

TRIP PLANNER APPLICATION

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Abbreviations

Sol: site of cultural and non-cultural interest (tourist attractions, museums, events, etc.)

Pol: Point of interest (refreshment points, garages, camper parking, etc.)

FE: Frontend Web

App: Application for smartphones.

Web app: Web application

BE: BackEnd

VT: Visit time estimated or set by BE

AR: Augmented Reality

Abstract

The following document summarizes in a descriptive way the functionalities and objectives of the software.

The project was created to promote tourism in the region of Veneto and Croatia. In particular, it wants to focus on sites and services in the area that may be of interest to tourists.

From this the need to create an app, web and for smartphones, which can involve the tourist or even the sustainable cultural tourist in his time of stay in the territory, helping him to discover everything that the territory offers and that is related to his interests.

Trip Planner Users

The basic profiles of the users involved are as follows:

Tourist: The tourist, by downloading the app or connecting to the website can register by entering their type of user (if with or without handicap) and their interests. Once you have selected your next trip (see next paragraph), you can scroll through the Sols to visit and have for each one the information about the time taken per visit. You can plan your trip and save your choices to have the calculation of the total visit time.

From your position to the points of interest that you will gradually select, the routes that will appear on the google map will be suggested, enriched with information on public and transport services such as airports, stations, etc.

Once arrived at an Sol, he will meet works, artifacts, cycle paths, tourist routes, etc. that will display a QR code. Through your smartphone, by framing the QR of interest, you can get detailed information. This information may include video, audio, descriptions, external references and, if present, augmented reality images.

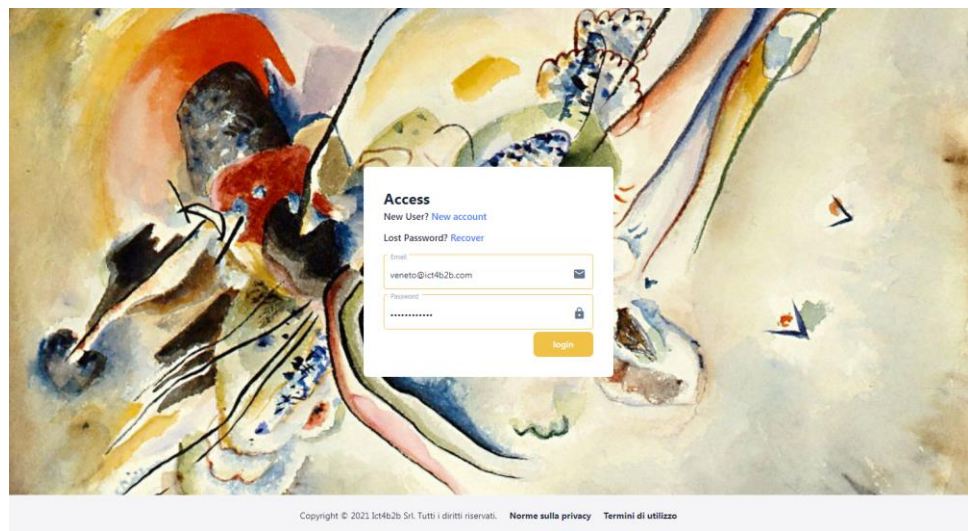
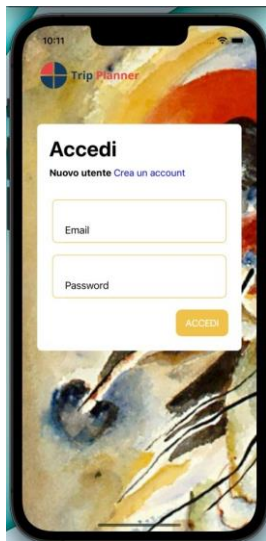
The framing of the QR related to the work or remains will trace the path for that journey. In fact, the application will save the reading and its time, associating the work with that specific trip. In this way the tourist will be able to retrace, within the app or website, his past trips, the times taken and compare them with the new ones planned.

Scholar: The scholar will have all the functions described for the tourist user, but the visit times for planning will change for him. He will have access to more detailed information about the work/rest and can also take notes for each work scanned with the QR.

Sol Administrator: The parent Sol manager will be the contact person for one or more Sol. He will create the SOI, certify the upload of works / remains by his subordinate Administrators (or "delegates"). It will therefore be possible, only after certification, to print the relevant QR code. Its delegates will be able to upload the general contents related to the Sol such as the site map with a predetermined route, a brief description, etc. as well as the Pol associated with it (see p. 5.1.5). The Managing Directors can only be generated by the reference Sol Administrator

Sol delegate: the "delegate" administrator of the Sol, generated by the "Main" Sol administrator, will be able to upload the contents (more videos, more audio, descriptions, more external references and, if present, more augmented reality images) for each work / rest related to their Sol to which they belong. It will not be able to generate other delegates and will not be able to certify any uploaded work.

The System Administrator will have access to all areas of the portal, as well as having aggregate data tables concerning the master data of users, Sol and works / remains. It will be able to appoint new directors and managers and will have the burden of enabling the registration requests of the new Sol managers. You can download the excel file of the language and upload it later with the new language (see p. 4.5).



Registration of Personal Data, Sol, Works, Authors and Languages

PERSONAL DATA

Personal data: Users, Sol, Works, Authors and PoI. Apart from standard data typical of the master data that will be saved on the DB, part of the information will be saved on filesystems such as image, audio, video and 3D image rendering files for AR.

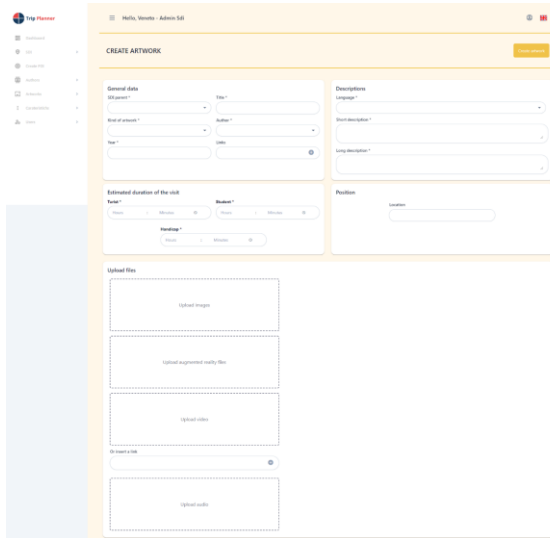
SoI DATA ENTRY

Each CEO, previously generated by an Sol Administrator, will have to upload information regarding his site of interest.

The insertion form must be completed with:

- Title;
- SOI code that corresponds to the QR;
- SOI code of hierarchical membership;
- address;
- geolocation;
- Brief description;
- representative poster;
- category (and possible subcategory [...]) of Sol;
- Possible link to the official website;
- Possible photo gallery (separate file with more photos);
- Possible video presentation (separate file with multiple videos);
- Audio file(s) with audio guide (if in a language other than the profile, present the country code) (separate files with multiple audios);
- Possible opening hours;
- General image (jpeg, tiff,..) of the map (separate file with multiple maps – including historical ones);
- Map image with predetermined route;
- Possible discounts for the disabled;
- estimated visit time per tourist;

- estimated time of visit to disabled people;
- estimated time passionate or scholarly visit;
- Possibility of parking: only car or even camper, guarded or not;
- Possible refreshment points.



After saving, it will be possible to use and then also print the QR code of the Sol or receive it by email.

Each Chief Executive Officer may modify its content, but any modification / insertion must be examined by the Director of Sol of reference.

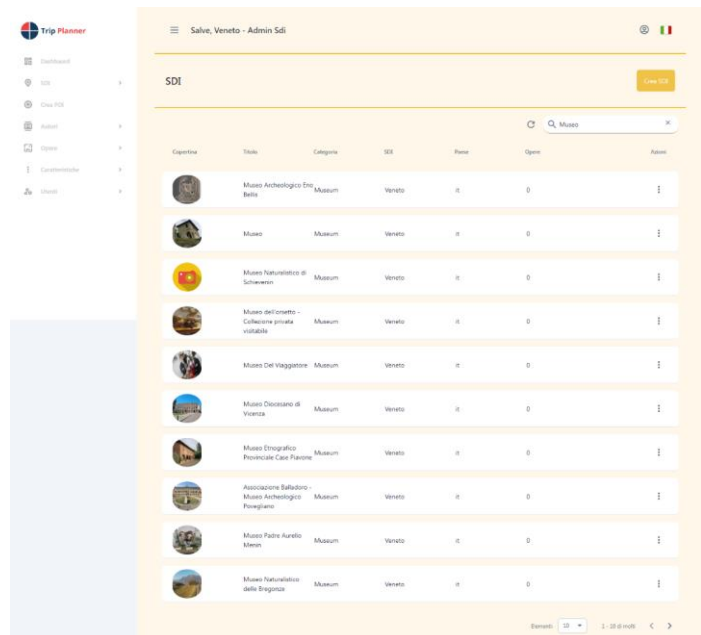
Each Delegate may register one or more Sol. At login you will see a summary table with all the Sol registered by the same manager.

Since they are georeferenced, the Sol will appear during the planning phase of the trip, as well as in the list also on the map of the route associated with the trip.

OPERA DATA ENTRY

Each registered Sol may have one or more cultural works within it. The Administrator will have the opportunity to enter the various information through another input form that must be completed with:

- Sol reference (if there are more Sol registered by the responsible user);
- location (room, corridor, etc.);
- geolocation (think of excavations, ...);
- categories or subcategories of membership (separate relationship files);
- Title of the work;
- Type of work (sculpture, painting, rest, etc ...);
- Estimated visit time per tourist;



Copertina	Titolo	Categoria	SDI	Paese	Opere	Azioni
	Museo Archeologico Etrusco	Museum	Veneto	it	0	
	Museo	Museum	Veneto	it	0	
	Museo Nazionale di Scienze	Museum	Veneto	it	0	
	Museo dell'Orchestra - Collezione privata visitabile	Museum	Veneto	it	0	
	Museo Del Viaggiatore	Museum	Veneto	it	0	
	Museo Diocesano di Venezia	Museum	Veneto	it	0	
	Museo Etnografico Provinciale Casa Pascale	Museum	Veneto	it	0	
	Associazione Baladino - Museo Archeologico Provinciale	Museum	Veneto	it	0	
	Museo Padre Aurelio Mezz	Museum	Veneto	it	0	
	Museo Nazionale della Biogenia	Museum	Veneto	it	0	

- visiting time for disabled people;
- Estimated visit time per scholar;
- Short description (per tourist user);
- Full description (for scholar user);
- Possible author of the work;
- Year of construction;
- Possible photo gallery with descriptions (separate file with more photos);
- Any videos with associated titles (as above);
- Any audio with associated titles (as above);
- External links.

The next step, after saving, will be the generation of the QR code, which will be saved on a dedicated area. This dedicated area will contain all the QR codes of the generated works, with the possibility of elimination, printing or sending via email, single or massive.

Ownership and transfer of the work

Each work will have an owner (owner of the work, identified by a name and surname or company name in case of ownership of a legal entity), which (in this first release) can never change.

In the event that a work is transferred, the system must record the date of transfer and, in the case of transfer. temporary, the date of return. The system will then have to manage membership in one or another Sol.

The transfer of a work will be managed by the head of Sol father.

AUTHOR INSERTION

The loading of the users is left to the Delegates. It too will be certified as a work.

The input form will be complete with the following fields:

- Name and surname
- Description
- Type of author
- Year

LANGUAGE INPUT

The application will be prepared for multiple languages. In the first release, the application will have loaded English and Italian.

In case the user's language will not be present, the English language will be displayed by default.

Application languages

For the general administrator only there will be a page where you can download an excel file with the static strings of the application (labels, error messages, etc ...) of the entire tree of the app and the web app.

He can add a column with a translation of the new language and upload the completed file within the same page. This file will initially be under review. Upon upload, an email will be sent to future technicians responsible for system maintenance. They will be in charge of validating the document and adding the new language to the system. Once validated, the uploaded file will change from review to valid or rejected.

Content languages

When inserting content, such as descriptions of the Sol or the work, there will be three text fields, with mandatory insertion of one of the three, which represent the translations of the three languages of the application.

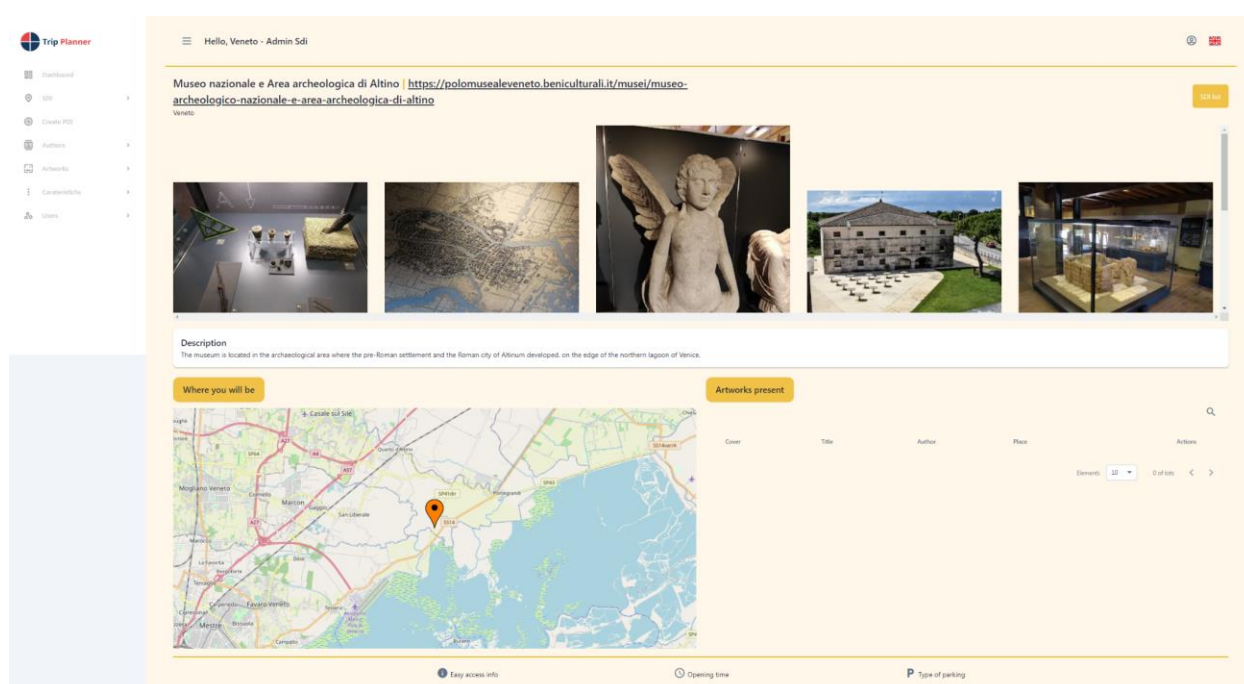
DELETION OF DATA

Any deletion of data or metadata will be handled logically.

Specific Features

Trip Planner

The basic functionality of the project is the Trip Planner. It is intended as a tool to facilitate the planning of trips for tourists or scholars and at the same time maximize and promote knowledge of the heritage of the territory, both cultural and attractive and / or playful. The user can see on the map all the Sol and from here possibly select the categories (or subcategories) of interest.



Travel planning

After registering, the user both via web and app, through this function will have the opportunity to plan his next trip, initially indicating the destination, the period of time of the trip, the preferred means of travel and their interests. The latter will be listed as checkboxes selectable according to a predefined list, such as:

- Tourist routes of attraction
- Time available
- Cultural sites along the way

- Cultural preferences

And at the check of some categories one or more subcategories may appear (see end of paragraph).

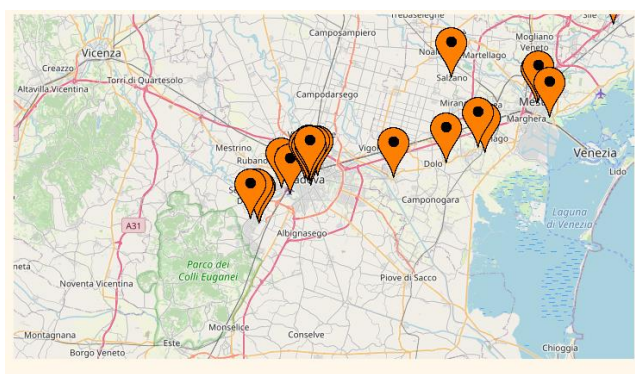
Map, Sol geolocation and Visit Time

The algorithm then, based on the selections made, will return a map of geolocated points with all the Sol registered along the selected route.

There will also be a navigable table with records selectable with the VT of each Sol. At each subsequent selection of an Sol the total visit time will be updated, which will be the sum of the VT of all the selections.

Filters

A specific search bar for the table will also appear, with the possibility to filter by category or subcategory of Sol, include or exclude some categories or subcategories, include or exclude the Sol by distance from the main path and finally sort the columns of the table (see previous para).



Works/Remains filter

In the event that the Sol found will contain within them works or remains, the possibility will appear to select or deselect filters by author of the work and / or category, by time of visit of the single work, by type of work or rest, etc

Points of interest

Based on the preferences selected during registration or in general in your profile or with an additional filter, the map of the returned route may also indicate other points of interest not specifically cultural but useful for the traveler, such as:

- Restaurants or dining venues with food for people and/or animals
- Motorhome areas with services
- Mechanical
- Animal shelter
- Info center

- Etc...

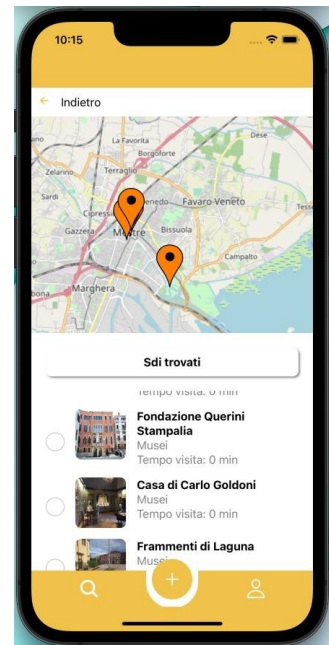
These Pol will be inserted/modified or deleted by the CEO. Each Pol is associated with a reference Sol or they can also be isolated and visible by users as close to their Sol of interest.

They will have the fields:

- Type of Pol;
- Name;
- Any associated Sol (e.g. restaurant inside a mouse, bar at the entrance, book shop at the exit, etc.);
- Description of the Pol;
- Latitude and longitude;
- Localization within the Sol;
- Possible distance from the Sol in meters.

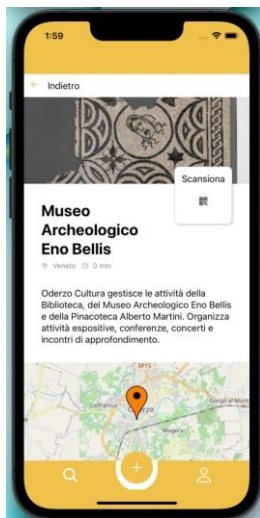
Navigator - Transport

In a dedicated tab of the app or web app there will be everything related to transport. By selecting the various Sol of the route, an interactive map will show the distance and the travel time to reach this Sol based on the selection of the type of means of transport, the service areas for refueling or any indication of the timetables of public transport.



Historicization of visits and remaining visit time

Each route calculated with the Trip Planner will be saved in the user's reserved area on the columnar db.



The wealth of interactive information stored for each Sol and, if present, the information of each work, will encourage the user to frame the QR code of the Sol visited and the various QR codes of the works that gradually encounters in the path.

If the user prepares the route beforehand, the smartphone could load a whole set of useful information. When you are on the site without 4g coverage, you can still visit it and be guided appropriately and in detail.

In a future release also the tourist user can add his own comments that will remain historicized for his use and consumption, also leave a vote for each Sol and Opera and a rating of the work itself. Always on the columnar db.

Each scan will be tracked and saved with the associated date and time of scanning in order to historicize the actual visit data of the Sol or the work / rest.

Remaining visit time

The historicization of the visit allows you to return the remaining time directly to the app to complete the journey or pre-established route.

Notifications

There will be two main types of notifications that will come to users:

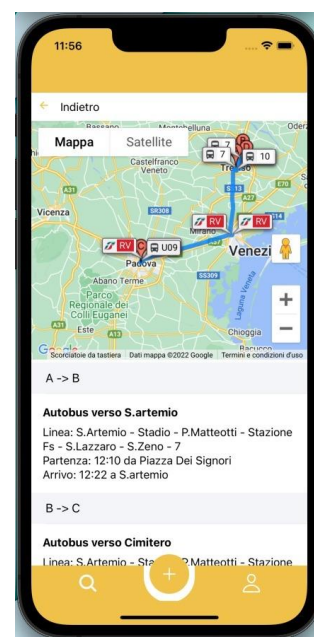
- Automatic emails;
- Push notifications.

The former are sent whenever a user:

- subscribes;
- retrieves the PSW;
- generates a new Sol, Work, Author.

The latter are sent instead, after consent during user registration, in the case of an event scheduled by the trip planner close to the beginning of the event itself, also considering the travel time taken to reach the place of the event.

In the case of daily closure of an Sol, the application will notify the user who has little time left to visit the Sol, considering the estimated time of achievement to reach the place of the Sol added to the total visit time.



Audio files in the background

Each Sol will have the possibility to upload an audio file that will illustrate the user throughout the visit. After framing the QR code of the Sol, or at the specific request of the user via app, the uploaded trace of the Sol manager will be issued during the registration of the Sol itself, if any. A simple interface at the base of the app screen can command the pause or continuation of the track, with the possibility of rewind and forward.

Case Study

The user registered as a scholar will have the opportunity to "open a case study", i.e. he can, after framing a specific QR code, insert free text in a dedicated section. This feature, which will appear as an icon on the app, will create a notification for the head of the Sol and a related email. At the next access, the Administrator (parent) can modify the information of that work or share this note with other scholar users, sending both a notification to each app of the scholars chosen by him and a relative email.

Augmented reality

If the Sol manager loads a 3D graphic file for a work or rest, it will be linked to the reference QR code. Together with the various contents available for that work / rest, an icon will also appear that will indicate the presence of visualization in AR. By framing an available surface and starting the "augmented" display, the render of the relative work will be displayed.

Sol Selfie and social sharing

While viewing the AR rendering, the user can take a "special" photo. The image of the work in AR will in fact be immortalized and superimposed on the camera video. Thanks to this feature, the user can use this image overlay to take an additional photo or selfie.

After the second shot, this photo with the AR image overlay will be made shareable through the social apps installed on the smartphone.

Multilingualism and internationalisation

The platform will be released in Italian, but there will be a conversion table of all labels and strings displayed on both apps and web apps.

A special function of the administrators' control panel is to be able to add a language at will. With special export function in excel it will be possible to download a file with the list of all labels or strings with relative column for the language. The administrator can then independently add a

column to the downloaded excel, inserting for each label the translation related to the language he wants to insert. This excel, once completed, will then be uploaded to a special upload space for future review. In fact, this file will be sent to an email box set up during the release of the project.

After review by a distributor, if the file is complete and approved, the new required language will be uploaded to the portal. The language validation application must allow the simultaneous display of both the English field, which will be the first loaded, and the field relating to the language being certified. This is to avoid description alignment errors.

Technology Analysis

Hardware and frameworks

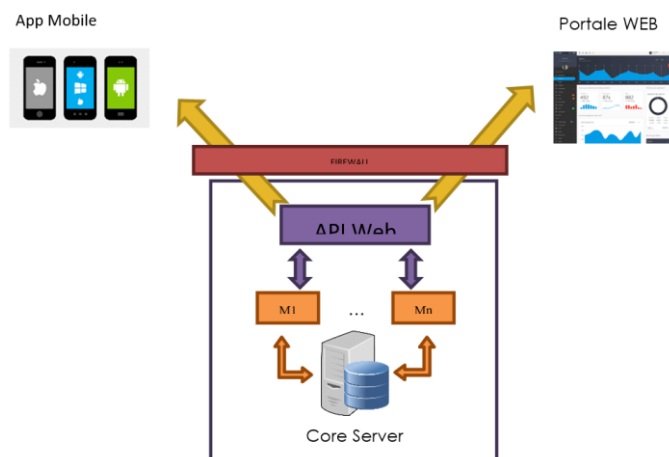
The project revolves, first of all, around an application usable in smartphones, with Android and IOS operating systems. The choice to develop an app is mandatory since, by the nature of the project, the user, especially during visits, will have to use features that are typical only of smartphones. The feature of the app on smartphones as conceived in the project, is to make the solution on smartphones, IN PART, usable even without network coverage as previously downloaded your map or route, in this case you just need to have GPS coverage.

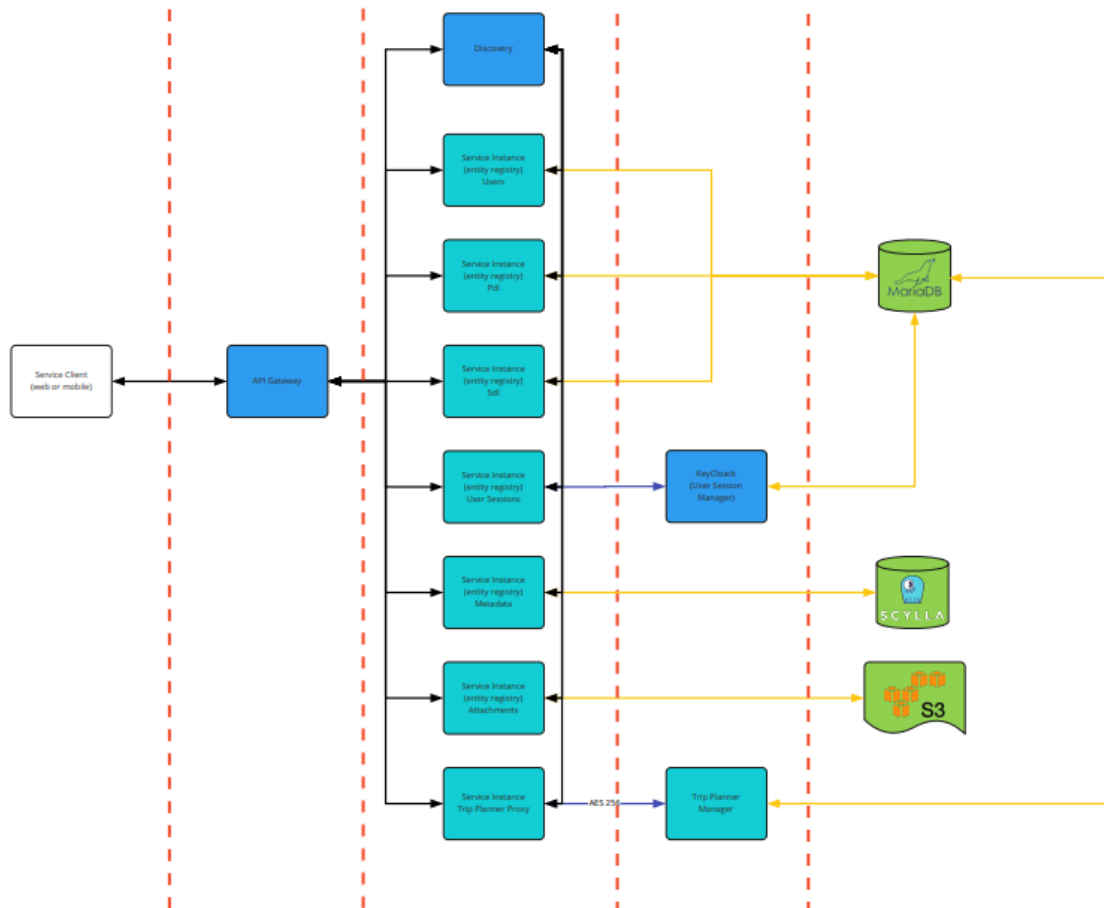
The web part instead acts as a control and project management center for administrators, the managers of the Sol, while as a "personal area" for tourist and scholar users. It is developed as a portal protected by credentials and organized by hierarchies. The web solution aims to be the most effective for the management of the various project areas, as it can be used from any device that can connect to the internet and is easy to customize and easy to use by the staff in charge.

The core of the project will instead reside on clusters of dedicated servers, in which all the processing, algorithms and methodologies required by the project will be carried out. 4 tiers will be identified to increase data security and a server technology with intercommunicating microservices in encrypted and the last tier for communication with the Databases. A RESTFull API technology will instead interpose itself between Apps and Web Apps to serve the requests of the Frontend.

Security on 4 tier

The architecture will be as follows:





The Frontend and APIs

The frontend will consist of applications for apps and web apps. The web app will be available on all major browsers such as Chrome, Firefox, Safari and Edge. The apps will be written for the two main OS, Android and iOS. All FE applications will communicate via JWT tokens. The library used by the FE of the web app will be the

The logic and graphics of the FE

The logic and graphics of the frontend can be consulted at the link:

https://ict4b2b.invisionapp.com/freehand/Trip-Planner-miGHwydG1?dsid_h=67a8dc7fd83dd1a58d014eb913f966a5e973fba88061e92d91e5cb371d4664a6&uid_h=d1135a727f6f780163912d992dc3caa891b505e7453ab0a37a2e096287d1bfa7

The development technologies will be Angular for the web and the WEB API will serve as a "buffer" to group all and only the data that serves as interface information with users, whether they are portal managers or users of the app.

JSON object-based APIs enable app developers to easily store and restore data structures. Partition keys instruct apps to search for key-value pairs, series of columns, or semi-structured documents containing serialized app objects and attributes.

Remember to explain that the most significant operations, mainly cancellations, can be carried out through a double signature authorization with OTP.

Programming languages

The project, depending on its declination, is based on different technologies. The administration web portal will be based on Angular technology (v. 11) ideal for interfacing with Restfull WEB API. The mobile application will be developed with native programming languages: Swift for IOS and Java for Android devices. They will also communicate with the core through the same Resfull Web APIs.

The core of the project, i.e. the central server, will be based on various Java spring technologies by creating microservices that are registered on docker.

Database

NoSQL

As for programming languages, also on the database side, the project is articulated and differentiated according to the area of interest. The Scylla columnar db containing the data usable through the app and web portal will be of the NoSql type which has the following advantages compared to the most famous relational databases:

- Optimal workloads: NoSQL databases are designed for many data access schemes that include low-latency applications. NoSQL search databases are designed for heavy-duty insertion access and in some cases for data analysis;
- Data Model: NoSQL databases offer a variety of data models such as key-value, document, and graph, optimized for performance and scalability;

- Among the features there is also the automatic replication with definable factors that increase its security significantly;
- Scalability: NoSQL databases are typically partitionable because access schemes are able to scale out using distributed architecture to increase throughput that provides consistent performance with almost no scalability limit.

Minimum Requirements

Software

Angular technology (web platform) supports (as of the date of writing) the following browsers:

- Chrome, latest version;
- Firefox, latest version;
- Edge, last two major versions;
- IE, 11;
- Safari, last two major versions.

Mobile app technologies will support the following minimum versions:

- IOS 11.0+;
- Android 8.0+.

The web portal will be responsive, it will adapt to desktop and tablet resolutions. As for the smartphone will not be optimized as the primary tool on the phone side is represented by the mobile application.

The web part will be responsive, it will adapt to desktop, tablet and smartphone resolutions.

All three structures need a stable internet connection to function properly.