# PA International Web presence

PA International produces Geo-location software and data logging units (*devices*). The department for data logging and Geo-location is fully developed, but the department for data presentation and unit monitoring is falling behind.

The PA International has requested a project with a new website and a web-service.

The web-service should be used by the devices and the website, as well as anyone who wishes to write a custom client. Custom clients are not a part of the project.

The system should be able to handle a large number of simultaneous devices (several thousand), as well as a large number of simultaneous web page and service users (several hundred).



## Devices

The devices register themselves and upload status and readings to the web-service.

The devices receive commands and configuration from the web-service.

## Web-service

The web-service must ensure that only authorized data access is permitted. The performance penalty of using HTTPS (SSL/TSL) as opposed to basic HTTP authentication should be considered, yet the actual implementation may be done without authentication or confidentiality concerns.

The web-service has three distinct types of requests as enumerated below and shown on the following figure.

1. Device reading or status requests.
2. Device configuration and command requests
3. Service administration requests



### Type 1 (Device readings and status)

The web service should maintain three pieces of information about a device:

1. The location and a track of the locations,
2. The status and a track of the status.
3. A track of the readings.

This information must be exposed to interested parties (web site, custom clients, etc.).

If a device is not known when the first Type 1 package is received the device registered with the system.

The device information is exchanged in the XML language PAGeoLoggingML, which informally can be described as:

* The root element is *geoLogCollection*, and contains attribute *deviceID*, attribute *timestamp*, and zero or more geoLog elements
* *deviceID* uniquely identify the device and is of type URI.
* *timestamp* is of type DateTime and indicate the time of the reading or status update.
* The *geoLog* element may contain elements *location*, *status*, *readings* and *zone*
* *location* is defined in the KML XML Language (Keyhole Markup Language) and indicates the device location at time *timestamp*
* *status* contains status information for the device. Exact content will be defined later. Only present if this is a status update.
* *readings* contains a list of key-value-type pairs where the type is either a known MIME-type or defined in the Request header. Only present if this is a new reading.
* *zone* contains information about the zone that this device belongs to, if any. This information is generated by the web-service, and is not part of the device <-> web-service exchange.

An XML Schema formalization of this language must be created as part of the web-service API. Naturally the above specification is subject to change as the project progresses.

### Type 2 (Device commands and configuration)

Will be defined as needed.

### Type 3 (Service configuration)

The web-service should furthermore allow for the administration of devices as follow:

1. Which user/owner a device is associated with
2. Which zone a device is in, if any (only used for manual override).
3. Definition of zones.

The specific XML notation will be defined as needed.

### API

The API for the web-service should be REST-like. E.g.

* A GET-request to /geolog/devices returns a list of all devices registered to the user
* A POST-request to /geolog/devices with a device ID and possible a timespan returns a collection of device data for that device.
* A PUT request to /geolog/devices registers a new device on the system
* A PUT request to /geolog/devices/readings adds a reading for a given device
* A detailed specification will be part of the web project

## Web site

The website should expose the information and capabilities of the web service in an easy to understand manner, using graphical aids where possible.

The use of Google Maps to illustrate the location of the devices, as well as the zones is a requirement.

The website must have an application look-and-feel and respond to changes in a device without user interaction.

Technologies  
Java Servlets, JSP, XML, XML Schema, JDOM, XSLT, JavaScript, HTML, CSS, REST, JQuery, Java

## Projektet I forhold til kursusmålene

Kursusmål er fremhævet med kursiv i den følgende tekst

*Udvikling af følgende kompetencer;*

*Erfaring med at udvælge og kombinere XML- og webteknologier til udvikling af realistiske web-services.* Dokumenteres ved at udvikle et system som defineret i denne synopsis. Systemet inddrager jf. definitionen de omtalte teknologier.

*Efter gennemførelse af faget er det målet, at deltagerne kan:*

*udvælge og motivere teknologier til et konkret webudviklingsprojekt.* Motivation for de valgte teknologier vil fremgå af rapportens diskussion af alternative valgmuligheder.

*implementere og afteste et websystem sammensat af forskellige teknologier.* Dokumenteres ved projektets kodebase og diskussion og gennemførelse af tests. Der vil også blive diskuteret potentielle problematikker med f.eks. skalerbarhed.

*dokumentere design og funktionalitet af et websystem.* Design dokumenteres med diagrammer og tekst. Funktionalitet dokumenteres ved test af det samlede system.