



# NEW ASPECTS OF LANDSCAPE ARCHITECTURE

Proceedings of the 1st WSEAS International Conference on  
LANDSCAPE ARCHITECTURE (LA '08)

Algarve, Portugal, June 11-13, 2008

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## **Preface**

This book contains the proceedings of the 1st WSEAS International Conference on LANDSCAPE ARCHITECTURE (LA '08) which was held in Algarve, Portugal, June 11-13, 2008. This conference aims to disseminate the latest research and applications in Landscape Design, Traditional Building, Landscape Gardening, Gardens, Gardening to attract wildlife, Community gardens, Parks, National parks, Botanical gardens, Children's gardens, Sanctuary gardens, Cemeteries, Golf courses, Plazas, Labyrinths, Memorials, Historic districts, Historic sites and other related topics.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from <http://www.wseas.org/reports>. Your feedback encourages the society to go ahead as you can see in <http://www.worldses.org/feedback.htm>

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: [www.worldses.org/indexes](http://www.worldses.org/indexes)

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: [www.worldses.org/indexes](http://www.worldses.org/indexes)) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

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## Plenary Lecture

### Landscape Architecture: One of the Major Actors Shaping Urban Landscape



**Professor Dr. Selma Celikyay**

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**Abstract:** Environment we perceive in urban space has constituted urban landscape. The form of urban landscape has been realized at the end of multidiscipline process beginning with planning and going on the design of urban environment. The process of urban formation is a period in which a lot of sub-purposes should be determined in accordance with the planning purposes. In this process, all the actors authorized and responsible for urban environment should take up seriously the aim of creation of the urban quality. Landscape architecture is one of the major actors shaping urban landscape. It is an interface between urban planning and urban design. Landscape architecture is of great importance from the creation of livable cities, urban quality and urban landscape point of view. In this paper, missions and visions of urban planning, urban design, landscape architecture, architecture and the interrelating role of landscape architecture will be mentioned. Furthermore, that landscape architecture not only has great effect on the form of urban landscape but also is the major tool to re-create ecological footprint of the human on the earth will be emphasized.

**Brief biography of the speaker:** Selma Celikyay is an architect who graduated from Yildiz Technical University in Istanbul. She took Msc. Degree from Urban Design Program at Mimar Sinan University and PhD. from Yildiz Technical University, Department of City and Regional Planning. Has been teaching at Zonguldak Karaelmas University, Bartın Faculty of Forestry, Department of Landscape Architecture, since 1996 and has been teaching at Karabuk University, Fethi Toker Fine Arts Faculty, Department of Architecture. The topics of her scientific researches and studies are architecture, ecological design, ecological planning, strategic environmental assessment, urban conservation, urban design, urban ecology, urban landscape design, urban landscape planning.

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# Security enhancement in a WebGIS application

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**Abstract:** WebGIS is a term describing the combination of Internet and Geographic Information Systems, allowing dissemination and sharing of spatial data using the internet. The Long Term Ecological Research Program for Monitoring Aeolian Soil Erosion in Central Asia (CALTER) is a multinational research project where the participant investigators with various types of spatial information need to share and create cartographic information in a secure way. The WebGIS system developed uses the Mapserver software in a L.A.M.P (Linux-Apache-MySQL-PHP) system. The WebGIS has several layers of security. The chroot-jail method is used so that all the WebGIS in run in an isolated way. The security and rewrite modules are responsible for the security at the Apache server level, preventing code injection in the GET/POST requirement and avoiding displayed error messages, the rewrite module is responsible to redirect the URL to an HTTPS connection. The developed WebGIS security system can withstand all common internet threats.

**Key words:** Mapserver, Apache, LAMP, WebGIS, Central Asia.

## 1. Introduction

Geographic Information Systems (GIS) are accepted as power full and integrated tools for storing, manipulating, visualizing and analyzing spatial data (Dragicevie, 2004). Like many other rapidly evolving technologies, the GIS that were originally intended to run from a desktop environment have in part migrated to the World Wide Web and are commonly referred as WebGIS. This allows for a rapid dissemination of data, and sharing of maps between users in different locations (Frehner *et al.*, 2006; Jesus *et al.*, 2006).

The WebGIS is based on the Mapserver system which was developed by the University of Minnesota and NASA and it uses an Open-source licensing scheme. The Mapserver is integrated in a L.A.M.P (Linux-Apache-MySQL-PHP), architecture and is normally runs as an external module of PHP (there is also the option to run Mapserver using JAVA, C#, C++, Phyton, Perl) (Kropla, 2005).

The Mapserver itself will render the image according to the values of the variables passed by a GET or POST statement; the rendered image will be based in predefined options of a map file, and on the information contained in a raster, vectorial file or any spatial information contained in a database.

The Long Term Ecological Research Program for Monitoring Aeolian Soil Erosion in Central Asia (CALTER) started in November 2005 with the objective of understanding the impact of aeolian dust in desert ecosystems, particularly in the New Independent Countries located in central-Asia. A WebGIS was developed to support the long term ecological study of the CALTER project, so that participants can share/retrieve spatial data gathered from different working groups.

One major concern of the WebGIS system is its security. The data contained in the WebGIS should only be available to the participants and more importantly the system should be secure enough to allow external HTTP(S) connections into the main frame of the Ben-Gurion University of the Negev where the server is physically located. Objective of the present work is to describe the security enhancements of the WebGIS developed to support the CALTER project.

## **2. Methology**

### **2.1 Introduction**

The internet server supporting the WebGIS system is located in the Ben-Gurion University of the Negev (Israel). The server also supports the Department of Geography and Environmental Development, and the EPIF Lab (Earth & Planetary Image Facility). The server runs the Linux OS (Operating System) SUSE 10.1 using Apache 2.2.1 for the HTTP service. The administration of the server is done from Portugal using a VPN (Virtual Private Connection) connection and SSH (Secure Shell).

### **2.2 Mapserver description**

The WebGIS of the CALTER project uses the Mapserver software developed by the University of Minnesota and NASA, this software runs as a CGI (Common Gate Interface). The Mapserver it self is based on a stateless protocol, simple replying to information requests done by direct GET/POST form submission or by the Mapscript language. The Mapscript Language is not a new language but the API (Application Program Interface) of Mapserver, which allows for the programmer to control the Mapserver using languages like Perl, C#, Java, Python and PHP (Kropla, 2005).

The structure of the maps to be rendered, the rendering options and the location of the different data sets, are defined by an independent file called the Map file

(normally it uses the extension \*.map). This file is read every time the Mapserver has to reply to a request or when the Mapscript language creates a map object (the programming of Mapscript is Object-Oriented). The information to create the rendered image can be obtained from raster image files, shape files (vector data) and databases like MySQL or more commonly PostGIS.

The WebGIS of the CALTER project uses PHP as the Mapscript language, to do so, the Mapserver libraries are loaded in to the PHP module when the Apache server is initiated. Therefore the major security structure to protect the WebGIS is in the Apache server, the PHP module and the Linux OS (Operating System) it self.

## **2.2 Chroot Security**

The chroot is the operation in the UNIX system for changing the location or the root (/), the programs that run inside the new root are "sand-boxed" and can not access any resources outside the new root system. This allows from insecure software to be jailed and in case of buffer overflow only the programs run inside the chroot-jail are affected (Garfinkel, *et al.*, 2003).

The Apache, PHP module, Mapscript libraries and the Mapserver are inside the jailed directory. The only software that is running in the major root of the OS is the MySQL and its access is done by a socket connection from inside the jail directory to the database.

The jail-chroot has to be specially crafted, so that all the libraries and systems files necessary for the Apache and Mapserver are located inside the "sand-box", this is done using the ltrace/strace command to trace the opened libraries when each software is being run

The list of files required are then copied to the new directory structure, the files copied also include the most import /etc files like passwd, group, which will be striped of all the users except nobody and the httpd user necessary to run Apache and Mapserver.

From the normal /etc structure it is also copied the SSL certificates and the keys necessary for the HTTPS connection.

## **2.3 IPtables**

The IPtables is the tool that controls the packet filtering and NAT (Network Address Translation) of the Kernel (Hunt, *et al.*, 2003). The rules of IPTables were created in a way that the supporting WebGIS server only accepts external connections (from the WWW) to port 80 (HTTP) and 443 (HTTPS), all other traffic from the outside is dropped. The SSH connections and NFS (Network File System) are only allowed from the IP-range of the Geography Department's Domain (BGU-Geography).

## **2.4 Apache Compilation**

The Apache server was compiled with GCC 4.1, all the Apache modules were statically compiled except the PHP module. The PHP module reported several errors/problem when statically compiled and therefore it was compiled with the option for dynamic loading.

The number of modules was restricted to the most fundamental ones, and modules like "include", "CGI" were disabled since they pose a significant security risk (Ristic, 2005).

The security module was also included and statically compiled.

## **2.5 Security module (ModSecurity)**

The security module or ModSecurity is an external module of the Apache project whose function is to detect and prevent malicious attacks using GET and POST. In a GET/POST request, an attacker could inject designed code to damage the system. The ModSecurity detects such situations and drops any request that is considered a treat, also it has the ability to check the reply of the Apache server for sensitive information like command execution and PHP errors that could compromise the system (Ristic, 2005).

Compilation errors of ModSecurity 2.0 (using GCC 4.1) did not allow its use; instead the lower version 1.9 was compiled and integrated into Apache.

## **2.6 HTTP/HTTPS access**

The Apache server has two virtual hosts running and listening to different ports, the main virtual host listens to port 80 and hosts the main software page of the EPIF lab, while the virtual host that supports the Mapserver only listens to port 443, therefore all the communications to and from the Mapserver is encrypted. The encryption certificate and keys were first generated in the normal root directory and then moved to the jail-chroot structure.

To force all the traffic to use the HTTPS the rewrite module was used, were any HTTP access will automatically be re-written to HTTPS.

## **2.7 Login system**

Only members from the CALTER project can access the Mapserver, for that reason it was created a simple login system that uses the session\_id function of PHP to grant access to the WebGIS pages. The identification control is done by checking the user/password login with records in the MySQL database.

The session\_id associated with the valid session is stored as a cookie in the user's browser with the purpose of tracking the requested maps and the login time.

## **2.8 Mapscript/PHP security**

PHP version 5.1.6 was used as Mapscript. This version of PHP is more secure than previously one, since the default options are more secure, for example the global\_registers are off and the exposure of the systems information either by normal header or by errors is lower (Squier, 2004).

The PHP module is running from the chroot-jail therefore increasing the security of use. The use of the Security Module in the Apache server also prevents the injection of HTML tags, Scripts and SQL commands that could be run by PHP. The Security Module also prevents PHP errors to be reported, in case of error only the log files will contain the specific information and error-message.

### 3. Discussion /Conclusion

The final result of the WebGIS system and all its methods/structures can be seen in figure 1.

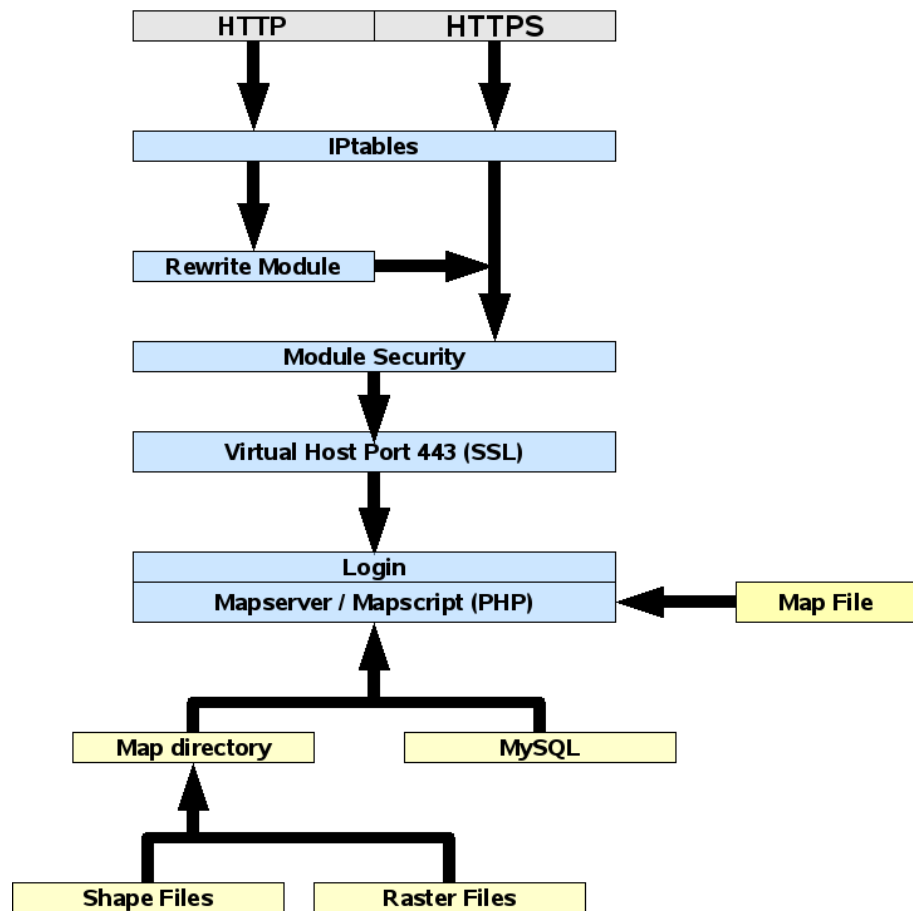


Figure 1 - WebGIS structure contained inside the chroot (except the MySQL database), based in the Mapserver software and with the security enhancements like the Iptables, Apache's rewrite and security module, HTTPS traffic redirection and the login system.

To test the firewall it was used the nmap program to perform a port scan from inside the BGU-Net (by the VPN access) and from an external source of the BGU-Net, the result was that only port 80/443 was open for exterior while other service ports like 22 necessary for SSH access were accessible from inside BGU-Net.

The rewrite module also redirected all the URLs of the Mapserver that were not encrypted, to the HTTPS secure connection.

The security module was tested by injecting some script tags on the URL, which were detected and produced, a "mod\_security: Access denied with code 500. Pattern match" on the error logs of the Apache. The security module also blocked any PHP error being outputted to the users' browsers.

From the security tests it can be concluded that the developed defense system of the CALTER WebGIS can withstand all common internet attacks.

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