Summer School on Digital Humanities

Web site: https://bit.ly/dt4h-gis

Augusto Ciuffoletti

13 giugno 2025



- We have seen how open services provide many functionalities to
 - produce a //ve map, with web links and multimed a contents
 - share it with others
 - export the data across to stand other service
- However
- existing \$
- In that ca
- 111 111 111 01
- library. leafl
- . In this conclu
- understand its

- We have seen how open services provide many functionalities to
 - produce a live map, with web links and multimedia contents
 - share it with others
 - export the pata across too stand other service
- However, existing §
- In that ca
- The task
- In this conclu
- understand its

- We have seen how open services provide many functionalities to
 - produce a live map, with web links and multimedia contents
 - share it with others

- We have seen how open services provide many functionalities to
 - produce a live map, with web links and multimedia contents
 - share it with others
 - export the data across tools and other services
- However we that have requirements that do not exactly match an

- We have seen how open services provide many functionalities to
 - produce a live map, with web links and multimedia contents
 - share it with others
 - export the data across tools and other services
- However we may have requirements that do not exactly match an existing service
- In that case we need to code our own web service
- The task is signified by the axisted the of a power of popular to the library. Jealle 1. The task is the last of the last
- In this concluding tuil wall with the service of this tool to

- We have seen how open services provide many functionalities to
 - produce a live map, with web links and multimedia contents
 - share it with others
 - export the data across tools and other services
- However we may have requirements that do not exactly match an existing service
- In that case we need to code our own web service
- The task is simplified by the existence of a powerful open source library, leafler
- In this concluding turnial we scratch the surface of this tool to understand its potential



- We have seen how open services provide many functionalities to
 - produce a live map, with web links and multimedia contents
 - share it with others
 - export the data across tools and other services
- However we may have requirements that do not exactly match an existing service
- In that case we need to code our own web service
- The task is simplified by the existence of a powerful open source library, leaflet
- In this concluding tutorial we scratch the surface of this tool to understand its potential



- We have seen how open services provide many functionalities to
 - produce a live map, with web links and multimedia contents
 - share it with others
 - export the data across tools and other services
- However we may have requirements that do not exactly match an existing service
- In that case we need to code our own web service
- The task is simplified by the existence of a powerful open source library, leaflet
- In this concluding tutorial we scratch the surface of this tool to understand its potential



 The tutorial consists in the step-by-step creation of a simple app that:

- Displays a mar
- Allow the luger to add markers to the map
- Exposing the markers as a GeoJSON string
- Store
- The tool
 Stackhlitt
- The code
- Stackblitz pr
- The link to each course website

- The tutorial consists in the step-by-step creation of a simple app that:
 - Displays a map

- The tutorial consists in the step-by-step creation of a simple app that:
 - Displays a map
 - Allow the user to add markers to the map
 - Exports the markers as a GeoJSON string
 - Stores the law
 - The tool of Stackblit
- The code
 - Stackblitz pr
- The link to each course website

- The tutorial consists in the step-by-step creation of a simple app that:
 - Displays a map
 - Allow the user to add markers to the map
 - Exports the markers as a GeoJSON string
 - The tool is a leg
- The code of the Stackblitz project
- The link to each
 course website

- The tutorial consists in the step-by-step creation of a simple app that:
 - Displays a map
 - Allow the user to add markers to the map
 - Exports the markers as a GeoJSON string
 - Stores the layer in the cloud (until September 2025)
- The tool we are going to use to practice the leader library is Stackblitz (https://www.com/) an online IDF for JavaScript
- The code to vac step can be very tested and modified as a Stackblitz project
- The link to each project is in the title of each stide, and in the course website pass dedicated that popic.



- The tutorial consists in the step-by-step creation of a simple app that:
 - Displays a map
 - Allow the user to add markers to the map
 - Exports the markers as a GeoJSON string
 - Stores the layer in the cloud (until September 2025)
- The tool we are going to use to practice the *leaflet* library is Stackblitz (https://stackblitz.com/), an online IDE for JavaScript
- The code for each step can be viewed, tested and modified as a Stackblitz project
- The link to each project is in the title of each side, and in the course website page dedicated to this topic.



- The tutorial consists in the step-by-step creation of a simple app that:
 - Displays a map
 - Allow the user to add markers to the map
 - Exports the markers as a GeoJSON string
 - Stores the layer in the cloud (until September 2025)
- The tool we are going to use to practice the *leaflet* library is Stackblitz (https://stackblitz.com/), an online IDE for JavaScript
- The code for each step can be viewed, tested, and modified as a Stackblitz project
- The link to each project is in the title of each slide, and in the course website page dedicated to this topic.



- The tutorial consists in the step-by-step creation of a simple app that:
 - Displays a map
 - Allow the user to add markers to the map
 - Exports the markers as a GeoJSON string
 - Stores the layer in the cloud (until September 2025)
- The tool we are going to use to practice the *leaflet* library is Stackblitz (https://stackblitz.com/), an online IDE for JavaScript
- The code for each step can be viewed, tested, and modified as a Stackblitz project
- The link to each project is in the title of each slide, and in the course website page dedicated to this topic.



Follow the project link for the first step

 In the right frame you see the preview of your service, showing a map

e the URI

a In the left &

• In the left

The select

- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it.
 - In the left party tipere is the project conten

(ロト 4週 > 4 분 > 4 분 > - 분 - 쒸익()

- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
 - In the left trange there is the project content

- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content

- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content
 - The README.md describes the step

- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content
 - The README.md describes the step
 - The index.html is the HTML code for the page
 - The Wher files

- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content
 - The README.md describes the step
 - The index.html is the HTML code for the page
 - The index.js file is the javascript code using the leaflet library
 - The other mestan

- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content
 - The README.md describes the step
 - The index.html is the HTML code for the page
 - The index.js file is the javascript code using the leaflet library
 - The other files are not of interest

900 E 4E 4E 4 A 4 A 1

- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content
 - The README.md describes the step
 - The index.html is the HTML code for the page
 - The index.js file is the javascript code using the leaflet library
 - The other files are not of interest
- The selected file is shown in the center frame
 - You can edit the code and see what happens
 - For instance, try to shange the string in line 10 in index.html and notice the preview changes
 - Your edits remain socal. To cave your project you should register on Stackblitz



- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content
 - The README.md describes the step
 - The index.html is the HTML code for the page
 - The index.js file is the javascript code using the leaflet library
 - The other files are not of interest
- The selected file is shown in the center frame
 - You can edit the code and see what happens
 - For instance, try to change the string in line 10 in index.html and notice the preview change
 - Your edits remain scal. To cave your project you should register on Stackblitz



- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content
 - The README.md describes the step
 - The index.html is the HTML code for the page
 - The index.js file is the javascript code using the leaflet library
 - The other files are not of interest
- The selected file is shown in the center frame
 - You can edit the code and see what happens
 - For instance, try to change the string in line 10 in index.html and notice the preview change
 - Your edits remain ocal. To save your project you should register on Stackhlitz



- Follow the project link for the first step
- In the right frame you see the preview of your service, showing a map
 - the URL on top of the frame is functional: try it...
- In the left frame there is the project content
 - The README.md describes the step
 - The index.html is the HTML code for the page
 - The index.js file is the javascript code using the leaflet library
 - The other files are not of interest
- The selected file is shown in the center frame
 - You can edit the code and see what happens
 - For instance, try to change the string in line 10 in index.html and notice the preview change
 - Your edits remain local. To save your project you should register on Stackblitz



 The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster



- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package vock file.
 In the FTML file:
 - The Six of Every 1 to 100 of the
 - The Solve Control of Solve Character of Solve Control of Solve Control of Solve Character of Solve Control o
 - Next we add a proground asser, which is open Street M

- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file

- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:

- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:
 - a head element with the CSS for the Leaflet library

- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:
 - a head element with the CSS for the Leaflet library
 - a div element for the map (its id is mapid)

0 p d d p d d p d d p d d p

- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:
 - a head element with the CSS for the Leaflet library
 - a div element for the map (its id is mapid)
 - The index.js file contains the JavaScript code of our App

- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:
 - a head element with the CSS for the Leaflet library
 - a div element for the map (its id is mapid)
 - The index.js file contains the JavaScript code of our App
 - The capital L stands for the Leaflet class
 - So we create a man with two parameters

- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:
 - a head element with the CSS for the Leaflet library
 - a div element for the map (its id is mapid)
 - The index.js file contains the JavaScript code of our App
 - The capital L stands for the Leaflet class
 - So we create a map with two parameters
 - the id of the DOM element hosting the raster (our mapid)
 - A JavaScript officet that describes position of map center and zoom level
 - Next we add a background raster, which is OpenStreetMap



- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:
 - a head element with the CSS for the Leaflet library
 - a div element for the map (its id is mapid)
 - The index.js file contains the JavaScript code of our App
 - The capital L stands for the Leaflet class
 - So we create a map with two parameters
 - the id of the DOM element hosting the raster (our mapid)
 - A Java cript object that describes position of map center and zoom level
 - Next we add a background aster, which is OpenStreetMap



- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:
 - a head element with the CSS for the Leaflet library
 - a div element for the map (its id is mapid)
 - The index.js file contains the JavaScript code of our App
 - The capital L stands for the Leaflet class
 - So we create a map with two parameters
 - the id of the DOM element hosting the raster (our mapid)
 - A JavaScript object that describes position of map center and zoom level
 - Next we add a background raster, which is OpenStreetMap



- The first step in our tutorial consists of using the Leaflet library to display an OpenStreetMap raster
- How to:
 - The reference to the library is in the package-lock file
 - In the HTML file:
 - a head element with the CSS for the Leaflet library
 - a div element for the map (its id is mapid)
 - The index.js file contains the JavaScript code of our App
 - The capital L stands for the Leaflet class
 - So we create a map with two parameters
 - the id of the DOM element hosting the raster (our mapid)
 - A JavaScript object that describes position of map center and zoom level
 - Next we add a background raster, which is OpenStreetMap



Step 1: Lab activity

- Browse the web to find the coordinates of a place at your choice as the center of the raster
- Modify/remove the zoom factor

IMPORTANT:

- relax: you cannot damage my repo (you'd need my credentials)
- you may Fork (button on top-left corner) a branch in a repo of your own (recommended not strictly needed)
- you can undo unsaved updates with Ctrl-z
- after forking and signing up you can save your work



 When the user clicks on the map an alert appears with the coordinates of the click

How to:

- When the user clicks on the map an alert appears with the coordinates of the click
- How to:
 - The Hill file is identical, we added management of a click event in the capas wint

40.40.45.45. 5 000

- When the user clicks on the map an alert appears with the coordinates of the click
- How to:
 - The HTML file is identical, we added management of a click event in the JavaScript

- When the user clicks on the map an alert appears with the coordinates of the click
- How to:
 - The HTML file is identical, we added management of a click event in the JavaScript
 - We apply the *on* method to the map to catch *click* events



- When the user clicks on the map an alert appears with the coordinates of the click
- How to:
 - The HTML file is identical, we added management of a click event in the JavaScript
 - We apply the on method to the map to catch click events
 - the first parameter is the name of the event we want to capture
 - the second parameter sa callback that takes the event description as
 - the call act the part and the containing data extracted from the event
 - the event
 - we ext

- When the user clicks on the map an alert appears with the coordinates of the click
- How to:
 - The HTML file is identical, we added management of a click event in the JavaScript
 - We apply the on method to the map to catch click events
 - the first parameter is the name of the event we want to capture
 - the second parameter is a callback that takes the event description as a parameter
 - the callback displays an aleg containing data extracted from the event descriptor e
 - the event descriptor is an one
 - we extract the lat and so fields in the latt



- When the user clicks on the map an alert appears with the coordinates of the click
- How to:
 - The HTML file is identical, we added management of a click event in the JavaScript
 - We apply the on method to the map to catch click events
 - the first parameter is the name of the event we want to capture
 - the second parameter is a callback that takes the event description as a parameter
 - the callback displays an alert containing data extracted from the event descriptor e
 - the event descriptor is an object
 - we extract the lat and hig fields in the lating field.



- When the user clicks on the map an alert appears with the coordinates of the click
- How to:
 - The HTML file is identical, we added management of a click event in the JavaScript
 - We apply the on method to the map to catch click events
 - the first parameter is the name of the event we want to capture
 - the second parameter is a callback that takes the event description as a parameter
 - the callback displays an alert containing data extracted from the event descriptor e
 - the event descriptor is an object
 - we extract the lat and tog fields in the lating field.



- When the user clicks on the map an alert appears with the coordinates of the click
- How to:
 - The HTML file is identical, we added management of a click event in the JavaScript
 - We apply the on method to the map to catch click events
 - the first parameter is the name of the event we want to capture
 - the second parameter is a callback that takes the event description as a parameter
 - the callback displays an alert containing data extracted from the event descriptor e
 - the event descriptor is an object
 - we extract the lat and lng fields in the lating field.



Step 2: Lab activity

• create a named <div> and write within the coordinates. Use

document.getElementById("myDiv").textContent = ...



 Each click on the map adds a marker, and their coordinates are shown on the page



How to:

- Each click on the map adds a marker, and their coordinates are shown on the page
- How to:
 - We and a divitor the coordinates in the htm
 - new marker
 - The c
 - DOM

(ロ) (団) (団) (ほ) (ほ) (ほ) (の)

- Each click on the map adds a marker, and their coordinates are shown on the page
- How to:
 - We add a div for the coordinates in the html
 - In the JavaScript waterdrip the event callback the
 - The cool of Europe DOM

- Each click on the map adds a marker, and their coordinates are shown on the page
- How to:
 - We add a div for the coordinates in the html
 - In the JavaScript we add to the event callback the creation of the new marker

- Each click on the map adds a marker, and their coordinates are shown on the page
- How to:
 - We add a div for the coordinates in the html
 - In the JavaScript we add to the event callback the creation of the new marker
 - its position is computed using the lating field in the event descriptor



- Each click on the map adds a marker, and their coordinates are shown on the page
- How to:
 - We add a div for the coordinates in the html
 - In the JavaScript we add to the event callback the creation of the new marker
 - its position is computed using the lating field in the event descriptor
 - The coordinates are appended to the list in a div element of the DOM

Step 3: Lab activity

 Reverse the order of coordinates: longitude is shown first in the bottom list

A progressive index is assigned to each new point

 The index is shown in the list and added as a title field in the marker definition

the me

How to

- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on
- How to:

- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on the marker
- How to:

- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on the marker
- How to:



- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on the marker
- How to:
 - HTML is the same
 - We add a neweight
 - The event call
 - The value of n leadings
 - The mar
 - the marke

- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on the marker
- How to:
 - HTML is the same
 - We add a new global variable n in the JavaScript
 - The event callback increments the variable each time it is run
 - The value of n laters blad
 - The marker extions

 The marker extinons

 The marke



- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on the marker
- How to:
 - HTML is the same
 - We add a new global variable n in the JavaScript
 - The event callback increments the variable each time it is run
 - The value of n is displayed on each lin
 - The marker constructor now takes a second parameter containing the marker options.

- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on the marker
- How to:
 - HTML is the same
 - We add a new global variable n in the JavaScript
 - The event callback increments the variable each time it is run
 - The value of n is displayed on each line in the list
 - The marker constructor now takes a second parameter containing the marker options.

- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on the marker
- How to:
 - HTML is the same
 - We add a new global variable n in the JavaScript
 - The event callback increments the variable each time it is run
 - The value of n is displayed on each line in the list
 - The marker constructor now takes a second parameter containing the marker options
 - among which the title option



- A progressive index is assigned to each new point
- The index is shown in the list and added as a title field in the marker definition
 - the title field is automatically displayed when the mouse hovers on the marker
- How to:
 - HTML is the same
 - We add a new global variable n in the JavaScript
 - The event callback increments the variable each time it is run
 - The value of n is displayed on each line in the list
 - The marker constructor now takes a second parameter containing the marker options
 - among which the title option



Step 4: Lab activity

- Configure the marker as draggable (ignore that the displayed coordinates become inconsistent)
 - hint: in the marker variable definition add a draggable: true property after the title, separated by a ","

Step 5: all markers in an array (project)

- Record the markers in an array to have them accessible
 - in the previous steps the marker was a local variable in the callback
- How to:

Step 5: all markers in an array (project)

- Record the markers in an array to have them accessible
 - in the previous steps the marker was a local variable in the callback



- Record the markers in an array to have them accessible
 - in the previous steps the marker was a local variable in the callback
- How to:
 - Create an array for the markers
 - Pushin arke a in the arra
 - n ind

- Record the markers in an array to have them accessible
 - in the previous steps the marker was a local variable in the callback
- How to:
 - Create an array for the markers
 - Pushinarkers in the array.

- Record the markers in an array to have them accessible
 - in the previous steps the marker was a local variable in the callback
- How to:
 - Create an array for the markers
 - Push markers in the array

- Record the markers in an array to have them accessible
 - in the previous steps the marker was a local variable in the callback
- How to:
 - Create an array for the markers
 - Push markers in the array
 - n index corresponds to array length

- Record the markers in an array to have them accessible
 - in the previous steps the marker was a local variable in the callback
- How to:
 - Create an array for the markers
 - Push markers in the array
 - n index corresponds to array length
 - no need to increment it

Step 5: Lab activity

- Create a button that fades-out the markers
- Hint
 - · loop through all items in the array with a for loop

```
for (let m in markers) {...}
```

• use the setOpacity(0.5) on each marker

Having all markers in a layer is more practical than in an array





- Having all markers in a layer is more practical than in an array
- How to:

- Having all markers in a layer is more practical than in an array
- How to:
 - HTML is always the same
 - Replace the array with a layerGroup object added to the map
 - Repade the plat operation with an addk-aver at
 - layers our
 - The cards

See the eff

- Having all markers in a layer is more practical than in an array
- How to:
 - HTML is always the same
 - Replace the array with a layerGroup object added to the map (markers)
 - Replace the plan operation with an add-aver a
 - Add Xlaver do find property and the man to recept the solution of the solution of
 - The conf

- Having all markers in a layer is more practical than in an array
- How to:
 - HTML is always the same
 - Replace the array with a layerGroup object added to the map (markers)
 - Replace the push operation with an addLayer applied to the layerGroup
 - Add a layer do fit of protein the map to toggle layer visibility
 - The coriner of cation takes avo object

- Having all markers in a layer is more practical than in an array
- How to:
 - HTML is always the same
 - Replace the array with a layerGroup object added to the map (markers)
 - Replace the push operation with an addLayer applied to the layerGroup
 - Add a layer control icon to the map to toggle layer visibility

- Having all markers in a layer is more practical than in an array
- How to:
 - HTML is always the same
 - Replace the array with a layerGroup object added to the map (markers)
 - Replace the push operation with an addLayer applied to the layerGroup
 - Add a layer control icon to the map to toggle layer visibility
 - The control creation takes two object arguments

One of the base layers tracio button just one)

- Having all markers in a layer is more practical than in an array
- How to:
 - HTML is always the same
 - Replace the array with a layerGroup object added to the map (markers)
 - Replace the push operation with an addLayer applied to the layerGroup
 - Add a layer control icon to the map to toggle layer visibility
 - The control creation takes two object arguments
 - One for the base layers (radio button, just one)
 - See the effect on the layers button top right in the map



- Having all markers in a layer is more practical than in an array
- How to:
 - HTML is always the same
 - Replace the array with a layerGroup object added to the map (markers)
 - Replace the push operation with an addLayer applied to the layerGroup
 - Add a layer control icon to the map to toggle layer visibility
 - The control creation takes two object arguments
 - One for the base layers (radio button, just one)
 - One for the overlay layers (multiple choice)
 - See the effect on the layers button top right in the map



- Having all markers in a layer is more practical than in an array
- How to:
 - HTML is always the same
 - Replace the array with a layerGroup object added to the map (markers)
 - Replace the push operation with an addLayer applied to the layerGroup
 - Add a layer control icon to the map to toggle layer visibility
 - The control creation takes two object arguments
 - One for the base layers (radio button, just one)
 - One for the overlay layers (multiple choice)
 - See the effect on the layers button top-right in the map



Step 6: Lab activity

• move the markers layerGroup in the base layers. Any change?



- It is handy to have a standard string representation of a piece of data (serialization)
 - . e.g. to store the data in a file
- The GeoJSON representation can be easely transformed into a JSON string, and viceversa
- We want to print in the console the JSON string for our markers
- The toged son method converts the markers layer into a JavaScrip object with the Geod Son format. A FRICA
- The stringify wethor serial serial estimates object as a String object
- The string is fir



- It is handy to have a standard string representation of a piece of data (serialization)
 - . e.g. to store the data in a file
- The GeoJSON representation can be easely transformed into a JSON string, and viceversa
- We want to print in the console the JSON string for our markers
- The toGeoJSON method converts the markers layer into a JavaScript object with the GeoJSON format
 - · alas, in this way we tobe the title
- The stringify method serial esigne object as a String object
- The string is finally reco



- It is handy to have a standard string representation of a piece of data (serialization)
 - e.g. to store the data in a file
- The GeoJSON representation can be easely transformed into a JSON string, and viceversa
- We want to print in the console the JSON string for our markers
- The toGeoJSON method converts the markers layer into a JavaScript object with the GeoJSON format
 - alas, in this way we lose the title field
- The stringify method serial zesone object as a String object
- The string is finally recorded in the least



- It is handy to have a standard string representation of a piece of data (serialization)
 - . e.g. to store the data in a file
- The GeoJSON representation can be easely transformed into a JSON string, and viceversa
- We want to print in the console the JSON string for our markers
- The toGeoJSON method converts the markers layer into a JavaScript object with the GeoJSON format
 - alas, in this way we lose the title field
- The stringify method serializes the object as a String object
- The string is finally recorded in the leg-



- It is handy to have a standard string representation of a piece of data (serialization)
 - . e.g. to store the data in a file
- The GeoJSON representation can be easely transformed into a JSON string, and viceversa
- We want to print in the console the JSON string for our markers
- The toGeoJSON method converts the markers layer into a JavaScript object with the GeoJSON format
 - alas, in this way we lose the title field
- The stringify method serializes the object as a String object
- The string is finally recorded in the log



Step 7: Lab activity

- Is there any way to record the title field in the JSON string?
- Study the geoJSON format in the console and find a solution
- If needed see :
 - https://geojson.org/ for geojson syntax
 - https://leafletjs.com/reference-1.7.1.html#marker for the toGeoJSON method

- We want to store our markers in the cloud
- The simplest option is to use a Key-Value service
 - a basic one is the one Implemented on MongoDB Atlas (just demonstration, not for public use)
- A New buffer in the interface allows the user to account a reserved key (sterring).

(project)

A Save batton
 Key box; (ste

(project)

 A Load button Kev box) (step



- We want to store our markers in the cloud
- The simplest option is to use a Key-Value service
 - a basic one is the one I implemented on MongoDB Atlas (just demonstration, not for public use)
- A New button in the interface allows the user to acquire a reserved key (step 8).

(project)

A Save botton allows in opposite the along record (a

(project)

A Load button allows be download the cladd rebord (after filling the Key box) (step 10)



- We want to store our markers in the cloud
- The simplest option is to use a Key-Value service
 - a basic one is the one I implemented on MongoDB Atlas (just demonstration, not for public use)
- A New button in the interface allows the user to acquire a reserved key (step 8)

(project)

A Save botton allows to update the double record (after filling the Key box) (step 9)

(project)

• A Load button allows be download the cloud record (after filling the Key box) (step 10)



- We want to store our markers in the cloud
- The simplest option is to use a Key-Value service
 - a basic one is the one I implemented on MongoDB Atlas (just demonstration, not for public use)
- A New button in the interface allows the user to acquire a reserved key (step 8)

(project)

 A Save button allows to update the cloud record (after filling the Key box) (step 9)

(project)

 A Load button allows to slow fload the cloud record (after filling the Key box) (step 10)



- We want to store our markers in the cloud
- The simplest option is to use a Key-Value service
 - a basic one is the one I implemented on MongoDB Atlas (just demonstration, not for public use)
- A New button in the interface allows the user to acquire a reserved key (step 8)

(project)

 A Save button allows to update the cloud record (after filling the Key box) (step 9)

(project)

 A Load button allows to download the cloud record (after filling the Key box) (step 10)



- For this you need a Google account
- You need first to access the console of the service at https://console.jaryoase.google.com/ and add a new project
 - o obse
- In the S
- o ill the S
- Finally d
- < rour Projectivi
- Your app is no

- For this you need a Google account
- You need first to access the console of the service at https://console.firebase.google.com/ and add a new project
 - o III lile
 - ODSER
- a In the Stad
- 5
- Click Oi
- Finally
- `<YourProje</pre>
- Your app is no

- For this you need a Google account
- You need first to access the console of the service at https://console.firebase.google.com/ and add a new project
 - in the following dialog, do not enable Google Analytics
- In the St
- Click on the
- Finally di
- ` <YourProje
- Your app is no

- For this you need a Google account
- You need first to access the console of the service at https://console.firebase.google.com/ and add a new project
 - in the following dialog, do not enable Google Analytics
 - observe the firebase logo, in the upper left corner
- In the Stackblitz window click on the line base logo in the left toolba
- Click on Melnan
- Finally click on
- <YourProjectN
 </pre>
- Your app is no

- For this you need a Google account
- You need first to access the console of the service at https://console.firebase.google.com/ and add a new project
 - in the following dialog, do not enable Google Analytics
 - observe the firebase logo, in the upper left corner
- In the Stackblitz window click on the firebase logo in the left toolbar
- Click on the name of your project and ne
- ` <YourProjectNave> fivehasean
- < YourProjectName>.fixebaseap
- Your app is not



- For this you need a Google account
- You need first to access the console of the service at https://console.firebase.google.com/ and add a new project
 - in the following dialog, do not enable Google Analytics
 - observe the firebase logo, in the upper left corner
- In the Stackblitz window click on the firebase logo in the left toolbar
- Click on the name of your project and next "Deploy"
- Finally click on the 'Open Site', visit

 <Your Project Name > . fixebase applicants
- Your app is now permanently awailable at that URI



- For this you need a Google account
- You need first to access the console of the service at https://console.firebase.google.com/ and add a new project
 - in the following dialog, do not enable Google Analytics
 - observe the firebase logo, in the upper left corner
- In the Stackblitz window click on the firebase logo in the left toolbar
- Click on the name of your project and next "Deploy"
- Finally click on the "Open Site", or visit
 <YourProjectName>.firebaseapp.com
- Your app is now permanently available at that URL



- For this you need a Google account
- You need first to access the console of the service at https://console.firebase.google.com/ and add a new project
 - in the following dialog, do not enable Google Analytics
 - observe the firebase logo, in the upper left corner
- In the Stackblitz window click on the firebase logo in the left toolbar
- Click on the name of your project and next "Deploy"
- Finally click on the "Open Site", or visit
 <YourProjectName>.firebaseapp.com
- Your app is now permanently available at that URL



- In the right frame we see the preview of our service
 - the URL/on top of the screen is functional (try) it...
- In the certify frame there is a code edito
- In the lef
- a Tha laft
- The top to

- In the right frame we see the preview of our service
 - the URL on top of the screen is functional (try it...)
- In the center frame there is a code editor
- In the left tame
- The left;
- The top too

- In the right frame we see the preview of our service
 - the URL on top of the screen is functional (try it...)
- In the center frame there is a code editor
 - try to change the string in line 6 and notice the preview change
- In the left ame there is the project content and gith. Freference
- The left toollo

- In the right frame we see the preview of our service
 - the URL on top of the screen is functional (try it...)
- In the center frame there is a code editor
 - try to change the string in line 6 and notice the preview change
- In the left tame there is the project content and bithus reference
- The left too bar doubted
- The top tool bases voluments

- In the right frame we see the preview of our service
 - the URL on top of the screen is functional (try it...)
- In the center frame there is a code editor
 - try to change the string in line 6 and notice the preview change
- In the left frame there is the project content and github reference
- The left toolbar doublest the confent of the left colur
- The top tool have s to the top tool have s

- In the right frame we see the preview of our service
 - the URL on top of the screen is functional (try it...)
- In the center frame there is a code editor
 - try to change the string in line 6 and notice the preview change
- In the left frame there is the project content and github reference
- The left toolbar controls the content of the left column
- The top toolbanks department manager

- In the right frame we see the preview of our service
 - the URL on top of the screen is functional (try it...)
- In the center frame there is a code editor
 - try to change the string in line 6 and notice the preview change
- In the left frame there is the project content and github reference
- The left toolbar controls the content of the left column
- The top toolbar is for project management

- The project code resides on the Stackblitz Webserver
- The user get/access to the project following a
- The page displays an editable
- The user

 and quality
- and suci

- The project code resides on the Stackblitz Webserver
- The user get access to the project following a web link
- The page displays an editable
- The user interaction with the browser clicking but one and such a such and such as the suc
- All this is

- The project code resides on the Stackblitz Webserver
- The user get access to the project following a web link
- The page displays an editable
- The user interacts with the browser clicking but ons, filling forms
- All this is synthe

- The project code resides on the Stackblitz Webserver
- The user get access to the project following a web link
- The page displays an editable
- The user interacts with the browser clicking buttons, filling forms and such

- The project code resides on the Stackblitz Webserver
- The user get access to the project following a web link
- The page displays an editable
- The user interacts with the browser clicking buttons, filling forms and such
- All this is synthesised in the StackBlitz screen
 - using a Webiserver which is appropriate only for development
 - a real deployment that auton sind baga third icon in the left toolbar
 - free plan a ailable Google account needs



- The project code resides on the Stackblitz Webserver
- The user get access to the project following a web link
- The page displays an editable
- The user interacts with the browser clicking buttons, filling forms and such
- All this is synthesised in the StackBlitz screen
 - using a Web server which is appropriate only for development
 - a real deployment may runton illebase in iro icon in the leπ toolbar

- The project code resides on the Stackblitz Webserver
- The user get access to the project following a web link
- The page displays an editable
- The user interacts with the browser clicking buttons, filling forms and such
- All this is synthesised in the StackBlitz screen
 - using a Web server which is appropriate only for development
 - a real deployment may run on Firebase (third icon in the left toolbar)
 - free plan available. Google account needed



- The project code resides on the Stackblitz Webserver
- The user get access to the project following a web link
- The page displays an editable
- The user interacts with the browser clicking buttons, filling forms and such
- All this is synthesised in the StackBlitz screen
 - using a Web server which is appropriate only for development
 - a real deployment may run on Firebase (third icon in the left toolbar)
 - free plan available, Google account needed

