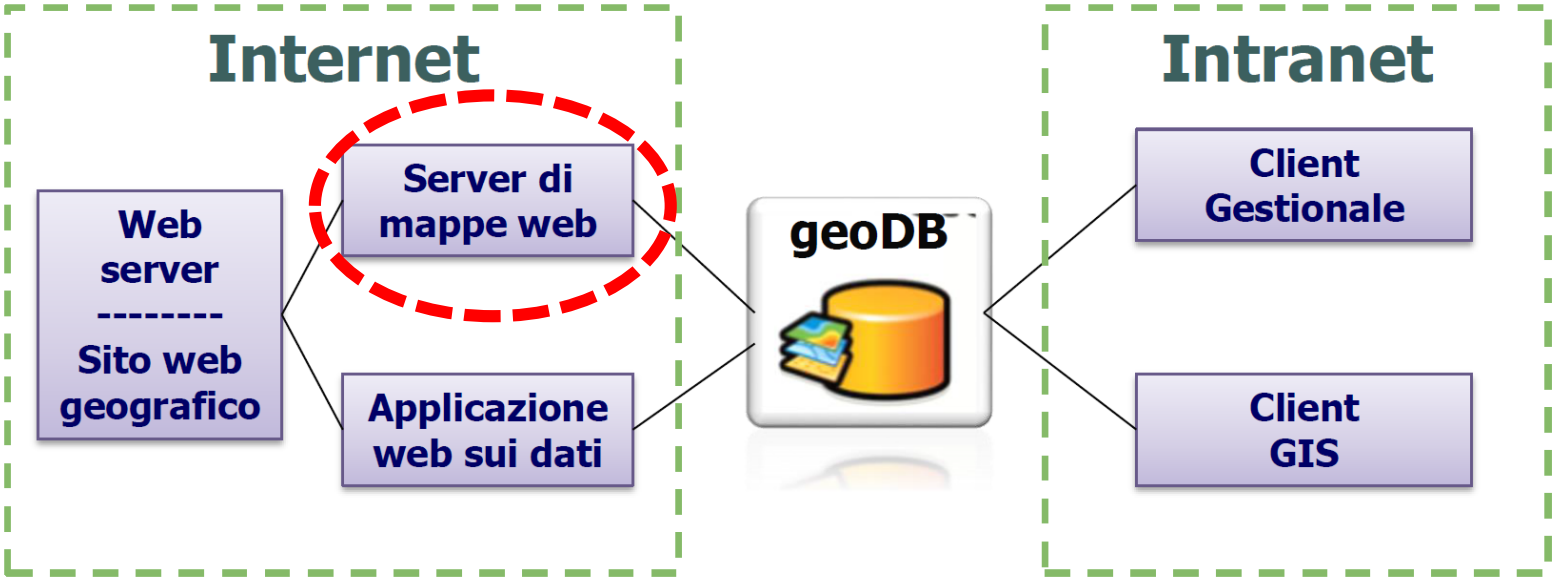
Strumenti e tecnologie Geo-web

Fondamenti sulla condivisione web delle informazioni geografiche

Corso di Sistemi Informativi Territoriali Avanzati – UD12

prof. Giovanni Borga

Architettura di sistema per una piattaforma geo-web



Interoperabilità e Open Geospatial Consortium

About OGC

The OGC (Open Geospatial Consortium) is an international not for profit organization committed to making **quality open standards for the global geospatial community**. These standards are made through a consensus process and are freely available for anyone to use to improve sharing of the world's geospatial data.

OGC members come from government, commercial organizations, NGOs, academic and research organizations.

Strategic (5)
Principal (18)
Technical (74)

Technical Aggregate (1)
Associate (127)
Small Company (44)

GovFuture-Subnational (20)
NGO / Not For Profit Institute (57)
GovFuture-Local (33)

University (110)
Individual (32)

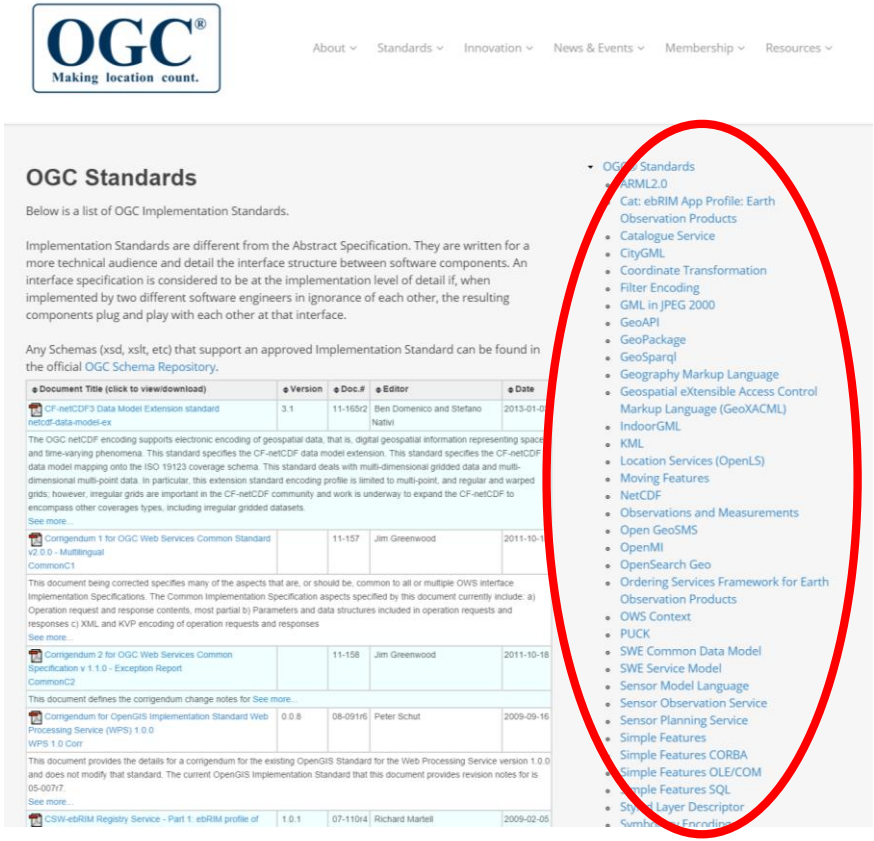
Standards di interoperabilità OGC

Standard attualmente più utilizzati:

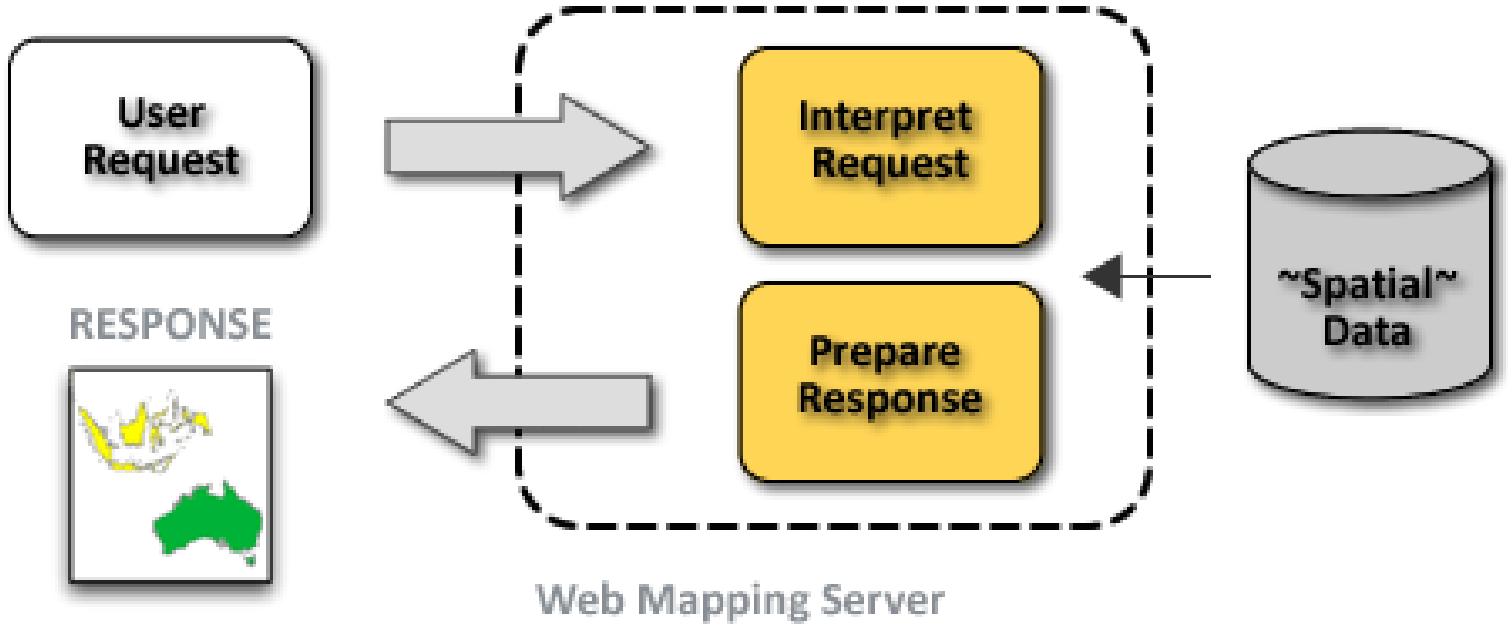
WMS

WFS

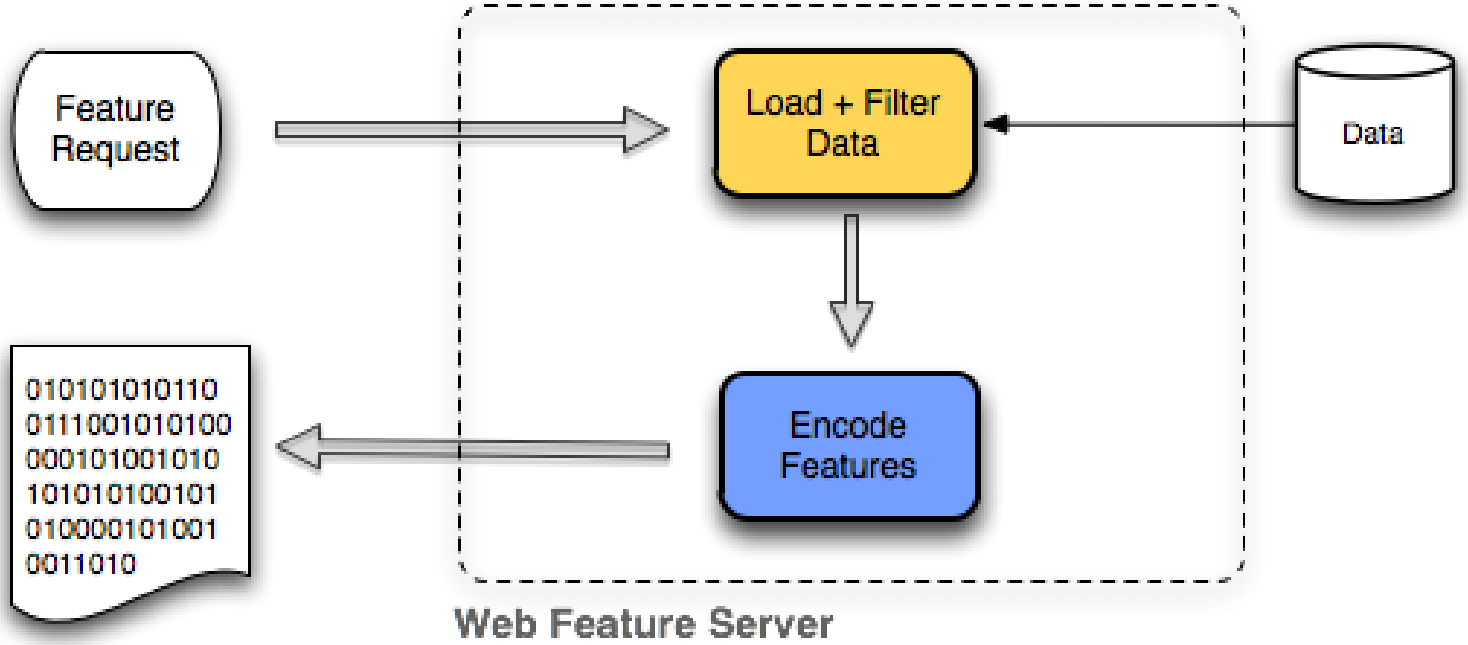
www.opengeospatial.org



Web Map Service

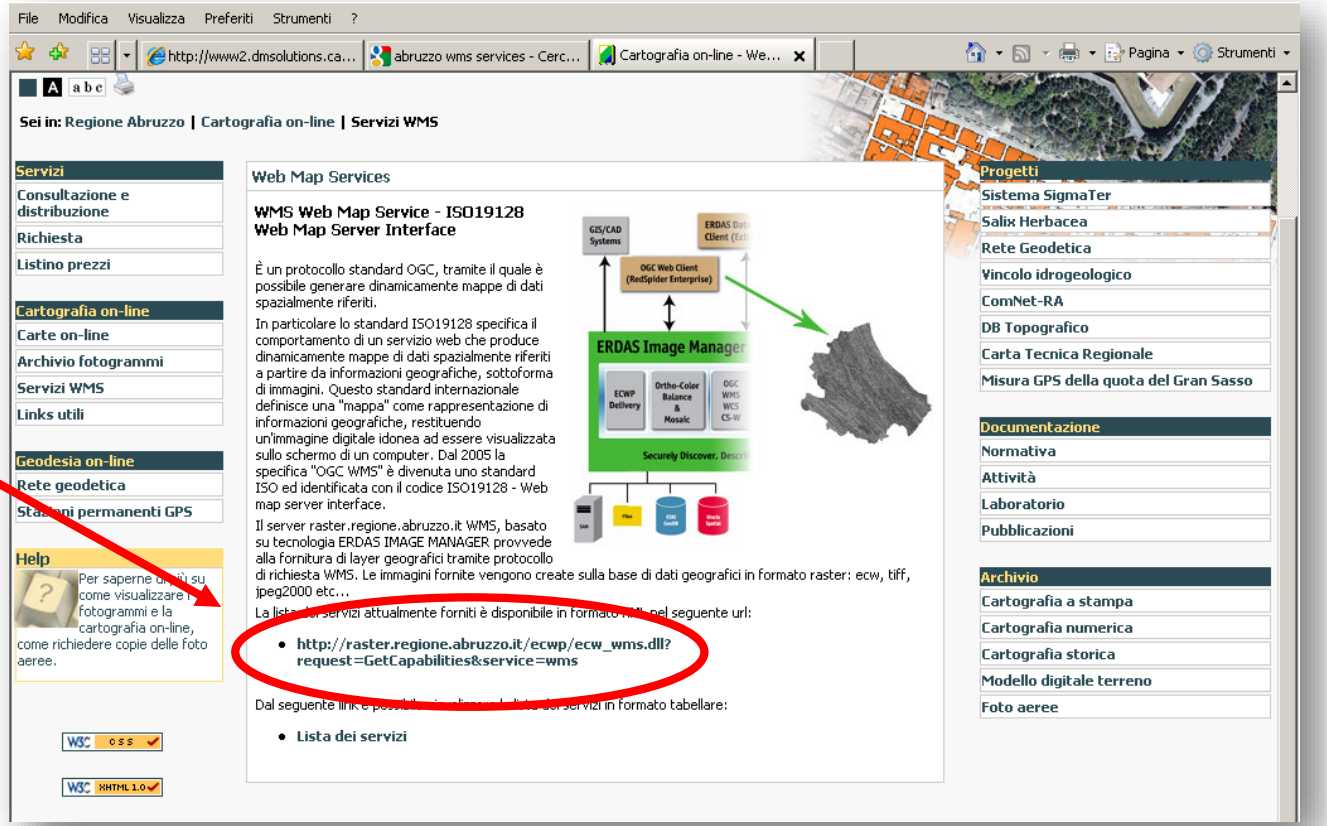


Web Feature Service



Esempio di WMS pubblico: regione Abruzzo

Link al servizio



Anatomia del servizio web WMS

http://raster.regione.abruzzo.it/ecwp/ecw_wms.dll
?request=GetCapabilities&service=wms

- HTTP-based
- Combine map images from multiple remote servers
- Request types:
  - **GetCapabilities**
  - GetMap
  - GetFeatureInfo

```
<?xml version="1.0" encoding="UTF-8" ?>
<!--  ER Mapper Image Web Server 8.5   -->
<!DOCTYPE WMT_MS_Capabilities (View Source for full doctype...)>
- <WMT_MS_Capabilities version="1.1.1" updateSequence="0">
  + <Service>
  - <Capability>
    + <Request>
    + <Exception>
    + <Layer queryable="0" opaque="0" noSubsets="0">
    </Capability>
  </WMT_MS_Capabilities>
```

Le sotto-sezioni del GetCapabilities:

- Request (tipi di richeste supportate; es. GetMap)
- Exception (tipi di dato per i messaggi di errore)
- Layer (layers disponibili e loro caratteristiche)

Anatomia del servizio web WMS

La sotto-sezione Layer del GetCapabilities …

```
<Layer>
  <Title>Root Layer Name</Title>
  ...

  <Layer>
    <Title>Groupe/Theme Name</Title>
    ...

      <Layer>
        <Title>Layer 1</Title>
        ...
      </Layer>

      <Layer>
        <Title>Layer 2</Title>
        ...
      </Layer>

      <Layer>
        <Title>Layer 3</Title>
        ...
      </Layer>

  </Layer>
```

Anatomia del servizio web WMS

http://raster.regione.abruzzo.it/ecwp/ecw_wms.dll
?request=GetCapabilities&service=wms

- HTTP-based
- Combine map images from multiple remote servers
- Request types:
  - **GetCapabilities**
  - GetMap
  - GetFeatureInfo

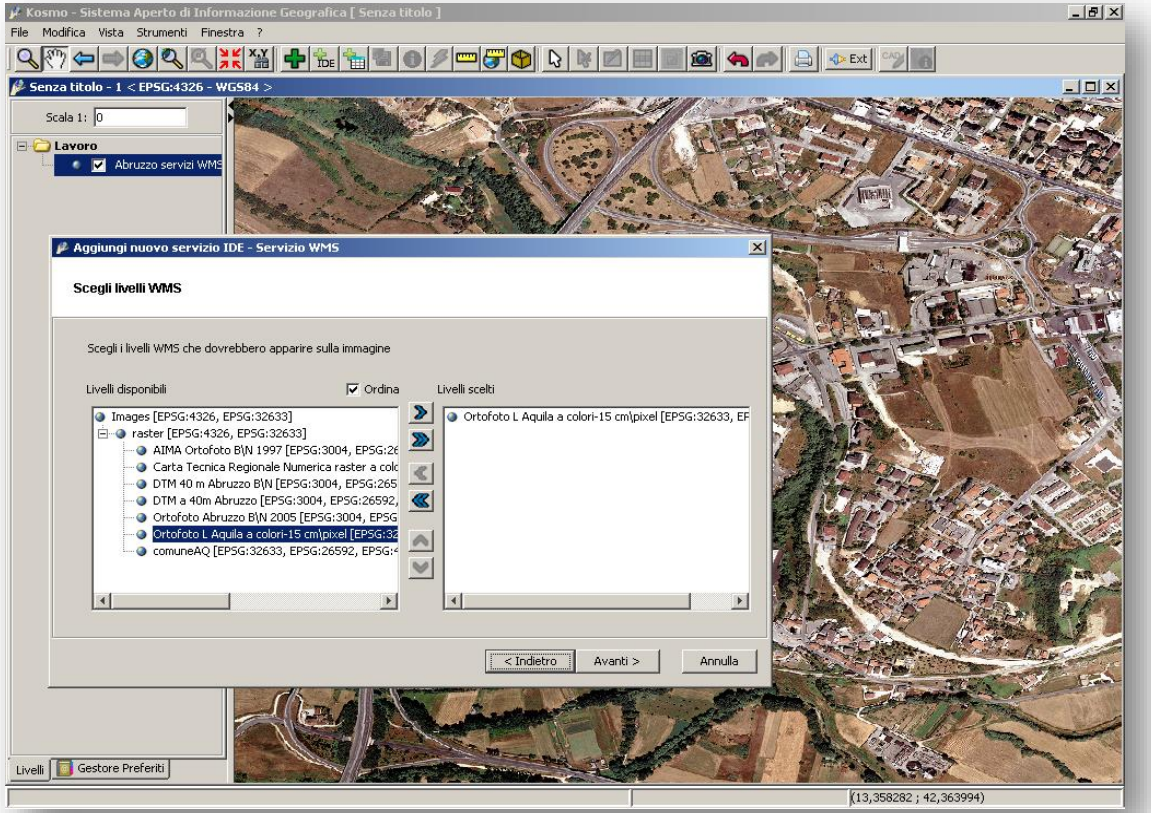
```
<?xml version="1.0" encoding="UTF-8" ?>
<!--  ER Mapper Image Web Server 8.5  -->
<!DOCTYPE WMT_MS_Capabilities (View Source for full doctype...)>
- <WMT_MS_Capabilities version="1.1.1" updateSequence="0">
- <Service>
    <Name>OGC:WMS</Name>
    <Title>Abruzzo servizi WMS Raster</Title>
    <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink
      xlink:href="http://raster.regione.abruzzo.it" />
    <Abstract>WMS Regione Abruzzo</Abstract>
  - <KeywordList>
      <Keyword>ECW</Keyword>
      <Keyword>JPEG 2000</Keyword>
      <Keyword>Abruzzo</Keyword>
      <Keyword>cartografia</Keyword>
      <Keyword>raster</Keyword>
      <Keyword>wms</Keyword>
      <Keyword>regione</Keyword>
      <Keyword>servizi</Keyword>
      <Keyword>web map service</Keyword>
    </KeywordList>
  - <ContactInformation>
    - <ContactPersonPrimary>
        <ContactPerson>Alessandro Cacchione</ContactPerson>
        <ContactOrganization>Regione Abruzzo</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Webgis area services manager</ContactPositio
    - <ContactAddress>
        <AddressType>indirizzo</AddressType>
        <Address>via Leonardo Da Vinci 6</Address>
        <City>L Aquila</City>
        <StateOrProvince>Abruzzo-Italy</StateOrProvince>
```

Anatomia del servizio web WMS

http://raster.regione.abruzzo.it/ecwp/ecw_wms.dll
?request=GetMap
&version=1.1.0
&layers=IMAGES_COMUNEAQ.ECW
&styles=
&srs=EPSG:4326
&bbox=13.36,42.36,13.37,42.35
&width=400&height=350&format=image/jpeg
&transparent=false

- HTTP-based
- Combine map images from multiple remote servers
- Request types:
  - GetCapabilities
  - **GetMap**
  - GetFeatureInfo

Accesso ad un WMS tramite un desktop GIS



Geoserver

Geoserver

What is Geoserver?

GeoServer is a Java-based software server that allows users to view and edit geospatial data. Using open standards set forth by the Open Geospatial Consortium (OGC), GeoServer allows for great flexibility in map creation and data sharing.

Open and Share Your Spatial Data

GeoServer allows you to display your spatial information to the world. Implementing the Web Map Service (WMS) standard, GeoServer can create maps in a variety of output formats. OpenLayers, a free mapping library, is integrated into GeoServer, making map generation quick and easy. GeoServer is built on Geotools, an open source Java GIS toolkit.

There is much more to GeoServer than nicely styled maps, though. GeoServer also conforms to the Web Feature Service (WFS) standard, which permits the actual sharing and editing of the data that is used to generate the maps. Others can incorporate your data into their websites and applications, freeing your data and permitting greater transparency.

Use Free and Open Source Software

GeoServer is free software. This significantly lowers the financial barrier to entry when compared to traditional GIS products. In addition, not only is it available free of charge, it is also open source. Bug fixes and feature improvements in open source software are greatly accelerated when compared to traditional software solutions. Leveraging GeoServer in your organization also prevents software lock-in, saving costly support contracts down the road.

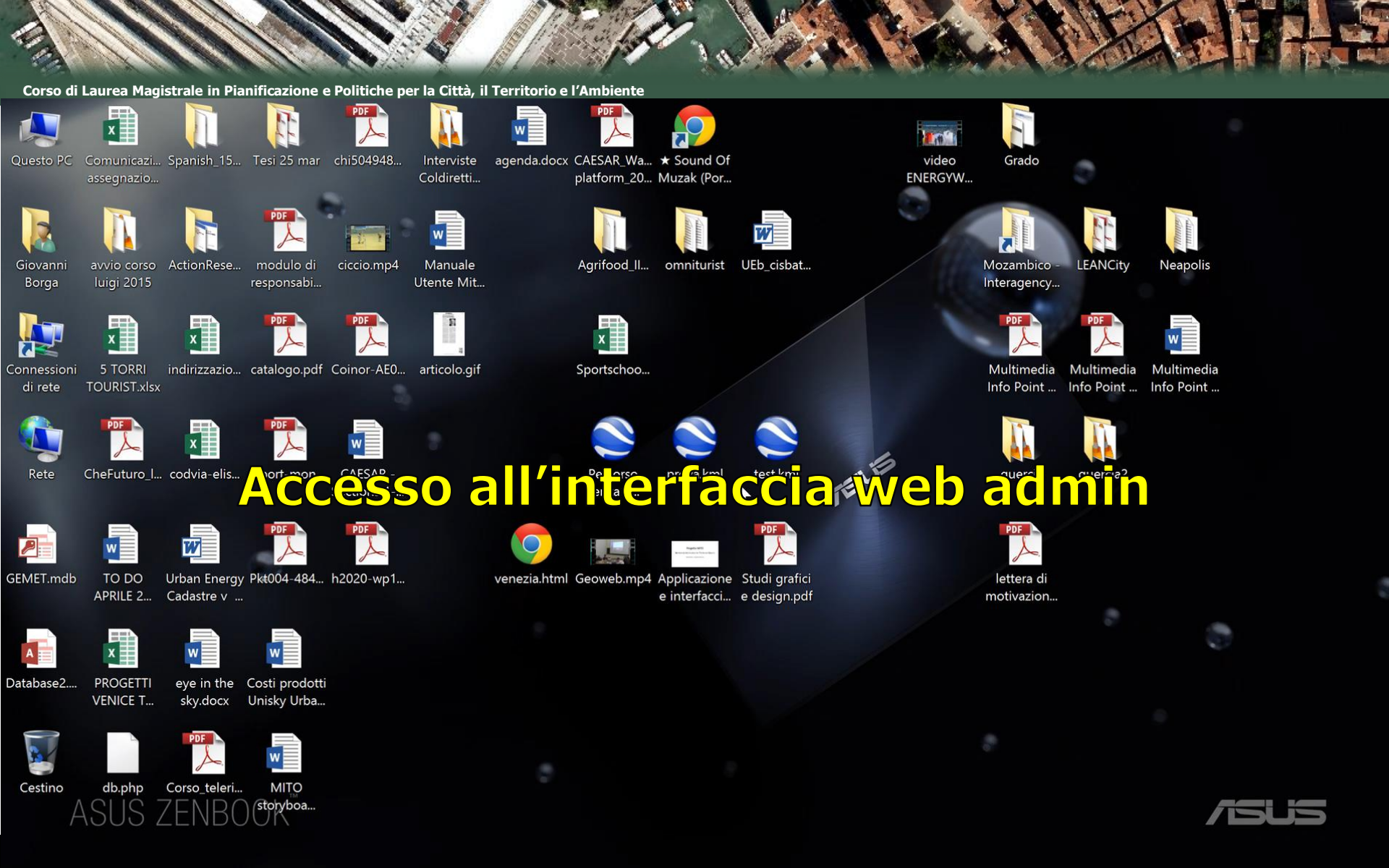
Integrate With Existing Mapping APIs

GeoServer can display data on any of the popular mapping applications such as Google Maps, Google Earth, Yahoo Maps, and Microsoft Virtual Earth. In addition, GeoServer can connect with traditional GIS architectures such as ESRI ArcGIS.

Join the Community

GeoServer has a large and vibrant community consisting of users and developers from all over the world. Support is available through a variety of sources, such as email lists and IRC (the latter with real time access to software developers). In addition, commercial support is available from a variety of providers. With GeoServer, you are always in good company.

Download e installazione di geoserver


Corso di Laurea Magistrale in Pianificazione e Politiche per la Città, il Territorio e l'Ambiente
Questo PC
Comunicazi... assegnazio...
Spanish_15...
Tesi 25 mar
chi504948...
Interviste Coldiretti...
agenda.docx
CAESAR_Wa... platform_20...
★ Sound Of Muzak (Por...
video ENERGYW...
Grado
Giovanni Borga
avvio corso luigi 2015
ActionRese...
modulo di responsabi...
ciccio.mp4
Manuale Utente Mit...
Agrifood_II...
omniturist
UEb_cisbat...
Mozambico - Interagency...
LEANCity
Neapolis
Connessioni di rete
5 TORRI TOURIST.xlsx
indirizzazio...
catalogo.pdf
Coinor-AE0...
articolo.gif
Sportschoo...
Multimedia Info Point ...
Multimedia Info Point ...
Multimedia Info Point ...
Rete
CheFuturo_I...
codvia-elis...
Accesso all'interfaccia web admin
GEMET.mdb
TO DO APRILE 2...
Urban Energy Cadastre v ...
Pkt004-484...
h2020-wp1...
venezia.html
Geoweb.mp4
Applicazione e interfacci...
Studi grafici e design.pdf
lettera di motivazion...
Database2....
PROGETTI VENICE T...
eye in the sky.docx
Costi prodotti Unisky Urba...
Cestino
db.php
Corso_teleri...
MITO storyboa...
ASUS ZENBOOK

Corso di Laurea Magistrale in Pianificazione e Politiche per la Città, il Territorio e l'Ambiente

GeoServer: Welcome

Giovanni

localhost:8080/geoserver/web/

GeoServer

Username Password Remember me Login

Welcome

Welcome

This GeoServer belongs to The ancient geographes INC.

This GeoServer instance is running version **2.7.1**. For more information please contact the administrator.

About & Status

About GeoServer

Data

Layer Preview

Demos

Service Capabilities

WCS
- 1.0.0
- 1.1.0
- 1.1.1
- 1.1

WMS
- 1.0.0
- 1.1.0
- 2.0.0

WMS
- 1.1.1
- 1.3.0

TMS
- 1.0.0

WMS-C
- 1.1.1

WMTS
- 1.0.0

Creazione di un workspace

GeoServer: Workspaces

Giovanni

localhost:8080/geoserver/web/?wicket:bookmarkablePage=:org.geoserver.web.data.workspace.WorkspacePage

GeoServer

Logged in as admin. Logout

About & Status
- Server Status
- GeoServer Logs
- Contact Information
- About GeoServer

Data
- Layer Preview
- Workspaces
- Stores
- Layers
- Layer Groups
- Styles

Services
- WCS
- WFS
- WMS

Settings
- Global
- JAI
- Coverage Access

Tile Caching
- Tile Layers
- Caching Defaults
- Gridsets
- Disk Quota

Workspaces

Manage GeoServer workspaces

Add new workspace

Remove selected workspace(s)

<< < 1 > >> Results 1 to 8 (out of 8 items)

Search

Workspace Name	Default
cite	
it.geosolution	
nurc	
sde	
sf	
tiger	
topp	
venezia	✓

<< < 1 > >> Results 1 to 8 (out of 8 items)

Creazione di uno store

GeoServer: Stores

Giovanni

localhost:8080/geoserver/web/?wicket:bookmarkablePage=:org.geoserver.web.data.store.StorePage

GeoServer

Logged in as admin. Logout

About & Status
- Server Status
- GeoServer Logs
- Contact Information
- About GeoServer

Data
- Layer Preview
- Workspaces
- Stores
- Layers
- Layer Groups
- Styles

Services
- WCS
- WFS
- WMS

Settings
- Global
- JAI
- Coverage Access

Tile Caching
- Tile Layers
- Caching Defaults
- Gridsets
- Disk Quota

Stores

Manage the stores providing data to GeoServer

Add new Store

Remove selected Stores

<< < 1 > >> Results 1 to 10 (out of 10 items)

Search

Data Type	Workspace	Store Name	Type	Enabled?
	venezia	agrifood	PostGIS	✓
	[illegible]	[illegible]	[illegible]	✓
	nurc	img_sample2	WorldImage	✓
	nurc	mosaic	ImageMosaic	✓
	tiger	nyc	Shapefile	✓
	sf	sf	Shapefile	✓
	sf	sfdem	GeoTIFF	✓
	topp	states_shapefile	Shapefile	✓
	topp	taz_shapes	Shapefile	✓
	nurc	worldImageSample	WorldImage	✓

<< < 1 > >> Results 1 to 10 (out of 10 items)

Pubblicazione di un layer

QGIS 2.8.1-Wien

Progetto Modifica Visualizza Layer Impostazioni Plugins Vettore Raster Database Web Processing Guida

Browser

- Home
- Preferiti
- C:/
- D:/
- MSSQL
- Oracle
- PostGIS
- test
- venezia
- public
- bufferetichette
- bufferstrade
- copsuolo
- elementostradale
- elementostradale2

Legenda

copsuolo

Creazione di uno stile

Sviluppo di un client di visualizzazione

le librerie OpenLayers

OpenLayers 3

Docs Examples API Code

A high-performance, feature-packed library for all your mapping needs.

LATEST

OpenLayers v3.10.1 is here! Check out the docs and the examples to get started. The full distribution can be downloaded from the release page.

If you've come here looking for OpenLayers 2.x information, you'll find everything you need on the 2.x page.

FEATURES

Tiled Layers

Pull tiles from OSM, Bing, MapBox, Stamen, MapQuest, and any other XYZ source you can find. OGC mapping services and untiled layers also supported.

Vector Layers

Render vector data from GeoJSON, TopoJSON, KML, GML, and a growing number of other formats.

Fast & Mobile Ready

Mobile support out of the box. Build lightweight custom profiles with just the components you need.

Cutting Edge & Easy to Customize

Map rendering leverages WebGL, Canvas 2D, and all the latest greatness from HTML5. Style your map controls with straight-forward CSS.

LEARN MORE

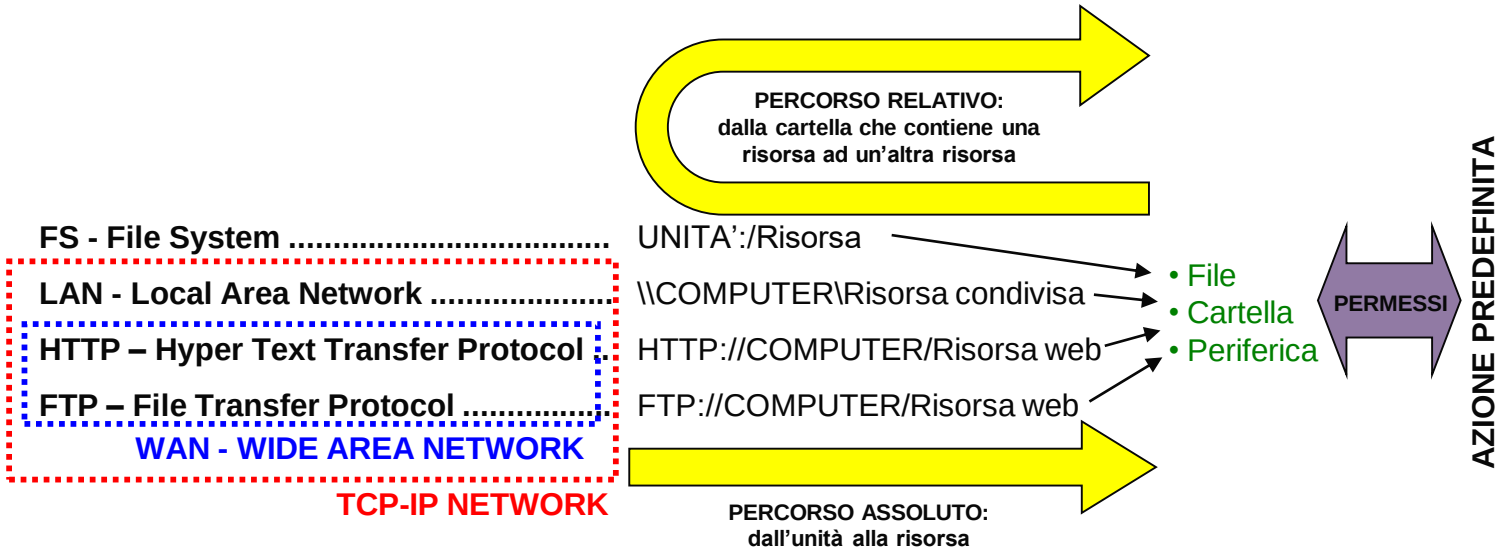
Quick Start

Seen enough already? Go here to get started.

Download

Get the latest release or dig through the archives.

L'accesso alle risorse informatiche e il ruolo dei server web



SERVER WEB

Crea un sistema di **mappatura delle risorse** permettendo il trasferimento con protocolli di trasmissione standardizzati

Permette l'esecuzione di procedure durante il trasferimento dei dati con i protocolli standard: **server applications**

Programmare "con gli oggetti"

La programmazione si può classificare all'interno di due grandi categorie:

- **Programmazione procedurale**
- **Programmazione ad oggetti**

Il codice procedurale viene eseguito sequenzialmente riga per riga ed è composto essenzialmente da assegnazione di valori e istruzioni predefinite.

Il codice ad oggetti è modulare e si basa sull'uso di elementi predefiniti assieme ad elementi definiti dall'utente. Gli elementi ("oggetti" appunto) svolgono sia il ruolo di "contenitori di dati" sia il ruolo di esecutori di determinate azioni.

La programmazione ad oggetti è attualmente la più utilizzata per la sua versatilità e potenza soprattutto in presenza di architetture relativamente complesse.

Programmare "con gli oggetti"

La programmazione ad oggetti si fonda sui concetti di:

- **Classe**
- **Oggetto (ovviamente!)**

Le classi sono i **MODELLI**
Gli oggetti sono **ISTANZE** delle classi

Secondo questo paradigma una classe viene definita una sola volta e con essa è possibile istanziare *n* oggetti dello stesso tipo.

Mentre nelle CLASSI le caratteristiche sono solo dichiarate,
negli OGGETTI le caratteristiche vengono effettivamente utilizzate

Caratteristiche degli oggetti

Le caratteristiche fondamentali degli oggetti sono

- **Proprietà**
- **Metodi**

E' possibile assimilare un oggetto ad un record di un database:

In questo caso la tabella è la classe e viene definita in sql con l'esecuzione della "CREATE TABLE", durante la quale vengono definiti i campi che sono invece le proprietà dell'entità rappresentata dalla tabella.

In qualsiasi momento posso inserire un record popolando i campi:

In quest'altro caso l'operazione è simile all'istanziazione di un nuovo oggetto con relativa assegnazione di valore alle proprietà

Caratteristiche degli oggetti

Per quanto riguarda i metodi l'analogia con i DBMS non regge. L'oggetto è infatti una cosa più complessa di un record. Esso non si limita a contenere dati ma possiede delle capacità di operare su questi e su altri dati esterni, oltre a poter interagire con altri oggetti.

Le capacità di operare sono delle funzioni denominate METODI.

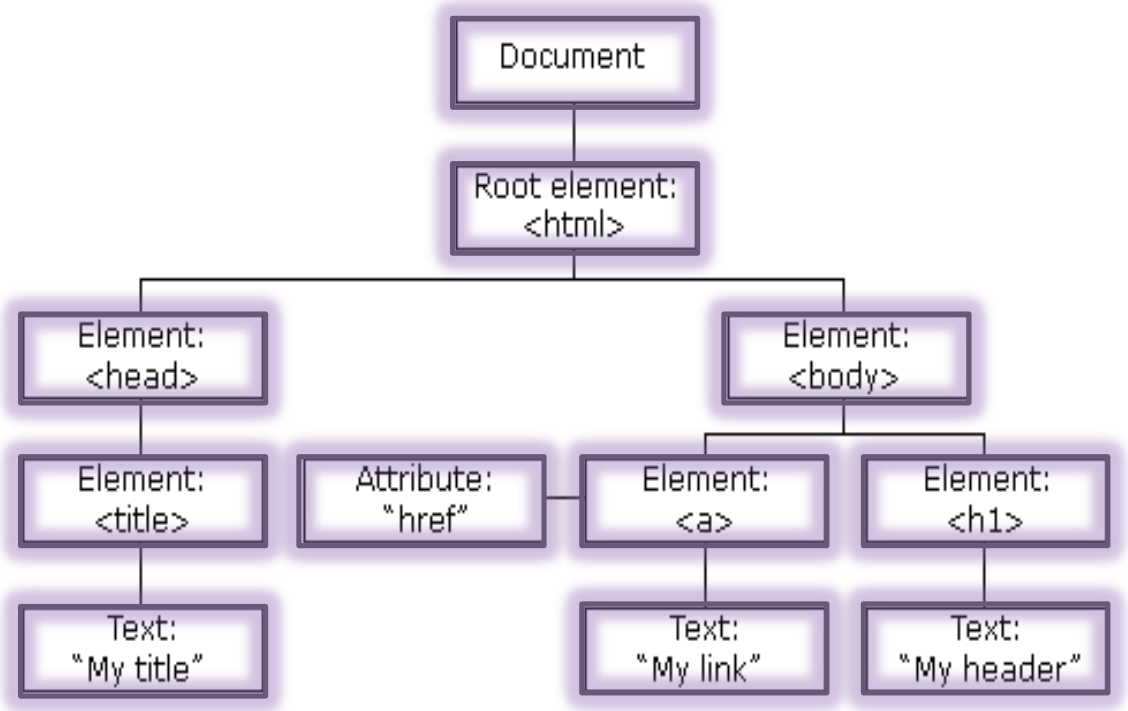
Esempi di sintassi:

Istanziazione:
```
oggetto = new(Classe)
```
Valorizzazione delle proprietà:
```
oggetto.proprietà = valore
```
Esecuzione di metodi:
```
oggetto.metodo()
```

Integrazione tra Javascript e HTML

L'integrazione tra Javascript e pagina HTML avviene mediante l'inserimento di un tag apposito destinato a contenere le righe di codice di programmazione.

La pagina viene vista da javascript come un oggetto articolato in sotto-oggetti e altri sotto-oggetti ancora secondo il noto schema gerarchico che viene detto tecnicamente **DOM** (Document Object Model):

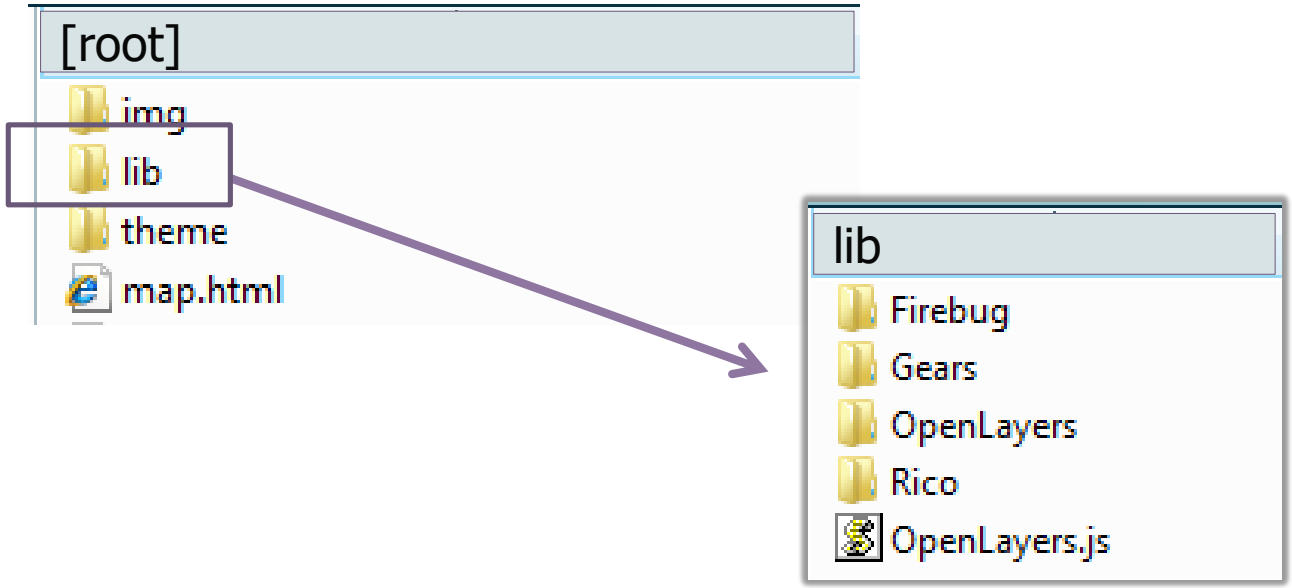


Pagina HTML standard

```
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>Esempio OpenLayers</title>
  </head>
  <body>
    <h3 id="title">Mappa con OpenLayers</h3>
    <div id="docs">
        Semplice mappa con un layer WMS e controlli di base.
    </div>
  </body>
</html>
```

Collegamento alle librerie e agli stili

```
<link rel="stylesheet" href="theme/default/style.css" type="text/css" />
<script src="lib/OpenLayers.js"></script>
```



Quick Start - put a map on a page

```
<!doctype html>
<html lang="en">
  <head>
    <link rel="stylesheet" href="http://openlayers.org/en/v3.10.1/css/ol.css" type="text/css">
    <style>
      .map {
        height: 400px;
        width: 100%;
      }
    </style>
    <script src="http://openlayers.org/en/v3.10.1/build/ol.js" type="text/javascript"></script>
    <title>OpenLayers 3 example</title>
  </head>
  <body>
    <h2>My Map</h2>
    <div id="map" class="map"></div>
    <script type="text/javascript">
      var map = new ol.Map({
        target: 'map',
        layers: [
          new ol.layer.Tile({
            source: new ol.source.MapQuest({layer: 'sat'})
          })
        ],
        view: new ol.View({
          center: ol.proj.fromLonLat([37.41, 8.82]),
          zoom: 4
        })
      });
    </script>
  </body>
</html>
```

Struttura del viewer

To include a map a web page you will need 3 things:

1. Include OpenLayers
2. `<div>` map container
3. JavaScript to create a simple map

Include OpenLayers

```
<script src="http://openlayers.org/en/v3.10.1/build/ol.js" type="text/javascript"></script>
```

The first part is to include the JavaScript library. For the purpose of this tutorial, here we simply point to the openlayers.org website to get the whole library. In a production environment, we would build a custom version of the library including only the module needed for our application.

`<div>` to contain the map

```
<div id="map" class="map"></div>
```

The map in the application is contained in a `<div>` HTML element. Through this `<div>` the map properties like width, height and border can be controlled through CSS. Here's the CSS element used to make the map 400 pixels high and as wide as the browser window.

```
<style>
  .map {
    height: 400px;
    width: 100%;
  }
</style>
```

Struttura del viewer

```
var map = new ol.Map({
  target: 'map',
  layers: [
    new ol.layer.Tile({
      source: new ol.source.MapQuest({layer: 'sat'})
    })
  ],
  view: new ol.View({
    center: ol.proj.fromLonLat([37.41, 8.82]),
    zoom: 4
  })
});
```

With this JavaScript code, a map object is created with a MapQuest Open Aerial layer zoomed on the African East coast. Let's break this down:

The following line creates an OpenLayers `Map` object. Just by itself, this does nothing since there's no layers or interaction attached to it.

```
var map = new ol.Map({ ... });
```

To attach the map object to the `<div>`, the map object takes a `target` into arguments. The value is the `id` of the `<div>`:

```
  target: 'map'
```

The `layers: [ ... ]` array is used to define the list of layers available in the map. The first and only layer right now is a tiled layer:

```
  layers: [
    new ol.layer.Tile({
      source: new ol.source.MapQuest({layer: 'sat'})
    })
  ]
```

Struttura del viewer

Layers in OpenLayers 3 are defined with a type (Image, Tile or Vector) which contains a source. The source is the protocol used to get the map tiles. You can consult the list of available layer sources here

The next part of the `Map` object is the `View`. The view allow to specify the center, resolution, and rotation of the map. The simplest way to define a view is to define a center point and a zoom level. Note that zoom level 0 is zoomed out.

```
    view: new ol.View({
      center: ol.proj.fromLonLat([37.41, 8.82]),
      zoom: 4
    })
```

You will notice that the `center` specified is in lon/lat coordinates (EPSG:4326). Since the only layer we use is in Spherical Mercator projection (EPSG:3857), we can reproject them on the fly to be able to zoom the map on the right coordinates.

*C:\Users\Giovanni\Desktop\venezia.html - Notepad++

File Modifica Cerca Visualizza Formato Linguaggio Configurazione Macro Esegui Plugin Finestra ?

venezia.htm

```
<!doctype html>
<html lang="en">
<head>
    <link rel="stylesheet" href="http://openlayers.org/en/v3.1.1/css/ol.css" type="text/css">
    <style>
        .map {
            height: 500px;
            width: 600px;
        }
    </style>
    <script src="http://openlayers.org/en/v3.1.1/build/ol.js" type="text/javascript"></script>
    <title>OpenLayers 3 example</title>
</head>
<body>
    <div id="map" class="map"></div>
    <script type="text/javascript">
        var map = new ol.Map({
            target: 'map',
            layers: [
              new ol.layer.Tile({
                  source: new ol.source.MapQuest({ layer: 'sat' })
              }),
              new ol.layer.Tile({
                  source: new ol.source.TileWMS(/** @type {olx.source.TileWMSOptions} */({
                      url: '.....................',
                      params: { 'LAYERS': '.................', 'TILED': true },
                      serverType: 'geoserver'
                  }))
              })
            ],
            view: new ol.View({
               center: ol.proj.transform([12.5, 45.5], 'EPSG:4326', 'EPSG:3857'),
               zoom: 10
            })
```

Creazione del web viewer