

Life GreenYourMove: Development and promotion of a co-modal journey planning platform to minimize GHG emission in Europe

Manual for GYM Database and GYM data-services

Partner responsible for this report: AVMap GIS S.A.

Document Information Summary

Action:	B1: Creation of GreenYourMove database and related data-access services
Activity:	B1.1: Definition of data scheme B1.2: Digitization and data transformations B1.3: Creation of database B1.4: Development of data access services
Deliverable Number:	
Deliverable Title:	
Leader:	AVMap
Participants:	UTH, AVMap, CHAPS, EMISSIA, PlannerStack
Author(s)	Andreas Vassilopoulos, Paul Kottas, Eleni Melidoni
Project website	www.greenyourmove.org
Status:	Final

Disclaimer:

The LIFE GYM [LIFE14 ENV/GR/000611] project is co-funded by the LIFE programme, the EU financial instrument for the environment.

The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.

Start Date: 15 September 2015 - Duration: 35 months

Contents

Contents.....	4
Abbreviations	5
List of Figures	7
List of Tables	8
Abstract.....	9
1 Manual.....	10
1.1 Environment setup	10
1.1.1 Prerequisites.....	10
1.2 Minimum requirements of SQL Server [1]	10
1.2.1 Hardware requirements	10
1.2.2 Software requirements	11
1.2.3 Network requirements	13
1.3 Setup instructions.....	14
1.3.1 Data retriever program.....	14
1.3.2 Digitization program	14
1.3.3 Homogenization program	24
1.4 Accessing the database.....	24
1.4.1 Connection details.....	24
1.4.2 Tools for viewing	24
1.5 Data access services manual.....	24
1.5.1 WMS.....	24
1.5.2 WFS	26
1.5.3 REST (WSDL).....	26
1.5.4 GTFS.....	31
2 Bibliography	32

Abbreviations

API	Application Programming Interface
APP	application
bit	bit data type
CSV	Comma separated values
DB	Database
FTP	File Transfer Protocol
GB	Gigabyte
GHz	Gigahertz
GIS	Geographic Information Systems
GTFS	Google Transit Feed Specification
GTFS-RT	Google Transit Feed Specification - RealTime
GUI	Graphical User Interface
GYM	GreenYourMove
GYM-WS	GreenYourMove-WebServices
HTTP	Hyper Text Transfer Protocol
ID, id	identifier
IIS	Internet Information Services
JSON	JavaScript Object Notation
lat	latitude
lng	longitude
MB	Megabyte
MSG	Message
OLE	Object Linking and Embedding
OSM	OpenStreetMaps
osm2mssql	OpenStreetMaps to Microsoft SQL Server tool
PDF	Portable Document Format
R1, R2	Revision 1, Revision 2
RDBMS	Relational DataBase Management System
REST	Representational State Transfer
SP1, SP2	Service Pack 1, Service Pack 2
SQL	Structured Query Language
SSIS	SQL Server Integration Services
SSMS	Sql Server Management Studio
URL	Uniform Resource Locator
UTC	Coordinated Universal Time
WFS	Web Feature Service
WMS	Web Map Service
WSDL	Web Service Definition Language
XML	Extensible Markup Language

List of Figures

FIGURE 1: THE MAIN SCREEN OF THE DIGITIZATION PROGRAM.....	15
FIGURE 2: DIGITIZATION WORKFLOW-CREATE AGENCY	17
FIGURE 3: DIGITIZATION WORKFLOW-STEPS TO CREATE A ROUTE.....	17
FIGURE 4: DIGITIZATION WORKFLOW-ROUTE BASIC INFORMATION	18
FIGURE 5: DIGITIZATION WORKFLOW-STOPS MANAGEMENT	19
FIGURE 6: DIGITIZATION WORKFLOW-STOP EDITING	19
FIGURE 7: DIGITIZATION WORKFLOW-TRIP TYPE CREATION	21
FIGURE 8: DIGITIZATION WORKFLOW- TRIP TYPE MANUAL EDITING OF SHAPE	22
FIGURE 9: DIGITIZATION WORKFLOW –SCHEDULE CREATION.....	23
FIGURE 10: A ZOOMED-OUT PICTURE OF OSM WAYS FOR GREECE	25
FIGURE 11: A ZOOMED-IN PICTURE OF OSM WAYS IN ATHENS, GREECE	25
FIGURE 12: LOGIN SCREEN	27
FIGURE 13: EXAMPLE OF THE TEST-CLIENT, PROVIDING AN EASY WAY TO CALL THE GETWEATHERBYCITY METHOD	27
FIGURE 14: LIST OF METHODS IN THE HELP PAGE.....	28

List of Tables

TABLE 1: MINIMUM HARDWARE REQUIREMENTS.....	11
TABLE 2: MINIMUM SOFTWARE REQUIREMENTS	13
TABLE 3: MINIMUM NETWORK REQUIREMENTS.....	13

Abstract

This manual serves as a reference on how to setup the appropriate software of Action B1, as well as a step-by-step reference on how to input new datasets in the appropriate format (i.e. digitization program).

1 Manual

1.1 Environment setup

1.1.1 Prerequisites

1. Python 2.7¹
2. Osm2mssql²
3. Microsoft Access Database Engine 2010 Redistributable ³ (Used by SSIS packages to read Excel files)
4. Internet Information Server 7⁴ (Used by the web-services)
5. .NET Framework 4⁵ (Used by the web-services)
6. Geoserver 2.6⁶ (Used by the web-services)

1.2 Minimum requirements of SQL Server [1]

1.2.1 Hardware requirements

Component	Requirement
Memory	<p>Minimum:</p> <ul style="list-style-type: none">• Express Editions: 512 MB• All other editions: 1 GB <p>Recommended:</p> <ul style="list-style-type: none">• Express Editions: 1 GB• All other editions: At least 4 GB and should be increased as database size increases to ensure optimal performance.
Processor Speed	<p>Minimum:</p> <ul style="list-style-type: none">• x86 Processor: 1.0 GHz• x64 Processor: 1.4 GHz <p>Recommended: 2.0 GHz or faster</p>
Processor Type	<ul style="list-style-type: none">• x64 Processor: AMD Opteron, AMD Athlon 64, Intel Xeon with Intel EM64T support, Intel Pentium IV with EM64T support• x86 Processor: Pentium III-compatible processor or faster

¹ <https://www.python.org/downloads/release/python-2710/>

² <https://osm2mssql.codeplex.com/>

³ <https://www.microsoft.com/en-us/download/details.aspx?id=13255>

⁴ <http://www.iis.net/>

⁵ <https://www.microsoft.com/en-us/download/details.aspx?id=17851>

⁶ <http://geoserver.org/>

Hard Disk	SQL Server 2014 requires a minimum of 6 GB of available hard-disk space.
External drives	A DVD drive, as appropriate, is required for installation from disc.
Monitor	SQL Server 2014 requires Super-VGA (800x600) or higher resolution monitor.

Table 1: Minimum hardware requirements

NOTE: The total disk space occupied by the databases is 14 GB (10 GB for the GYM database and 4 GB for the stage database)

The data transformations that occur to import/update data require ample temporary disk space, we recommend having at least 200GB in order to avoid unforeseen interruptions. During the import process, we measured a single transformation task (Generating the GTFS table “oasth_stop_times” for OASTH data) to take up more than 40GB of temporary disk space. Keep in mind that tasks may run in parallel, so it is advised to have extra disk space just in case.

1.2.2 Software requirements

Component	Requirement	
Operating System	32bit	64bit
	<ul style="list-style-type: none"> Windows Server 2012 R2 Datacenter 64-bit Windows Server 2012 R2 Standard 64-bit Windows Server 2012 R2 Essentials 64-bit Windows Server 2012 R2 Foundation 64-bit Windows Server 2012 Datacenter 64-bit Windows Server 2012 Standard 64-bit Windows Server 2012 Essentials 64-bit Windows Server 2012 Foundation 64-bit Windows Server 2008 R2 SP1 Datacenter 64-bit Windows Server 2008 R2 SP1 Enterprise 64-bit Windows Server 2008 R2 SP1 Standard 64-bit Windows Server 2008 	<ul style="list-style-type: none"> Windows Server 2012 R2 Datacenter 64-bit Windows Server 2012 R2 Standard 64-bit Windows Server 2012 R2 Essentials 64-bit Windows Server 2012 R2 Foundation 64-bit Windows Server 2012 Datacenter 64-bit Windows Server 2012 Standard 64-bit Windows Server 2012 Essentials 64-bit Windows Server 2012 Foundation 64-bit Windows Server 2008 R2 SP1 Datacenter 64-bit Windows Server 2008 R2 SP1 Enterprise 64-bit Windows Server 2008 R2 SP1 Standard 64-bit Windows Server 2008

	<p>R2 SP1 Foundation 64-bit</p> <ul style="list-style-type: none"> Windows Server 2008 <p>R2 SP1 Web 64-bit</p> <ul style="list-style-type: none"> Windows 8.1 32-bit Windows 8.1 Pro 32-bit Windows 8.1 <p>Enterprise 32-bit</p> <ul style="list-style-type: none"> Windows 8.1 64-bit Windows 8.1 Pro 64-bit Windows 8.1 <p>Enterprise 64-bit</p> <ul style="list-style-type: none"> Windows 8 32-bit Windows 8 Pro 32-bit Windows 8 Enterprise 32-bit Windows 8 64-bit Windows 8 Pro 64-bit Windows 8 Enterprise 64-bit Windows 7 SP1 Ultimate 64-bit Windows 7 SP1 Enterprise 64-bit Windows 7 SP1 Professional 64-bit Windows 7 SP1 Home Premium 64-bit Windows 7 SP1 Home Basic 64-bit Windows 7 SP1 Ultimate 32-bit Windows 7 SP1 Enterprise 32-bit Windows 7 SP1 Professional 32-bit Windows 7 SP1 Home Premium 32-bit Windows 7 SP1 Home Basic 32-bit Windows Server 2008 SP2 Datacenter 64-bit Windows Server 2008 SP2 Enterprise 64-bit Windows Server 2008 SP2 Standard 64-bit 	<p>R2 SP1 Foundation 64-bit</p> <ul style="list-style-type: none"> Windows Server 2008 <p>R2 SP1 Web 64-bit</p> <ul style="list-style-type: none"> Windows 8.1 64-bit Windows 8.1 Pro 64-bit Windows 8.1 <p>Enterprise 64-bit</p> <ul style="list-style-type: none"> Windows 8 64-bit Windows 8 Pro 64-bit Windows 8 Enterprise 64-bit Windows 7 SP1 Ultimate 64-bit Windows 7 SP1 Enterprise 64-bit Windows 7 SP1 Professional 64-bit Windows 7 SP1 Home Premium 64-bit Windows 7 SP1 Home Basic 64-bit Windows Server 2008 SP2 Datacenter 64-bit Windows Server 2008 SP2 Enterprise 64-bit Windows Server 2008 SP2 Standard 64-bit Windows Server 2008 SP2 Foundation 64-bit Windows Server 2008 SP2 Web 64-bit
--	--	--

	<ul style="list-style-type: none"> • Windows Server 2008 SP2 Foundation 64-bit • Windows Server 2008 SP2 Web 64-bit • Windows Server 2008 SP2 Datacenter 64-bit • Windows Server 2008 SP2 Enterprise 32-bit • Windows Server 2008 SP2 Standard 32-bit • Windows Server 2008 SP2 Web 32-bit 	
.NET Framework	<p>.NET 3.5 SP1 is a requirement for SQL Server 2014 when you select Database Engine, Reporting Services, Master Data Services, Data Quality Services, Replication, or SQL Server Management Studio, and it is no longer installed by SQL Server Setup.</p> <p>.NET 4.0 is a requirement for SQL Server 2014. SQL Server installs .NET 4.0 during the feature installation step.</p>	
Windows PowerShell	SQL Server 2014 does not install or enable Windows PowerShell 2.0; however Windows PowerShell 2.0 is an installation prerequisite for Database Engine components and SQL Server Management Studio. If Setup reports that Windows PowerShell 2.0 is not present, you can install or enable it by following the instructions on the Windows Management Framework page.	
Virtualization	<p>SQL Server 2014 is supported in virtual machine environments running on the Hyper-V role in:</p> <ul style="list-style-type: none"> • Windows Server 2008 SP2 Standard, Enterprise and Datacenter editions • Windows Server 2008 R2 SP1 Standard, Enterprise, and Datacenter editions. • Windows Server 2012 Datacenter and Standard editions. 	

Table 2: Minimum software requirements

1.2.3 Network requirements

Component	Requirement
Internet	Internet functionality requires Internet access.
Network Software	Supported operating systems for SQL Server 2014 have built-in network software. Named and default instances of a stand-alone installation support the following network protocols: Shared memory, Named Pipes, TCP/IP and VIA.

Table 3: Minimum network requirements

1.3 Setup instructions

1. Setup the environment (chapter 1.1);
2. Install Microsoft SQL Server 2014;
3. Install SQL Server Management Studio ;
4. Restore the database backups from Deliverable B2. GYM database is now operational;
5. Restore the SSIS packages from Deliverable B2 to the location given in the corresponding readme file;
6. Activate the SSIS_Update job in the database. The homogenization mechanism is now active;
7. Restore the python scripts to the location given in the corresponding readme file;
8. Create a scheduled task to execute the scripts. The retriever program is now active;
9. Restore the GYM_WS folder from Deliverable B2 to your web folder (usually c:\inetpub\wwwroot);
10. Configure a new IIS website to point to the folder.
11. Make sure that the connection strings in GYM_WS\web.config are correct. The web services are now active.

1.3.1 Data retriever program

The data retriever program is a collection of various Python scripts, which handle the downloading of data from various sources and storing them to a location on the server. Execution of the scripts is done automatically, using the standard Windows Task Scheduling capabilities.

These scripts are:

- **Download_files_ftp.py** – Retrieves files via the FTP protocol
- **Download_files_web.py** – Retrieves files via the HTTP protocol
- **Config.py** – Contains the configuration of the scripts

1.3.2 Digitization program

The digitization program was based on the open-source program **GTFS editor**⁷. It is a web based program, which allows simultaneous editing by multiple users. Users of this program can create routes, schedules, map the stops of each route etc. The program can then produce a GTFS feed file, and/or GIS files such as shapes containing the stop locations.

⁷ <https://github.com/conveyal/gtfs-editor>

Transit Database

Home

Xanthi Intercity Busses

Export

Welcome NewUser!

Language

Guide

Explore/Search Routes

New Route

Manage Schedule Exceptions

Snapshots

Routes for Xanthi Intercity Busses

GTFS Id	Status	Short Name	Long Name	Route Type	Description	Service on
UPER_KTEL_KSANTHI_no3	IN_PROGRESS		Route from Xanthi to Ag. Athanasios			Mo Tu We Th Fr Sa Su
UPER_KTEL_KSANTHI_no30	IN_PROGRESS		Route from Xanthi to Temenos			Mo Tu We Th Fr Sa Su
UPER_KTEL_KSANTHI_no31	IN_PROGRESS		Route from Xanthi to Oreio			Mo Tu We Th Fr Sa Su
UPER_KTEL_KSANTHI_no13	IN_PROGRESS		Route from Xanthi to Thessaloniki			Mo Tu We Th Fr Sa Su

Figure 1: The main screen of the digitization program

1.3.2.1 Features of the program

GUI placement of stops: The user can point and click on an interactive map to create a new stop. By clicking on each stop, he can enter additional information, such as name, whether it has bike parking, whether it allows wheelchair boardin, etc.

Easy timetable creation. The user can easily create timetables, because arrival and departure times for each stop are automatically generated based on the trip pattern. Then, the user just offsets the times (e.g. +1 hour) for the entire scheduled route.

Automatic interpolation of arrival/departure times. In cases whether an exact timetable is not available, the program asks the user to estimate the average vehicle speed, and then interpolates the arrival and departure times for each stop based on the spatial data.

1.3.2.2 Example of a digitization workflow

1.3.2.2.1 Installation of the program

Installation on Windows

The following instructions assume that the user has administrative rights on the computer.

1. Install Java JRE 7⁸, if not already installed.
2. Install latest 1.X version of Play Framework⁹ (**caution:** software does not support 2.X versions of the Play Framework). Installation works by simple copying and unzipping the appropriate file.
3. Copy and unzip the digitization program¹⁰ to a folder of your choice.
4. Copy the file “application.conf.template” and rename it to “application.conf”. The file is located in the “conf” subfolder.
5. (Optional) If you need to change any default options, such as the port under which the software runs, open the file with a text editor (e.g. Notepad), and make the appropriate changes.

⁸ <http://www.oracle.com/technetwork/java/javase/downloads/jre7-downloads-1880261.html>

⁹ <https://www.playframework.com/download>

¹⁰ <https://github.com/conveyal/gtfs-editor/archive/master.zip>

6. Using a command prompt, navigate to the installation folder of the digitization program.
7. In the command prompt, type the following command:
`[path to play framework]/play dependencies`
8. You can now run the program by typing:
`[path to play framework]/play run`
If the server shuts down/restarts, you now only need to run step #8 to have the software up and running again.

Installation on Linux

The following instructions assume installation on an Ubuntu distribution of Linux, using the terminal, with appropriate sudo permissions.

1. Install Java JRE 7, if not already installed.
`sudo apt-get install openjdk-7-jre`
2. Install latest 1.X version of Play Framework¹¹ (**caution:** software does not support 2.X versions of the Play Framework).
`wget http://downloads.typesafe.com/releases/play-1.4.9.zip`
3. Copy and unzip the digitization program to a folder of your choice.
`git clone https://github.com/conveyal/gtfs-editor.git`
`cd gtfs-editor`
4. Copy the file “application.conf.template” and rename it to “application.conf”. The file is located in the “conf” subfolder .
`cp conf/application.conf.template conf/application.conf`
5. (Optional) If you need to change any default options, such as the port under which the software runs, open the file with a text editor (e.g. Nano), and make the appropriate changes.
`sudo nano conf/application.conf`
6. Navigate to the installation folder of the digitization program.
7. In the terminal, type the following command:
`[path to play framework]/play dependencies`
8. You can now run the program by typing:
`[path to play framework]/play run`
If the server shuts down/restarts, you now only need to run step #8 to have the software up and running again.

1.3.2.2.2 Agency creation

The first time a user enters data for a transport organization, such as TRAINOSE, an “agency” must be created. Figure 2 shows this.

¹¹ <https://www.playframework.com/download>

New Agency ×

GTFS ID
(Optional)

Name
(Required)

URL
(Required)

Default Latitude
(Required)

Default Longitude
(Required)

Default Route Type
(Required)

Cancel

Save

Figure 2: Digitization workflow-Create agency

After the agency is created, the user can start creating the available routes. This is a multi-step process, as shown in Figure 3. The steps needed are the following.

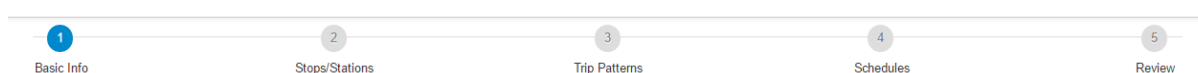


Figure 3: Digitization workflow-Steps to create a route

1.3.2.2.3 Basic information

The user enters basic information about the route, such as name, whether it's a bus route, metro route, whether it has a color to be associated with (e.g. "Metro red line"), etc. This is shown in Figure 4.

Short Name
(Required)

"4"

Long Name
(Required)

Route from Xanthi to Komotini

Route Type
(Required)

Αστικά Λεοφωρεία/ City Busses (BUS ▾

Route Types

Wheelchair Boarding

Unknown ▾

Description

URL

Color

Text Color

Comments

Save & Continue

Figure 4: Digitization workflow-Route basic information

1.3.2.2.4 Stops

Here the user enters the available stops. All stops managed by the agency are shown, to prevent duplicate entries. By clicking on each stop, the user can enter additional information about it. This is shown in Figure 5 and Figure 6.

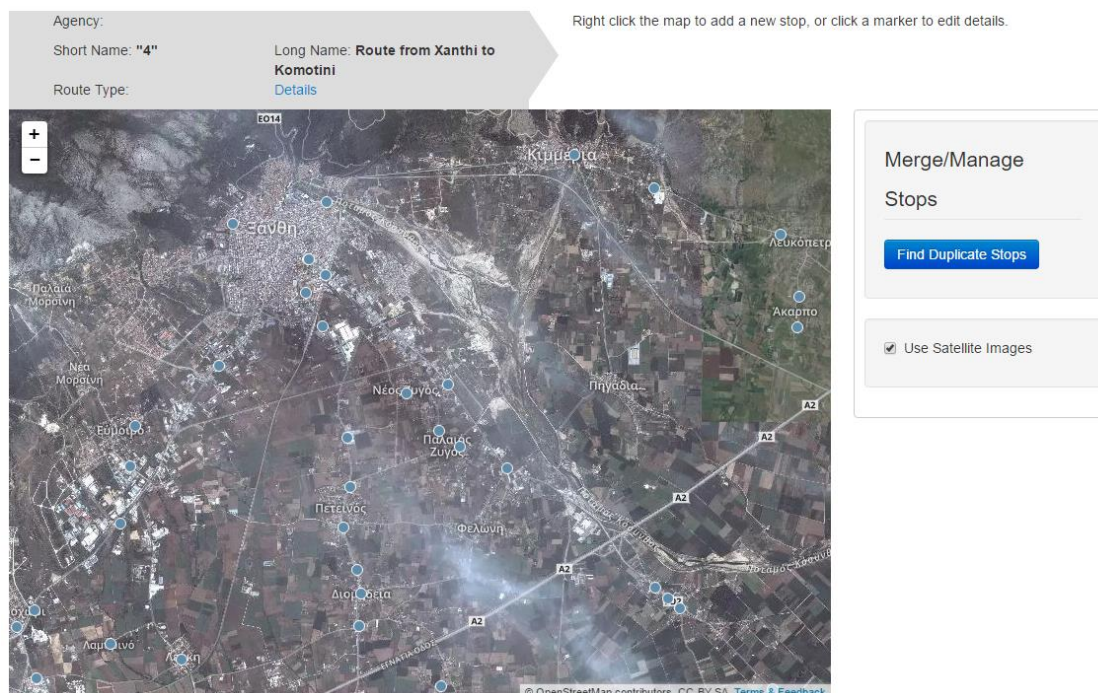


Figure 5: Digitization workflow-Stops management

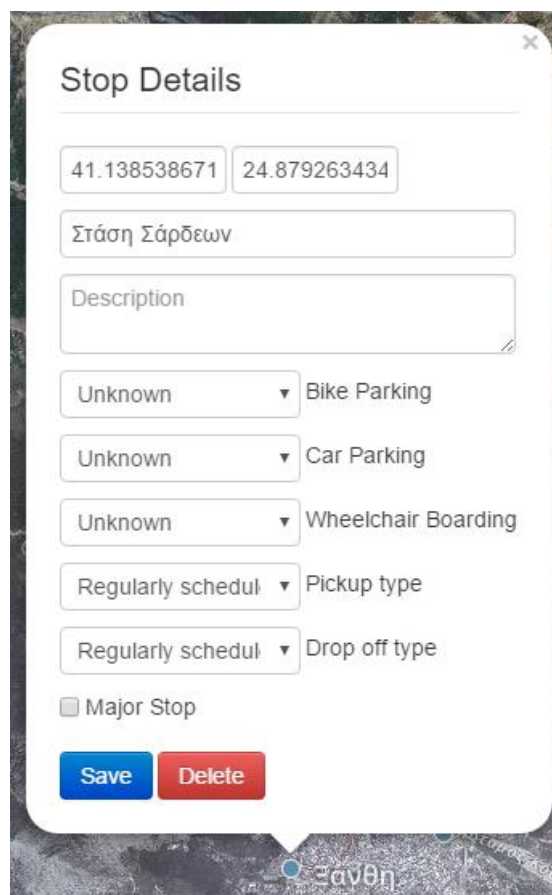


Figure 6: Digitization workflow-Stop editing

1.3.2.2.5 Trip-types

The next step is to create the various trip types. A trip type is a sequence of stops. A trip type is connected to a particular set of calendar dates. For example, the “Athens-Airport” bus line might include different stops on Saturdays and Sundays. The user just points and clicks each stop that participates in the trip type, and a shape is created connecting each stop (Figure 7). If the user wishes, he can edit the shape, to show the actual route the bus follows (Figure 8).

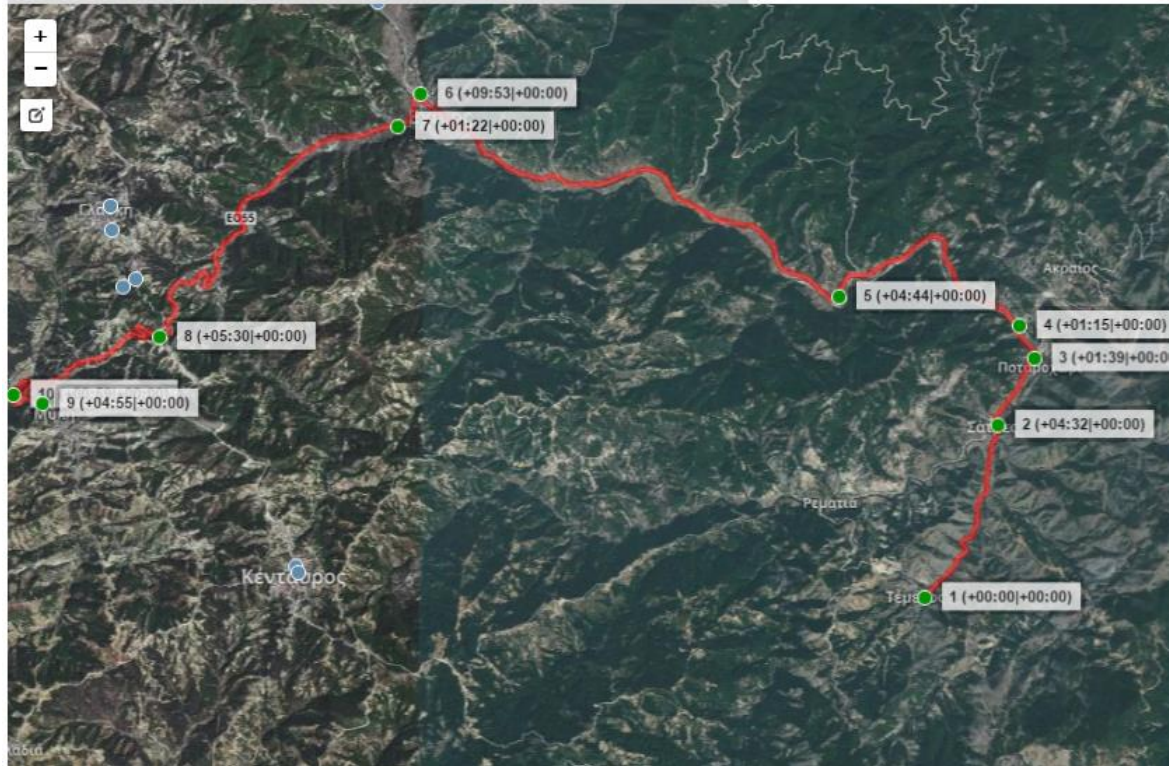
Agency:

Short Name:

Long Name: **Route from Xanthi to Temenos**

Route Type: [Details](#)

Click on stops on the map to make an ordered trip pattern. Set the travel and dwell time for each stop and create an alignment.



Trip Patterns

Create New Pattern
Delete Pattern

Duplicate Pattern

Edit Pattern Name

Stop Sequence

Zoom to Pattern Extent
Clear Pattern

Reverse Pattern

Alignment

Create Alignment from Pattern

Timing

Calculate Times

Figure 7: Digitization workflow-Trip type creation



Figure 8: Digitization workflow- Trip type manual editing of shape

1.3.2.2.6 Scheduling

The next step for the user is to enter the scheduled trips for each trip type. The user can choose two methods to fill this table: either via frequency (e.g. "create a scheduled trip every 20 min"), or by creating a timetable. The latter is the most frequent choice, since there are many fluctuations to the daily schedule, at least for Greek buses.

In timetable creation, the user is presented with the view shown in Figure 9, where he enters the arrival and departure times for each stop. These are prefilled with the automatic calculations based on spatial data (e.g. stop #2 is 5 minutes away from stop #1), and the user can quickly offset the entire row by a chosen amount (e.g. +20 minutes, or +1 hour, etc). The user can also manually edit times if he chooses, duplicate rows and then offset them etc.

← Return to route view Save changes + New trip ↓ Sort schedule Help										
Trip ID	Block ID	Trip headsign	Αγ. Αθανάσιος		Κοσμήτης 2η στάση		Κοσμήτης 1η στάση		Θαλασσιά 2η στάση	
UPER_KTEL_KSANTHI		ΞΑΝΘΗ	7:00:00	7:00:00	7:04:53	7:04:53	7:05:36	7:05:36	7:09:28	7:09:28
UPER_KTEL_KSANTHI		ΞΑΝΘΗ	13:45:00	13:45:00	13:49:53	13:49:53	13:50:35	13:50:35	13:54:28	13:54:28
UPER_KTEL_KSANTHI		ΞΑΝΘΗ	15:30:00	15:30:00	15:34:53	15:34:53	15:35:35	15:35:35	15:39:28	15:39:28

Figure 9: Digitization workflow –Schedule creation

1.3.2.2.7 Review

The final step of the digitization is the review screen, where the user enters comments and status about the completion status of each route. Only routes marked as “Approved” are included in the exports, to prevent erroneous or incomplete data in the GTFS feed files.

1.3.2.2.8 Exporting

Exports of the data in GTFS format are performed periodically. The files are then stored on a web-accessible path, to be retrieved from the “Data retriever” program.

1.3.3 Homogenization program

The homogenization program uses the SQL Server Integration Services (SSIS for short), combined with the scheduling system of SQL Server. Each step in the program is designed using a graphical editor, which automatically generates the appropriate machine code (organized in compiled packages) when executed. To install the program, simply copy the packages to a folder of your choice, and schedule them to run automatically using the SQL Server Agent.

1.4 Accessing the database

1.4.1 Connection details

To connect to the database use the following details:

- **Host:** gym-db.avmap.gr
- **Port:** 1449
- **Username:** GYM_roUser
- **Password:** wedLfPJz9Pi3AMvKaTgH
- **Database name:** GYM

For the correct format of the connection string that is to be used in your preferred method of programmatic access, you can view here various syntaxes:

<http://www.connectionstrings.com/sql-server/>

1.4.2 Tools for viewing

The recommended tool for viewing the database is SQL Server Management Studio which can be downloaded as part of the free version (“Express”) of SQL Server 2014 here:

<https://www.microsoft.com/en-us/download/details.aspx?id=42299>

1.5 Data access services manual

1.5.1 WMS

Access to GYM web services through the WMS protocol is done via: <http://gym-ws.avmap.gr:8081/geoserver/wms>.

The current GeoServer installation has multiple data sources (layers), the ones related to GYM are prefixed with “MyGIS:GYM_” in their name.

Current layers related to GYM:

- MyGIS:GYM_GIS_OSM_tNode – The OpenStreetMaps nodes of Greece
- MyGIS:GYM_GIS_OSM_tWay – The OpenStreetMaps ways of Greece

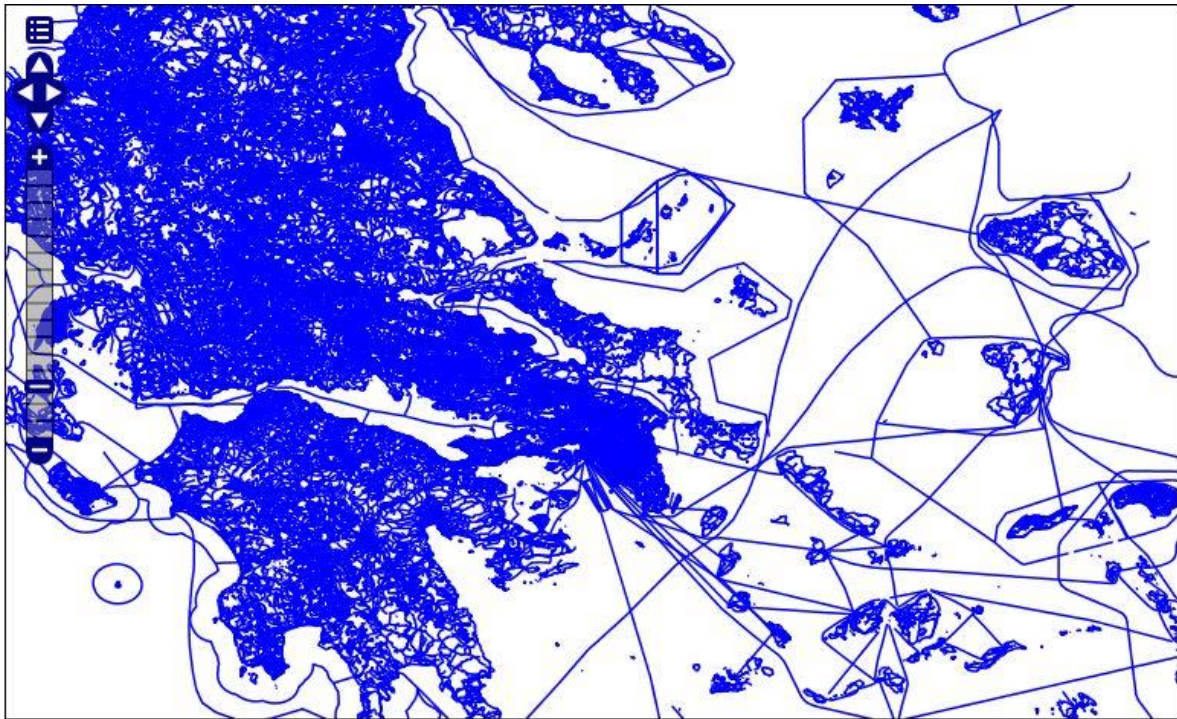


Figure 10: A zoomed-out picture of OSM ways for Greece



Figure 11: A zoomed-in picture of OSM ways in Athens, Greece

1.5.1.1 Example call

To get the above image, you issue a request like the following:

http://gym-ws.avmap.gr:8081/geoserver/MyGIS/wms?LAYERS=MyGIS%3AGYM_GIS_OSM_tWay&STYLES=&FORMAT=image%2Fpng&SERVICE=WMS&VERSION=1.1.1&REQUEST=GetMap&SRS=EPSG%3A4326&BBOX=23.668019446283,38.000876981126,23.770255805853,38.06304414248&WIDTH=768&HEIGHT=467.

The recommended way to issue WMS calls is through the use of an open-source library, like OpenLayers: <http://openlayers.org/>

For more information on how to use WMS protocol you can visit: <http://www.opengeospatial.org/standards/wms>.

1.5.2 WFS

Access to GYM web services through the WMS protocol is done via: <http://gym-ws.avmap.gr:8081/geoserver/wfs>

The current GeoServer installation has multiple data sources, the ones related to GYM are prefixed with "GYM_" in their name.

1.5.2.1 Example: Calling CSV export via wfs

Request url:

http://gym-ws.avmap.gr:8081/geoserver/MyGIS/ows?service=WFS&version=1.0.0&request=GetFeature&typeName=MyGIS:GYM_GIS_OSM_tNode&maxFeatures=50&outputFormat=csv

Results sample:

FID,Id,location_g,Latitude,Longitude,Geometry
GYM_GIS_OSM_tNode.78695,78695,[B@1d99714,37.5964742,23.0709818,POINT (23.0709818 37.5964742)
GYM_GIS_OSM_tNode.78696,78696,[B@4ddf84,37.5961011,23.0711918,POINT (23.0711918 37.5961011)

The recommended way to issue WFS calls is through the use of an open-source library, like OpenLayers: <http://openlayers.org/>.

For more information on how to use WFS protocol you can visit: <http://www.opengeospatial.org/standards/wfs>

1.5.3 REST (WSDL)

WSDL access to G.Y.M. web services is done through:

http://gym-ws.avmap.gr/GYM_WS.asmx

To login, use the following information:

Username: gymApp

Password: gymApp123!



Figure 12: Login Screen

After you login, you will get a help page listing the available methods, as well as a sample client to access them. For the formal definition of the web service, you can use the following url: http://gym-ws.avmap.gr/GYM_WS.asmx?WSDL.

GYM_WebServices

Click [here](#) for a complete list of operations.

GetWeatherByCity

Parameters	
city	Part of city name to search. All cities that begin with this value will be returned
minDate	Lower end of dates to search for (inclusive). yyyy-mm-dd format.
maxDate	Upper end of dates to search for (inclusive) yyyy-mm-dd format.

Test

To test the operation using the HTTP POST protocol, click the 'Invoke' button.

Parameter	Value
city:	<input type="text"/>
minDate:	<input type="text"/>
maxDate:	<input type="text"/>

Figure 13: Example of the test-client, providing an easy way to call the GetWeatherByCity method

GYM_WebServices

The following operations are supported. For a formal definition, please review the [Service Description](#).

- [GetAgencies](#)
Parameters:

--
- [GetCalendarsByRoute](#)
Parameters:

route_id

- [GetFareAttributesByRoute](#)
Parameters:

route_id

- [GetFareRulesByRoute](#)
Parameters:

route_id

- [GetFrequenciesByRoute](#)
Parameters:

route_id

- [GetRoutes](#)
Parameters:

--
- [GetRoutesByAgency](#)
Parameters:

agency_id

- [GetShapesByTrip](#)
Parameters:

trip_id

- [GetStopTimesByLocation](#)
Parameters:

arrival_time	HH:mm:ss
margin_minutes	Buffer in minutes from arrival time
x,y	Coordinates to search around for
radius	Buffer around search point, in meters. Use at least 5.

Figure 14: List of methods in the help page

All methods return JSON¹² results (string). The results follow the pattern:

```
{
  results: [(list of objects)],
  error: {
    code: (integer),
    msg: (string),
    trace: (string)
  }
}
```

¹² If you use the help-page, the JSON results are enfolded in an xml envelop. To ensure clear JSON results, call the web-service from your code, specifying *Content-type: application/json*

If the call was successful, the code in the error object will be equal to 0. A successful call does not imply that there are results to display, only that there wasn't an error in calling the method. If the error code is different than 0, then the *msg* and *trace* variables should give a hint on the cause of the error. Please forward all errors to support@avmap.gr, including the call parameters your send, and the results returned.

1.5.3.1 Example

Results when calling the GetRoutesByAgency method with parameter "asdf":

```
{
  "results":[
  ],
  "error":{
    "code":0,
    "msg": "",
    "trace":""
  }
}
```

Results when calling the GetRoutesByAgency method with parameter "oasa":

```
{
  "results":[
    {
      "route_id":"oasa_021-20",
      "agency_id":"oasa",
      "route_short_name":"021",
      "route_long_name":"\ "KANIITTOΣ - ΓΚΥΖΗ\ ",
      "route_desc": "",
      "route_type":"3",
      "route_url": "",
      "route_color":"153CE0",
      "route_text_color":"FFFFFF"
    },
    {

```

```
"route_id":"oasa_022-20",
"agency_id":"oasa",
"route_short_name":"022",
"route_long_name":"\N. ΚΥΨΕΛΗ - ΜΑΡΑΣΛΕΙΟΣ\\"",
"route_desc":"",
"route_type":"3",
"route_url":"",
"route_color":"153CE0",
"route_text_color":"FFFFFF"
},
...
...
{
  "route_id":"oasa_X97-20",
  "agency_id":"oasa",
  "route_short_name":"X97",
  "route_long_name":"\ΣΤ. ΜΕΤΡΟ ΕΛΛΗΝΙΚΟ - ΑΕΡΟΛ. ΑΘΗΝΩΝ (EXPRESS)\\"",
  "route_desc":"",
  "route_type":"3",
  "route_url":"",
  "route_color":"153CE0",
  "route_text_color":"FFFFFF"
}
],
"error":{
  "code":0,
  "msg":"",
  "trace":""
}
```

}

1.5.4 GTFS

The GTFS feed for all data is generated automatically through the web-services. To retrieve it, use the **GetGTFS**¹³ method.

¹³ <http://gym-ws.avmap.gr/GetGTFS>

2 Bibliography

- [1] "Hardware and Software Requirements for Installing SQL Server 2014," [Online]. Available: <https://msdn.microsoft.com/en-us/library/ms143506%28v=sql.120%29.aspx#pmosr>.
- [2] GreenYourMove consortium, "Green Your Move - Deliverable B1".