

# Introduction

## Getting Started

As a developer you are tasked with altering or extending the functionality of a HUBzero install or one of its extensions. You will need to be proficient in PHP and have some familiarity with such things as JavaScript or CSS. If you are new to HUBzero, this reference should help guide you through the creation of extensions such as modules and widgets (more on those later).

Thankfully, the requirements for getting started creating HUBzero extensions are minimal: knowledge of programming in PHP and a good text editor. While those are the only *requirements* we do, however, recommend you have working knowledge of the following:

- (X)HTML
- Cascading Stylesheets (CSS)
- JavaScript (familiarity with the [jQuery](#) framework is a plus)
- XML
- Model-View-Controller (MVC) design pattern
- Object-Oriented Programming

# Installation

## Directories & File Structure

The initial directory structure of a HUBzero install.

```
/hubzero
  /administrator
  /cache
  /components
  /images
  /includes
  /language
  /libraries
  /logs
  /media
  /modules
  /plugins
  /site
  /templates
  /tmp
  /xmlrpc
  configuration.php
  index.php
  index2.php
  htaccess.txt
  robots.txt
```

While this looks very much like a typical Joomla! 1.5 install, there are some noticeable exceptions. Some directories vital to HUBzero functionality have been added. A quick explanation of the additional directories:

**/site**

This is where HUB specific data such as member pictures, files used in wiki pages, etc. is stored.

# Accessing Files

## Accessing via SSH

The following tutorial should help you in using SSH to connect to and from your HUBzero server(s). You should be relatively comfortable with using a terminal (also referred to as a "command-line tool") to navigate directories and manipulate files.

**Warning:** Most accounts do **not** have SSH/sFTP access initially. Your system administrator must grant your account access before you will be able to connect.

From a terminal type `ssh <user>@<host>`. You will then be prompted for a password. Both the username and password will typically be the same as the account you registered on <host>.

```
yourmachine:~ you$ ssh username@host
yourmachine:~ you$ username@host password:
```

```
host ~
```

## Windows Clients

- [PuTTY](#) (a Telnet and SSH client)

## Mac OSX

All versions of Mac OSX come with Terminal.app which may be found in the /Utilities directory of your /Applications directory.

## Accessing via sFTP

sFTP, or secure FTP, is a program that uses SSH to transfer files. Unlike standard FTP, it encrypts both commands and data, preventing passwords and sensitive information from being transmitted in the clear over the network. It is functionally similar to FTP, but because it uses a different protocol, you can't use a standard FTP client to talk to an sFTP server, nor can you connect to an FTP server with a client that supports only sFTP.

The following tutorial should help you in using sFTP to connect to and from your HUBzero server(s).

**Warning:** Most accounts do **not** have SSH/sFTP access initially. Your system administrator

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must grant your account access before you will be able to connect.

### Graphical Clients

Using graphical SFTP clients simplifies file transfers by allowing you to transmit files simply by dragging and dropping icons between windows. When you open the program, you will have to enter the name of the host (e.g., yourhub.org) and your HUB username and password.

#### Windows Clients

- [WinSCP](#)
- [BitKinex](#)
- [FileZilla](#)
- [PuTTY](#)

#### Mac OSX Clients

- [Transmit](#)
- [Fetch](#)
- [Cyberduck](#)
- [Flow](#)
- [Fugu](#)

### Command-line

You can use command line SFTP from your Unix account, or from your Mac OS X or Unix workstation. To start an SFTP session, at the command prompt, enter:

```
yourmachine:~ you$ sftp username@host
yourmachine:~ you$ username@host password:
```

**host** ~

Some standard commands for command-line sFTP

Command	Description
cd	Change directory
chmod	Change permissions
chown	Change ownership
dir (or ls)	List the contents of the remote directory
exit (or quit)	Close the session and return to the local shell
get	Copy files from the remote host to the local host

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Command	Description	
	help (or ?)	Get h
	lcd	Chan
	lls	See a
		the lo
	mkdir	Crea
	ln (or symlink)	Crea
		comp
	lpwd	Show
		direc
	lumask	Chan
	mkdir	Crea
	put	Copy
		remo
	pwd	Show
		direc
	rename	Ren
	rm	Dele
	rmdir	Rem
		direc
	version	Displ
	!	In Un
		enter
		SFTP
		!pwd
		dropp

## Finding Files

Once connected to a server, by either sFTP or directly with SSH, you will need to find the web root which contains the HUB install. The web root for the production version of a HUB can be found at /www/yourhub. Typically, HUBs will also have a development version of a HUB, which can be found at /www/dev.

Once in the desired directory, file layout and directory structure follows Joomla! 1.5 conventions unless otherwise noted.

See the [Installation](#) overview for details on a typical HUBzero install's directory structure.

# Direct Database Access

## Accessing via command-line

The following tutorial should help you in using SSH to connect to and from your HUBzero server(s) and access the database. You should be relatively comfortable with using a terminal (also referred to as a "command-line tool") to navigate directories and manipulate files.

**Warning:** Most accounts do **not** have SSH/sFTP access initially. Your system administrator must grant your account access before you will be able to connect.

See [Accessing Files](#) for further details on how to use SSH.

# Libraries

## Hubzero

Location:

```
/libraries/Hubzero
```

The Hubzero library contains code that is essential for a hub to run properly and altering or adding to the library without Hubzero approval is *strongly* discouraged.

## File Formatting

For files that contain only PHP code, the closing tag ("?>") is omitted. It is not required by PHP, and omitting it prevents the accidental injection of trailing white space into the response.

## Class Names

Class names may only contain alphanumeric characters. Numbers are permitted in class names but are discouraged in most cases. Underscores are only permitted in place of the path separator; the filename `/libraries/Hubzero/User/Helper.php` must map to the class name `"Hubzero_User_Helper"`.

If a class name is comprised of more than one word, the first letter of each new word must be capitalized. Successive capitalized letters are not allowed, e.g. a class `"Hubzero_PDF"` is not allowed while `"Hubzero_Pdf"` is acceptable.

**Note:** Code deployed alongside Hubzero libraries must never start with `"Hubzero_"`.

## Filenames

Hubzero standardizes on a class naming convention whereby the names of the classes directly map to the directories in which they are stored. The root level directory of Hubzero's standard library is the `/libraries/Hubzero` directory. All Hubzero classes are stored hierarchically under this root directory.

For all other files, only alphanumeric characters, underscores, and the dash character ("-") are permitted. Spaces are strictly prohibited.

File names must map to class names as described above.

# Debugging

## Joomla's Debugging Mode

To turn on Joomla!'s Debug mode:

- Login to the Joomla administration e.g. <http://YOURSITE/administrator/>
- At the top under the **Site** menu click **Global Configuration**.
- Click the **System** tab.
- Under the **Debug Settings** section change **Debug System** to **Yes**.
- Click the **Save** button.

Debug mode will output a list of all queries that were executed in order to generate the page. This will also turn on a stack trace output for error and warning pages. Hubzero components will also have PHP error reporting turned on, allowing one to see any PHP errors that may be present.

**Note:** Turning on debugging mode for production (live) sites is strongly discouraged and it is recommended to be avoided if at all possible.

## Restricting who sees debug output

Since debug mode can contain potentially sensitive, it is **strongly** recommended that access to debug output is restricted to the administrator or super administrator user access levels and/or a defined list of users.

To restrict:

- Login to the Joomla administration e.g. <http://YOURSITE/administrator/>
- At the top under the **Extensions** menu click **Plugin Manager**.
- Select **System** from the "Select Type" drop-down.
- Find the debug plugin, typically titled "System - Debug", and click to edit.
- Under the **Parameters** section select the **Allowed Groups** and/or enter a comma-separated list of usernames into the Allows Users box.
- Click the **Save** button.

## Illegal variable ... passed to script.

One encounters the following error:

Illegal variable `_files` or `_env` or `_get` or `_post` or `_cookie` or `_server` or `_session` or `globals` passed to script.

This error is generated when the key of a key-value pair is numeric in one of the following



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variables: `_files` or `_env` or `_get` or `_post` or `_cookie` or `_server` or `_session` or `globals`. An example of this would be `$_POST[5] = 'value'`. This is most often generated by having form elements with numeric values as names. For example:

```
<input type="text" name="5" />
```

As the error indicates, this is not allowed. Element names must include at least one non-numeric character. Examples:

```
<input type="text" name="n5" />
```

```
<input type="text" name="n_5" />
```