Netforum Architectural Overview

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General

Netforum is a module developed for the Moodle e-learning platform. The module enables a layered discussion where one entry can reference many other entries, thus forming a mesh of connected topics. To help visualize and highlight the most significant contributions, entries are presented as a weighted subject cloud and, if enabled, a node graph. Many instances of the Netforum module can exist on the same Moodle installation, either inside or outside of Moodle course instances.

The Netforum module was developed by Mikko Johansson, Juho Kilpikoski, Tevje Olin, Max Pagels and Aleksi Toivanen as part of the course *Software Engineering Project* (University of Helsinki, Computer Science department, summer 2009).

Requirements

Generally speaking, a functional installation of the Netforum Moodle module has the same requirements as a Moodle 1.9.5 installation. The full requirements for this Moodle installation can be found on the Moodle website (http://www.moodle.org). Some of the most significant requirements include PHP 4.3.0, MySQL 4.1.16 or Postgres 8.0 or MSSQL 9.0 or Oracle 9.0. Testing of the Netforum module was done using MySQL as a database backend.

In addition to Moodle's own requirements, the advanced graphing feature of Netforum requires the Graphviz tools dot, neato, fdp, circo and twopi, each in the same location (directory). Without these tools, the Netforum will still work, albeit minus the graphing functionality. The latest set of Graphviz tools can be downloaded from http://www.graphviz.org.

It is recommended to use either Internet Explorer 7 or Firefox 3 (or higher) when using the Netforum module, as these browsers fully support easy text formatting using the built-in Moodle WYSIWYG editor.

Simplified Architectural Overview

In a working installation, the Netforum module resides in the Moodle module directory, from where it communicates with Moodle PHP functions according to Moodle guidelines. Database manipulation is achieved via Moodle helper functions to ensure support for different Relational Database Management Systems (RDBMS). However, in some cases queries are executed directly on the underlying database using the SQL query language - in these cases, the SQL used has been checked to conform with the SQL standard.
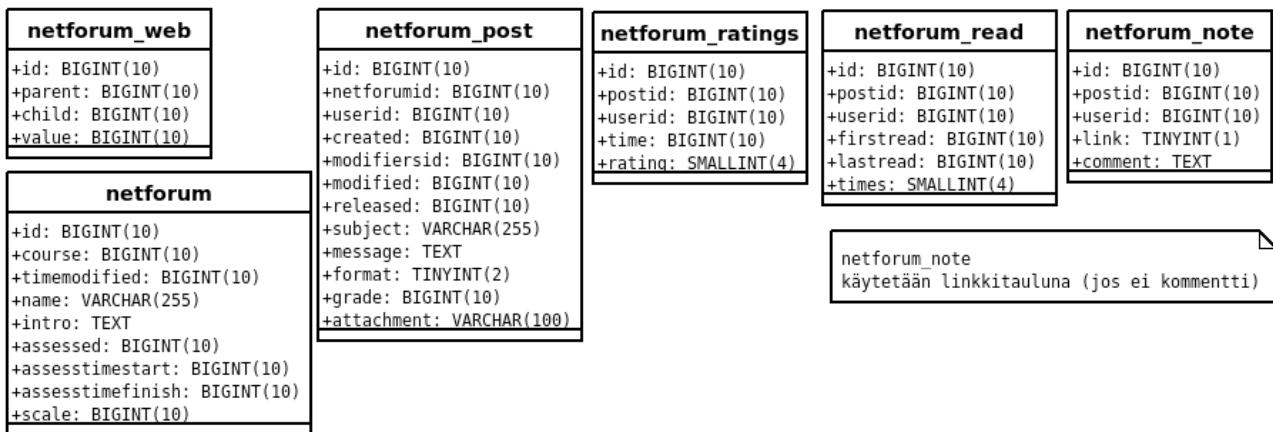
Generally speaking, the codebase of the Netforum module is divided into PHP files, each providing application logic for a specific portion of the Netforum feature set. Below is a comprehensive list of the PHP files used in the Netforum module, along with a brief description of what function they perform.

- **db/access.php** - contains a list of Netforum capabilities for each level of Moodle user
- **db/upgrade.php** - an essentially empty required file for updating older versions of the module
- **index.php** - provides a list view of all the Netforum instances used in a particular course
- **lib.php** - a large library of helper functions, including a host of functions required by Moodle.
- **list.php** - provides a sortable list view of all the entries in a particular Netforum instance
- **managecitations.php** - provides the user with management options for deleting one or more collected citations
- **managedrafts.php** - provides the user with management options for deleting one or more entry drafts
- **managenotes.php** - provides the user with management options for deleting or editing one or more collected notes
- **mod_form.php** - contains logic for the form used when adding or editing a Netforum instance
- **neighbourgraph.php** - logic for the Netforum graphing functionality
- **note.php** - logic for displaying a user's notes for a particular entry
- **note_form.php** - contains logic for the form used when adding or editing a particular note
- **note_lib.php** - a library of helper functions for note functionality
- **post.php** - logic for displaying a particular entry
- **post_form.php** - contains logic for the form used when writing an entry
- **rate.php** - provides logic for rating entries and integration with the Moodle gradebook
- **settings.php** - general settings, including the location of the Graphviz tools
- **statistic.php** - provides teachers with a view detailing users and their contributions within a Netforum instance
- **styles.php** - custom CSS style declarations for the subject cloud
- **tabs.php** - logic for combining many of the Netforum features under an easy-to-use tabbed user interface
- **tagcloud.php** - logic for generating the subject cloud
- **version.php** - version information
- **view.php** - provides the default view for a Netforum instance

In addition to the aforementioned files, the lang/ directory includes English, Finnish and Swedish localization files.

Data Storage Overview

All data used by the Netforum module is stored persistantly in the underlying Moodle installation's database. In accordance with much of the default Moodle database architecture, the Netforum module uses a denormalized schema to store information, providing good query performance. The figure below details the schema.

netforum_web

+id: BIGINT(10)
+parent: BIGINT(10)
+child: BIGINT(10)
+value: BIGINT(10)

netforum

+id: BIGINT(10)
+course: BIGINT(10)
+timemodified: BIGINT(10)
+name: VARCHAR(255)
+intro: TEXT
+assessed: BIGINT(10)
+assesstimestart: BIGINT(10)
+assesstimefinish: BIGINT(10)
+scale: BIGINT(10)

netforum_post

+id: BIGINT(10)
+netforumid: BIGINT(10)
+userid: BIGINT(10)
+created: BIGINT(10)
+modifiersid: BIGINT(10)
+modified: BIGINT(10)
+released: BIGINT(10)
+subject: VARCHAR(255)
+message: TEXT
+format: TINYINT(2)
+grade: BIGINT(10)
+attachment: VARCHAR(100)

netforum_ratings

+id: BIGINT(10)
+postid: BIGINT(10)
+userid: BIGINT(10)
+time: BIGINT(10)
+rating: SMALLINT(4)

netforum_read

+id: BIGINT(10)
+postid: BIGINT(10)
+userid: BIGINT(10)
+firstread: BIGINT(10)
+lastread: BIGINT(10)
+times: SMALLINT(4)

netforum_note

+id: BIGINT(10)
+postid: BIGINT(10)
+userid: BIGINT(10)
+link: TINYINT(1)
+comment: TEXT

netforum_note
käytetään linkkitauluna (jos ei kommentti)

The described schema uses Moodle standard data types to describe information, and the schema is created using the XMLDB editor provided by the software. The schema information for the Netforum module is stored as an XML file named install.xml, located in the module's db subdirectory. The XML file is used as such to create the neccessary database tables upon installation.

Test Architecture

Testing of the Netforum module has been primarily performed using Selenium (http://seleniumhq.org), a web application testing system better suited for Moodle testing than conventional unit tests. The entire test suite is included in the module distributable as a collection of importable HTML files intended to be run after successful installation of the module. More information detailing the structure of the test cases can be found in the seperate test document, also located in the distributable.