vehicles in a binary tree of vehicles.*
- long eliminaStazione (Stazione **root, long id, long elimina)

  *Removes a station from a binary tree of stations based on its unique ID.*
- void ripulisciTutto (Stazione **root)

  *Recursively deletes all stations and their vehicles in the binary tree.*
- void stampaVeicoli (Veicolo *root)

  *Recursively prints the autonomy of all vehicles in the binary tree (Post-order).*
- void stampaTutto (Stazione *root)

  *Recursively prints the ID of each station and the autonomy of all its vehicles (Post-order).*
- Stazione * successiva (Stazione *curr)

  *Finds the in-order successor of a station in the binary tree.*
- Stazione * precedente (Stazione *curr)

  *Finds the in-order predecessor of a station in the binary tree.*
- Route * creaRoute (long id)

  *Creates a new route with the given ID.*
- void aggiungiSpazzatura (Spazzatura **lista, Route *route)

  *Adds a new 'Spazzatura' node to the front of the list.*
- void svuotaSpazzatura (Spazzatura **lista)

  *Empties the 'Spazzatura' linked list.*
- void stampaRoute (Route *lista)

  *Recursively prints the IDs of all routes in the list.*
- Route * salvaRoute (Route *route)

  *Creates a copy of the given 'Route' linked list.*

- void segnatoreSottoAlberoCrescente (Stazione *maxPadre, long idPartenza, long minUltima, long maxId, Route *route, Stazione **ultimaVisitata, Spazzatura **listaSpazzatura)

  *Recursively searches for the best reachable station using binary tree properties.*
- Stazione * cercaMaxPadre (Stazione *maxPadre, long idPartenza, long maxId)

  *Searches for the last parent station reachable based on given ID limits.*
- void pianificaPercorsoCrescente (Stazione *stazionePartenza, long idArrivo)

  *Plans a route between ascending stations up to the arrival station.*
- void segnatoreSottoAlberoDecrescente (Stazione *minPadre, long idPartenza, long ultimaVisitata↩ Precedente, long minId, Route *route, Stazione **ultimaVisitata, Spazzatura **listaSpazzatura)

  *Recursively marks stations in a descending order binary tree and adds routes.*
- Stazione * cercaMinPadre (Stazione *minPadre, long idPartenza, long minId)

  *Finds the minimum parent station reachable from the starting station.*
- void pianificaPercorsoDecrescente (Stazione *stazionePartenza, long idArrivo)

  *Plans a descending route from the starting station to the destination.*
- long maxVeicolo (Veicolo *root)

  *Finds the maximum autonomy of vehicles in a binary tree.*
- int main ()

  *Main function to manage the station and vehicle system.*

## 4.1.1 Macro Definition Documentation

### 4.1.1.1 MAX_RICHIESTA

```
#define MAX_RICHIESTA 19
```

Definition at line 6 of file API_Tallarico.c.

## 4.1.2 Typedef Documentation

### 4.1.2.1 Route

```
typedef struct Route Route
```

Represents a route in the transportation network.

This structure contains a unique identifier for the route ('id') and a pointer to the next route node in a linked list.

### 4.1.2.2 Spazzatura

```
typedef struct Spazzatura Spazzatura
```

Represents garbage collection data in the transportation system.

This structure contains a pointer to a 'Route' and a pointer to the next garbage node in a linked list.

#### 4.1.2.3 Stazione

```
typedef struct Stazione Stazione
```

Represents a station in the transportation network.

This structure contains information about the station, including its unique identifier, relationships with other stations, a binary tree of vehicles, and routing information.

#### 4.1.2.4 Veicolo

```
typedef struct Veicolo Veicolo
```

Represents a vehicle in the transportation system.

This structure contains information about the vehicle's autonomy and pointers to its left and right children in a binary tree.

### 4.1.3 Function Documentation

#### 4.1.3.1 aggiungiSpazzatura()

```
void aggiungiSpazzatura (
            Spazzatura ** lista,
            Route * route )
```

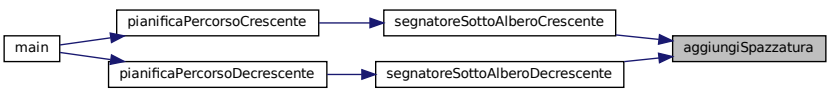
Adds a new 'Spazzatura' node to the front of the list.

**Parameters**

| | |
|---|---|
| *lista* | A pointer to the head of the 'Spazzatura' linked list. |
| *route* | A pointer to the 'Route' to be added. |

Definition at line 503 of file API_Tallarico.c.

Here is the caller graph for this function:



#### 4.1.3.2 cercaMaxPadre()

```
Stazione* cercaMaxPadre (
            Stazione * maxPadre,
            long idPartenza,
            long maxId )
```

Searches for the last parent station reachable based on given ID limits.

**Parameters**

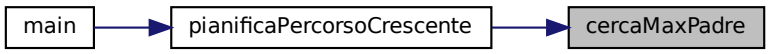
| | |
|---|---|
| *maxPadre* | The current station from which the search begins. |
| *idPartenza* | The starting station ID. |
| *maxId* | The maximum allowed station ID for the search. |

**Returns**

Returns the largest reachable station within the specified ID range.

Definition at line 607 of file API_Tallarico.c.

Here is the caller graph for this function:




#### 4.1.3.3 cercaMinPadre()

```
Stazione* cercaMinPadre (
            Stazione * minPadre,
            long idPartenza,
            long minId )
```

Finds the minimum parent station reachable from the starting station.

**Parameters**

| | |
|---|---|
| *minPadre* | The current station to inspect. |
| *startId* | The starting station ID. |
| *minId* | The minimum station ID to consider. |

**Returns**

Pointer to the minimum parent station, or NULL if not found.

Definition at line 710 of file API_Tallarico.c.

Here is the caller graph for this function:


#### 4.1.3.4 cercaStazione()

```
Stazione* cercaStazione (
            Stazione * root,
            long id )
```

Searches for a station with a specific ID in a binary tree of stations.

**Parameters**

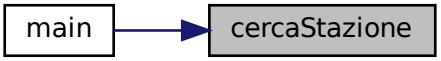
| | |
|---|---|
| *root* | Pointer to the root of the binary tree of 'Stazione'. |
| *id* | The unique identifier of the station to search for. |

**Returns**

A pointer to the 'Stazione' with the specified ID, or NULL if not found.

Definition at line 100 of file API_Tallarico.c.

Here is the caller graph for this function:



#### 4.1.3.5 creaRoute()

```
Route* creaRoute (
            long id )
```

Creates a new route with the given ID.

**Parameters**

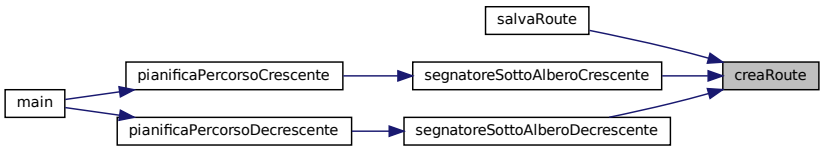
| | |
|---|---|
| *id* | The unique identifier for the route. |

**Returns**

A pointer to the newly created 'Route' structure.

Definition at line 490 of file API_Tallarico.c.

Here is the caller graph for this function:




#### 4.1.3.6 creaStazione()

```
Stazione* creaStazione (
            long id )
```

Creates and initializes a 'Stazione' structure.

**Parameters**

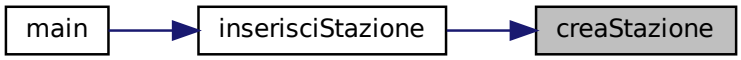
| | |
|---|---|
| *id* | The unique identifier for the station. |

**Returns**

A pointer to the newly created 'Stazione' structure.

Definition at line 80 of file API_Tallarico.c.

Here is the caller graph for this function:




#### 4.1.3.7 creaVeicolo()

```
Veicolo* creaVeicolo (
            long autonomia )
```

Creates and initializes a 'Veicolo' structure.

**Parameters**

| | |
|---|---|
| *autonomia* | The autonomy value to be assigned to the vehicle. |

**Returns**

A pointer to the newly created 'Veicolo' structure.

Definition at line 65 of file API_Tallarico.c.

Here is the caller graph for this function:


#### 4.1.3.8 eliminaStazione()

```
long eliminaStazione (
            Stazione ** root,
            long id,
            long elimina )
```

Removes a station from a binary tree of stations based on its unique ID.

**Parameters**

| | |
|---|---|
| *root* | A pointer to the pointer of the root node of the binary tree of 'Stazione'. |
| *id* | The unique identifier of the station to be removed. |
| *elimina* | A flag indicating whether to delete all vehicles associated with the station (1) or not (0). |

**Returns**

The unique ID of the removed station, or 0 if the station is not found.

Definition at line 285 of file API_Tallarico.c.

Here is the call graph for this function:


Here is the caller graph for this function:


#### 4.1.3.9 eliminaTuttiVeicoli()

```
void eliminaTuttiVeicoli (
            Veicolo ** root )
```

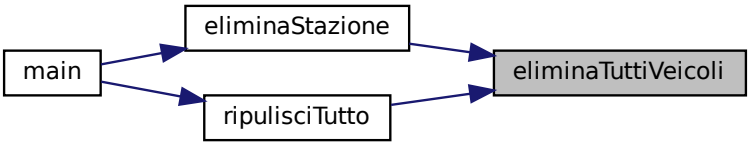
Deletes all vehicles in a binary tree of vehicles.

**Parameters**

| | |
|---|---|
| *root* | A pointer to the pointer of the root node of the binary tree of 'Veicolo'. |

Definition at line 266 of file API_Tallarico.c.

Here is the caller graph for this function:




#### 4.1.3.10 eliminaVeicolo()

```
long eliminaVeicolo (
            Veicolo ** root,
            long autonomia )
```

Removes a vehicle from a binary tree of vehicles based on its autonomy.

**Parameters**

| | |
|---|---|
| *root* | A pointer to the pointer of the root node of the binary tree of 'Veicolo'. |
| *autonomia* | The autonomy value of the vehicle to be removed. |

**Returns**

The autonomy of the removed vehicle, or -1 if the vehicle is not found.

Definition at line 180 of file API_Tallarico.c.

Here is the caller graph for this function:

#### 4.1.3.11 inserisciStazione()

```
void inserisciStazione (
            Stazione ** root,
            long id,
            Stazione * padre )
```

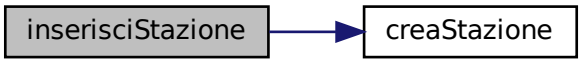
Inserts a station into a binary tree of stations in the appropriate position.

**Parameters**

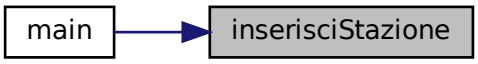
| | |
|---|---|
| *root* | A pointer to the pointer of the root node of the binary tree of 'Stazione'. |
| *id* | The unique identifier of the station to be inserted. |
| *padre* | A pointer to the parent station of the new station being inserted. |

Definition at line 157 of file API_Tallarico.c.

Here is the call graph for this function:




Here is the caller graph for this function:




#### 4.1.3.12 inserisciVeicolo()

```
void inserisciVeicolo (
            Veicolo ** root,
            long autonomia )
```

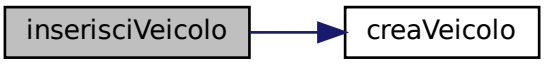
Inserts a vehicle into a binary tree of vehicles.

**Parameters**

| | |
|---|---|
| *root* | A pointer to the pointer of the root node of the binary tree of 'Veicolo'. |
| *autonomia* | The autonomy value of the vehicle to be inserted. |

Definition at line 136 of file API_Tallarico.c.

Here is the call graph for this function:




Here is the caller graph for this function:


#### 4.1.3.13 main()

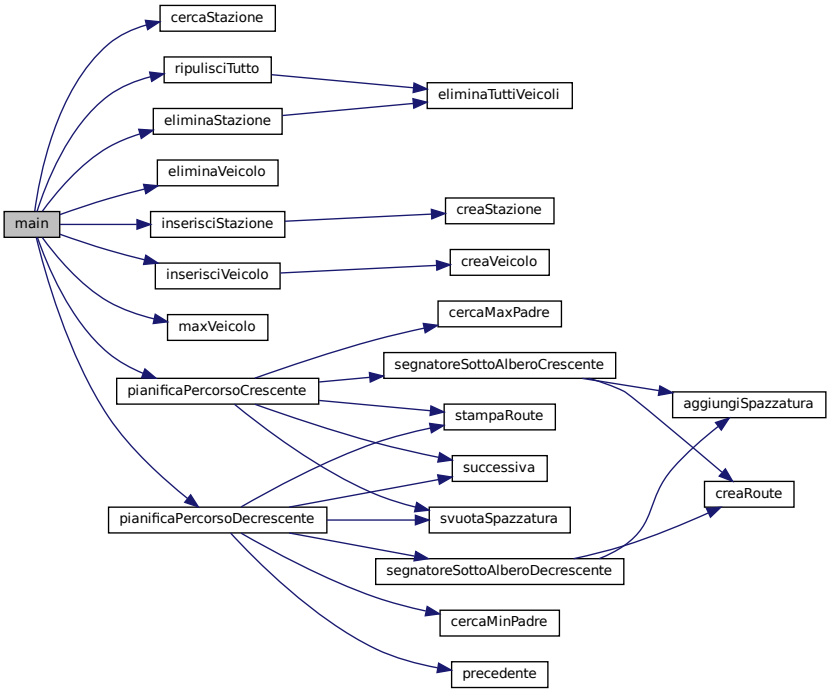
```
int main ( )
```

Main function to manage the station and vehicle system.

Reads commands from input, manages stations and vehicles, and plans routes. Commands include adding/removing stations and vehicles, and planning routes.

Definition at line 823 of file API_Tallarico.c.

Here is the call graph for this function:




#### 4.1.3.14 maxVeicolo()

```
long maxVeicolo (
            Veicolo * root )
```

Finds the maximum autonomy of vehicles in a binary tree.

**Parameters**

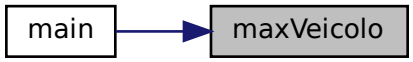
| | |
|---|---|
| *root* | The root of the vehicle tree. |

**Returns**

The maximum autonomy value, or 0 if the tree is empty.

Definition at line 805 of file API_Tallarico.c.

Here is the caller graph for this function:




#### 4.1.3.15 pianificaPercorsoCrescente()

```
void pianificaPercorsoCrescente (
            Stazione * stazionePartenza,
            long idArrivo )
```

Plans a route between ascending stations up to the arrival station.

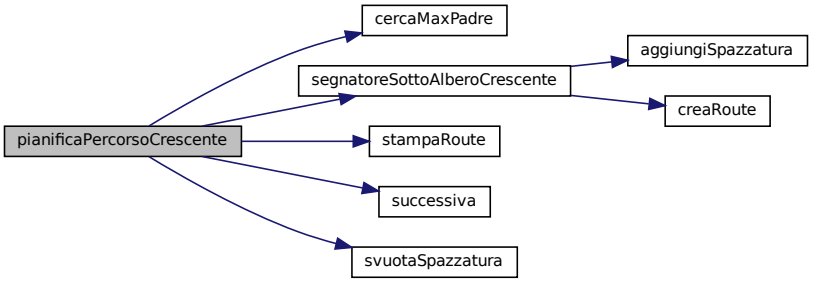
Uses a binary tree to search for stations with ascending IDs and update the route.

**Parameters**

| | |
|---|---|
| *startingStation* | The starting station. |
| *arrivalId* | The ID of the arrival station. |

Definition at line 627 of file API_Tallarico.c.

Here is the call graph for this function:



Here is the caller graph for this function:


#### 4.1.3.16 pianificaPercorsoDecrescente()

```
void pianificaPercorsoDecrescente (
            Stazione * stazionePartenza,
            long idArrivo )
```

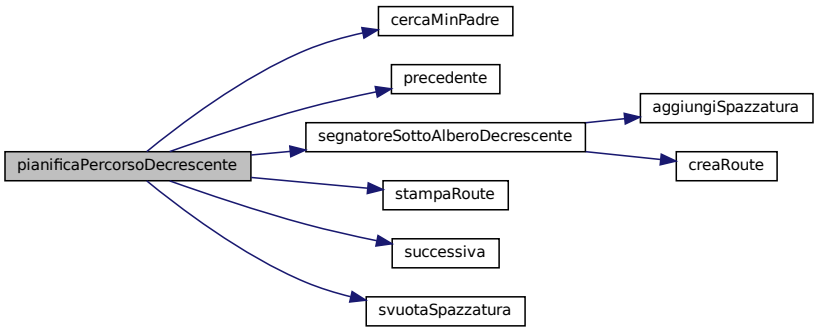
Plans a descending route from the starting station to the destination.

**Parameters**

| | |
|---|---|
| *startStation* | The starting station for the route. |
| *arrivalId* | The ID of the destination station. |

Definition at line 728 of file API_Tallarico.c.

Here is the call graph for this function:



Here is the caller graph for this function:


#### 4.1.3.17 precedente()

```
Stazione* precedente (
            Stazione * curr )
```

Finds the in-order predecessor of a station in the binary tree.

**Parameters**

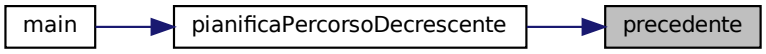
| | |
|---|---|
| *curr* | A pointer to the current 'Stazione' node. |

**Returns**

A pointer to the in-order predecessor, or NULL if none exists.

Definition at line 462 of file API_Tallarico.c.

Here is the caller graph for this function:




#### 4.1.3.18 ripulisciTutto()

```
void ripulisciTutto (
            Stazione ** root )
```

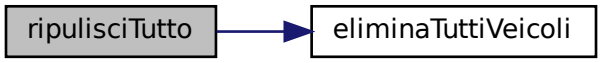
Recursively deletes all stations and their vehicles in the binary tree.

**Parameters**

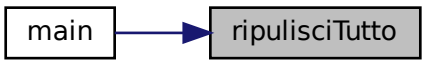
| | |
|---|---|
| *root* | A pointer to the pointer of the root node of the binary tree of 'Stazione'. |

Definition at line 390 of file API_Tallarico.c.

Here is the call graph for this function:




Here is the caller graph for this function:




#### 4.1.3.19 salvaRoute()

```
Route* salvaRoute (
            Route * route )
```

Creates a copy of the given 'Route' linked list.

**Parameters**

| | |
|---|---|
| *route* | A pointer to the head of the original 'Route' list. |

**Returns**

A pointer to the head of the new copied 'Route' list.

Definition at line 546 of file API_Tallarico.c.

Here is the call graph for this function:


#### 4.1.3.20 segnatoreSottoAlberoCrescente()

```
void segnatoreSottoAlberoCrescente (
            Stazione * maxPadre,
            long idPartenza,
            long minUltima,
            long maxId,
            Route * route,
            Stazione ** ultimaVisitata,
            Spazzatura ** listaSpazzatura )
```

Recursively searches for the best reachable station using binary tree properties.

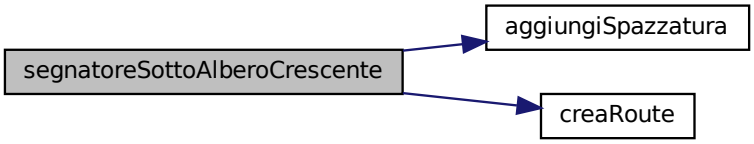
Marks the stations within ID limits, adds a route, and updates the last visited station.

**Parameters**

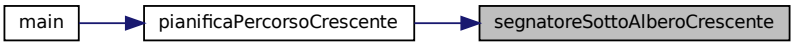
| | |
|---|---|
| *maxPadre* | Pointer to the current station being inspected. |
| *idPartenza* | Starting station ID. |
| *minUltima* | Minimum ID of the last visited station. |
| *maxId* | Maximum reachable station ID. |
| *route* | Pointer to the current route. |
| *ultimaVisitata* | Pointer to the last visited station. |
| *listaSpazzatura* | Pointer to the garbage list for storing routes to be freed. |

Definition at line 573 of file API_Tallarico.c.

Here is the call graph for this function:



Here is the caller graph for this function:




#### 4.1.3.21 segnatoreSottoAlberoDecrescente()

```
void segnatoreSottoAlberoDecrescente (
            Stazione * minPadre,
            long idPartenza,
            long ultimaVisitataPrecedente,
            long minId,
            Route * route,
            Stazione ** ultimaVisitata,
            Spazzatura ** listaSpazzatura )
```

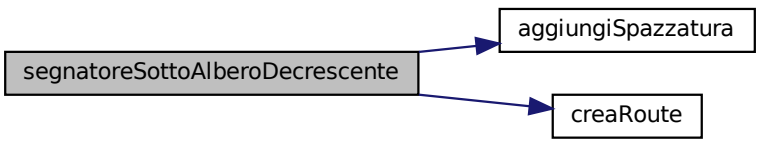
Recursively marks stations in a descending order binary tree and adds routes.

**Parameters**

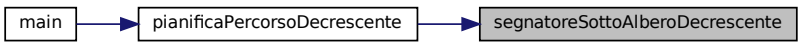
| | |
|---|---|
| *minPadre* | The current station to inspect. |
| *startId* | The starting station ID. |
| *previous↩ VisitedId* | The ID of the last visited station. |
| *minId* | The minimum station ID to consider. |
| *route* | The current route being constructed. |
| *lastVisited* | A pointer to the last visited station. |
| *trashList* | A pointer to the list of marked routes. |

Definition at line 678 of file API_Tallarico.c.

Here is the call graph for this function:



Here is the caller graph for this function:




#### 4.1.3.22 stampaRoute()

```
void stampaRoute (
            Route * lista )
```

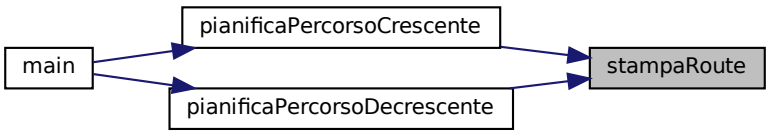
Recursively prints the IDs of all routes in the list.

**Parameters**

| | |
|---|---|
| *lista* | A pointer to the head of the 'Route' linked list. |

Definition at line 532 of file API_Tallarico.c.

Here is the caller graph for this function:




#### 4.1.3.23 stampaTutto()

```
void stampaTutto (
            Stazione * root )
```

Recursively prints the ID of each station and the autonomy of all its vehicles (Post-order).

**Parameters**

| | |
|---|---|
| *root* | A pointer to the root node of the binary tree of 'Stazione'. |

Definition at line 419 of file API_Tallarico.c.

Here is the call graph for this function:


#### 4.1.3.24 stampaVeicoli()

```
void stampaVeicoli (
            Veicolo * root )
```

Recursively prints the autonomy of all vehicles in the binary tree (Post-order).

**Parameters**

| | |
|---|---|
| *root* | A pointer to the root node of the binary tree of 'Veicolo'. |

Definition at line 406 of file API_Tallarico.c.

Here is the caller graph for this function:


#### 4.1.3.25 successiva()

```
Stazione* successiva (
            Stazione * curr )
```

Finds the in-order successor of a station in the binary tree.

**Parameters**

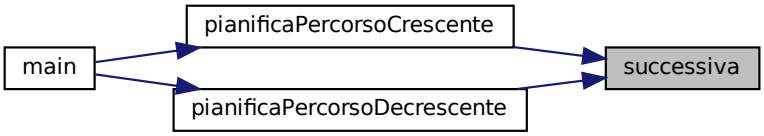
| | |
|---|---|
| *curr* | A pointer to the current 'Stazione' node. |

**Returns**

A pointer to the in-order successor, or NULL if none exists.

Definition at line 435 of file API_Tallarico.c.

Here is the caller graph for this function:




#### 4.1.3.26 svuotaSpazzatura()

```
void svuotaSpazzatura (
            Spazzatura ** lista )
```

Empties the 'Spazzatura' linked list.

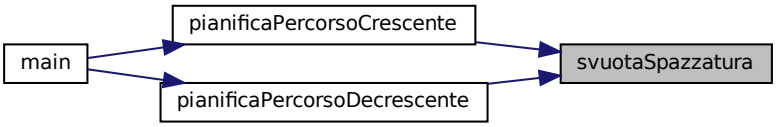
Frees all nodes and their associated 'Route'.

**Parameters**

| | |
|---|---|
| *lista* | A pointer to the head of the 'Spazzatura' linked list. |

Definition at line 517 of file API_Tallarico.c.

Here is the caller graph for this function:



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