

FAO-MOSAICC: module integration requirements and skills

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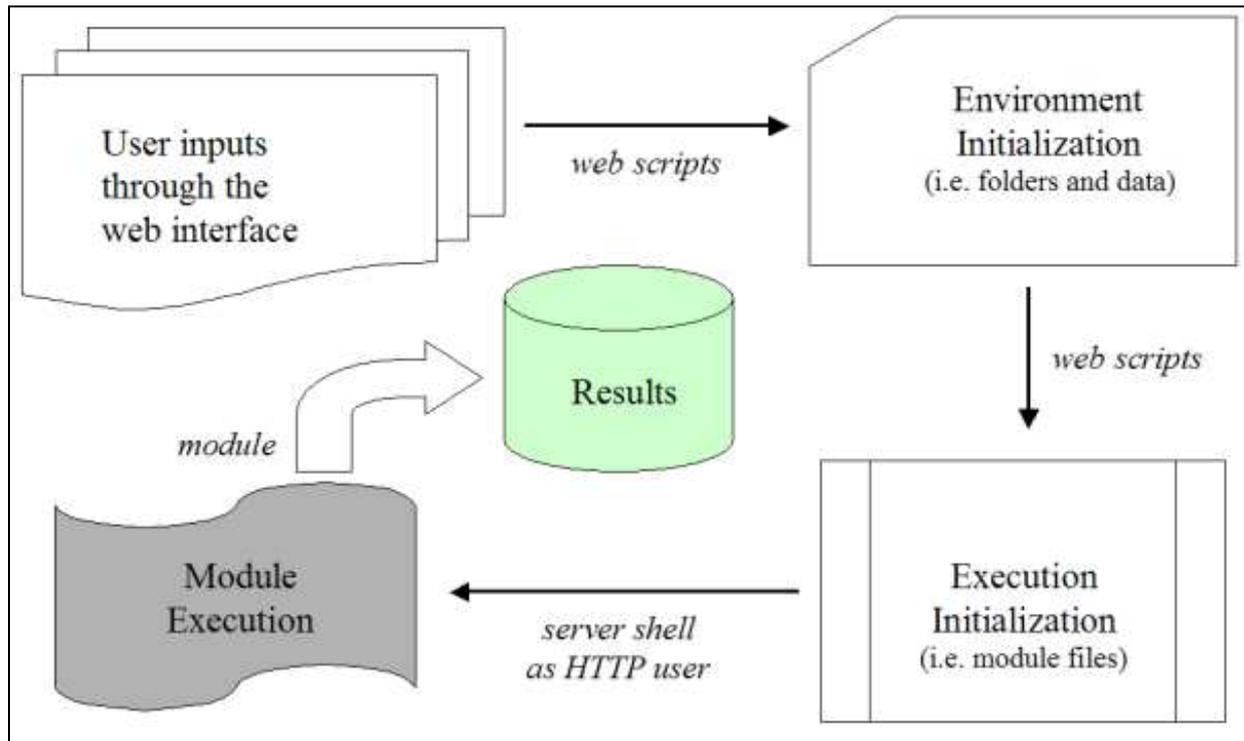
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Introduction

FAO-MOSAICC (for *MO*delling *S*ystem for *A*gricultural *I*mpacts of *C*limate *C*hange) is a system of models designed to carry out each step of the impact assessment from climate scenarios downscaling to economic impact analysis at national level.

The models are programs written in different languages (R, Pascal, Basic and Python) that run on the MOSAICC server, in an environment created from the MOSAICC shell. The following picture shows the scheme of the module execution:



The MOSAICC user interface provides the tools to manage several aspects around and/or behind the “module execution”:

- data management:
 - upload
 - archiving into the DB and on the server disk
 - customisation
 - download
- module upload
- module execution
 - module customisation through a specific interface for each module type
 - data processing
 - data analysis
 - format conversion
 - geographic re-projection
 - module execution
 - module task management
 - result display and download
 - log management

The system is designed to be cross-platform and it is tested under Windows and Linux.

The goal of this document is to provide some guide lines about the following topics:

- hardware requirements
- operational environment requirements
- administrator skills

Hardware requirements

The hardware requirements for the system are quite simple:

- the computer where the system will be installed and the modules will run
- the back-up unit for the system

Server

The system is designed and tested to run under Linux and Windows. Thus, the minimum requirements depend on the selected operating system, but there are some more extra needs:

- enough CPU to run several modules or several instances of the same module at the same time
- enough RAM to run several modules or several instances of the same module at the same time
- enough disk space to store the experiments and the finale results

Minimal configuration:

- CPU: Dual Core 3.00 GHz
- RAM: 4 GB
- System HD: 80 GB
- Data HD: 1 TB
- Operating System:
 - Linux (Red Hat like systems have been tested)
 - Windows Server edition (2000 or higher)

Recommended configuration:

- CPU: Quad Core 3.00 GHz
- RAM: 8 GB
- System HD: 80 GB
- Data HD: 1 TB
- RAID 1 or 5
- Operating System:
 - Linux Enterprise Distribution (Red Hat like systems have been tested)
 - Windows Server edition (2000 or higher)

Back-up

The system is going to produce a lot of data, especially when working in the climate area.

A back-up unit should be installed in order to guarantee the experiments won't be lost in case of system failure.

Minimal configuration:

- Device type: USB 2.0 external disk
- Device size: 1 TB
- RAID level: 1

Recommended configuration:

- Device type: NAS (*Network-Attached Storage*)
- Device size: 1 TB
- RAID level: 1

Operational environment requirements

The operational environment relates to the power supply and the network.

Power supply

Any PC or server that handles important information should have a suitable power supply, that guarantees a safe shutdown of the system when the input power source rails. It is strongly recommended to connect the server to an UPS (*uninterruptible power supply*) unit and to configure it to shutdown when the UPS reports that the input power source fails.

Network

The user interface of FAO MOSAICC is web-based and then the natural environment to use it is a network that can be just local or even Internet. It is possible to work directly on the server console, but it is not advisable except for test purposes.

The type of network depends on the usage of the system. The local firewall on the server is usually activated, but if the users need to access it from Internet it is strongly recommended to install the server behind a firewall that will guarantee the network security.

Minimal configuration:

- Network type: local network (LAN)
- Network speed: 100 Mbps

System administrator skills

A system administrator, systems administrator, or sysadmin, is a person employed to maintain and operate a computer system and/or network. The system administrator is not requested to deal with the FAO MOSAICC system directly but more properly with the computer and the network that host the it. Unlike many other professions, there is no single path to becoming a system administrator: the most important skill for a system administrator is the experience built after several years of daily troubleshooting in practical situations, with several computers connected to the network, operational services (web, ftp, mail, etc.) and firewall. A system administrator must also have the ability to consider the system like an organism where all the components interact to produce its behaviour, that is what the users perceive.

Minimal skills:

- system administration for the host operating system (Linux or Windows server)
 - installation and configuration of the operating system
 - management of the operating system, including its updates
 - user management
 - disk management
 - RAID management and troubleshooting
 - basic services configuration and management
 - WEB server configuration and management
 - FTP server configuration and management
 - monitoring tools configuration and management
 - shell scripting
 - task scheduling
- DB administration
 - back-up
 - recovery procedures
 - DBMS optimisation
- network administration
 - network configuration
 - basic security skills (i.e. sufficient to deal with simple firewall appliances or software-based firewalls)
- open-source package compiling and installation
 - compiling packages usually requires programming skills in low level languages, like C/C++

Note - No user should be able to access the FAO MOSAICC folders in write mode except the system administrator and the WEB server user.

FAO-MOSAICC uses the following open-source software:

- Programmig Languages:
 - C / C++ (ver. 4.1.2)
 - Pascal (ver. 2.2.4)
 - Basic (ver. 0.20.0)
 - Fortran (ver. 2.4.0)
 - Python (ver. 2.4.3)
 - R (ver. 2.12.1)
- Libraries:
 - PROJ.4 (ver. 4.7.0)
 - GEOS (ver. 3.2.2)
 - GDAL (ver. 1.8.0)
 - GDAL-Python (ver. 1.7.3)
- DBMS:
 - PostgreSQL (ver. 8.4.4)
 - PostGIS (ver. 1.5.1)

- WEB server:
 - Apache (ver. 2.2.3)
 - PHP (ver. 5.1.6)
 - Mapserver (ver. 5.6.5)
 - Drupal CMS (ver. 6.20)

The above list reports the tested version of each software as reference.

Note - To update the operating system could require to update the libraries and other pieces of software that are parts of FAO-MOSAICC, but before attempting to go through such kind of operation it is important to evaluate the consequences because sometimes the version dependencies are very tricky.

Programming skills

To have programming skills means to know how to design, write, build, debug and distribute an application, that is much more complex than a procedure that reads parameters, performs some operations and prints the results. To build an open-source software sometimes means to download several packages, to build each of them and then to build the required software. To have an idea of that it could be useful to flick through the compiling instructions of MapServer and GDAL:

- MapServer: <http://mapserver.org/installation/unix.html>
- GDAL <http://trac.osgeo.org/gdal/wiki/BuildingOnUnix>