

API Project

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Chapter 1

Data Structure Index

1.1 Data Structures

Here are the data structures with brief descriptions:

Route	Represents a route in the transportation network	5
Spazzatura	Represents garbage collection data in the transportation system	6
Stazione	Represents a station in the transportation network	7
Veicolo	Represents a vehicle in the transportation system	10

Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

/home/admin/ProgettoApi/[API_Tallarico.c](#) 13

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.

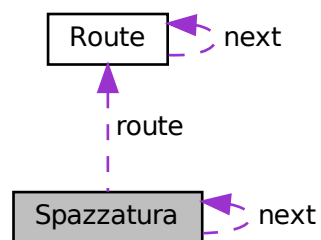
The documentation for this struct was generated from the following file:

- /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.

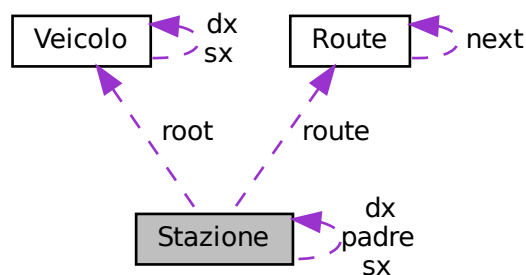
The documentation for this struct was generated from the following file:

- /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.

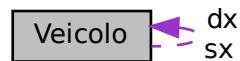
The documentation for this struct was generated from the following file:

- /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](#)

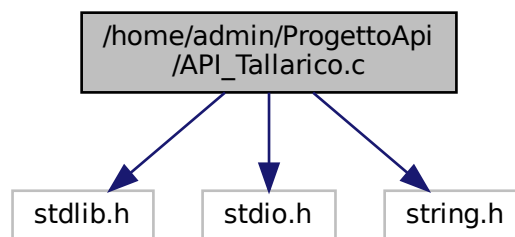
Chapter 4

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, [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 )
```

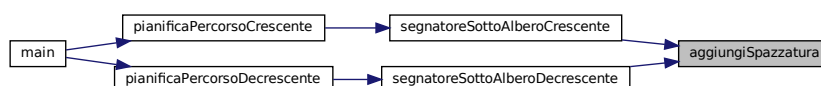
Adds a new '[Spazzatura](#)' node to the front of the list.

Parameters

<i>lista</i>	A pointer to the head of the ' Spazzatura ' linked list.
<i>route</i>	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

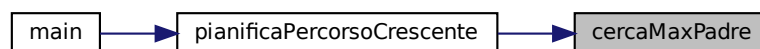
<i>maxPadre</i>	The current station from which the search begins.
<i>idPartenza</i>	The starting station ID.
<i>maxId</i>	The maximum allowed station ID for the search.

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

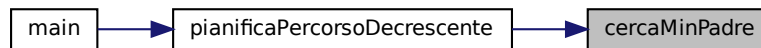
<i>minPadre</i>	The current station to inspect.
<i>startId</i>	The starting station ID.
<i>minId</i>	The minimum station ID to consider.

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

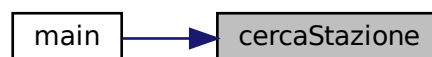
<i>root</i>	Pointer to the root of the binary tree of 'Stazione'.
<i>id</i>	The unique identifier of the station to search for.

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

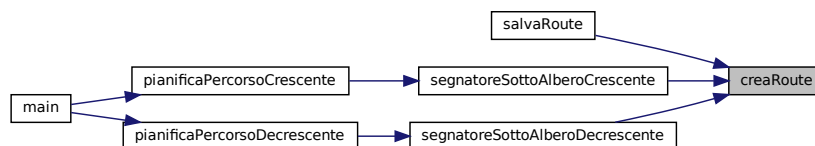
<i>id</i>	The unique identifier for the route.
-----------	--------------------------------------

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

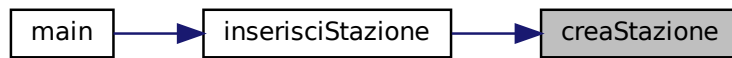
<i>id</i>	The unique identifier for the station.
-----------	--

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

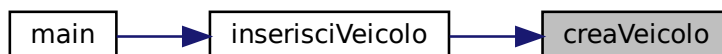
<i>autonomia</i>	The autonomy value to be assigned to the vehicle.
------------------	---

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

<i>root</i>	A pointer to the pointer of the root node of the binary tree of 'Stazione'.
<i>id</i>	The unique identifier of the station to be removed.
<i>elimina</i>	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 )
```

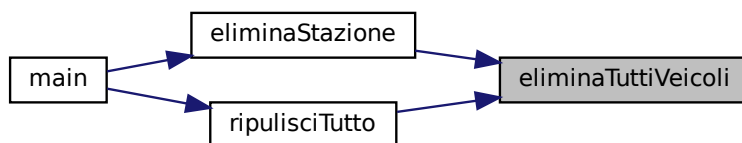
Deletes all vehicles in a binary tree of vehicles.

Parameters

<i>root</i>	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

<i>root</i>	A pointer to the pointer of the root node of the binary tree of ' Veicolo '.
<i>autonomia</i>	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

<i>root</i>	A pointer to the pointer of the root node of the binary tree of 'Stazione'.
<i>id</i>	The unique identifier of the station to be inserted.
<i>padre</i>	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

<i>root</i>	A pointer to the pointer of the root node of the binary tree of ' Veicolo '.
<i>autonomia</i>	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()**

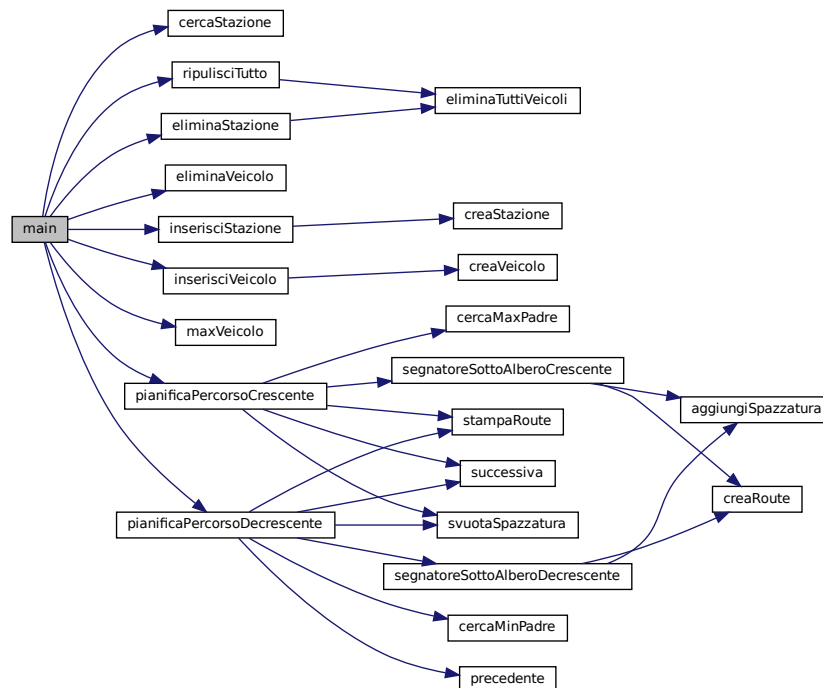
```
int main ( )
```

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

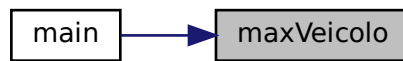
<i>root</i>	The root of the vehicle tree.
-------------	-------------------------------

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.

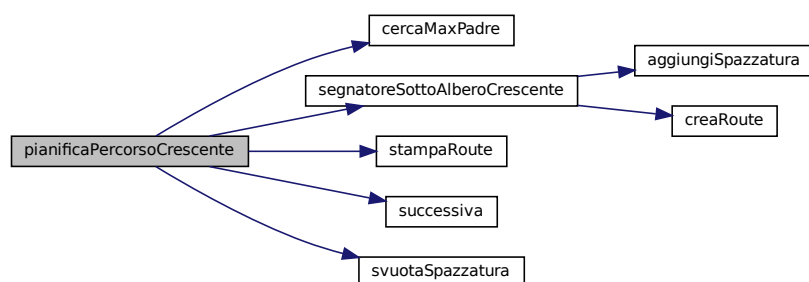
Uses a binary tree to search for stations with ascending IDs and update the route.

Parameters

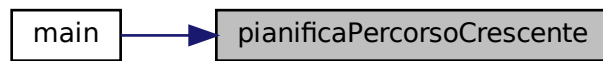
<i>startingStation</i>	The starting station.
<i>arrivalId</i>	The ID of the arrival station.

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 )
```

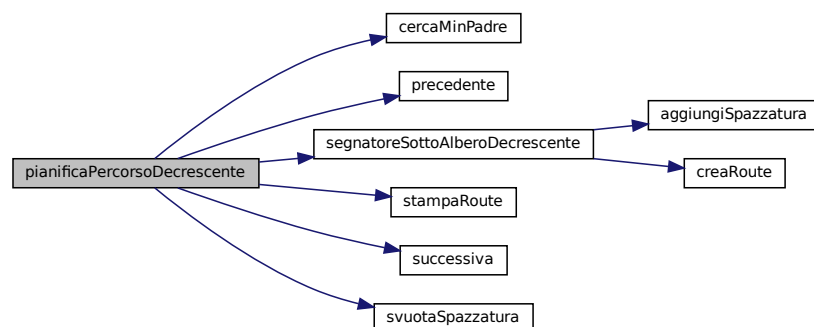
Plans a descending route from the starting station to the destination.

Parameters

<i>startStation</i>	The starting station for the route.
<i>arrivalId</i>	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

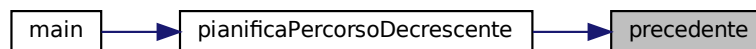
<i>curr</i>	A pointer to the current 'Stazione' node.
-------------	---

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

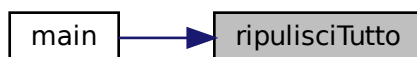
<i>root</i>	A pointer to the pointer of the root node of the binary tree of ' Stazione '.
-------------	---

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

<i>route</i>	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.

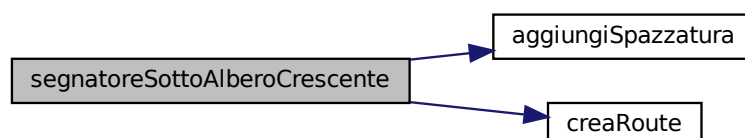
Marks the stations within ID limits, adds a route, and updates the last visited station.

Parameters

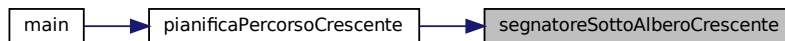
<i>maxPadre</i>	Pointer to the current station being inspected.
<i>idPartenza</i>	Starting station ID.
<i>minUltima</i>	Minimum ID of the last visited station.
<i>maxId</i>	Maximum reachable station ID.
<i>route</i>	Pointer to the current route.
<i>ultimaVisitata</i>	Pointer to the last visited station.
<i>listaSpazzatura</i>	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 )
  
```

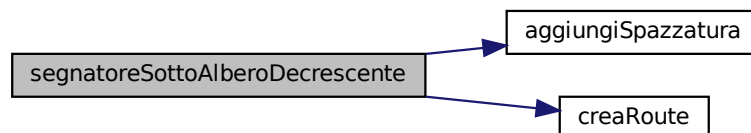
Recursively marks stations in a descending order binary tree and adds routes.

Parameters

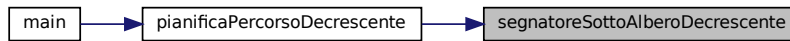
<i>minPadre</i>	The current station to inspect.
<i>startId</i>	The starting station ID.
<i>previous↔ VisitedId</i>	The ID of the last visited station.
<i>minId</i>	The minimum station ID to consider.
<i>route</i>	The current route being constructed.
<i>lastVisited</i>	A pointer to the last visited station.
<i>trashList</i>	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 )
```

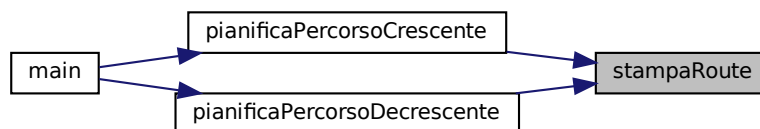
Recursively prints the IDs of all routes in the list.

Parameters

<i>lista</i>	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

<i>root</i>	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

<i>root</i>	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

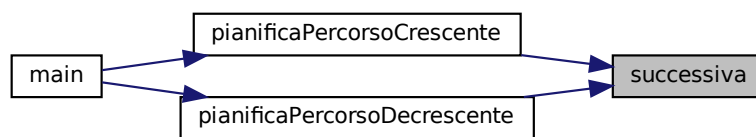
<i>curr</i>	A pointer to the current 'Stazione' node.
-------------	---

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.

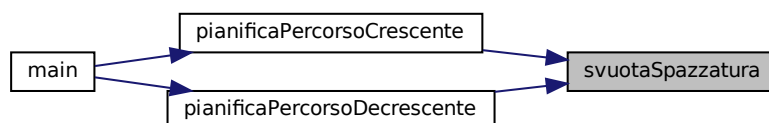
Frees all nodes and their associated 'Route'.

Parameters

<i>lista</i>	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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