Moodle 3 Administration
Third Edition

Moodle is the de facto standard for open source learning platforms. However, setting up and managing a learning environment can be a complex task since it covers a wide range of technical, organizational, and pedagogical topics.

This book concentrates on basic tasks such as how to set up and configure Moodle and how to perform day-to-day administration activities, and moves on to more advanced topics that show you how to customize and extend Moodle, manage courses, cohorts, and users, and how to work with roles and capabilities. You’lld learn how to configure Moodle plugins and ensure your VLE conforms to the pedagogical and technical requirements of your organization. You’ll then learn how to integrate the VLE via web services and network it with other sites, including Mahara, and extend your system via plugins and LTI. By the end of this book, you will be able to set up an efficient, fully fledged, and secure Moodle system.

Who this book is written for
If you are a technician, systems administrator, or part of an academic staff, this is the book for you. This book is ideal for anyone who has to administer a Moodle system. Whether you are dealing with a small-scale local Moodle system or a large-scale multisite VLE, this book will assist you with any administrative task. Some basic Moodle knowledge is helpful, but not essential.

What you will learn from this book
- Install and update Moodle on multiple platforms manually and via the CLI and Git
- Manage courses and categories, users and cohorts, as well as roles
- Get Moodle hooked up to repositories, portfolios, and open badges
- Configure Moodle for mobile usage, accessibility, localization, communication, and collaboration
- Guarantee backups, security, and privacy, and achieve maximum performance via the Moodle Universal Cache and the new cron system
- Configure the Moodle events system to generate comprehensive reports, statistics, and learning analytics
- Network Moodle with Mahara and extend it with third-party add-ons and via LTI
- Customize Moodle web services to enable mobile learning and integration with other IT systems

In this package, you will find:

- The author biography
- A preview chapter from the book, Chapter 1 'Moodle Installation'
- A synopsis of the book’s content
- More information on *Moodle 3 Administration Third Edition*
Alex Büchner is the co-founder and technical director of the Platinum Totara, Moodle, and Mahara partner, Synergy Learning. He has been involved in system and database administration for more than two decades and has been administering virtual learning environments of all shapes and sizes since their advent on the educational landscape.

Alex holds a PhD in computer science and an MSc in software engineering. He has authored over 50 international publications, including two books, and is a frequent speaker on Totara, Moodle, Mahara, and related open source technologies. His first two books on Moodle Administration by Packt Publishing have become the de facto standard on the topic.
Since its launch in 2002, Moodle has become the benchmark that every learning management system is measured against. It has won a wide range of international accolades and established itself as an ecosystem for a large number of educational tools and services.

*Moodle 3 Administration, Third Edition* is a complete, practical guide for administering Moodle sites. It covers setting up Moodle, configuration, and day-to-day administrative tasks as well as advanced options to customize and extend Moodle.

The author, who has been at the cutting edge of Moodle administration since its advent, has adopted a problem-solution approach to bring the content in line with your day-to-day operations. The practical examples will help you to set up Moodle for large organizations and small courses alike.

This is a one-stop reference for tasks that you will come across when administering a Moodle site of any shape or size. It not only covers core Moodle functionality, but also third-party tools and add-ons that will increase your flexibility and efficiency even further when dealing with administrative duties.

Why another book on Moodle administration? Since the second edition of the title in 2011, the system has been modified and extended significantly to cover all the relevant new functionality in Moodle 3.
What this book covers

Moodle has grown into a mature, sophisticated, and complex software system. As a result, Moodle Administration covers a wide range of topics. A fun way to demonstrate the various subjects is in the form of a tube/subway/metro/underground map (under the Creative Commons license by Synergy Learning):

Chapter 1, *Moodle Installation*, tells you about the most suitable Moodle setup for your organization, including software and hardware requirements. You will learn how to install Moodle in three environments, namely, LAMP/Unix, Windows, and Mac OS, before Moodle updates options are covered in detail. Throughout the chapter, you will also learn how to perform some of the described operations using the Moodle Command-line Interface (CLI), Git, and Moodle Shell (Moosh).

Chapter 2, *The Moodle System*, covers the building blocks of the learning platform. First, we cover the Moodle architecture, that is, the main Moodle components and where its data and code is stored. We then provide you with the skills to find your way around Moodle via its intuitive user and administration interface. Finally, we deal with the management of files, which includes Moodle's standard file management, web host file management, and file management via the file system repository.

Chapter 3, *Courses, Users, and Roles*, gives you an overview of Moodle courses, users, and roles. It covers the basics of the three key concepts and demonstrates how the three core elements are inherently intertwined.
Chapter 4, Course Management, shows you how to set up new courses (also in bulk) and organize them in categories. The remainder of the chapter deals with an array of enrolment options, covering Moodle's internal enrolment (manual, self, and guest), cohort enrolment and synchronization, database-driven enrolment, for instance, via LDAP, meta courses, and payment-driven enrolments.

Chapter 5, User Management, explains how to manage users on your system. We first cover what user profiles look like and how they can be extended before presenting (manual and bulk) standard user actions. We then explain how to add users to Moodle manually, that is, one-by-one, and via batch upload before dealing with cohorts. Then, you will learn about a plethora of authentication mechanisms that Moodle equips us with. Finally, we discuss the best practices of user naming schemes.

Chapter 6, Managing Permissions – Roles and Capabilities, guides you through permission management. It applies roles and capabilities to users in different contexts. We will cover the assignment of roles, modification of existing roles, and creation of new roles before we deal with any administrative role-related settings.

Chapter 7, Moodle Look and Feel, tells you how to adapt your Moodle system to bring it in line with the corporate branding of your organization. We will cover the customization of the front page, basic creation of Moodle themes, and support for mobile devices via responsive themes. You will also learn how to configure the Moodle editor and support users with accessibility requirements.

Chapter 8, Moodle Plugins, explains in detail how to extend your Moodle system via third-party add-ons. You will be able to distinguish between good add-ons and not-so-good add-ons before we cover extensions that are popular with other users. We will then cover how to install, configure, and uninstall third-party add-ons. Plugins that are covered are activities, blocks and filters, repositories, portfolios, text editors, licenses, question types and behaviors, plagiarism prevention, licenses, and availability restrictions.

Chapter 9, Moodle Configuration, deals with the educational and technical configuration of your Moodle system. Pedagogical topics that are covered are badges, collaboration (blogs, comments and tags), LTI, localization, grades and gradebook settings, and a number of miscellaneous parameters. Technical subjects that are dealt with include synchronous communication (instant messaging and video conferencing), asynchronous communication (inbound and messaging as well as RSS feeds), and a number of experimental settings.
Chapter 10, Moodle Logging and Reporting, equips you with the tools that you require in order to interpret and analyze the vast amount of usage data that Moodle is collecting. You will learn about the logging framework and monitoring facilities provided by Moodle that include activity reporting, user tracking, and some basic statistics. Then, we will take a look at third-party tools that cover learning analytics, report generation, web log analyzers, and live data trackers such as Google Analytics and Piwik.

Chapter 11, Moodle Security and Privacy, focuses on ensuring that the data in your Moodle system is protected from any misuse. You will learn about security notifications, user security, data and content security, and system security. We will conclude the chapter with information on privacy and data protection concerns.

Chapter 12, Moodle Performance and Optimization, makes sure that your Moodle system runs to its full potential. We will cover configuring, monitoring, and fine-tuning your virtual learning environment for maximum speed. You will learn how to optimize Moodle content before we focus on system parameters, namely, caching via the Moodle Universal Cache (MUC), session handling, cron management, scheduled tasks, module settings, and miscellaneous settings. We also present some basic performance profiling and monitoring tools.

Chapter 13, Backup and Restore, focuses on ensuring that your data would not be lost in the event of a disaster. We will cover course backups, site backups, system backups, and restoring data from the taken data archives.

Chapter 14, Moodle Admin Tools, covers Moodle admin tools that assist you with certain specific administrative tasks. These include web-based helpers such as upgrade and database tools as well as CLI scripts. We will also be looking at some add-ons, especially the powerful Moodle Shell, Moosh.

Chapter 15, Moodle Integration, looks at ways to integrate Moodle with other systems via web services. We will provide information about the basic concepts of Moodle web services before you learn how to set up external systems and users controlling Moodle. This also covers the support for the official mobile app.

Chapter 16, Moodle Networking, tells you how to connect disparate Moodle and Totara systems either in a peer-to-peer setup or via a Moodle hub. You will also be able to apply the learned networking techniques to connect the popular open source e-portfolio system, Mahara, and the social learning tool, Totara Social, to Moodle. We will further show you how to connect to Moodle.net and set up your own community hub.

Appendix, Configuration Settings, provides you with a list of parameters that can be modified in Moodle's configuration file and the impact that each of these values will have. The areas covered are Administration Settings and System Settings.
Let's get started by installing Moodle.

After providing an overview that describes which setup is most suitable, software as well as hardware requirements are outlined.

We will then cover the following installations:

• Installing Moodle in a LAMP/Unix environment
• Installing Moodle in a Windows environment
• Installing Moodle in a Mac OS X environment
• Installing Moodle via the Command Line Interface (CLI)
• Upgrading Moodle manually and via CLI and Git

You will only need to study the section(s) of the operating system(s) you are planning to use. Moodle can be scaled from a single instructor to an entire institution. We will only be able to cover the most common installations and present solutions to some common problems. We also have to assume that you are familiar with basic system administration of the operating system on which you will be installing Moodle.

Moodle installation – an overview

Before we start installing Moodle, you have to decide which setup is right for your organization. Once you have come to a conclusion, there are a number of prerequisites that you have to provide before we can get started.
Choosing the best setup

There are a number of different environments in which you can set up Moodle. The three main criteria that should dictate the choice of the correct setup are:

- **Flexibility**: If you want to have full control over your system, be able to tweak system settings, and make frequent changes to the setup, you are best suited to host your own server. However, if your preferred choice is to only administer Moodle while somebody else is looking after the operating system, the web server, and backups, it is better to opt for a professionally-hosted setup, and particularly, the offerings provided by the authorized Moodle Partners.

- **Scalability**: This is entirely driven by the number of concurrent users, that is, the number of active learners and teachers logged in to Moodle at the same time. A Moodle on a single-processor desktop computer will not be able to cope with hundreds of simultaneously logged-in users. A load-balanced cluster, on the other hand, would be overkill for a small institution with a handful of learners. The following table provides some indicative setups for different types of educational organizations, and is by no means complete:

<table>
<thead>
<tr>
<th>Max number of concurrent users</th>
<th>Recommended setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (to experiment locally)</td>
<td>Desktop, laptop, memory stick</td>
</tr>
<tr>
<td>20 (single class)</td>
<td>Public server or <a href="https://moodlecloud.com/en/">https://moodlecloud.com/en/</a></td>
</tr>
<tr>
<td>100 (small school / company)</td>
<td>Shared server</td>
</tr>
<tr>
<td>250 (large school / company)</td>
<td>Dedicated server</td>
</tr>
<tr>
<td>500 (medium-to-large college)</td>
<td>Dedicated application and database servers</td>
</tr>
<tr>
<td>+500 (university/corporate)</td>
<td>Load-balanced cluster</td>
</tr>
</tbody>
</table>

Please bear in mind that these are only indicative numbers, which are not written in stone, and also depend on the other factors mentioned here. The mentioned hosting option on [https://moodlecloud.com/en/](https://moodlecloud.com/en/) offers free Moodle hosting by Moodle HQ with a number of limitations: maximum number of users is set to 50, storage capacity is limited to 200 MB, there is no ability to install plugins, and there is advertisement displayed throughout the site. This is a good way to try out Moodle, but not intended for production sites.

Organizations require a server (either dedicated or shared) that is either hosted in-house or externally. If you decide to go down the hosted route, it is highly recommended to avoid a cheap hosting package as their systems are not optimized for Moodle usage. This will have a significant impact on the performance of the system, especially with an increasing number of users.
• **Cost**: Budgetary constraints will certainly play an important role in your setup. Unless you already have the appropriate infrastructure in place, it is likely to be more cost-effective to host your Moodle system externally as it saves you from having to purchase servers and provide a 24/7 data connection that caters to your learners' needs. Licensing cost is significantly higher if you use commercial operating systems, web servers, and database systems, instead of an open source solution. Either way, Moodle is designed to support a wide range of possible infrastructures suitable to your organization's IT policy.

In addition to these three key criteria that usually influence the decision about the underlying infrastructure, there are other factors that will have an impact on your decision, such as *in-house expertise, compatibility with other systems, personal preference, and existing resources.*

We will cover the three most popular operating systems for hosting Moodle—Linux, Windows, and Mac OS. For other setups such as on a memory stick, in a virtualized environment, or a larger multi-server cluster, please consult your local Moodle Partner ([https://moodle.com/](https://moodle.com/)). Some hosting companies offer quick one-click installations (often via the Fantastico installer, which usually doesn't contain the latest version). While the resulting Moodle system is sufficient for experimental sites, it is certainly unsuitable for production environments.

**Moodle prerequisites**

There are a number of hardware and software requirements that have to be satisfied before we can start installing Moodle.

**Hardware requirements**

These requirements apply if you host Moodle yourself or if it is hosted on an external server (shared, virtual, dedicated, or clustered). On cheaper hosting packages, the hardware configuration is often insufficient to run Moodle efficiently:

- **Disk space**: Moodle takes up between 150 MB and 200 MB of disk space. However, this only provides you with an empty system and does not take into account the space you require for any learning resources. The faster the disks, the better. RAIDed disks are recommended, but are not essential on smaller installations.

- **Memory**: The (absolute) minimum requirement is 256 MB for a single-user instance, but more is necessary in a multiuser setup. A good rule of thumb is to have 1 GB of RAM for every 10-15 concurrent users. You have to double this calculation on Windows-based systems due to the higher overhead of the operating system.
The more RAM the better; the faster the RAM the better.

- **CPU**: Processor type and speed is important too, but not as important as RAM. As always, the faster the CPU the better, and the more cores a CPU has, the more powerful it will be.

- **Network**: While Moodle can run on a standalone machine, its full potential is in a networked environment. A fast network card is essential, as is good upload and download speed if the LMS is accessed over the Internet.

### Software requirements

While it is recommended to have the latest version installed, for Moodle 3, you must have the following components up and running on your server (release specific notes can be found at [https://docs.moodle.org/dev/Releases](https://docs.moodle.org/dev/Releases)):

- **Database**: Moodle officially supports four database systems: MySQL (version 5.5.31 or later utilizing the ACID-compliant InnoDB storage engine), PostgreSQL (version 9.1+), MariaDB (version 5.5.31+) Microsoft SQL Server (version 2008+), and Oracle (version 10.2+).

- **Web server**: Apache is the preferred web server option, but Moodle works well with any other web server that supports PHP such as Microsoft IIS.

- **PHP**: PHP 5.4.4 is the minimum PHP version to run Moodle 3. PHP 7 is also supported. There are a number of PHP settings, which you might have to change in the `php.ini` or `.htaccess` file (see [https://docs.moodle.org/en/Installing_Moodle](https://docs.moodle.org/en/Installing_Moodle) for more details).

- **PHP extensions**: Moodle makes use of a number of extensions, most of which are compiled into PHP, by default. They are as follows:

  - **Compulsory extensions**: curl, ctype, dom, gd, hash, iconv, json, pcree, simplexml, spl, xml, zip, and zlib
  - **Recommended extensions**: intl, mbstring, openssl, tokenizer, soap, and xmlrpc
  - **Conditional extensions**: mysql, odbc, pgsql, (depending on database) and ldap, ntlm, and so on (depending on authentication mechanism used)
Depending on your specific setup, additional software and hardware might be required. It is assumed that the database, web server, PHP, and its extensions have been installed correctly as this is not a VLE administrator task. Once this is the case, we are ready to go.

Internet Explorer 8 is not supported by Moodle. A modern web browser (Internet Explorer 9+, Firefox 25+, Google Chrome 30+, or Safari 6+) is required to access Moodle.

Installation in a LAMP environment
Moodle is developed in Linux using Apache, MySQL, and PHP (known as the **LAMP platform**). If you have a choice, this is the preferred environment to use. There is ongoing debate whether PostgreSQL is the more suitable database option, but we will stick with MySQL as this is the system most administrators are familiar with. Also, some organizations are bound to Microsoft SQL or Oracle. If this is the case, please refer to the respective installation guide as this is beyond the scope of this book.

**Downloading Moodle**
Go to [https://download.moodle.org/](https://download.moodle.org/) and select **Latest release** in the **Standard Moodle** section:

<table>
<thead>
<tr>
<th>Version</th>
<th>Information</th>
<th>.tgz</th>
<th>.zip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moodle 3.0+</td>
<td>This package is built every week with new fixes produced by our stable development process. It contains a number of fixes made since the 3.0 release and is usually a better choice for production than the actual 3.0 package below.</td>
<td>36.2MB</td>
<td>48MB</td>
</tr>
<tr>
<td>MOODLE_30_STABLE</td>
<td>Built Weekly 3 days 1 hour ago</td>
<td>244 today</td>
<td>751 today</td>
</tr>
<tr>
<td></td>
<td>• Recent changes log</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Upgrading notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Requires: PHP 5.4.4, MariaDB 5.5.31 or MySQL 5.5.31 or Postgres 9.1 or MSSQL 2008 or Oracle 10.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Language packs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Moodle 3.0  | This is the latest official update of Moodle 3.0.                           | 36.2MB | 48MB   |
| MOODLE_30  | 16 Nov 2015 6 days 17 hours ago                                             | 48 today | 114 today |
|            | • Release notes                                                              |        |        |
|            | • Fixed issues                                                               |        |        |
|            | • Upgrading notes                                                            |        |        |
|            | • Requires: PHP 5.4.4, MariaDB 5.5.31 or MySQL 5.5.31 or Postgres 9.1 or MSSQL 2008 or Oracle 10.2 |        |        |
|            | • Language packs                                                             |        |        |
Moodle Installation

By the time of reading, a newer version is likely to be available. If you wish to go
with the 3.0 version this book has been written for, select Other supported releases
on the right; otherwise, feel free to go with the latest stable build; most content in this
book will still be applicable.

There are five types of builds available on Moodle's download site:

- **Latest release**: For the current version of Moodle, there are two releases—the
  latest stable build and the latest official release. The latest stable version is
  created weekly (every Wednesday) and is the best choice for a new server. The
  latest official release contains the stable build as well as new fixes, but
  the version will not have gone through the weekly code review and might
  contain unresolved issues.

- **Other supported releases**: Older versions than the current one are
  maintained by the Moodle development team and bug fixes are back-ported
  for 12 months after release. Sometimes, the newly-added functionality is
  back-ported. Version 3.1 will be a long-term support release and will be
  supported for 3 years.

- **Security-only-supported releases**: For one further release, critical fixes that
  will impact on security or data loss will be provided, but no other bug fixes
  will be back-ported.

- **Legacy releases**: For older versions, the last build is made available.
  However, these are not maintained any further.

- **Development release**: Moodle also offers you the option to download beta
  releases of the software (if available) and also the latest development release.
  These should only be downloaded for testing or development purposes,
  never in production environments!

Each version is made available in the two compressed formats: TGZ (use the **tar**
command to uncompress) and ZIP (requires **unzip**). You can either download them
by clicking on the respective link or, if you have (secure) shell access, retrieve the file
directly by using the **wget** command:

```
wget http://download.moodle.org/moodle/moodle-latest.zip
```

The location where you install Moodle is referred to as **dirroot**.
If you make use of Moodle Shell (MOOSH), which is described in more detail in Chapter 14, Moodle Admin Tools, you can use the following command to download the latest stable branch of Moodle:

```
moosh download-moodle
```

Once you have moved the file to the location where you want to install it on your web server (dirroot), extract the file using the `unzip` command (or `tar xvfz` if you downloaded the TGZ version). In a hosted environment, you might have to use the uncompressing method provided by the web administration interface (cPanel, Plesk, or any bespoke system):

```
unzip moodle-latest.zip

tar xvfz moodle-latest.tgz
```

If you place the entire folder in your web server documents directory, the site will be located at `www.yourwebserver.com/moodle`. To access your site from `www.yourwebserver.com`, copy the contents directly into the main web server's documents directory.

The URL via which Moodle is accessed is referred to as `wwwroot`.

Once this has been successfully done, you have to create the database that Moodle uses to store its data.

## Creating the Moodle database and the data directory

Moodle requires a database where it can store its information. While it is possible to share an existing database, it is highly recommended to create a separate database for Moodle. This can either be done via a web interface, as provided for hosted servers, or via the Unix command line.

### Using a hosted server

Most hosting providers provide a dedicated web interface to carry out basic database operations. Alternatively, you can use phpMyAdmin, an open source software that allows you to manage MySQL databases over the Web. It is part of most Linux distributions and many control panels, such as CPanel or Plesk. (phpMyAdmin is often configured not to allow new databases to be created. If this is the case, you have to create the database from the database manager in your control panel.)
Once you have started phpMyAdmin, go to the Databases section and create a new database using the UTF collation (utf8_general_ci collation). You don't need to create any tables; Moodle will be populating the database during the installation process.

While you can use an existing database user account, it is good practice to create a dedicated user for the Moodle database. This step is carried out in the Privileges section.

![Caution] Do not use the MySQL root account for your Moodle database!

phpMyAdmin allows you to perform both steps—creating a database and adding a new user—in a single action, as shown in the following screenshot. We will create a user, book, and also check the Create database with same name and grant all privileges option:

### Using the command line

If you don't have access to a web interface to create MySQL databases and user accounts or if you prefer to use a Linux shell, you can perform these steps via the command line:

1. Start the database command line tool by entering `mysql -root -p` and enter the password at the prompt.
2. Create a database here (called moodle) by entering `CREATE DATABASE moodle;` (all MySQL commands have to be completed with a semicolon).
3. Set the default character and collation order to UTF8 by entering `ALTER DATABASE moodle DEFAULT CHARACTER SET utf8 COLLATE utf8_unicode_ci;`.

4. Create a user and password (here `user@localhost` and `password`, respectively) and grant database access permissions by entering `GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, CREATE TEMPORARY TABLES, DROP, INDEX, ALTER ON moodle.* TO user@localhost IDENTIFIED BY 'password';`.

5. Exit the MySQL command tool by entering `QUIT`.

It is necessary to reload the grant tables using the following command line:

```
mysqladmin -u root -p reload
```

You have now completed the database setup. All we have to do now is to create Moodle's data directory before we are ready to start the installation of Moodle itself.

**Creating the Moodle data directory**

Moodle stores most of its information in the database you have just created. However, any uploaded files such as assignments or pictures are stored in a separate directory. This data directory in Moodle is usually referred to as `moodledata`.

The location which holds your Moodle data files is referred to as `dataroot`.

Later on, the Moodle installer will attempt to create this directory but, in some setups, this is not possible due to security restrictions. To be on the safe side, it is better to create `moodledata` manually or via a web-based file manager, as provided by some systems:

1. Create the directory by entering `mkdir moodledata`. This is where all the uploaded files by course authors and learners will be stored, so make sure this is dimensioned properly. You might also consider to create this in a separate partition.

2. Change permissions recursively by entering `chmod -R 0770 moodledata` (if you use 0777, then everybody on the server will have access to the files).
3. Change the user and group of the directory to that of your web server (usually apache or www-data and nobody or www-data, respectively) by entering `chown -R apache:nobody moodledata`.

If you don't have permission to create the data directory in a secure location, create the .htaccess file in your home directory containing the following two lines:

```plaintext
order deny,allow
deny from all
```

This will prevent files from being accessed without the user having permissions to do so.

**Running the installer script**

The installer script performs two main actions—populating the database and creating the configuration file, `config.php`. The Moodle installer is initiated by entering the URL of `wwwroot` (the location where you copied Moodle) into your web browser; Moodle will recognize that it hasn't been installed yet and start the process automatically.

The Moodle installer has to set a session cookie. If your browser has been configured to trigger a warning, make sure you accept that cookie.

The first screen lets you choose the language to be used during installation. This is not the locale used for Moodle, only the language for the installation:
The following screenshot displays the expected values for **Web address** of the site (wwwroot), **Moodle directory** (dirroot) and **Data directory** (dataroot); you might have to modify the data directory entry if the location of your moodledata differs:

<table>
<thead>
<tr>
<th>Web address</th>
<th><a href="http://packt.ab.local">http://packt.ab.local</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Moodle directory</td>
<td>/var/www/packt</td>
</tr>
<tr>
<td>Data directory</td>
<td>/var/www/moodledata</td>
</tr>
</tbody>
</table>

If `dataroot` cannot be located or does not have the correct permissions, an error message with details will be displayed. The same applies if `dataroot` is accessible directly via the Web and is hence, not secure.

In the following screenshot, you have to select which database you wish to use. On my system, only the drivers for MySQL, MariaDB, and PostgresSQL are installed. To use other database systems such as Oracle or MS SQL Server, the respective driver has to be installed first.
Moodle Installation

This interface is using the configuration details previously established. The following screenshot will look slightly different if you have chosen a different database driver to the native MySQL:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database host</td>
<td>The default is localhost (127.0.0.1), which is correct if the database is located on the same server as the web server. If it is located on a separate server, specify the IP address (preferably unresolved, to improve performance).</td>
</tr>
<tr>
<td>Database name</td>
<td>This is the database name, user name, and password you enter when you run the <code>mysql</code> command.</td>
</tr>
<tr>
<td>Database user</td>
<td></td>
</tr>
<tr>
<td>Database password</td>
<td></td>
</tr>
<tr>
<td>Tables prefix</td>
<td>All the tables the Moodle installer is going to create will be prefixed with <code>mdl_</code>. This should only be changed if you run multiple Moodle installations using the same database.</td>
</tr>
<tr>
<td>Database port</td>
<td>This is the port of the database in your setup. It is usually empty or 3306.</td>
</tr>
<tr>
<td>Unix socket</td>
<td>If selected, the connection takes place through the file system as opposed to TCP/IP. A Unix socket file connection is marginally faster than TCP/IP, but it can only be used when connecting to a server on the same computer.</td>
</tr>
</tbody>
</table>
Once you see the following screen, you will know the Moodle configuration file, config.php, has been successfully created. If the creation of the configuration file fails (usually because of incorrect permissions), the installer will display the content of the configuration file. You will have to copy the text from the screen and paste it to config.php in your dirroot.

---

**Moodle - Modular Object-Oriented Dynamic Learning Environment**

**Copyright notice**

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http://docs.moodle.org/dev/License

Have you read these conditions and understood them?

[ ] Continue  [ ] Cancel

---

Before Moodle can proceed with the installation, you have to agree to the GPL license agreement. You find the full license text at https://docs.moodle.org/dev/License.

Once you have accepted the license agreement, the Moodle installer checks to see whether certain components are installed. Not all the modules are compulsory — see the Moodle prerequisites section in this chapter and notice on screen. The installer also verifies the key PHP settings. If any of the tests are not passed, it is important that you go back to the Software requirements section to resolve any problems and restart the installation process after the issues have been fixed. Otherwise, some features may not work or the installer will not continue, depending on the importance of the module.
Two common issues that arise when using MySQL are the prerequisite to use the InnoDB Barracuda file format and file-per-table mode. In both cases entries have to be added to the [mysqld] section in `/etc/mysql/my.cnf` (innodb_file_format=Barracuda and innodb_file_per_table, respectively).

Once this screen has been confirmed, the Moodle installer will create all the tables in the database. This process might take a few minutes.
Once the table creation and population has been concluded, you will see the screen to set up the administrator account. The default **Username** is `admin`, which should be changed for security reasons. The self-explanatory fields you have to fill in are **New password**, **First name**, **Surname**, **Email address**, **City/town**, and **Select a country**. All other fields are explained in great detail in Chapter 5, User Management.

The last screen of the installation script asks you to enter some front page settings, namely, the **Full site name**, **Short name for site** and **Front page description**. These front page settings can be modified later (see Chapter 7, Moodle Look and Feel). Additionally, the installer allows you to turn on **Self registration**. Leave this disabled for now, until you have covered Chapter 5, User Management.

Once this information has been entered and the screen has been confirmed, you are ready to start using Moodle. However, it is recommended to finalize the installation and to set up the execution of the Moodle maintenance script.
Finalizing the installation

To make sure that Moodle is running without problems, go to Notifications in the Site administration menu in the Settings block:

In the case of my installation, there are two issues—a PHP setting has a value that is not recommended (I have to change this in the php.ini file) and the so-called cron maintenance script has not run for at least 24 hours. We will solve that mystery after we have registered our site. Other messages might appear in the Notifications area, and you should resolve them in due course.

Moodle provides some statistics about its usage on https://moodle.net/stats/. To be included in these figures, you have to register your Moodle site. Registration (below the Notification link) with https://moodle.org/ (MOOCH) is optional and free, and you decide what information will be made public. Even if you opt out of providing any usage patterns for your site, it is still highly recommended to register, as you will get occasional notices, for example, advanced security alerts:
The settings for the registration screen are as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The name of your site, as you just specified in the front page settings.</td>
</tr>
<tr>
<td>Privacy</td>
<td>You have these options:</td>
</tr>
<tr>
<td></td>
<td>• Please do not publish this site(default)</td>
</tr>
<tr>
<td></td>
<td>• Publish the site name only</td>
</tr>
<tr>
<td></td>
<td>• Publish the site name with a link</td>
</tr>
<tr>
<td>Description</td>
<td>This is a short narrative describing your site.</td>
</tr>
<tr>
<td>Language</td>
<td>This is the language your site is published in.</td>
</tr>
<tr>
<td>Postal address/Country</td>
<td>Enter your address and select the country in which your organization is located.</td>
</tr>
<tr>
<td>Geolocation</td>
<td>This is the latitude and longitude of your location.</td>
</tr>
<tr>
<td>Administrator</td>
<td>Enter your name.</td>
</tr>
<tr>
<td>Phone/Email address</td>
<td>Enter your contact phone number and e-mail address.</td>
</tr>
<tr>
<td>Contact form</td>
<td>By default, Moodle creates a form for other Moodle users to contact you—this can be turned off.</td>
</tr>
<tr>
<td>Email notifications</td>
<td>By default, Moodle e-mails you important information, such as upgrades and security issues.</td>
</tr>
<tr>
<td>Site Url, Moodle version, Moodle release and More information</td>
<td>This is the data sent to <a href="https://moodle.org/">https://moodle.org/</a> on a regular basis. This information will not be displayed to the public and will only be used for statistical purposes.</td>
</tr>
</tbody>
</table>

**Setting up the cron process**

Moodle has to perform a number of background tasks on a regular basis. The script that performs these tasks is known as a cron script, and is executed by the cron process. An entire page has been dedicated to this in the Moodle documentation; you can find it at https://docs.moodle.org/en/Cron. It is important that you set up the cron process; otherwise, any timed Moodle features, such as scheduled backups, sending forum notifications, statistics processing, and so on, will not work.

The script, cron.php, is located in the admin directory and can be triggered manually through a web browser (unless your security settings have been changed). Once executed, the output from the script (http://yoursite/admin/cron.php) is shown on screen and you have to navigate back to your Moodle system manually.
Most control panels allow you to set up scheduled tasks via a cron job management tool. Bear in mind that this is not part of Moodle but a part of your hosting package. The following screenshot is from the widely used Plesk system, which executes the script every five minutes:

There are a number of ways to call the cron script. The most popular option in a Linux environment is `wget -q -O /dev/null http://<yoursite>/admin/cron.php` (see Command in the preceding screenshot). However, if this does not suit your setup, check out https://docs.moodle.org/en/Cron for alternatives.

The interface shown earlier creates an entry in `crontab`, a file located in the `/etc` directory that contains all the system-wide cron entries. This file can also be edited manually using `crontab -e`, but be careful to get the syntax right!

On larger sites, it is recommended to run the cron process every minute!

This concludes the installation process for Moodle in a LAMP environment. If you have come across any problems that have not been covered in these instructions or if your setup differs from the one described, go to https://docs.moodle.org/en/Installing_Moodle, where more installation details are provided and exceptions are covered in great detail.
Installation in a Windows environment

XAMPP is a free Apache distribution that contains MySQL and PHP (as well as Perl) and exists for a number of operating systems. The Moodle distribution for Windows makes full use of XAMPP and is located at https://download.moodle.org/windows. The installation works on all the latest Windows PCs and server variants.

The XAMPP-based Moodle distribution is only suitable for servers with a small number of users. For larger Windows installations, you have to install Moodle manually. This involves installing a database server (MS SQL or any other support system), a web server (Microsoft IIS or Apache), and PHP, separately. You can find details about this process at https://docs.moodle.org/en/Windows_installation.

Once downloaded, follow these ensuring steps:

1. Copy the distribution to a folder on your PC and unzip the archive in your folder of choice.
2. Make sure any software that uses port 80 (such as Skype) is not running, or change its settings to point it to an alternative port.
3. Double-click on StartMoodle.exe.
4. If you have a firewall installed, allow any shown services to be executed.
5. The XAMPP service will run in the Windows background.
6. Go to your web browser and enter http://localhost to your address bar.
7. You will see the same installer being launched as the one described for the LAMP environment. All values have already been populated; all you have to do is navigate through all the screens until you see the familiar Setup administrator account. This process will take a few minutes.
8. Enter the administrator details and select Update profile.
9. Enter the Front Page settings for your site.
10. Check that no warnings are displayed in the Notifications section of the Site administration area in the Settings block.

That's it! Your Moodle system is now up and running and you are now able to use Moodle locally or from a web browser on another machine as long as your IP address is accessible via the network you are on.

To stop using Moodle, double-click on StopMoodle.exe. If you have a firewall installed, you might have to allow the program to be executed.
Instead of starting and stopping Moodle manually, you can start Apache and MySQL automatically as Windows services. In the server directory of your Moodle system, you find an executable called service.exe, which you have to run with the -install parameter as administrator, as in the following example:

```
C:/moodle/server/service.exe -install
```

**Installation in a Mac OS X environment**

**MAMP** is a free distribution that contains Apache (and Nginx), MySQL, and PHP for Mac OS X. Like its Windows counterpart, the Moodle distributions for Mac OS X (10.4 or higher) are only intended for local installations and not for production environments. There is also a link on the download site for Mac server installation.

Moodle4Mac is available as universal binaries using MAMP, which is located at [https://download.moodle.org/macosx](https://download.moodle.org/macosx). Once downloaded, follow these steps:

1. Double-click on the downloaded DMG file to start the installation. This will open a screen as follows, which explains the remainder of the installation process:

![MoodleMac MAMP installation screen](image)

2. Drag the **MAMP** folder on this screen onto the **Applications** icon, which will copy the Moodle system and its required components.
3. Open the MAMP folder in Applications, where you will find the following relevant icons:

4. Double-click on the MAMP.app icon and start servers (Apache and MySQL). You can configure MAMP to automatically start the two servers in the preferences:

5. Double-click on the Link to Moodle30 icon, which opens your Moodle instance on your localhost in your default web browser.

And that's it! An installation cannot be easier than that! You don't even have to go through the installation process. Moodle is already preconfigured, and you are ready to go.
The default password for the admin account is 12345, which you should change in the user profile.

The MAMP folder also includes a shell script called UpdateMoodle30.sh (this requires Git to be installed—see the Updating Moodle section discussed later). When you double-click on the file, the script will be executed to download the latest version of Moodle and install it on your Mac. On all other operating systems, you will have to go through a more cumbersome update process, which is described further.

### Installation via the Command Line Interface

Moodle provides a Command Line Interface (CLI), which lets you perform a number of administrative tasks from the Unix shell prompt. There is no CLI for Windows-based systems. CLI-based installations are useful if you need to automate setups, for example, in an environment where you have to host multiple Moodle instances.

The CLI is not for the faint-hearted, so be careful when using it. You have to execute the installation script as the same user used for the web server, usually www-data or apache. You can run the installation script, install.php, in interactive mode (you will have to enter any parameters by hand) or in non-interactive mode where the script will run silently.
From your dirroot, you can initiate the interactive script as follows:

```
sudo -u www-data /usr/bin/php admin/cli/install.php
```

More interesting is the non-interactive mode as this can be used for scripting and automation purposes. The list of all the available parameters is displayed using the

```
--help
```

command:

```
sudo -u www-data /usr/bin/php admin/cli/install.php --help
```

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>--chmod=OCTAL-MODE</td>
<td>Permissions of new directories created within dataroot. Defaults is 777. You may want to change it to 770 or 2750 or 750. See chmod man page for details.</td>
</tr>
<tr>
<td>--lang=CODE</td>
<td>Installation and default site language.</td>
</tr>
<tr>
<td>--wwwroot=URL</td>
<td>Web address for the Moodle site, required in non-interactive mode.</td>
</tr>
<tr>
<td>--dataroot=DIR</td>
<td>Location of the moodle data folder, must not be web accessible. Default is moodledata in the parent directory.</td>
</tr>
<tr>
<td>--dbtype=TYPE</td>
<td>Database type. Default is mysql.</td>
</tr>
<tr>
<td>--dbhost=HOST</td>
<td>Database host. Default is localhost.</td>
</tr>
<tr>
<td>--dbname=NAME</td>
<td>Database name. Default is moodle.</td>
</tr>
<tr>
<td>--dbuser=USERNAME</td>
<td>Database user. Default is root.</td>
</tr>
<tr>
<td>--dbpass=PASSWORD</td>
<td>Database password. Default is blank.</td>
</tr>
<tr>
<td>--dbport=NUMBER</td>
<td>Use database port.</td>
</tr>
<tr>
<td>--dbsocket=PATH</td>
<td>Use database socket, 1 means default. Available for some databases only.</td>
</tr>
<tr>
<td>--prefix=STRING</td>
<td>Table prefix for above database tables. Default is mdl_.</td>
</tr>
<tr>
<td>--fullname=STRING</td>
<td>The fullname of the site</td>
</tr>
<tr>
<td>--shortname=STRING</td>
<td>The shortname of the site</td>
</tr>
<tr>
<td>--summary=STRING</td>
<td>The summary to be displayed on the front page</td>
</tr>
<tr>
<td>--adminuser=USERNAME</td>
<td>Username for the moodle admin account. Default is admin</td>
</tr>
<tr>
<td>--adminpass=PASSWORD</td>
<td>Password for the moodle admin account, required in non-interactive mode.</td>
</tr>
<tr>
<td>--adminemail=STRING</td>
<td>Email address for the moodle admin account.</td>
</tr>
<tr>
<td>--upgradkey=STRING</td>
<td>The upgrade key to be set in the config.php, leave empty to not set it.</td>
</tr>
<tr>
<td>--non-interactive</td>
<td>No interactive questions, installation fails if any problem encountered.</td>
</tr>
<tr>
<td>--agree-license</td>
<td>Indicates agreement with software license, required in non-interactive mode.</td>
</tr>
<tr>
<td>--allow-unstable</td>
<td>Install even if the version is not marked as stable yet, required in non-interactive mode.</td>
</tr>
<tr>
<td>--skip-database</td>
<td>Stop the installation before installing the database.</td>
</tr>
<tr>
<td>-h, --help</td>
<td>Print out this help</td>
</tr>
</tbody>
</table>

Example:
```
$ sudo -u www-data /usr/bin/php admin/cli/install.php --lang=cs
```

An example command line would look similar to the following, where you will have to adjust the parameters to your local setup:

```
sudo -u www-data /usr/bin/php admin/cli/install.php
--wwwroot=http://123.54.67.89/moodle --dataroot=/var/moodledata/
--dbtype=mysql --dbhost=localhost --dbname=moodle --dbuser=moodle
--dbpass=Password123! --fullname=moodle2 --shortname=moodle2
--adminpass=Password123! --non-interactive --agree-license
```
Moodle Installation

There are more Moodle tasks that can be administered via the CLI, for example, resetting passwords or putting Moodle in maintenance mode. We will show the relevant syntax at the appropriate places throughout the book.

If your installer crashes, you might have to increase your PHP memory_limit and post_max_size settings in php.ini.

Updating Moodle

Moodle is being updated constantly, which is common practice in open source development environments. A new version containing resolved bug fixes is created every night and, as mentioned earlier, a fully-tested version is released on a weekly basis. There is usually no need to install updates every week; however, there are a number of scenarios when you should upgrade your Moodle system:

- Security patches have been issued
- New features have been added
- Bugs have been fixed that affect your setup
- A new version is released

There are principally two ways Moodle systems can be updated. You can either run updates manually (using the web interface or the CLI) or stay up to date using Git commands. Both procedures are described in this section.

Either way, before you start, make sure you put Moodle in maintenance mode to ensure that no other user is logged in during the update. Go to Server | Maintenance mode, Enable the Maintenance mode, and enter a maintenance message:

```
We are currently updating your Moodle server. The system will be back online Tuesday, June 10th, 2014.
We apologize for any inconvenience caused.
Your Moodle team.
```
You can also put Moodle in maintenance mode using its CLI as follows:

```
sudo -u www-data /usr/bin/php admin/cli/maintenance.php --enable
```

Using the `--enablelater=MINUTES` flag you can specify the time period before entering CLI maintenance mode. This is useful when you run an automatic update.

To change back to normal mode, use the `--disable` parameter instead of `--enable` as follows:

```
sudo -u www-data /usr/bin/php admin/cli/maintenance.php --disable
```

**Manual update**

The high-level process for updating a Moodle system manually is as follows:

1. Creating a backup.
2. Creating a new Moodle system.
3. Installing the update.

If you are updating from a previous version of Moodle, the process is the same. However, double-check the Upgrading document at [https://docs.moodle.org/en/Upgrading](https://docs.moodle.org/en/Upgrading) for any version-specific issues.

![You have to be at least on version 2.2 to update directly to the current version of Moodle.](image)

If you are still on version 1.9 or on a dinosaur release that is even older, you will need to get to version 2.0 first, before upgrading to 2.2, and then to the latest version.

![Upgrading Moodle 1.x to Moodle 3 is a big version jump that has some serious implications. For example, some theme elements will have to be recreated, custom code will need adjusting and, most importantly, your support and faculty staff is likely to require training before the new version is put in production.](image)

Moving from Moodle 1.x to Moodle 3 is more a migration from one system to another than an update. Setting up a separate test system to test the migration process has proven valuable. You will have to plan and have a budget for this.
Creating a backup

Before you install a new update, it is highly recommended that you run a backup of your Moodle system. While most updates will run smoothly, the backup will be required if you have to revert the system to the pre-update version. There are three parts that have to be backed up:

- **Database**: There are two ways you can create a so-called database dump from a MySQL database, either via command line or via Moodle's optional database interface.
  
The simplest syntax for the command line tool is:
  
  ```
  mysqldump -u <user> -p <database> > backup.sql
  ```
  
  To restore the database you need to use the `mysql` command line tool as follows:
  
  ```
  mysql -u <user> -p <database> < backup.sql
  ```
  
The interface for the database tool is accessed via Server | **Moodle Adminer**. This is an optional module and has to be installed separately refer to Chapter 8, **Moodle Plugins**, for more details.
  
  Click on the **Dump** link on the front page, select the database to export, and click on **Export**, as shown in the following screenshot. The output of the command will be displayed on screen.

  ![Moodle Adminer screenshot]

- **Data directory**: This is the **moodledata** directory. Create a copy of this elsewhere on the server (using `cp -R`) or create an archive using the `tar` command (`tar -cvf moodledata`).

---

[28]
• **Moodle:** This is the Moodle software itself. Create a copy of the directory elsewhere on the server. While only some parts of this backup are required (config.php, added themes, modified language packs, and so on), it is good practice to create a backup of the entire software. Finally, rename your Moodle system from moodle to, say, moodle.old (mv moodle moodle.old).

For more information on backups, check out Chapter 13, Backup and Restore.

**Creating your new Moodle system**

Once you have created a backup, it is time to download the new version of Moodle. This is done in the same way as described earlier, during the installation process.

First, create a new moodle directory (dirroot) and copy the new version to that location (using the same unzip or tar command as during the installation). Also make sure the permissions as well as user and group are correct.

Now, copy the following files and directories from your moodle.old directory to your new dirroot. The existing files and directories will have to be overwritten:

- config.php
- .htaccess (only if present)
- Any theme folders that have been created
- Any modified language packs
- The content of the local directory
- Any third-party modules and custom code that is not located in local

That's it! The next time you start Moodle, the update script will kick in. We'll go through that next.

Once you are more confident with the update process, you can copy the new version straight on top of the current version after you have created backups. This will save you the last steps of manually copying files from the old to the new versions.
Running the update script

Once you go to the location of your Moodle site and log in as administrator, the system will recognize that a new version is available and kick off the installer automatically.

The first screen displays the build of the new version (here, 3.0) and asks you to confirm that you wish to go ahead with the upgrade:

Your Moodle files have been changed, and you are about to automatically upgrade your server to this version:

3.0 (Build: 20151116) (2015111600.00)

Once you do this you can not go back again. Please note that this process can take a long time.

Are you sure you want to upgrade this server to this version?

Next, a screen is displayed that provides a link to the release notes and performs the same server check as the one described during the installation.

Moodle plugins, whether core (Standard) or third-party (Additional), sometimes cause problems when upgrading Moodle. The Status column highlights any actions required or problems found. You should resolve any issues that have arisen. Refer to Chapter 8, Moodle Plugins, for more details.
Once this screen has been confirmed, the actual installation starts, during which new database fields are created and data is modified if and when necessary. Any new system settings that have been added to Moodle are shown and can be changed straightaway. For example, in the following screenshot, a new **Always send email from the no-reply address** parameter has been added:

<table>
<thead>
<tr>
<th>Always send email from the no-reply address?</th>
<th>Default: No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled, all email will be sent using the no-reply address as the “from” address. This can be used to stop anti-spoofoilng controls in external mail systems blocking emails.</td>
<td></td>
</tr>
</tbody>
</table>

Once the upgrade process has been completed, make sure you check the **Notifications** page as earlier. Also, don’t forget to turn off the **Maintenance mode**!

### Updating Moodle via CLI

As you would expect, Moodle updates can also be run using the already-discussed CLI. Once you have backed up your data and updated to the latest version, all you need to do is run the following script:

```
sudo -u www-data /usr/bin/php admin/cli/upgrade.php --non-interactive
```

Updating Moodle via CLI is even more powerful when combined with the Git checkout of the Moodle source code. That is what we look at next.

An alternative approach exists to keep a current version up-to-date. It uses an open source versioning system which is supported by Moodle, namely Git. All checked-in Moodle code is made available via this method, which allows you to update only the modules that have actually changed.
Setting up Git is a cumbersome process, which is beyond the scope of this book. You can find details at https://docs.moodle.org/en/Git_for_Administrators. However, once set up, Git is a very streamlined system to use, particularly, in conjunction with the CLI we discussed earlier. The following is a sample script which gets the latest version of the source code, puts Moodle in maintenance mode, merges the old code with the new, runs the upgrade script, and disables the maintenance mode:

```bash
git fetch
sudo -u www-data /usr/bin/php admin/cli/maintenance.php --enable
git merge origin/cvshead
sudo -u www-data/usr/bin/php admin/cli/upgrade.php
sudo -u www-data/usr/bin/php admin/cli/maintenance.php --disable
```

If you have changed any core code, potential conflicts might arise and will have to be resolved (Git will prompt you to do so).

You might also come across some conflicting advice on whether to use Git for production sites or not. The advantage is that your system is always up to date and that the updates are carried out automatically. The disadvantage is that the update process might require intervention to resolve any conflicts or it might fail, especially when a lot of third-party add-ons have been employed.
Chapter 1

Update notifications

Moodle can notify you about a newly available version. In order to support this feature, you will need to change the **Enable updates deployment** settings in Server | **Update notifications** as follows:

![Update notifications]

Once this has been changed, you will be notified of any updates (system as well as plugins), and options will be shown in **Notifications**:

![There is a newer Moodle version available!]

Last check done on 26 December 2015, 7:00 AM
Summary
In this chapter, you learned how to install Moodle on the most popular operating systems and upgrade the LMS. You also learned how to use the powerful command-line interface.

The fact that Moodle uses a portable software architecture and facilitates standard open source components allows the installation on multiple platforms. However, this also means that different idiosyncrasies have to be considered in different environments.

Now that your system is up and running, let's have a look at the components of Moodle, which will provide you with a better understanding of the system and how to administer it.
Where to buy this book
You can buy Moodle 3 Administration Third Edition from the Packt Publishing website.
Alternatively, you can buy the book from Amazon, BN.com, Computer Manuals and most internet book retailers.
Click here for ordering and shipping details.