

# SilvaScope - Mobile application for field exercises in Marteloscopes

## Overview

The app will be built in Flutter for Android, iPhone and iPad. It should be possible to download information on a marteloscope before going out into the field, but also to see marteloscopes nearby whether or not they have been downloaded.

The stands and trees within them are defined via a webpage and stored in a SQLite-database. The information will be openly accessible over the internet and communicated to the app over HTTPS in JSON-format.

## Data storage

### SQL schema

The SQL schema for the webserver is described here:

```
CREATE TABLE marteloscopes (  
    id INT NOT NULL PRIMARY KEY,  
    name TEXT NOT NULL UNIQUE,  
    latitude REAL NOT NULL,  
    longitude REAL NOT NULL,  
    select_frame_trees INT NOT NULL DEFAULT 0,  
    show_species INT NOT NULL DEFAULT 0,  
    show_dbh INT NOT NULL DEFAULT 0,  
    show_height INT NOT NULL DEFAULT 0,  
    show_htc INT NOT NULL DEFAULT 0,  
    last_modified REAL NOT NULL DEFAULT ((julianday('now')-2440587.5) * 86400.0)  
)  
  
CREATE TABLE trees (  
    marteloscope_id INT NOT NULL REFERENCES marteloscopes(id),  
    species TEXT NOT NULL,  
    dbh INT NOT NULL,  
    height REAL,  
    htc REAL,  
    latitude REAL,  
    longitude REAL  
)
```

### JSON-format

The web server and app communicate over HTTPS using JSON formatted as below:

```

{
  "plot_id": 1,
  "plot_name": "NAME OF PLOT",
  "area": 10000,
  "show_species": false,
  "show_dbh": false,
  "show_height": false,
  "show_htc": false,
  "select_frame_trees": false,
  "location": {
    "lat": 64.01,
    "lon": 19.54
  },
  "downloaded": 1631696647.0,
  "trees": [
    {
      "tree_nr": 1,
      "species": "P. sylvestris",
      "dbh": 78,
      "height": 20.0,
      "htc": 16.0,
      "location": {
        "lat": 64.0105,
        "lon": 19.5399
      }
    }
  ]
}

```

**Key description** Possibly ambiguous keys are described here:

- **plot\_id** = Internal PlotID used by the server providing the marteloscope
- **area** = Integer given in square meters
- **show\_species** = Whether or not species name should be visible during tree selection (*default: false*)
- **show\_dbh** = Whether or not DBH should be visible during tree selection (*default: false*)
- **show\_height** = Whether or not height should be visible during tree selection (*default: false*)
- **show\_htc** = Whether or not height to crown should be visible during tree selection (*default: false*)
- **downloaded** = UNIX timestamp of when the marteloscope was downloaded from the server
- **species** = Tree species given as a string
- **dbh** = DBH in millimeters

- **height** = Height in meters (not mandatory)
- **htc** = Height to crown in meters (not mandatory)

## User interaction

After opening the app, the user is presented with a list of saved marteloscopes and the possibility of downloading more marteloscopes from the server, either by a search or by looking for marteloscopes nearby which are then shown on a map. Logos for SLU and the Swedish forest agency may be relevant here, as well as clear Silvaboreal-branding.

After selecting a marteloscope, the user is presented with a list of trees, the creator of the exercise may or may not allow users to see more information than the tree number. At the bottom of the page is a button allowing the user to proceed to a page presenting results of their theoretical thinning.

On the results page the user is presented with several statistics describing the change to the stand. These statistics vary depending on which data is available, but should at least describe the size distribution of remaining trees vs the size distribution before thinning, as well as some descriptive statistics. The app will summarize using all parameters available to all trees within the marteloscope.

The user may also return to the tree selection page to refine their selection, but the app will keep track of how many times this has been done.