Open APIs

T-110.5121 Mobile Cloud Computing

26.9.2012

Olli Rinne, Apps4Finland

Agenda

- Open data and Apps4Finland competition
- Case retkeni.fi – Prototype mobile application for nature tourism
- Introduction to various APIs:
  - Social media
  - Location and geo data
  - Transportartion

Open Data

- Freely available data from government, science, business and other organizations, citizens…
  - free **access** and **absence** of technological **restrictions**
  - License allows **redistribute** and **reuse**
  - License may require **attribution** and **integrity**
- Open data promotes
  - Democracy and transparency
  - New and improved processes (and easier live)
  - New business opportunities
  - Maker – Do-It-Yourself– culture

More info from Open Knowledge Foundation: http://okfn.org/

Apps4Finland

- Encourages citizens and enterprises to come up with new ideas on how to utilize the open data reserves of public administration

- Started 2009, year 2011 140 entries in 4 categories

- 11 partners opening data, bringing expertise and business networks and sponsoring the competition

- Sum of awards totaling 20,000€

- Best entries are awarded at the award gala in the International Right to Know Day honoring work of Anders Chydenius (1729-1803), pioneer of freedom of information

5 Categories

- Idea - Sharing ideas for how to use open data
- Application - Applications utilizing open data
- Visualization - Visualizing open data and present a data journalism project
- Data opening – Opening new data sets or improving accessibility of existing data sets
- Data tutorial (new)

Three themes, workshops and special awards (1000 €)

- Maps4Finland- GIS innovations (workshop 28.8)
- Stats4Finland – Understanding statistics (workshop 5.9)
- NewBiz4Finland – Innovative solutions to create new ways of doing business (workshop 12.9)
- For presentations see http://apps4finland.fi/ / Events

Apps4Finland – More Information

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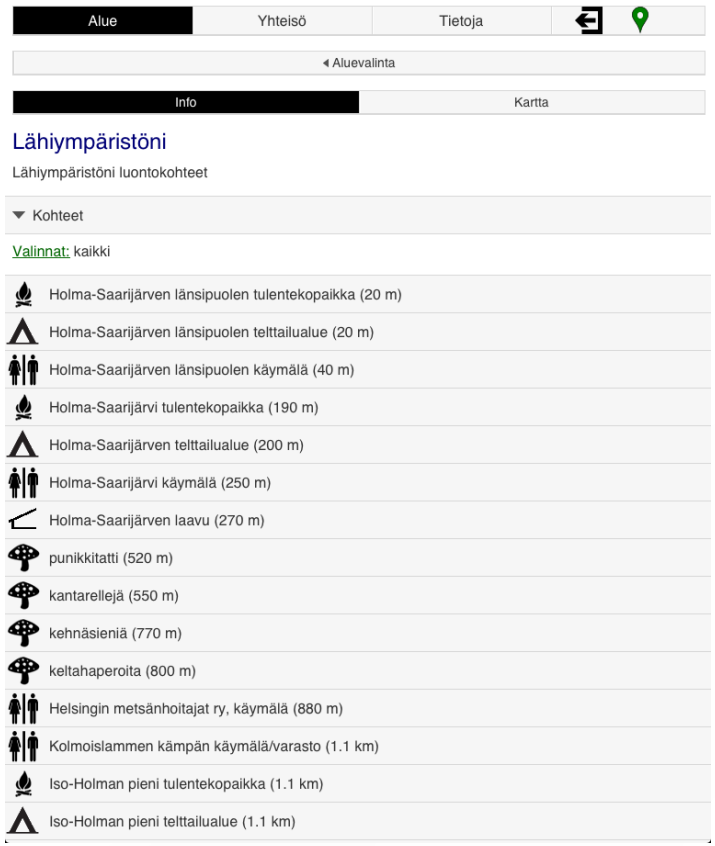
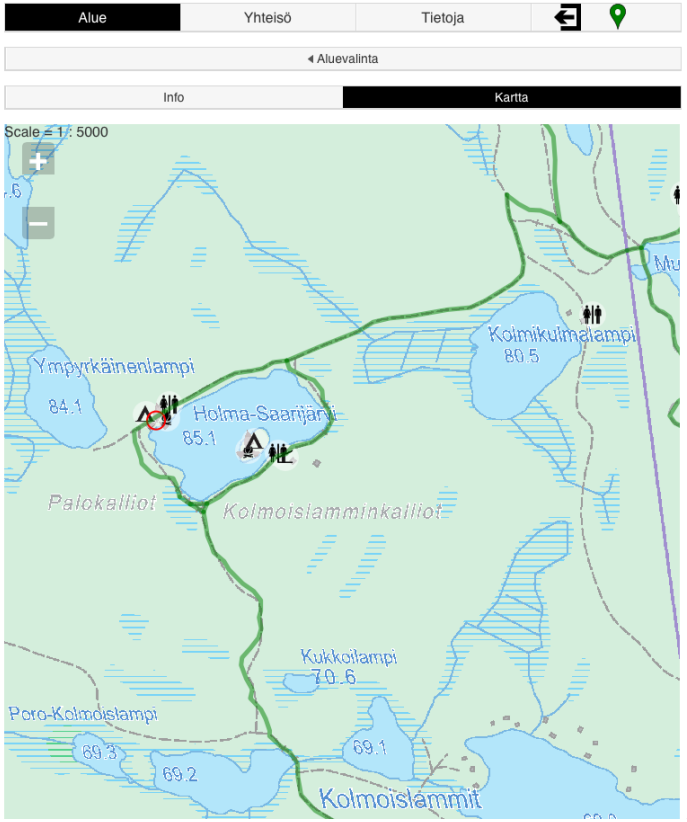
- Www: www.apps4finland.fi
- Videos: www.bambuser.com/channel/apps4finland , http://www.vimeo.com/user7318083
- Facebook: www.facebook.com/Apps4Finland
- Twitter: www.twitter.com/Apps4Fi
- Email: www.groups.google.com/group/apps4finland
- Slideshare: http://www.slideshare.net/apps4finland/

Retkeni.fi
Mobile guide for nature tourism

- Prototype for Master's Thesis 2011
- Development platform:
  - Client: ~~Native~~ or **HTML5/OpenLayers**
  - Server: **Own Database**~~, Map Server or service API~~
- Background maps
  - ~~Google~~, **OSM** vs. **NLS of Finland**
- POI sources (services,routes…) and licenses
- Data conversions from Geo Data Files

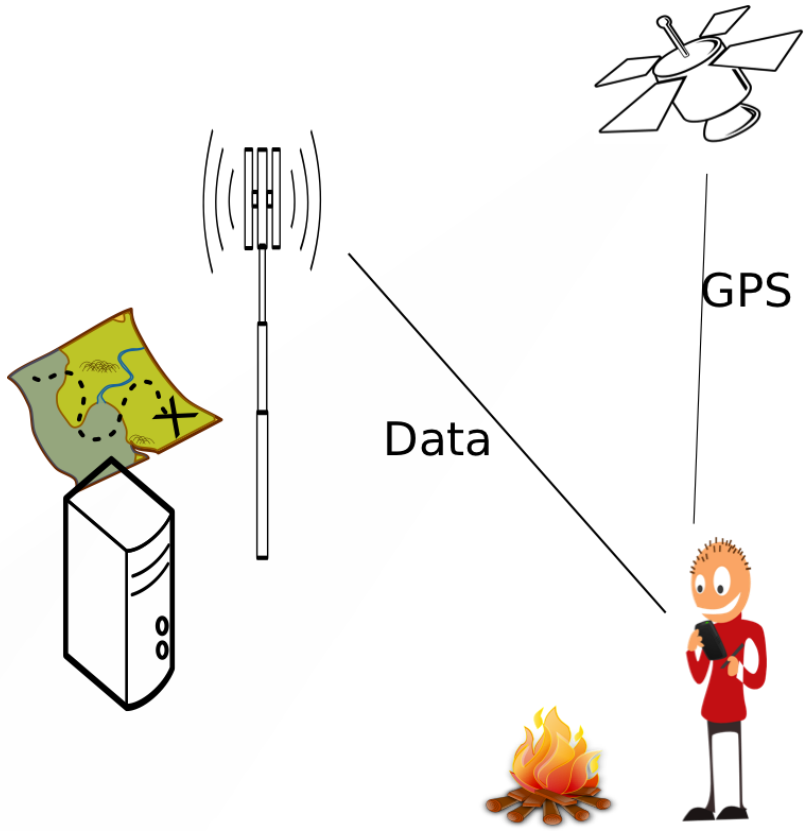
Retkeni.fi



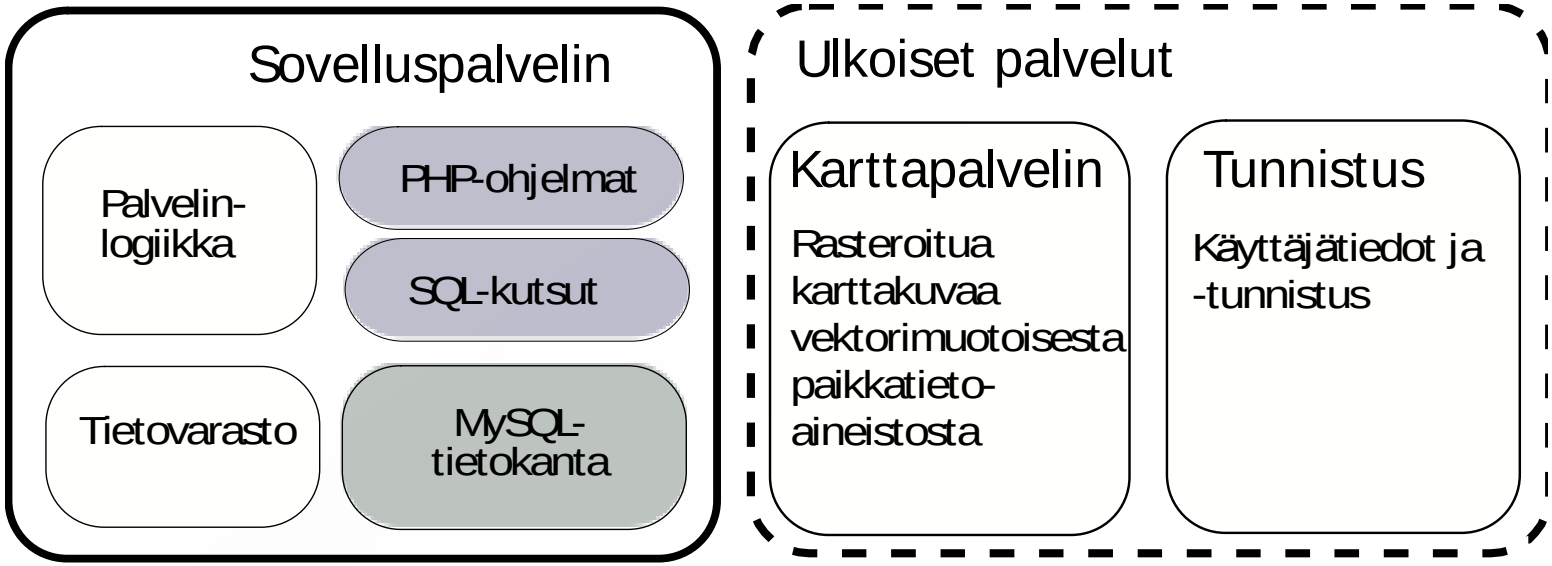


http://retkeni.fi

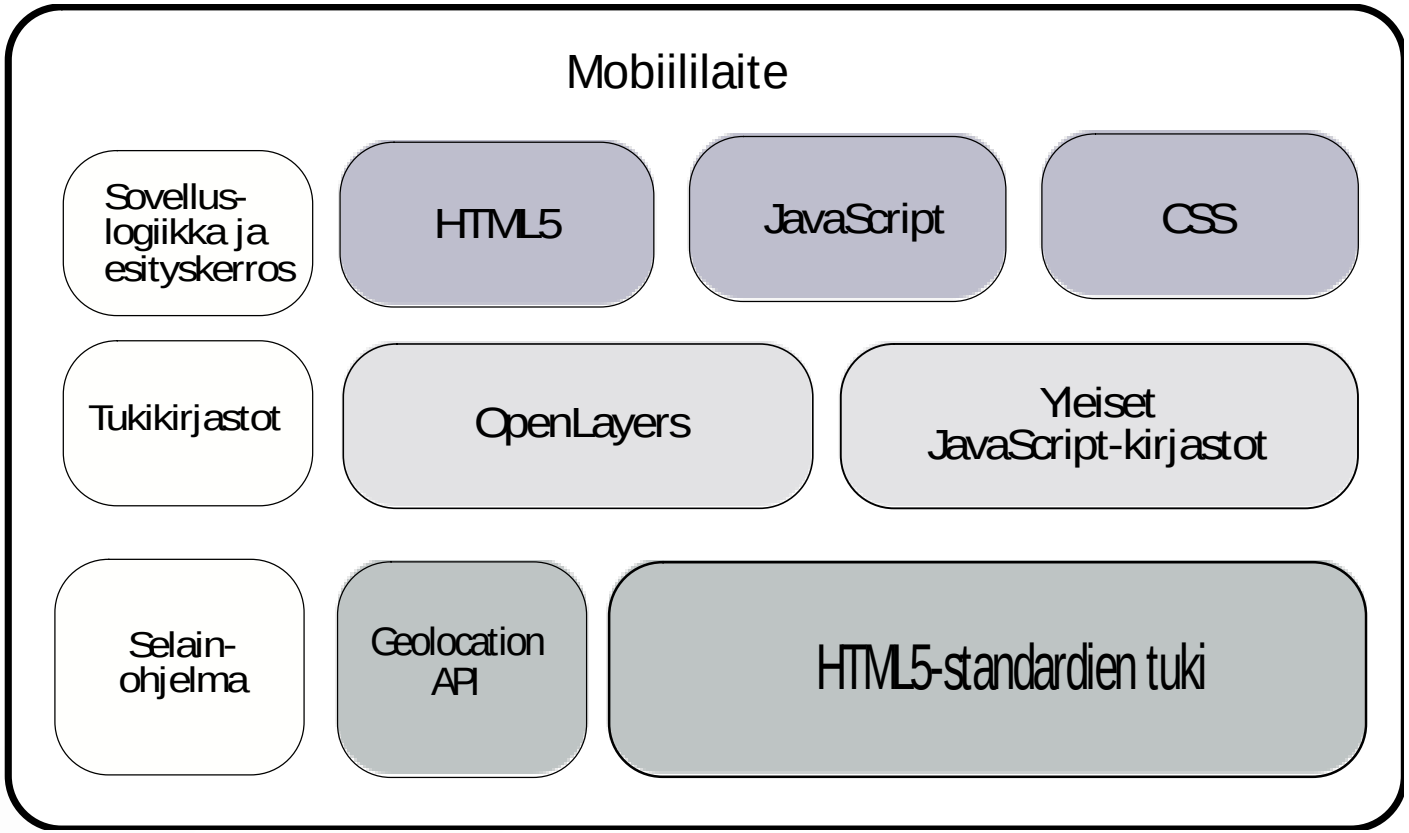
User Context of The Prototype



SW Architecture - Server



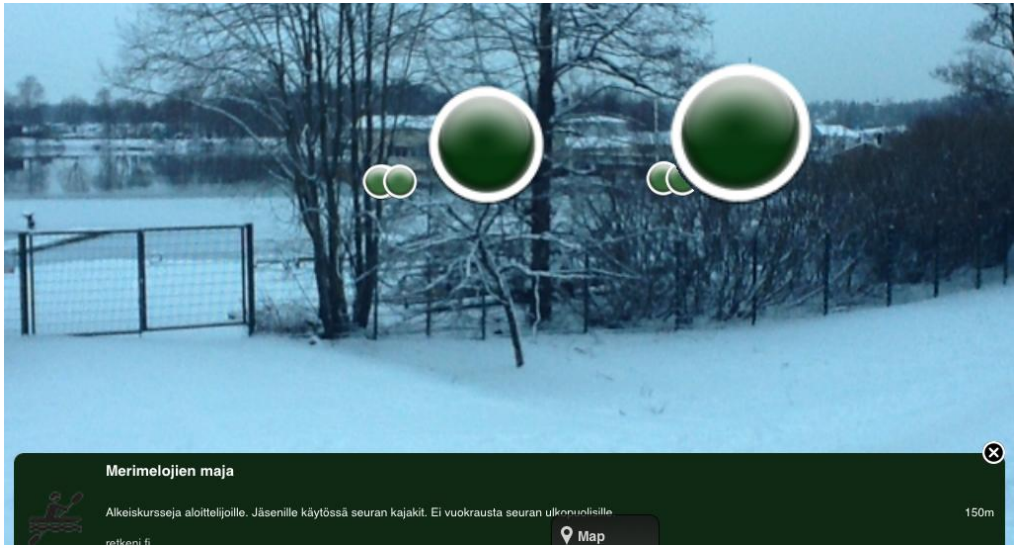
SW Architecture - Client



Retkeni.fi - Lessons Learned

- Coordinate conversions are tricky
- Apps4Finland - good networking opportunity
- More data is now opened up, e.g., NLS and NBA
- HTML5 allows platform independent development and works in latest browsers
- Collected POI data can be utilized on several platforms, e.g., Layar AR with geoJSON

POIs to Augmented Reality



- Layar Augmented Reality (AR) service reads POI data (Point of Interest) from the system database.
- GeoJSON endpoint is configured to Layar
- No programming is needed.

API – Application Programming Interface

- An **application programming interface** (**API**) is a specification intended to be used as an interface by software components to communicate with each other.
- An API can have impose some **limitations** on how much they can be use, e.g., 5,000 queries per IP per day.
- Open API typically requires **an application programming interface key** (API key) or uid/password to identify calling application.
- Open API is an accessible API to open data.

XML - Extensible Markup Language

- markup language, produced by the W3C, defines rules for encoding documents
- **machine-readable** and human-readable
- used in hundreds of XML-based languages and API-standards , including RSS, Atom, SOAP, GML, WFS and XHTML

Example:

```
<?xml version="1.0"?>
<note>
	<to>Tove</to>
	<from>Jani</from>
	<heading>Reminder</heading>
	<body>Don't forget me this weekend!</body>
</note>
```

JSON - JavaScript Object Notation

- **JSON** a lightweight data-interchange format.
- easy for
  - humans to read and write
  - easy for machines to parse and generate
- based on a subset of the JavaScript programming language, but language independent

Example:

```
{"employees": [
{ "firstName":"John" , "lastName":"Doe" },
 { "firstName":"Peter" , "lastName":"Jones" }
]}
```

REST
- the Representational State Transfer

- REST is an architecture style, not a real standard
- It relies on a stateless, client-server, cacheable communications protocol - typically HTTP
- Typically returns JSON or XML, or more complex like picture
- Twitter, Flickr etc. expose data using REST
- Example:
  `http://www.acme.com/phonebook/UserDetails/12345`

XML vs. REST Service Call

XML:

<?xml version="1.0"?> <soap:Envelope
xmlns:soap="http://www.w3.org/2001/12/soap-envelope"
soap:encodingStyle="http://www.w3.org/2001/12/soap-encoding">
<soap:body pb="http://www.acme.com/phonebook">
<pb:GetUserDetails> <pb:UserID>12345</pb:UserID>
</pb:GetUserDetails> </soap:Body> </soap:Envelope>

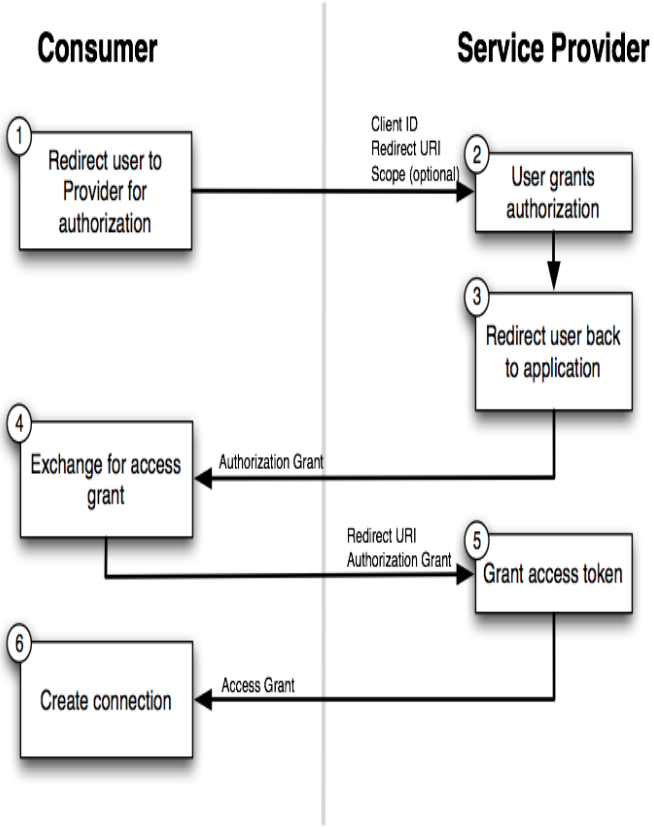
REST:

http://www.acme.com/phonebook/UserDetails/12345

Social Media APIs

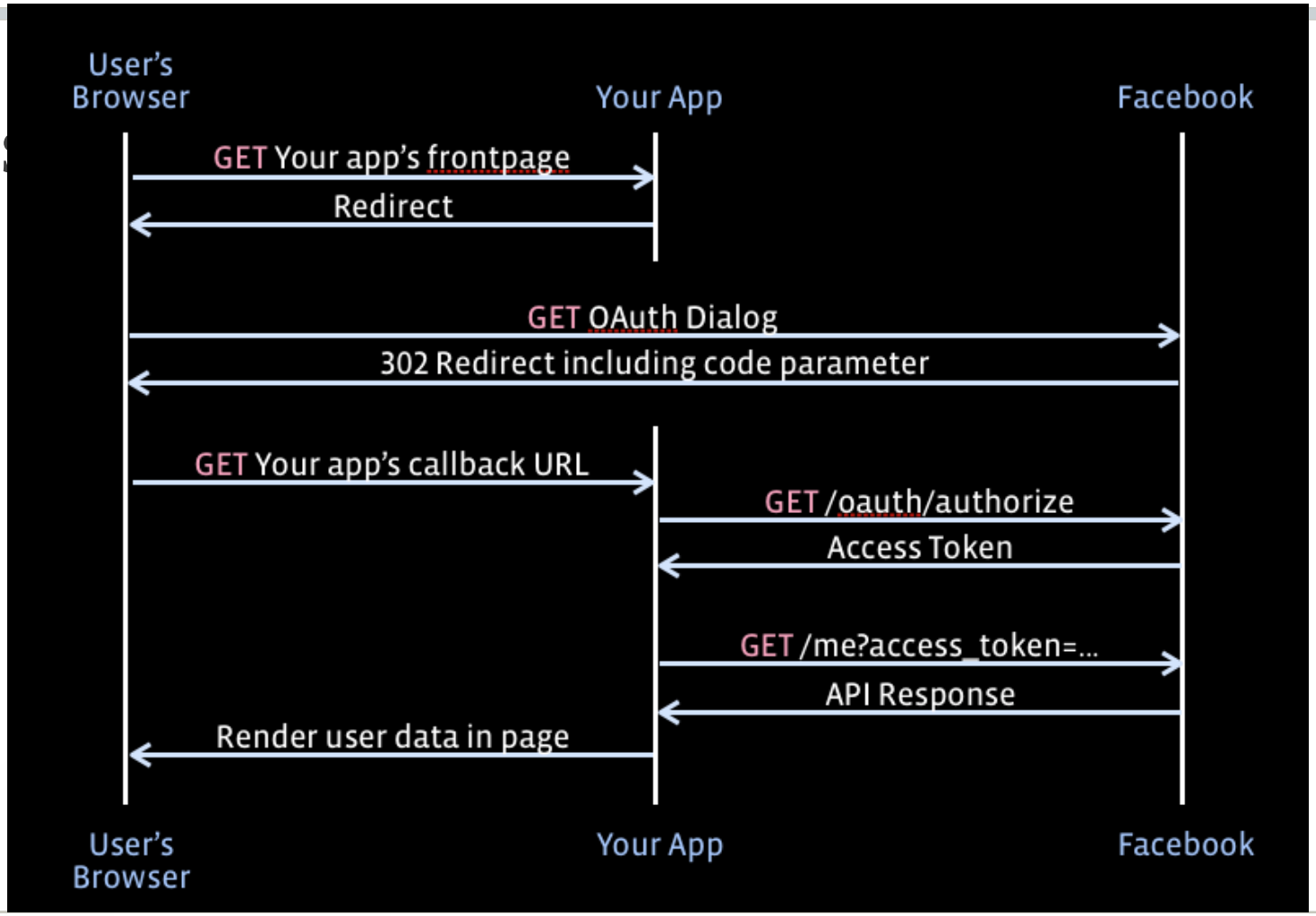
- Facebook, Foursquare (geo game), Twitter, Flickr (images)…
- Authentication & authorization
- Social feeds/viral marketing,
- Local data, e.g. BlindSquare http://blindsquare.com/
- Typically OAuth authentication used

OAuth –Open Authentication



- OAuth is an open standard for authorization. It allows users to share their private resources (e.g. photos, videos, contact lists) stored on one site with another site, desktop or mobile application without having to hand out their credentials, typically username and password **tokens** instead. http://en.wikipedia.org/wiki/OAuth
- Used by most social media sites

Facebook authentication



Facebook Graph API

http://developers.facebook.com/docs/reference/api/

Examples:

- Pages: https://graph.facebook.com/apps4finland
- Pictures: https://graph.facebook.com/apps4finland/picture
- Friends: https://graph.facebook.com/me/**friends**?access_token=…

GeoJSON

- GeoJSON is a JSON based format/extension for encoding a variety of geographic data structures
- Point, LineString, Polygon, MultiPoint, MultiLineString, MultiPolygon, and GeometryCollection
- http://www.geojson.org/

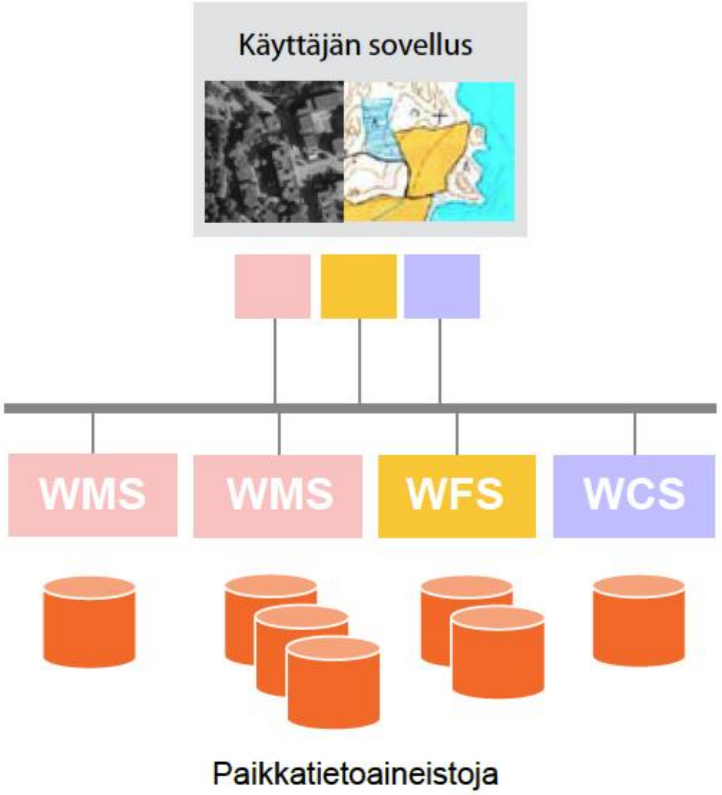
W3C Geolocation API

- Get the **current location** from the **device,** not from the net
- Supported by latest browser, access thru JavaScript
- The API itself is agnostic of the underlying location information sources, e.g., GPS, Mobile Network, IP.
- parameters: accuracy, timeout, age,
- return coordinates (lat, lon, alt), accuracy, heading and speed to a callback function
- WGS84-coordinate system (GPS)

Example Map Data Sources

- Google Maps (Bing etc.)
  - pros: well documented environment, easy to use, global
  - cons: license restrictions/fees, not accurate outside cities
- OSM
  - pros: free, updateable
  - cons: accuracy varies, service level not guaranteed
- Local (eg. NLS Finlad)
  - pros: very accurate
  - cons: national coverage, possibly own coordinate systems/apis

Geo Data Standards



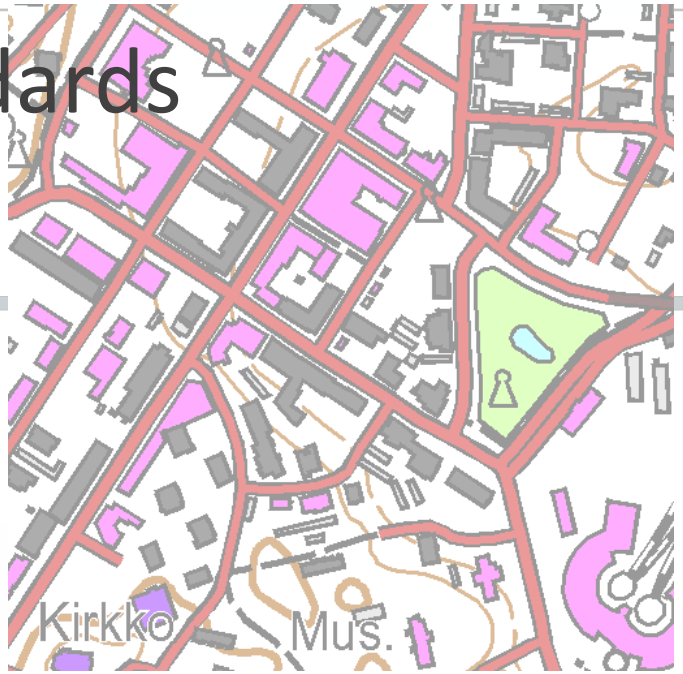
Vector or Raster Map Data

- Bitmap image from API (WMS, WMTS)
  - + easy processing on the device
  - - cannot scale
  - - images require bandwidth
- Map Vectors from API (WFS)
  - + scalability and configurability (visualization)
  - - more sophisticated engine needed on the device

Interface standards

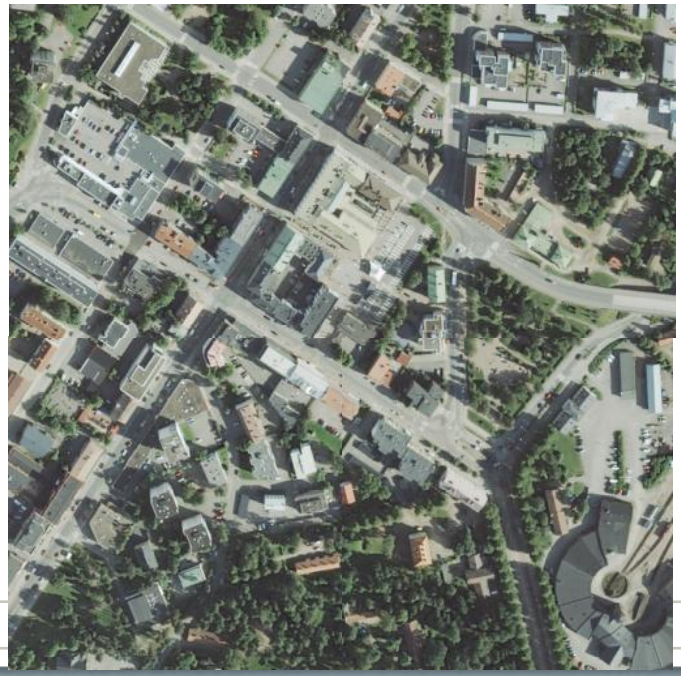
- WMS Web Map Service
  - Serves georeferenced images

http://www.opengeospatial.org/standards/wms



- WMTS Web Map Tiling Service
  - provides map tiles (small images that are part of a map)

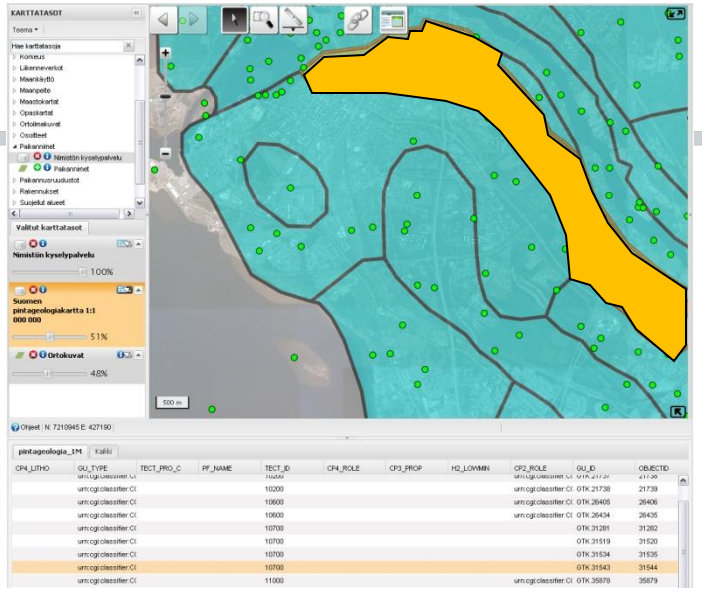
http://www.opengeospatial.org/standards/wmts



Interface standards

- WFS Web Feature Service
  - an interface allowing requests for geographical features across the web
  - The Geography Markup Language (GML) is the XML grammar defined by the Open Geospatial Consortium (OGC)

http://www.opengeospatial.org/standards/wfs
http://www.opengeospatial.org/standards/filter

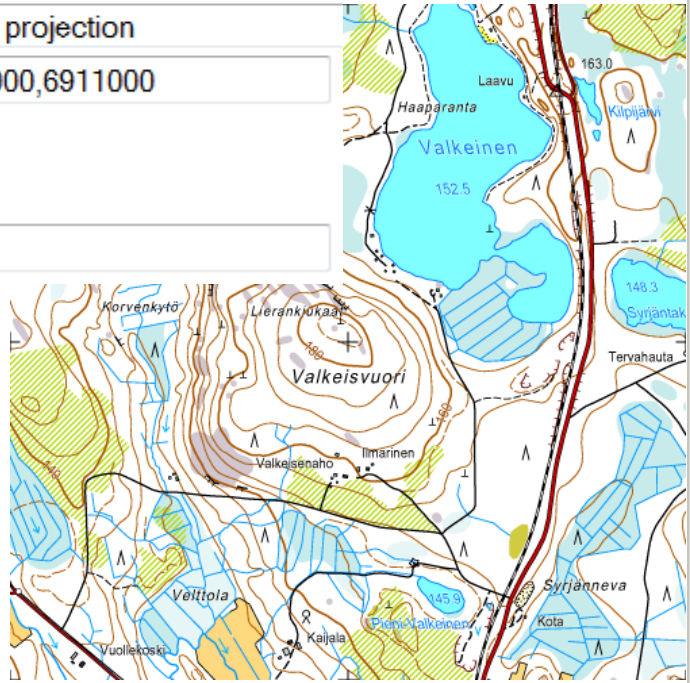


WMS example

- https://ws.nls.fi/rasteriaineistot/test/index.html

GetMap - map request

width	Image width (pixels):	500
height	Image height (pixels):	500
format	Image format:	image/png
layers	Map layer:	peruskartta - Basic map raster
styles	Style:	Normal
srs	The coordinate reference system:	ETRS-TM35FIN-map projection
bbox	Bounding Box (min-E, min-N, max-E, max-N):	364000,6909000,366000,6911000
bgcolor	Background color	ffffff
transparent	Transparency:	false
time	Time (only for the orthophotos):	



OpenLayers

- JavaScript library for displaying map data in web browsers
- OpenLayers implements a JavaScript API for building rich web-based geographic applications, similar to the Google Maps and MSN Virtual Earth APIs,
- You can create multiple layers from various data sources (OpenStreetMap, Google, GeoJSON, ShapeFile…)

OpenLayers and WMTS

```
<script>
    function init() {
        Proj4js.defs["EPSG:3067"] = "+proj=utm +zone=35 +ellps=GRS80 +units=m +no_defs";

        var map = new OpenLayers.Map({
            units : "m",
            allOverlays : true,
            projection : new OpenLayers.Projection("EPSG:3067"),
            resolutions : [2000, 1000, 500, 200, 100, 50, 20, 10, 4, 2, 1], // 0.5, 0.25],
            maxExtent : new OpenLayers.Bounds(0, 0, 10000000, 10000000)
        });

        var format = new WMTSFormatWithLimits();
        format.initMapWithCaps(map, 'caps.xml', 'EPSG_3067_MML', function() {
            /* note: this is an asynchronous call with a callback function */
            map.render('map');
            map.setCenter(new OpenLayers.LonLat(385576, 6675364), 4);
        });
    }
</script>
```

Transportation APIs

- No global standards, European standards emerging
- Helsinki Area: HSL Journey Planner, see http://developer.reittiopas.fi/, API v.2.0
- Nationwide API: Matka.fi: http://developer.matka.fi, API v.1.0
  - Geocoding - coordinates of addresses
  - Reverse geocoding - address closest to given coordinate
  - Routing - route between two coordinate points
  - Timetables - timetable for any (bus) stop
- Note: API documentation in English

Coordinate systems

- Roughly 2000 – 3000 different coordinate systems
- Web Nerd Shortcut (WNS):
  - ”I just use GPS coordinates”
- GIS Expert Answer (GEA):
- ”So, you will use WGS84. Like Latitude / Longitude. How do you calculate distance between two points?”
- Proj4js is a JavaScript library to transform point coordinates from one coordinate system to anotherhttp://trac.osgeo.org/proj4js/
- More info from Pekka Sarkola’s presentation: http://apps4finland.fi/2012/08/28/pekka-sarkola-understanding-and-processing-geo-data-with-qgis/

Open311 - GeoReport API

- Refers to a standardized protocol (XML /JSON) for location-based collaborative **issue-tracking**
- The GeoReport API allows developers to build applications to report non-emergency issues such as graffiti, potholes, and street cleaning directly to government organizations like cities.
- Technology that provides open channels of communication for issues that concern public space and public services.
- Open311 is an evolution of the phone-based 311 systems that many cities in North America offer
- City of Helsinki is piloting Open311 interface this year
- https://speakerdeck.com/u/philipashlock/p/agccp-open311-intro

Example: Flickr images from the vicinity

- Get location from W3C Geolocation API
- Search images:http://www.flickr.com/services/api/explore/flickr.photos.search
- Parse and show results

More info

- Geo Data workshop, presentations by Pekka Sarkola and Jari Reini:http://apps4finland.fi/events-2/maps4finland-workshop/
- Transport APIs: http://developer.reittiopas.fi (Helsinki area), http://developer.matka.fi/ (nationwide)
- Google ☺

Don’t forget to Enter Apps4Finland 2012 competion

Deadline for submissions Oct 28, 2012

Apps4Finland
doing good with open data

FORUM VIRIUM
HELSINKI

SUOMENVERKKODEMOKRATIASEURARY